

LIFE SCIENCES

# CATALOG GVS Life Sciences





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# GVS Life Sciences

**With over 30 years of experience GVS Group is one of the world's leading manufacturers of microfiltration devices with applications in the laboratory, medical and pharmaceutical markets.**

## **Medical Filters & Components**

The origins of GVS initially focused on medical filters for blood and IV solutions. Today GVS Life Sciences provides a wide range of innovative products including standard and custom devices for laboratory filtration, sample preparation, clarification or fine particulate removal for laboratory applications, protein and nucleic acid binding and analysis and biomarker research.

## **GVS Life Sciences offers a complete range of**

- MICROFILTRATION PRODUCTS, Syringe Filters, Vent Filters, Capsule Filters, Centrifugal Filters, Bottle Top, Filter Holders for Membranes, Filter Funnels
- MICROBIOLOGY, Microbiological Monitors, Analytical Monitors, Nutrient Liquid Media, Swab Kits, Dilution Bottles
- FILTRATION MEMBRANES , Membranes for Filtration (Discs, Sheets, Rolls), CA, NC, NY, PES, PP, PTFE, RC, PE, PVDF- hydrophilic, PCTE, PETE, Silver, Drain Discs, Filter Papers,Glass Fiber/Binder
- TRANSFER (blotting) MEMBRANES for nucleic acid and protein analysis
- FAST® microarray products for protein analysis
- CONTRACT DEVELOPMENT & PRODUCTION
- OEM MEMBRANES

## **Contract Development and Manufacturing**

Our expertise and capabilities combine to provide custom manufacturing and development services for your immunoassay products, lateral flow devices, cellular and medical tests. Products are offered in a variety of formats, from OEM components to complete test kits

## **International expansion**

GVS Group's presence in major markets across the world has led to the opening of 16 manufacturing plants located in - Italy (2), UK (5), Brazil (1), USA (4), China (3) and Romania (1), as well as offices in Italy, Germany, UK, Spain, Serbia, USA, México, Brazil, Argentina, China, Japan, Korea, India and Malaysia.

## **Sophisticated industrial Technology.**

GVS's highly innovative technical capabilities include filter material development, hydrophobic and hydrophilic technology, activated carbon filtration, filter surface coating technology, chemical / biological lab for test plastic filter and metal test and polymer development.

Production technologies include: Multi-cavity insert and over-molding, pleating, potting and low compression injection, high-speed automatic assembly, ultrasonic, heat and radio-frequency welding, laser cutting and welding and All in-Mold technology, a revolutionary manufacturing technology combining injection molding and robotic assembly all within the molding tool. All of the products are manufactured in a clean-room environment.

## **Commitment to Quality.**

GVS has obtained ISO 9001:2010 certification, and our Medical Division has qualified for ISO 13485: 2003 certification, plus several of our medical devices have been qualified for CE marking according to E.U. Directive 93/42/EEC. Recently, our Italian headquarters successfully achieved UNI EN ISO 14001:2004 certification for its Environmental Management System (EMS), marking a milestone in GVS Life Sciences's ongoing commitment to reduce its environmental footprint.

## **Research & Development.**

A great part of the know-how incorporated in GVS's products comes from its Research Lab, which ensures that the company's various divisions have access to innovative R&D. With its pioneering tools and facilities and highly sophisticated analytic techniques, this lab also works in close conjunction with a large number of hospitals and academic bodies of international acclaim, in Italy, in the UK and wherever GVS Life Sciences operates. Without it, the group's strongly innovation-oriented policy and commitment to growth would be much less effective.

## **Maine Manufacturing**

Maine Manufacturing LLC joined GVS Group in 2013, offering a full line of laboratory filtration and analysis products. GVS Life Sciences and Maine work together to provide an incomparable experience for customer in the analytical, chemistry and life science laboratories. Maine Manufacturing is a global supplier of membrane-based solutions for life science research. We offer a full line of research tools for filtration, protein and nucleic acid blotting and transfer. Maine Manufacturing also produces custom and OEM solutions for diagnostics, multiplexed immunoassays and sample preparation and analysis.



Your partner for practical laboratory solutions.

# MICROFILTRATION



# MICROFILTRATION

## 1. MICROFILTRATION FILTER DEVICES

### INTRODUCTION

GVS Life Sciences offers a comprehensive range of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with a wide variety of membrane filters. These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage, and agricultural testing laboratories.



### 1.1 Syringe-Filters

GVS Life Sciences offer a full range of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions, aerosol separation and venting.

These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage, and agricultural testing laboratories.

- Polypropylene or Acrylic housing
- Multifunctional connectors - equipped with luer-lock or luer-slip female connections
- Sterile or non-sterile options
- Available in bulk-packages or individual blisters
- Customized product and packaging on request

### Filtration Membrane Types

Microporous membranes are commonly used in filtration devices for sample preparation, purification and sterilization. The most common membrane types are described here with physical properties and applications.

#### Cellulose Acetate (CA)

Hydrophilic membrane. Low protein binding, Ideal for protein, cell culture media and enzymes filtrations, tissue culture media sterilization, biological fluid filtration and other filtration applications where maximum recovery of proteins is critical.

#### Features and Benefits

- Low protein binding,  $3.8 \mu\text{g}/\text{cm}^2$
- Hydrophilic
- High throughput
- Superior strength and stability
- Uniform pore structure, consistent flow rates
- Burst strength of 130 psi

#### Applications

- Protein and enzyme filtration
- Biological fluid filtration sterilization
- Tissue culture media sterilization
- Clarification of aqueous and alcohol solutions
- Cell Culture

**Detailed Application:** Biological sample preparation; Very low protein retention: protein and enzyme filtration with very low protein retention. Filtration of protein-containing solutions with minimal protein loss; Sterilization and clarification; Receptor binding studies; Tissue culture media sterilization; Particle removal of cellular constituents from solution: The  $0.22 \mu\text{m}$  membrane is the filter of choice for sterile filtration of aqueous solutions such as nutrient media, buffers and sera; The  $0.45 \mu\text{m}$  membrane is a very convenient filter type for the reduction of particles and microorganisms in aqueous solutions such as nutrient media, buffers and sera. Enhanced recovery of fastidious gram positive organisms. The  $0.8$  and  $1.2 \mu\text{m}$  membranes are used for the particle filtration in samples where a low adsorption is required. The  $5.0 \mu\text{m}$  membrane is used for the coarse particle filtration in samples where a low adsorption is required.

# 1.1 Syringe-Filters

## Nylon (NY)

Hydrophilic membrane. Ideal for use in general filtration or medical assays. Superior strength, resistant to a range of organic solvents. Low extractables. High protein binding capacity. Lot-to-lot consistency.

### Features and Benefits

- Naturally hydrophilic
- Wide chemical compatibility range
- Strength and dimensional stability
- Low extractables

**Detailed Application:** Ideally for use in general filtration and HPLC sample preparation of aqueous, solvent-based and organic solutions prior to chromatography or other instrument analyses; Excellent chemical compatibility with esters, bases, and alcohols; Biological sample preparation; High protein binding capacity: Immobilizes antigens, antibodies and other protein.

## Polyethersulfone (PES)

Hydrophilic membrane. designed to remove particulates during general filtration, low protein and drug binding characteristics make it ideally suited for use in life science applications. Its strength and durability are advantageous during usage that involves aggressive handling or automated equipment. Low protein and drug binding characteristics maximize recovery of critical drugs used in I.V. therapy, chemotherapy and open-heart surgery.

### Features and Benefits

- Very Low Protein Binding
- Fast Flow Rates
- Low Extractables
- Wide Chemical Compatibility Range
- Strength and Dimensional Stability
- Autoclavable

### Applications

- Sterilization, clarification of aqueous and organic solvent solutions
- HPLC sample preparation
- Chromatography
- Hydraulic Fluids and Machined Parts

**Detailed Application:** Ideally for use in life science applications. Preparation of aqueous, biological or protein based solutions prior to chromatography or other instrument analyses. Accurate results for the most sensitive analysis of ionic species. Specifically designed for IC applications. Low drug and protein binding for pharmaceutical filtration.

## Asymmetric Polyethersulfone (PES)

Asymmetric PES enables the fast filtration of aqueous solutions with greater throughput. The PES membrane has low drug and protein binding properties with aqueous solutions. Low ion and metals extractables provide for ideal analysis by ion chromatography and ICP MS. Asymmetric PES is provided both sterile and non-sterile.

### Features and Benefits

- Fast flow rate
- High filter capacity
- Low protein binding
- Extended filtration capacity and lifetime
- Higher particle loads and protein concentrations tolerance

### Applications

- Prefiltration and Clarification
- Liquid filtration and sterilization
- Ion chromatography
- Gas separation

## Nitrocellulose Mixed Esters (MCE)

Hydrophilic membrane. Aqueous clarification and particulate capture. Consistent high flow rate for faster filtration. Uniform pore structure for selectivity. Hydrophilic, inert cellulose nitrate. High binding capacity. Manufactured thickness within 10 microns.

### Features and Benefits

- Hydrophilic for aqueous clarification and particulate capture
- Consistent high flow rate for faster filtration
- Uniform pore structure for selectivity
- Hydrophilic, inert cellulose nitrate
- High binding capacity
- Manufactured thickness within 10 microns

### Applications

- Filtration of Aqueous and Organic Solutions
- Analytical Sample Prep, uHPLC
- Chromatography
- Clarification

**Detailed Application:** Used to clarify aqueous samples especially in water studies. Disposable syringe filters for wastewater, food and beverage filtration. Higher protein binding than cellulose acetate for most proteins. HCG; HIV; LH; Chlamydia. Drugs of Abuse Pathogenic Microorganisms, Environmental Contaminants.

# MICROFILTRATION

## Polyvinylidene Difluoride (PVDF)

Hydrophilic membrane. Ideal for use in Sterilizing and Clarifying filtration of biological solutions. High Flow Rates. Low Extractables. Broad Chemical Compatibility. Very low protein binding.

### Applications

- Filtration of Aqueous and Organic Solutions
- Analytical Sample Prep, uHPLC
- Chromatography
- Clarification

**Detailed Application:** Sterilizing and clarifying filtration of biological solutions. Preparation of protein-containing solutions prior to chromatography or other instrument analyses. Useful for a wide range of applications, including aggressive and non-aggressive solvent-based mobile phase. Offers excellent chemical compatibility, even with aggressive acids and alcohols. Provides high flow rates and throughput, low extractables and broad chemical compatibility. The 0.22  $\mu\text{m}$  pore size assures removal of the contaminant size most likely to plug a UHPLC column and offers significantly better protection of your analytical results.

## Polytetrafluoroethylene (PTFE)

Hydrophobic membrane. Ideal for filtration of strong acids and aggressive solutions, venting applications, phase separations, aerosol samplings. Chemically and biologically inert. Superior chemical resistance. Can withstand high temperatures.

### Features and Benefits

- Naturally hydrophobic
- Compatible with strong acids and aggressive solutions
- Improved durability and handling

### Applications

- Filtration of strong acids and aggressive solutions
- Venting applications
- Phase separations
- Aerosol sampling

**Detailed Application:** Preparation of organic solutions prior to chromatography or other instrument analyses. Exceptional chemical and temperature compatibility. Filtration of strong acids and aggressive solutions. Venting applications. Ideal for filtration of gas and/or HPLC organic solvents, aggressive solutions and small venting. Ultimate in chemical compatibility for filtering harsh chemicals that destroy other membrane materials. For solvents (acetone, dimethylformamide, DMSO...) or for aggressive aqueous liquids.

## Hydrophilic Polytetrafluoroethylene (PTFE 'HP')

PTFE HP membrane is compatible with organic solvents, acids, and basic solutions. Hydrophilic PTFE membrane has low drug and protein binding properties with excellent aqueous and solvent compatibility. High sample recoveries and low ion and UV extractables provide for ideal analysis by uHPLC and LC/ MS.

### Features and Benefits

- No need to pre-wet the membrane
- No need to flush membrane of pre-wetting chemicals
- No pre-wetting means production time reduction
- Reduce potential interference with biological processes
- Longer shelf life because the filters are stored and shipped dry

### Applications

- Molecular identification
- Structural determination
- Pharmacokinetics
- Drug discovery and development
- Drug testing
- Environmental monitoring
- Food safety monitoring
- Oil composition determination

**Detailed Application:** The PTFE HP has extremely low levels of extractables. PTFE HP syringe filters will not contribute extractables that will interfere with the ionization process. Excellent chemical resistance – Use this universal filter for all your uHPLC, Ion Chromatography and LCMS samples. The HydroPhilic PTFE membrane can be used with both organic and aqueous solvents. When used within a polypropylene housing, the membrane offers excellent chemical resistance.

## Glass Fiber (GF)

Hydrophilic material. Used also as a pre-filter to extend membrane life. Eliminate sample contamination. Excellent wet strength for each handling and filter integrity. Ideal for water/air pollution analysis, liquid clarification and cell harvesting.

### Features and Benefits

- Acrylic binder
- High dirt holding capacity
- Biologically inert
- Bonding reduces media migration

### Applications

- Filtration of Aqueous and Organic Solutions
- Analytical Sample Prep, uHPLC
- Difficult to Filter Solutions
- Fuel Hydraulic Fluids and Machined Parts

## Regenerated Cellulose (RC)

Hydrophilic membrane. Resistant to a very wide range of solvents. Suitable for use with either aqueous solutions or organic solvents. Compatible with HPLC solvents. Very low protein binding capacity and hence excellent for protein recovery applications.

### Applications

- Filtration of Aqueous and Organic Solutions
- Analytical Sample Prep, uHPLC

### Applications

- Chromatography
- Clarification
- Protein Chemistry

**Detailed Application:** Extremely versatile can be used with almost any laboratory procedure. Hydrophilic, solvent-resistant membrane. Extremely chemically resistant : suitable for use with aqueous solutions and resistant to a very wide range of solvents. Compatible with HPLC solvents: for simple, rapid and reliable ultra cleaning of samples for the HPLC or GC analysis. Chemically resistant with both aqueous and organic samples. Very low binding coefficient.

## **1.1 Syringe-Filters**

### **Polyethylene (PE)**

An "Universal" Filter for all analytical filtration requirements. For aqueous and aggressive organic solvent filtration. Highly recommended for filtering HPLC samples: HPLC sample preparation requiring low detection levels. Wide application in sample preparation. Ion chromatography.

### **Polypropylene (PP)**

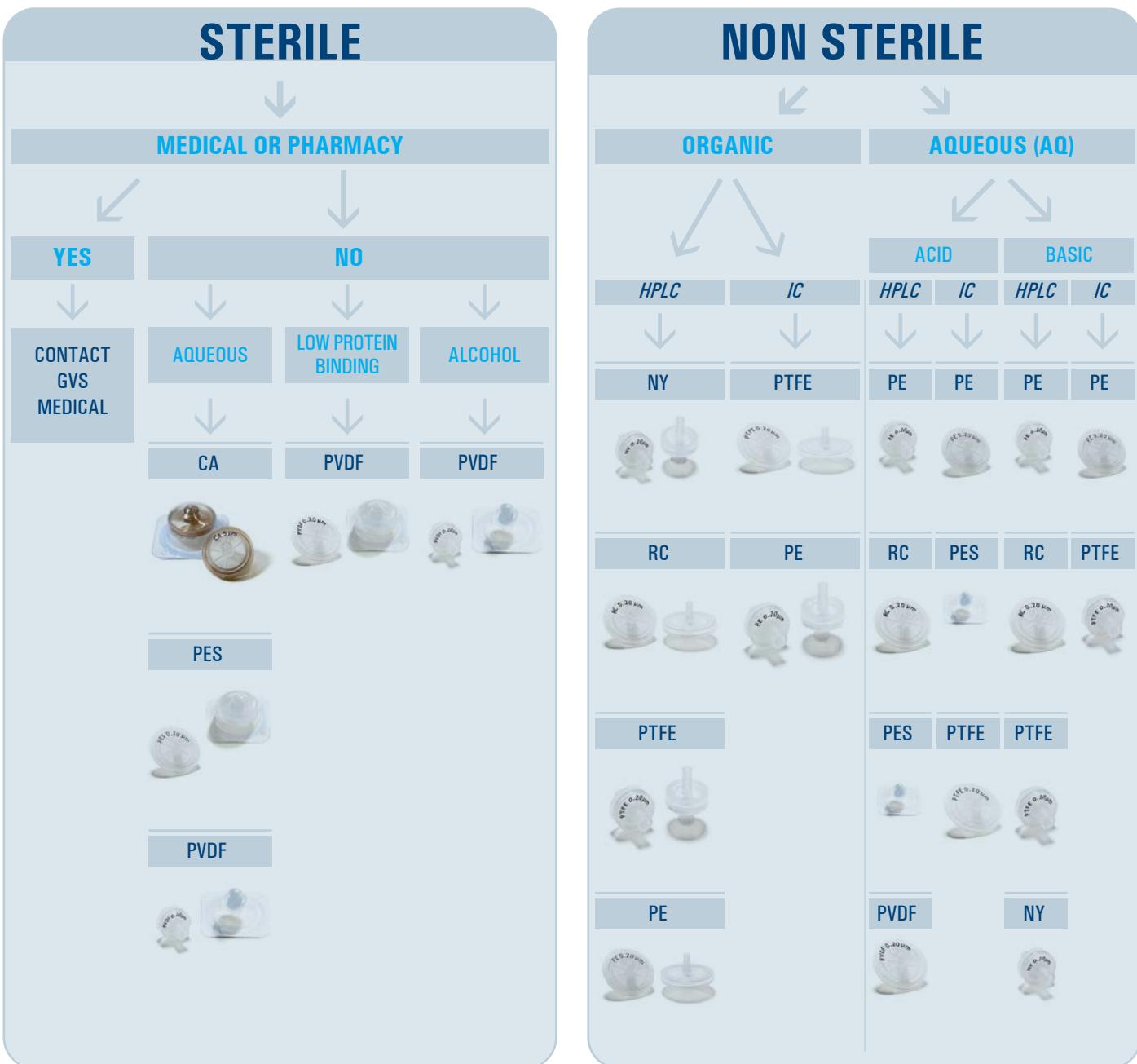
GVS Life Sciences polypropylene membrane filters are composed of pure polypropylene with absolute pore size ratings. These filters offer broad chemical compatibility allowing its use with aqueous and organic solvents samples. The polypropylene filter has extremely low extractable levels designed to provide accurate, consistent analysis results for sensitive ion chromatography applications while prolonging column life.

#### **Applications**

- Aqueous and organic solvent filtration
- HPLC sample preparation requiring low detection levels
- Ion chromatography
- Total digest for heavy metals

# MICROFILTRATION

## Quick application guide



# 1.1 Syringe-Filters

## 1.1.1 - 13 mm Syringe Filters ABLUO™



### Features and Benefits

Housing Material: Acrylic and Polypropylene

Membrane Material: Cellulose Acetate, Nylon, PES, Nitrocellulose Mixed Esters, Regenerated Cellulose, PVDF, PTFE and PE

Membrane Diameter: 13 mm

Housing Diameter: 18 mm

Effective Filtration Area: 0.6 cm<sup>2</sup>

Pressure Bar: 5

Sterile: No

Inlet / outlet: FLL/MLL-MLS

### Applications

- Filtration of Aqueous, Organic and Alcohol Solutions
- Analytical Sample Prep, uHPLC
- IC Chromatography
- Fuel Hydraulic Fluids and Machined Parts
- Clarification
- Protein Chemistry
- Cell Culture

### Specification

- Quick and efficient filtration of samples and all kind of solutions, solvents or gases
- Housing injected in Polypropylene or Acrylic
- Multifunctional Syringe Filters: equipped with luer-lock or luer-slip male connections for different applications
- Sterilized or non-sterile
- Available in bulk-packages or individual blisters
- Customized product and packaging on request

### Ordering information

Membrane Material	Pore Size (μm)	Housing Material	Color	Product Code
				Packaging 500/pk
Cellulose Acetate (CA)	0.22	Acrylic	Blue	FJ13ANCCA002DD01
Cellulose Acetate (CA)	0.45	Acrylic	Yellow	FJ13ANCCA004FD01
Cellulose Acetate (CA)	0.80	Acrylic	Green	FJ13ANCCA008ED01
Cellulose Acetate (CA)	1.20	Acrylic	Red	FJ13ANCCA012CD01
Cellulose Acetate (CA)	5.0	Acrylic	Brown	FJ13ANCCA050PD01
Nylon (NY)	0.20	Polypropylene	Transparent	FJ13BNPNY002AD01
Nylon (NY)	0.45	Polypropylene	Transparent	FJ13BNPNY004AD01
Polyethersulfone (PES)	0.22	Polypropylene	Transparent	FJ13BNPPS002AD01
Polyethersulfone (PES)	0.45	Polypropylene	Transparent	FJ13BNPPS004AD01
Nitrocellulose Mixed Esters (MCE)	0.22	Acrylic	Transparent	FJ13BNCNC002AD01
Nitrocellulose Mixed Esters (MCE)	0.45	Acrylic	Transparent	FJ13BNCNC004AD01
Regenerated Cellulose (RC)	0.20	Polypropylene	Transparent	FJ13BNPRC002AD01
Regenerated Cellulose (RC)	0.45	Polypropylene	Transparent	FJ13BNPRC004AD01
Polyvinylidene Fluoride (PVDF)	0.22	Polypropylene	Transparent	FJ13BNPPV002AD01
Polyvinylidene Fluoride (PVDF)	0.45	Polypropylene	Transparent	FJ13BNPPV004AD01
Polytetrafluoroethylene (PTFE)	0.20	Polypropylene	Transparent	FJ13BNPPT002AD01
Polytetrafluoroethylene (PTFE)	0.45	Polypropylene	Transparent	FJ13BNPPT004AD01
Polytetrafluoroethylene Hydrophilic (PTFE HP)	0.22	Polypropylene	Transparent	FJ13BNPPH002AD01
Polyethylene (PE)	0.20	Polypropylene	Transparent	FJ13BNPPE002AD01
Polyethylene (PE)	0.50	Polypropylene	Transparent	FJ13BNPPE005AD01

# MICROFILTRATION

13 mm Syringe Filters - Sterile ABLUO™



## Features and Benefits

Housing Material: Acrylic  
Membrane Material: Cellulose Acetate, PES and PVDF  
Membrane Diameter: 13 mm  
Housing Diameter: 18 mm  
Effective Filtration Area: 0.6 cm<sup>2</sup>  
Pressure Bar: 5  
Sterile: Yes  
Inlet / outlet: FLL/MLL-MLS

## Applications

- Filtration of Aqueous Solutions
- Analytical Sample Prep, uHPLC
- IC Chromatography
- Sterile Filtration and Clarification
- Protein Chemistry
- Cell Culture
- Clarification

## Ordering information

Membrane Material	Pore Size (μm)	Color	Product Code
			Packaging 50/pk
Cellulose Acetate (CA)	0.22	Blue	FJ13ASCCA002DL01
Cellulose Acetate (CA)	0.45	Yellow	FJ13ASCCA004FL01
Cellulose Acetate (CA)	0.80	Green	FJ13ASCCA008EL01
Cellulose Acetate (CA)	1.20	Red	FJ13ASCCA012CL01
Cellulose Acetate (CA)	5.0	Brown	FJ13ASCCA05OPL01
Polyethersulfone (PES)	0.22	Transparent	FJ13BSCPS002AL01
Polyethersulfone (PES)	0.45	Transparent	FJ13BSCPS004AL01
Polyvinylidene Fluoride (PVDF)	0.22	Transparent	FJ13BSCPV002AL01
Polyvinylidene Fluoride (PVDF)	0.45	Transparent	FJ13BSCPV004AL01

# 1.1 Syringe-Filters

## 1.1.2 - 17 mm Syringe Filters CAMEO™



### Description and Use

GVS Life Sciences offers a comprehensive range of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with a wide variety of membrane filters with a polypropylene housing. These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food/ beverage, and agricultural testing laboratories.

### Features and Benefits

**Housing:** Heat-sealed pure polypropylene without the use of glues or sealants  
**Media:** Nylon, PTFE, PES, PVDF, glass fiber, cellulose acetate and polypropylene  
**Autoclavable:** Yes  
**Prefilter:** 1.0 micron binderless glass-fiber  
**Filtration area:** 1.4 cm<sup>2</sup>  
**Housing diameter:** 22mm  
**Membrane diameter:** 17mm  
**Holdup volume:** < 15 microliter

### Ordering information

Media	Pore Size (μm)	Product Code				
		Packaging 50/pk	Packaging 200/pk	Packaging 500/pk	Packaging 1000/pk	Packaging 5000/pk
Cellulose Acetate (CA)	0.22	1225617	1225618	1225619	1233871	
Cellulose Acetate (CA)	0.45	1225620	1225622	1225623	1233882	
Nylon (NY)	0.22	1224746	1224747	1224748	1229460	1224749
Nylon (NY)	0.45	1224753	1224754	1224755	1229462	1224756
Nylon (NY)	1.2	1224760	1224761			
Nylon (NY)	5.0	1224763	1224764	1224765	1229464	
Polyethersulfone (PES)	0.22	1233547			1233544	3049950
Polyethersulfone (PES)	0.45	1233548			1233545	3019423
Polypropylene (PP)	0.22	1224808	1224809	1224810	1229452	1225602
Polypropylene (PP)	0.45	1224811	1224812	1224813	1229454	1225607
Polytetrafluoroethylene (PTFE)	0.22	1224780	1224781	1224782	1229447	1224783
Polytetrafluoroethylene (PTFE)	0.45	1224787	1224788	1224789	1229449	1224790
Polyvinylidene Fluoride (PVDF)	0.22				3049952	
Polyvinylidene Fluoride (PVDF)	0.45	3023135		3023188	3023187	
Glass Fiber/Nylon (GF/NY)	0.22	1224766	1224767	1224768	1229477	1224769
Glass Fiber/Nylon (GF/NY)	0.45	1224773	1224774	1224775	1229479	1224776
Glass Fiber/Polypropylene (GF/PP)	0.22	1224814	1224815		1229473	
Glass Fiber/Polypropylene (GF/PP)	0.45	1224817	1224818	1229481	1229475	
Glass Fiber/PTFE	0.22	1224794	1224795	1224796	1229469	1224797
Glass Fiber/PTFE	0.45	1224801	1224802	1224803	1229471	1224804

**Sample volume:** < 12 mL without prefilter; < 18 mL with prefilter  
**Operating parameters:** Maximum Operating Temperature 82°C/180°F, Maximum Operating Pressure 130psi  
**Inlet / outlet:** FLL-MLS

### Applications

- HPLC sample preparation
- Dissolution testing
- Content uniformity
- Environmental samples
- Composite assays
- Food analysis
- Biofuel analysis

### Specification

- Increased throughput and speed of sample preparation
- Lower hold-up volume due to an improved flow channel design and reduced spacing between the supports within the housing for better handling of small sample volumes or costly samples.
- Increases operating pressure up to 130 psi due to the overmold that prevents sample leaking at the seam and keeps the filter unit from bursting in half.
- Strict quality control: syringe filters are integrity-tested to ensure a proper filter fit and weld to eliminate any potential filter by-pass
- Accurate labeling: each filter is labeled with the specific filter material and pore size for easy identification even if the syringe filter is not in its original packaging

# MICROFILTRATION

## 1.1.3 - 25 mm Syringe Filters ABLUO™



### Features and Benefits

Housing materials: Acrylic and Polypropylene

Membrane materials: Cellulose Acetate, Nylon, PTFE, PES, PVDF, Regenerated Cellulose, Nitrocellulose, Polyethylene, Glass Fiber

Membrane Diameter: 25 mm

Pore Size: 0.20 µm, 0.22 µm, 0.45 µm, 0.80 µm, 1.20 µm, 5.0 µm and others.

Housing Diameter: 33 mm

Effective Filtration Area: 4.6 cm<sup>2</sup>

Pressure Bar: 5

Sterile: No

Inlet / outlet: FLL/MLL-MLS

### Applications

- HPLC sample preparation
- Biological fluids
- Buffer solutions
- Sterile filtering of tissue culture media
- Protein aqueous solutions

### Specification

- Increased throughput and speed of sample preparation.
- Lower hold-up volume due to an improved flow channel design and reduced spacing between the supports within the housing for better handling of small sample volumes or costly samples.
- Increased operating pressure up to 75 psi due to the over-mold that prevents sample leaking at the seam and keeps the filter unit from bursting in half.
- Strict quality control: Syringe filters are integrity tested to ensure a proper filter fit and weld to eliminate any potential filter by-pass.
- Accurate labeling: Each filter is labeled with the specific filter material and pore size for easy identification even if the syringe filter is not in its original packaging.
- Modified acrylic housing to bidirectionally support the membrane allowing sample injection or aspiration.

### Ordering information

Membrane Material	Pore Size (µm)	Housing Material	Color	Product Code
				Packaging 500/pk
Cellulose Acetate (CA)	0.22	Acrylic	Blue	FJ25ANCCA002D D01
Cellulose Acetate (CA)	0.45	Acrylic	Yellow	FJ25ANCCA004FD01
Cellulose Acetate (CA)	0.80	Acrylic	Green	FJ25ANCCA008ED01
Cellulose Acetate (CA)	1.20	Acrylic	Red	FJ25ANCCA012CD01
Cellulose Acetate (CA)	5.0	Acrylic	Brown	FJ25ANCCA050PD01
Nylon (NY)	0.20	Polypropylene	Transparent	FJ25BNPNY002AD01
Nylon (NY)	0.45	Polypropylene	Transparent	FJ25BNPNY004AD01
Polyethersulfone (PES)	0.22	Polypropylene	Transparent	FJ25BNPPS002AD01
Polyethersulfone (PES)	0.45	Polypropylene	Transparent	FJ25BNPPS004AD01
Polyethersulfone Asymmetric (PES)	0.22	Polypropylene	Transparent	FJ25BNPPX002AD01
Nitrocellulose Mixed Esters (MCE)	0.22	Acrylic	Transparent	FJ25BNCNC002AD01
Nitrocellulose Mixed Esters (MCE)	0.45	Acrylic	Transparent	FJ25BNCNC004AD01
Regenerated Cellulose (RC)	0.20	Polypropylene	Transparent	FJ25BNPRC002AD01
Regenerated Cellulose (RC)	0.45	Polypropylene	Transparent	FJ25BNPRC004AD01
Polyvinylidene Fluoride (PVDF)	0.22	Polypropylene	Transparent	FJ25BNPPV002AD01
Polyvinylidene Fluoride (PVDF)	0.45	Polypropylene	Transparent	FJ25BNPPV004AD01
Polytetrafluoroethylene (PTFE)	0.20	Polypropylene	Transparent	FJ25BNPPT002AD01
Polytetrafluoroethylene (PTFE)	0.45	Polypropylene	Transparent	FJ25BNPPT004AD01
Polytetrafluoroethylene Hydrophilic (PTFE HP)	0.22	Polypropylene	Transparent	FJ25BNPPH002AD01
Polyethylene (PE)	0.20	Polypropylene	Transparent	FJ25BNPPE002AD01
Polyethylene (PE)	0.50	Polypropylene	Transparent	FJ25BNPPE005AD01

## 1.1 Syringe-Filters

Membrane Material	Pore Size ( $\mu\text{m}$ )	Housing Material	Color	Product Code
				Packaging 50/pk
Glass Fiber (GF)	1.00	Polypropylene	Transparent	FJ25BNPGF010AD01
Glass Fiber (GF)	1.20	Polypropylene	Transparent	FJ25BNPGF012AD01
Glass Fiber (GF)	3.10	Polypropylene	Transparent	FJ25BNPGF031AD01
Glass Fiber / Cellulose Acetate (GF/CA)	GF 1.00 + CA 0.45	Polypropylene	Transparent	FJ25BNPGA004AD01
Glass Fiber / Nylon (GF/NY)	GF 1.00 + NY 0.45	Polypropylene	Transparent	FJ25BNPGN004AD01
Glass Fiber / Polytetrafluoroethylene (GF/ PTFE)	GF 1.00 + PTFE 0.45	Polypropylene	Transparent	FJ25BNPGT004AD01
Glass Fiber / Polyethylene (GF / PE)	GF 1.00 + PE 0.45	Polypropylene	Transparent	FJ25BNPGE005AD01

### 25 mm Syringe Filters - Sterile ABLUO™



#### Features and Benefits

**Housing Material:** Acrylic  
**Membrane Material:** Cellulose Acetate, Polyethersulfone, Polyvinylidene Fluoride  
**Membrane Diameter (mm):** 25  
**Housing Diameter (mm):** 33  
**Effective Filtration Area:** 4.6 cm<sup>2</sup>  
**Sterile:** Yes  
**Inlet / outlet:** FLL/MLL-MLS

#### Applications

- Filtration of Aqueous and Alcohol Solutions
- Sterile Filtration and Clarification
- Cell Culture
- Analytical Sample Prep, uHPLC
- IC Chromatography
- Clarification
- Protein Chemistry
- Filtration of Aqueous and Organic Solutions

### Ordering information

Membrane Material	Pore Size ( $\mu\text{m}$ )	Color	Product Code
			Packaging 50/pk
Cellulose Acetate (CA)	0.22	Blue	FJ25ASCCA002DL01
Cellulose Acetate (CA)	0.45	Yellow	FJ25ASCCA004FL01
Cellulose Acetate (CA)	0.80	Green	FJ25ASCCA008EL01
Cellulose Acetate (CA)	1.20	Red	FJ25ASCCA012CL01
Cellulose Acetate (CA)	5.0	Brown	FJ25ASCCA05OPL01
Polyethersulfone (PES)	0.22	Transparent	FJ25BSCPS002AL01
Polyethersulfone (PES)	0.45	Transparent	FJ25BSCPS004AL01
Polyvinylidene Fluoride (PVDF)	0.22	Transparent	FJ25BSCPV002AL01
Polyvinylidene Fluoride (PVDF)	0.45	Transparent	FJ25BSCPV004AL01

# MICROFILTRATION

## 25mm Syringe Filters- Sterile CAMEO™

**cameo**



### Description and Use

GVS Life Sciences offers a comprehensive range of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions. They are made with a wide variety of membrane filters. These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage, and agricultural testing laboratories.

### Features

**Housing:** Acrylic heat-sealed without the use of glues or sealants

**Media:** nylon, PES, glass fiber, and cellulose acetate

**Filtration area:** 4.1 cm<sup>2</sup>

**Autoclavable:** No

**Prefilter:** 1.0 micron binderless fiberglass

**Sterile:** Gamma irradiated

**Housing diameter:** 29mm

**Membrane diameter:** 25mm

**Holdup volume:** < 60 microliter

**Sample volume:** < 100 mL without prefilter; < 150 mL with prefilter

**Operating parameters:** Maximum Operating Temperature 55°C/131°F, Maximum Operating Pressure 75psi (5.2 bar)

**Inlet / outlet:** FLL-MLS

### Benefits

- Increased throughput and speed of sample preparation
- Lower hold-up volume due to an improved flow channel design and reduced spacing between the supports within the housing for better handling of small sample volumes or costly samples.
- Increased operating pressure up to 75 psi due to the over-mold that prevents sample leaking at the seam and keeps the filter unit from bursting in half.
- Strict quality control: syringe filters are integrity-tested to ensure a proper filter fit and weld to eliminate any potential filter by-pass.
- Accurate labeling: Each filter is labeled with the specific filter material and pore size for easy identification even if the syringe filter is not in its original packaging.
- Modified acrylic housing to bidirectionally support the membrane allowing sample injection or aspiration.

### Applications

- HPLC
- Biological fluids
- Buffer solutions
- Sterile filtering of tissue culture media
- Proteinaceous solutions

### Ordering information

Media	Pore Size (μm)	Product Code			
		Packaging 50/pk	Packaging 200/pk	Packaging 500/pk	Packaging 1000/pk
Cellulose Acetate (CA)	0.22	1213657	1213678	1213667	1224304
Cellulose Acetate (CA)	0.45	1213723	1213739	1213731	1224305
Cellulose Acetate (CA)	0.8	1213758		1213767	1262953
Glass Fiber (GF)	1.00	1212701			
Nylon (NY)	0.1	1213699	1213702	1213701	
Nylon (NY)	0.22	1213708	1213711	1213709	1215268
Nylon (NY)	0.45	1213724	1213726	1213725	1221513
Nylon (NY)	1.2	1213737	1213740	1213738	1239715
Nylon (NY)	5.0	1213744	1213746	1213745	1239369
Nitrocellulose Mixed Ester (MCE)	0.22	1213785	1213806	1213795	1224307
Nitrocellulose Mixed Ester (MCE)	0.45	1213814	1213828	1213822	1224306
Polyethersulfone (PES)	0.22	1214220	1222370	1222369	1215295
Polyethersulfone (PES)	0.45	1215130	1222266	3012605	1223379
Polyethersulfone (PES)	0.8	1222374		1222375	
Glass Fiber / Cellulose Acetate	0.22	1214344	1214349	1214346	1221496
Glass Fiber / Cellulose Acetate	0.45	1214358	1214360	1214359	1215245
Glass Fiber / Cellulose Acetate	0.8	1212630	1213122	1222378	3038584
Glass Fiber / Polyethersulfone	0.22	1222388	1215190	1214904	1215294
Glass Fiber / Polyethersulfone	0.45	1215146			1224085
Glass Fiber / Polyethersulfone	0.8	1222395			

# 1.1 Syringe-Filters

## 1.1.4 - 30 mm Syringe Filters - CAMEO™



They are made with a wide variety of membrane filters with a polypropylene housing. These syringe filters are suitable for numerous applications in pharmaceutical, environmental, biotechnology, food/beverage, and agricultural testing laboratories.

### Features

**Housing:** Pure polypropylene is heat-sealed without the use of glues or sealants  
**Media:** Nylon, PTFE, PES, PVDF, glass fiber, cellulose acetate and polypropylene

**Autoclavable:** Yes

**Prefilter:** 1.0 micron binderless glass-fiber

**Filtration area:** 4.8 cm<sup>2</sup> (0.74 inch<sup>2</sup>)

**Housing diameter:** 33mm

**Membrane diameter:** 30mm

**Holdup volume:** < 60 microliter

**Sample volume:** < 120 mL without prefilter

**Inlet / outlet:** FLL-MLS

### Description and use

GVS Life Sciences offers a comprehensive range of disposable syringe filter devices designed to provide fast and efficient filtration of aqueous and organic solutions.



### Benefits

- Increased throughput and speed of sample preparation.
- Lower hold-up volume due to an improved flow channel design and reduced spacing between the supports within the housing for better handling of small sample volumes or costly samples.
- Increased operating pressure up to 130 psi due to the over-mold that prevents sample leaking at the seam and keeps the filter unit from bursting in half.
- Strict quality control: Syringe filters are integrity tested to ensure a proper filter fit and weld to eliminate any potential filter by-pass.
- Accurate labeling: Each filter is labeled with the specific filter material and pore size for easy identification even if the syringe filter is not in its original packaging.

### Applications

- HPLC sample preparation
- Dissolution testing
- Content uniformity
- Environmental samples
- Composite assays
- Food analysis
- Biofuel analysis

### Ordering information

Material w/o Pre-filter	Pore Size (μm)	Packaging 50/pk	Packaging 200/pk	Packaging 500/pk	Packaging 1000/pk	Packaging 5000/pk
Cellulose Acetate (CA)	0.22	1213641	1213192	1214014	1229443	1270152
Cellulose Acetate (CA)	0.45	1214778	1214932	1214966	1229444	1227275
Cellulose Acetate (CA)	0.8	1226939	1226941	1226940	1229445	
Cameo Glass Fiber (GF)	1.00	1227204		1227205	1229451	1226150
Cameo Glass Fiber (GF)	0.7	1227207			1227208	1227209
Nylon (NY)	0.1	1224100	1224101	1224103	1229459	
Nylon (NY)	0.22	1224104	1224105	1224106	1229461	1224110
Nylon (NY)	0.45	1224112	1224113	1224114	1226917	1224117
Nylon (NY)	1.2	1224119	1224120	1224121	1229463	
Nylon (NY)	5.0	1224124	1224125	1224126	1229465	3019424
Polyethersulfone (PES)	0.22	1233549			1233541	
Polyethersulfone (PES)	0.45	1233550		1233551	1233543	
Polypropylene (PP)	0.22	1224172	1224173	1224174	1229453	1237235
Polypropylene (PP)	0.45	1224310	1224311	1224312	1229458	
Polytetrafluoroethylene (PTFE)	0.22	1224143	1224144	1224145	1229448	1224146
Polytetrafluoroethylene (PTFE)	0.45	1224150	1224151	1237721	1229450	1224153
Polyvinylidene Fluoride (PVDF)	0.22	3038551			3038552	
Polyvinylidene Fluoride (PVDF)	0.45	3020528		3020351	3023084	3049953
Glass Fiber/Cellulose Acetate	0.22	1226942	1226944	1226943	1229466	3050049
Glass Fiber/Cellulose Acetate	0.45	1226945	1226947	1226946	1229467	1270153
Glass Fiber/Cellulose Acetate	0.8		1226951	1226950		
Glass Fiber/Nylon	0.1				1229480	
Glass Fiber/Nylon	0.22	1224127	1224128	1224129	1229478	1224133
Glass Fiber/Nylon	0.45	1224135	1224136	1224137	1226916	1224138
Glass Fiber/Polyethersulfone	0.45	3050121		3050122		
Glass Fiber/Polypropylene	0.22	1224175	1224176	1224177	1229474	
Glass Fiber/Polypropylene	0.45	1224313	1224314	1224315	1229476	
Glass Fiber/PTFE	0.22	1224157	1224158	1224159	1229470	1224160
Glass Fiber/PTFE	0.45	1224164	1224165	1224166	1229472	1224167

# MICROFILTRATION

## 1.2 Vent Filters

### 40 mm Bacterial and Viral Vent Filter



#### Membrane:

Glass Fiber

#### Retention:

99,999 % Bacterial and 99,9999 % Viral filtration efficiency of 0,027  $\mu\text{m}$  phage

#### Housing:

Polypropylene

#### Connectors:

6 to 8 mm stepped barb

#### Filter Area:

14,6  $\text{cm}^2$

#### Air Flow Rate:

21 L/min at 3 psi

#### Housing Diameter:

53 mm

#### Housing Length:

59 mm

#### Maximum Pressure:

2,7 bar (approx. 40 psi)

Autoclavable up to 10 times

#### Applications

- Sterile venting of filling vessels and carboys
- Autoclave venting
- Low volume sterile filtration of non-aqueous fluids
- In-line sterilization of and particulate removal from air and gases

**Box Dimension:** 29 x 38 x 30 cm - **Box Weight:** 1,58 Kg - **Quantity / Box:** 50 Units

#### Ordering information

Product Code	Description
VF40CBPGF000AL01	Vent filter Ø40mm AS connectors PP transparent membr. GF - 50 pieces
VF40CSPGF000AX01	Vent filter Ø40mm AS connectors PP transparent membr. GF - sterile 10 pieces

### 50 mm Vent Filter



#### Membrane:

hydrophobic PTFE reinforced with polypropylene

#### Porosities:

0,45  $\mu\text{m}$  or 0,20  $\mu\text{m}$

#### Housing:

Polypropylene

#### Connectors:

6 to 12 mm stepped barb

#### Filter Area:

19,6  $\text{cm}^2$

#### Air Flow Rate:

32 L/min at 1 bar (0,45  $\mu\text{m}$ )

27 L/min at 1 bar (0,20  $\mu\text{m}$ )

#### Housing Diameter:

63 mm

#### Housing Length:

53 mm

#### Maximum Pressure:

3,5 bar (approx. 50 psi)

#### Sterilization:

Autoclave at 121 C or ETO

Autoclave up to 10 times

#### Applications

- Sterile venting of filling vessels and carboys
- Autoclave venting
- Low volume sterile filtration of non-aqueous fluids
- In-line sterilization of and particulate removal from air and gases

**Box Dimension:** 30 x 30 x 35 cm - **Box Weight:** 3,6 Kg - **Quantity / Box:** 100 Units

30 x 8,5 x 14 cm

0,45 Kg

10 Units

#### Ordering information

Product Code	Description
VF50ANPPT002AC01	Vent filter Ø50mm barb connectors PP transparent membr. PTFE 0.20 $\mu\text{m}$ - 100 pieces
VF50ANPPT004AC01	Vent filter Ø50mm barb connectors PP transparent membr. PTFE 0.45 $\mu\text{m}$ - 100 pieces
VF50ASPPT002AX01	Vent filter Ø50mm barb connectors PP transparent membr. PTFE 0.20 $\mu\text{m}$ - sterile 10 pieces
VF50ASPPT004AX01	Vent filter Ø50mm barb connectors PP transparent membr. PTFE 0.45 $\mu\text{m}$ - sterile 10 pieces

# MICROFILTRATION

## 50 mm PTFE Vent Filter



**Membrane:** PTFE  
**Housing:** Polypropylene  
**Filter Area:** 1735 mm<sup>2</sup>  
**Air Flow Rate:** 27L and 32L /min@1bar  
**Outer Diameter:** 60mm  
**Overall Length:** 63mm  
**Operating Pressure:** 4 bar

### Premier Performance

- PTFE membrane and polypropylene housing have broad chemical resistance
- Large surface area provides greater throughput and high air flow rate
- Reusable and autoclavable
- Disposable
- Hose barb connection inlet /outlet (6-12mm)

### Description and Use

GVS Life Sciences 50 mm hydrophobic PTFE membrane filters are ideal for sterilizing gases, venting and degassing sterile containers, and sterilizing or clarifying organic solutions.

### Features & Benefits

- Hydrophobic
- Chemically Compatible
- Lot-to-lot Consistency

### Ordering information

Product Code	Description
95000	0.22um pore size, 50/pk
95001	0.45um pore size, 50/pk

### Applications

- Sterile venting of filling vessels and carboys
- Autoclave venting
- Low volume sterile filtration of non-aqueous fluids
- In-line sterilization of and particulate removal from air and gases

# MICROFILTRATION

## 1.3 Capsule Filters - Calyx™



Capsule filters are available in sterile and non-sterile versions.

### Description and Use

GVS Life Sciences capsules are disposable filtration units designed for the removal of particles or bacteria from aqueous or solvent solutions and gas streams. They are ready to use, eliminating the need to disassemble, clean and reassemble filter housings.

GVS Life Sciences capsules contain no glue or surfactants and feature serial layer filter design for increased throughput and extended life. Two upstream vents are included to facilitate venting in any position. All capsules containing membrane media are preflushed with purified water to reduce extractables.

GVS Life Sciences capsules pass class VI toxicology testing and are integrity tested prior to shipment.

The capsules are available with the following connections: 3/8 or 1/4 inch hose barb, 1/4 or 1/2 inch NPTM, 1.5 inch sanitary flange.

**Table 1: Dimensions**

Diameter: 3.5" (9 cm)

Capsule Size	Effective Filtration Area	Length <sup>1</sup>
Small	0.8 ft <sup>2</sup> (748 cm <sup>2</sup> )	3.5 - 4.7" (9 - 13 cm)
Medium	3.0 ft <sup>2</sup> (2806 cm <sup>2</sup> )	7.6 - 8.8" (19 - 23 cm)
Large	5.9 ft <sup>2</sup> (5500 cm <sup>2</sup> )	11.5 - 12.7" (29 - 33cm)

<sup>1</sup>Varies with connection style

**Table 2: Operational Limits**

Maximum Operational Pressure	80psi (5.5bar) @ 70°F (21°C) in Liquid 50psi (3.8bar) @ 70°F (21°C) in Gas
Maximum Differential Pressure	60psi (4.1bar) @ 70°F (21°C)
Maximum Operating Temperature	110°F (43°C) @ ≤ 30 psi (2.1bar) Operating Pressure

**Table 3: Integrity Testing**

Water intrusion is ≤ 1.8cc/min per ft<sup>2</sup> of Effective Filtration Area

Micron Rating	Test Pressure
0.1 µm	40psi (2.8bar)
0.2 µm	30psi (2.1bar)

### Ordering information: PES Capsule Filters, Hydrophilic, Polyester housing

Pore Size µm	Filtration area ft <sup>2</sup> (cm <sup>2</sup> )	Length in (cms)	Adaptors: L=1/4 - 1/2 in stepped hose barb; M= 3/8 in hose barb; R=1/4in NPT male; Y=1.5 in sanitary flange; W=1/2 in NPT male				
			LL	MM	RR	WW	YY
0.1	0.8 (748)	3,5 (9)			1222323		
		3,5 (9)			1213608 1214001*		
		4,0 (10)	1214225*	1223129		1225346	
0.2	0.8 (748)	4,3 (11)					1213956
		4,7 (12)					
		8,1 (20)	1214436*				
0.2	3.0 (2808)	8,4 (21)				1215154 1223845*	
		8,8 (22)					1222327
		12,7 (32)					1214083
0.4	0.8 (748)	3,5 (9)			1213610		
		4,0 (10)	1214227*				1215030
0.4	3.0 (2808)	8,1 (20)	1222432*				

\*sterile product

### Ordering information: PTFE Capsule Filters, Hydrophobic, Polypropylene housing

Pore Size µm	Filtration area ft <sup>2</sup> (cm <sup>2</sup> )	Length in (cms)	Adaptors: L=1/4 - 1/2 in stepped hose barb; M= 3/8 in hose barb; R=1/4in NPT male; Y=1.5 in sanitary flange; W=1/2 in NPT male			
			MM	RR	WW	YY
0.1	0.8 (748)	3,5 (9)		1213160		
		4,0 (10)	1213154			
		4,3 (11)			1212936	
0.1	5.9 (5500)	11,5 (29)		1212982		
0.2	0.8 (748)	3,5 (9)		1213158		
		4,0 (10)	1213155			
		4,3 (11)			1212937	
		4,7 (12)				1212978

# MICROFILTRATION

Pore Size µm	Filtration area ft <sup>2</sup> (cm <sup>2</sup> )	Length in (cms)	Adaptors: L=¼ - ½ in stepped hose barb; M= 3/8 in hose barb; R=¼ in NPT male; Y=1.5 in sanitary flange; W=½ in NPT male			
			MM	RR	WW	YY
0.2	5.9 (5500)	11,5 (29)		1212987		
0.4	0.8 (748)	3,5 (9)		1213161		
0.4	5.9 (5500)	11,5 (29)		1212992		

## Ordering information: PP Capsule Filters, Hydrophobic, Polypropylene housing

Pore Size µm	Filtration area ft <sup>2</sup> (cm <sup>2</sup> )	Length in (cms)	Adaptors: L=¼ - ½ in stepped hose barb; M= 3/8 in hose barb; R=¼ in NPT male; Y=1.5 in sanitary flange; W=½ in NPT male			
			LL	MM	RR	WW
0.22	0.8 (748)	3,5 (9)			1213584 1213941	
		4,0 (10)	1212949	1213578		
		4,3 (11)				1212929
		4,7 (12)				1212971
0.22	3.0 (2808)	8,4 (21)			1213057	
		8,8 (22)				1213058
0.22	5.9 (5500)	11,5 (29)			1213089	
		12,3 (31)				1213090 1213893
		12,7 (32)				1213091
0.45	0.8 (748)	3,5 (9)			1213596	
		4,0 (10)	1212950	1213591		
		4,3 (11)				1212930
		4,7 (12)				1212972
0.45	5.9 (5500)	11,5 (29)			1213095	
1.2	0.8 (748)	3,5 (9)			1213611	
		4,0 (10)	1212951	1213605		
		4,3 (11)				1212932
		11,5 (29)			1213100	
1.2	5.9 (5500)	12,0 (30)		1213098		
		12,3 (31)				1213101
		11,5 (29)			1213157	
3.0	0.8 (748)	3,5 (9)				1212933
		4,3 (11)				
3.0	3.0 (2808)	8,1 (20)		1213070		
		3,5 (9)			1213620	
5.0	0.8 (748)	4,0 (10)	1212953	1213619		
		4,7 (12)				1212975
		7,6 (20)			1213078	
5.0	3.0 (2808)	8,8 (22)				1213080
		11,5 (29)			1213111	
5.0	5.9 (5500)	12,7 (32)				1213113
		3,5 (9)			1213622	
10.0	0.8 (748)	4,0 (10)	1212954	1213621		
		4,3 (11)				1212935
		8,1 (20)		1213081		
10.0	3.0 (2808)	11,5 (29)			1213117	
10.0	5.9 (5500)	3,5 (9)			1213617	
25.0	0.8 (748)	4,0 (10)		1213616		
25.0	3.0 (2808)	7,6 (20)			1220684	
25.0	5.9 (5500)	12,3 (31)			1215179	

# MICROFILTRATION

## Ordering information: NYLON Capsule Filters, Hydrophilic, Polyester housing

Pore Size μm	Filtration area ft <sup>2</sup> (cm <sup>2</sup> )	Length in (cms)	Adaptors: L=1/4 - 1/2 in stepped hose barb; M= 3/8 in hose barb; R=1/4in NPT male; Y=1.5 in sanitary flange; W=1/2 in NPT male				
			LL	MM	RR	WW	YY
0.1	0.8 (748)	3,5 (9)			1213540		
		4,0 (10)	1212939	1213529	3044268*		
0.1	3.0 (2080)	8,8 (22)					1221768
0.1	5.9 (5500)	11,5 (29)			1212899		
0.2	0.8 (748)	3,5 (9)			1213561		
		4,0 (10)		1213550 1213757*	3031900*		
0.2	5.9 (5500)	11,5 (29)			1212905		
0.4	0.8 (748)	3,5 (9)			1213577		
		4,0 (10)		1214457*			
0.4	5.9 (5500)	11,5 (29)			1212910		
		12,0 (30)		1212908			
		12,3 (31)				1212911	

\*sterile product

## 1.4 Centrifuge Filters - Centrex™

CENTREX centrifuge filters are supplied with a range of filtration and separation media. 1.5 ml and 5.0 ml sterile and nonsterile versions are available.



### Features and Benefits

- Centrifugal filter units with various types of membrane filter
- Rapid and simple preparation of a large number of samples
- More than six samples can be processed at once
- Ideal for automated systems and high-speed batch filtration with robots
- Considerably reduced contamination risk when working with radioactive biologically hazardous material
- Cross contamination avoided

### Applications

- 0.45 μm cellulose acetate membrane for the rapid elution of agarose gels
- Nylon and cellulose acetate membranes for the removal of particles and microorganisms from HPLC samples
- Sample preparation for quality control
- Cellulose acetate and nitrocellulose membrane for rapid clearing and filtration of aqueous solutions

### Ordering information

Color	Pore size	Membrane	1.5ml ST 50/carton	1.5ml non-ST 250/carton	5ml ST 50/carton	5ml non-ST 250/carton
Brown	0.2μm	Nylon	10467003		10467015	10467010
Tan	0.45μm	Nylon	10467007	10467002	10467021	10467012
Blue	0.2μm	Cellulose Acetate	10467004	10467009	10467013	
White	0.45μm	Cellulose Acetate	10467006	10467011	10467017	
Green	0.8μm	Cellulose Acetate	10467008			
Pink	0.2μm	Nitrocellulose	10467001			
Rust	0.45μm	Nitrocellulose	10467005		10467019	

# MICROFILTRATION

## 1.5 Bottle-top Filters - ZapCap™



### Description and Use

For filtration of medium volumes, cell culture media and HPLC solutions.

### Ordering information

Product Code	Description
10443401	ZapCap-S, cellulose acetate, 0.2 µm, sterile, 12/pk, housing: Polystyrene
10443411	ZapCap-S, cellulose acetate, 0.45 µm, sterile, 12/pk, housing: Polystyrene
10443421	ZapCap-CR, nylon, 0.2 µm, 12/pk, housing: Polypropylene
10443423	ZapCap-CR, nylon, 0.45 µm, 12/pk, housing: Polypropylene
10443425	ZapCap-CR, PTFE, 0.45 µm, 12/pk, housing: Polypropylene
10443430	ZapCap-S PLUS, cellulose acetate w/ glass fiber prefilter, 0.2 µm, sterile, 12/pk, housing: Polystyrene
10443435	ZapCap-S PLUS, cellulose acetate w/ glass fiber prefilter, 0.45 µm, sterile, 12/pk, housing: Polystyrene

## 1.6 Extractor - Ethidium bromide (EtBr) waste reduction system



One-step filtration polypropylene funnel device for the rapid removal of ethidium bromide from gel-staining solutions.

This disposable unit contains an activated carbon matrix, which removes > 99% of ethidium bromide from electrophoretic buffer quickly and easily. Each device can decontaminate up to 10 litres of gel-staining solution. After filtration, the decontaminated solution can be safely poured down the laboratory drain.

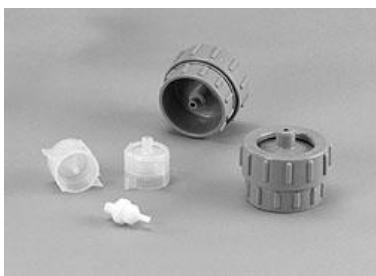
The extractor funnel device fits most standard laboratory flasks and bottles (neck size 33 to 45 mm), and the unit includes a cap for storage between uses. The polypropylene housing is chemically resistant to organics. Also included in the package are glass fiber prefilters, which remove gel pieces and other debris to avoid premature clogging of the carbon filter.

### Ordering information

Product Code	Description
10448030	Ethidium Bromide Extractor Waste System 2/pk, Polypropylene
10448031	Ethidium Bromide Extractor Waste System 6/pk, Polypropylene

# MICROFILTRATION

## 1.7 Filter Holders for Membranes



### Description and Use

To insure precise filtration, GVS Life Sciences offers a selection of filtration holders and apparatus that are designed to work with GVS Life Sciences membranes and are built to exacting standards. In most applications, the filter holder is just as important as the filter for accurate results every time.

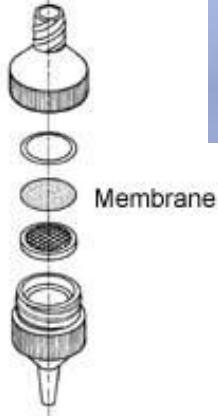
Filter holders are available for a wide variety of applications including air analysis, chemotaxis, tissue culturing and general aqueous and solvent filtration.

We also offer some unique products not found anywhere else like our filter static eliminator and our GVS Life Sciences analytical filter funnel that is so easy to use, you will wonder how you got along without one.

### PRODUCT INFORMATION – PRODUCT SELECTION GUIDE

Specifications	13 mm	25 mm	47 mm
Materials	Celcon (acetal copolymer)	Polypropylene - body & support	Polypropylene - body & support
O-rings	PTFE	Silicone	Silicone
Filter Size	13 mm	25 mm	47 mm
Prefilter Cap size	10 mm	22 mm	42 mm
Filtration Area	0.8 cm <sup>2</sup>	3.5 cm <sup>2</sup>	13.5 cm <sup>2</sup>
Diameter	16 mm (0.6 in)	30 mm (1.2 in)	63.5 mm (2.5 in)
Height	35 mm (1.4 in)	30 mm (1.2 in)	50 mm (2.0 in)
Maximum Liquid Temperature	80°C (176°F)	80°C (176°F)	80°C (176°F)
Maximum Operating Pressure	2.8 bar (40 psi)	2.9 bar (42 psi)	1.9 bar (71 psi)
Autoclaving	15 minutes at 121°C (250°F) and 15 psi	20 minutes at 121°C (250°F) and 15 psi	20 minutes at 121°C (250°F) and 15 psi
Connections, Inlet	Female Threaded Luer	Female LuerLok	1/4 inch NPTM, Female Luer Slip
Connections, Outlet	Male Luer Slip	Male Luer Slip	1/4 inch NPTM, Female Luer Slip
Shipping Weight	20 g (0.7 lb)	20 g (0.7 lb)	470 g (1.1 lb)

### 1.7.1 - 13 mm Filter Holder, Swinney



This GVS Life Sciences Swinney 13 mm filter holder is excellent for small volume (1-5 mL) particulate removal from fluids dispensed with a syringe. It is used in filtering biofluids, ophthalmics, gas chromatography samples, and lubricants that must be applied dust free to critical parts such as bearings. The holder is resistant to alcohols, esters, ethers, glycols, aromatic hydrocarbons, halogenated hydrocarbons, ketones, oils, photoresists and many other chemicals. Although suitable for most weak acids and bases, we recommend that you test for compatibility with acids.

### Used in filtering

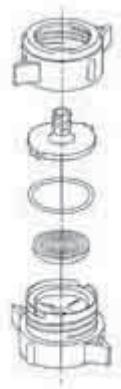
- Biofluids
- Ophthalmics
- Gas chromatography samples
- Lubricants

### Ordering information

Product Code	Description	Qty/ pk
1220950	Filter Holder, Swinney, 13 mm diameter	5/pk

# MICROFILTRATION

## 1.7.2 - 25 mm Filter Holder, Polypropylene



The GVS Life Sciences polypropylene 25 mm filter holders are very useful for ultra cleaning and sterilizing small volumes of liquids from a syringe. Due to the polypropylene construction, they can be used over a wide temperature range with excellent chemical compatibility. In the case of the syringe, the inlet cap locks into the base to prevent twisting damage to the membrane as the cap is tightened. Projection lugs on the base and the cap allow these units to be assembled and sealed quickly and efficiently. Typically, the 25 mm is used to filter up to 50 mL of sample. With the syringe holder type, dual support screens prevent membrane rupture in case back pressure is applied. It also allows for bi-directional sample flow. The polypropylene holder has a broad chemical compatibility range. It can withstand temperatures up to 121°C. and be autoclaved.

### Features & Benefits

- Excellent chemical compatibility
- Quick, efficient assembly
- No need for special tools
- Excellent temperature and chemical resistance
- Several syringe holders can be attached together for serial filtration

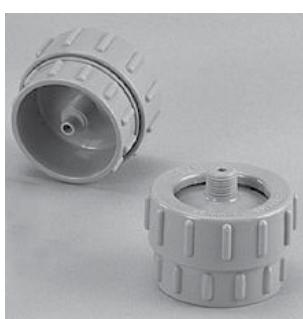
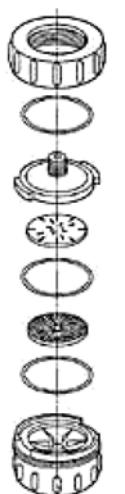
### Applications

- Point of use sampling
- Particulate removal
- Used in filtering chromatography solvents
- General filtration

### Ordering information

Product Code	Description	Qty/ pk
1214250	Filter Holder Polypropylene: 25 mm diameter	10/pk
1214526	Filter Holder Polypropylene Support Screen: 25 mm	10/pk

## 1.7.3 - 47 mm Filter Holder, Polypropylene



Polypropylene In-Line

The GVS Life Sciences polypropylene 47 mm filter holder is designed especially for ultra cleaning and sterilizing liquids under positive pressure. In addition this holder can be used for aseptic sampling of liquids or gases at point-of-use or when samples must be collected and processed on-site.

The polypropylene material allows these holders to be used over a wide temperature range with excellent chemical compatibility. Sealing is achieved by simple hand tightening of the locking ring. The 47 mm In-Line holder has dual support screens, which allow for flow in either direction. The inlet cap design and exterior locking ring allow the unit to be assembled quickly and efficiently without tearing the membrane. 3 O-rings help to prevent leaks with all membranes. The 47 mm can filter up to 1 liter depending upon the viscosity of the sample. The polypropylene holder can withstand temperatures up to 121°C and be autoclaved.

### Features & Benefits

- Easy to use - unique lock ring design assures proper sealing without damage to the membrane
- Easy to clean
- Conforms with EPA Method 1311 for Toxicity Characteristic Leaching Procedure, 40 CFR, Part 261, 1991 Hazardous Waste Compliance Guide

### Applications

- Point of use sampling
- Particulate removal
- Used in filtering chromatography solvents
- General filtration

### Ordering information

Product Code	Description	Qty/ pk
1262579	Filter Holder Polypropylene: 47 mm	1/pk
1214260	Filter Holder Polypropylene: 47 mm	10/pk

# MICROFILTRATION

## 1.7.4 · 47 mm Filter Holder - Gravi-Seal™



The GVS Life Sciences autoclavable filter holder combines a number of key features and benefits, making it a tremendous value. To begin with, the funnel has only two pieces. There are no clamps or locking devices to manipulate. A unique gravity sealing design allows for one-handed operation with no danger of filter by-pass or sample leakage when using depth filters. And it is stable and very solid with no costly replacement parts. It all adds up to the easiest and most cost-efficient analytical funnel available. GVS Life Sciences analytical funnels are available in polysulfone for aqueous samples. The polysulfone unit is autoclavable and chemically resistant for cell culture and microbiological applications. There are graduations up to 350 mL with 50 mL intervals. The No. 8 stopper mounts in a standard 1-liter filtering flask for individual tests or in three- and six-place stainless steel manifolds for multiple tests to run concurrently.

### Features & Benefits

- Durable - break resistant, no extra parts to break or wear out
- Uses a 47 mm depth filter disc
- One-handed operation
- Only two parts
- No clamps, wheel locks, or magnets to wear out
- Solid, stable and easy to use

### Applications

- Filtering liquids for sterility
- Particle removal
- General filtration
- Autoclavable

### Ordering information

Product Code	Description	Qty/ pk
1213865	Gravi-Seal PS Analytical Filter Holder (complete unit): 47 mm	1/pk
1214124	Gravi-Seal PS Analytical Filter Holder (complete unit): 47 mm	3/pk
1213883	Gravi-Seal PS Analytical Filter Holder, Base Only	1/pk
1213882	Gravi-Seal PS Analytical Filter Holder, Funnel Only	1/pk
1214301	Funnel Extenders, Vaccum, PS	6/pk

# MICROFILTRATION

## 1.8 Mini Vial - SEPARA™



Save time and money in sample prep process with GVS Life Sciences filter and vial disposable device.

The single step filtering process is efficient and saves time.

Easy to press , fast and simple to use.

### Features & Benefits

- Rapid sample preparation.
- Filtering with a plunger in the vial is a rapid single step, reducing sample loss.
- After filtration, the sample is ready for use in auto-sampling robot
- The pre-slit cap ensures easy and clean transfer of sample.
- Compatible with most standard auto-Samplers

### Applications by filtration membrane

#### PTFE

- Filtration of strong acids and aggressive solutions

#### Nylon

- Clarification of aqueous and organic solvent solutions
- HPLC sample preparation
- Chromatography

#### Membrane RC

- Filtration of Aqueous and Organic Solutions
- Analytical Sample Prep, uHPLC
- Chromatography
- Clarification
- Protein Chemistry

### Specifications

- Dimensions: 12mm diameter x 33mm height
- Material: Polypropylene, Septa, PTFE and silicone
- Filtering capacity: 0.48mL
- The force needed to compress the unit is estimated at 8 psi (0.6 bar)
- Maximum operating temperature: 120° F (50° C)

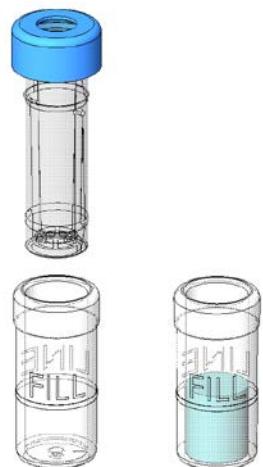


Fig. 1 sample filling

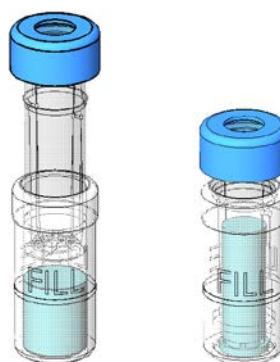


Fig. 2 press down  
to filter sample

Fig. 3 filtered sample  
ready for analysis

### Ordering information

Pore size	Membrane	Color	100/pk	1000/pk
0.45 µm	Nylon	Blue	MV32ANPNY004UC01	MV32ANPNY004UM01
0.20 µm	Nylon	Light Blue	MV32ANPNY002BC01	MV32ANPNY002BM01
0.45 µm	PTFE	Red	MV32ANPPT004CC01	MV32ANPPT004CM01
0.20 µm	PTFE	Pink	MV32ANPPT002TC01	MV32ANPPT002TM01
0.45 µm	RC	Black	MV32ANPRC004LC01	MV32ANPRC004LM01
0.20 µm	RC	Gray	MV32ANPRC002GC01	MV32ANPRC002GM01
0.45 µm	PVDF	Orange	MV32ANPPV004IC01	MV32ANPPV004IM01
0.20 µm	PVDF	Yellow	MV32ANPPV002FC01	MV32ANPPV002FM01
0.45 µm	PES	Dark Green	MV32ANPPS004WC01	MV32ANPPS004WM01
0.20 µm	PES	Light Green	MV32ANPPS002EC01	MV32ANPPS002EM01

# MICROBIOLOGY

**GVS**  
LIFE SCIENCES



# MICROBIOLOGY

## 2. MICROBIOLOGY

### 2.1 Microbiological monitors & Analytical Funnels



GVS Life Sciences microbiological monitors provide a complete system solution for liquid sample preparation. Each monitor is a single-use, pre-sterilized filtering unit consisting of a measured filter funnel, base, pad, membrane, removable lid and plug. With no need for flaming or sterilization, GVS Life Sciences monitors cut multiple steps out of the testing process, saving your lab up to 70% in preparation time. These ready-to-use 100 ml units are suited for monitoring contaminants in all types of samples, from raw materials to finished products.

#### Features and Benefits:

- Rapid testing:** With no need to sterilize funnels or filter base between samples, testing time can be reduced by up to 70%
- No flaming required:** Combined filtration unit minimizes the risk of cross-contamination
- All-in-one system:** Filtration unit easily converts to a Petri dish, which can be labeled and incubated for culturing
- Reduced contamination:** Single-use materials virtually eliminate cross-contamination between funnel and membrane
- Reproducible results:** All-in-one filtration unit reduces the chance of external error
- Easy handling:** Ready-to-use, pre-sterilized monitors are simple to use

**Analytical Funnel:** The membrane can be removed and transferred to a Petri dish.

**Microbiological Monitor:** The membrane is fixed to the unit.

#### Applications:

Microbiological analysis of:

- Potable water
- Beer and wine
- Waste water
- Dairy products
- Soft drinks

#### Ordering information: Microbiological monitors sterile

Product Code		Description	Qty/ pkg
47 mm	56 mm		
10497511	10497603	Monitor, Nitrocellulose, 0.2 $\mu\text{m}$ , white/black grid	50
10497500	10497600	Monitor, Nitrocellulose, 0.45 $\mu\text{m}$ , white/black grid	50
10497501	n/a	Monitor, Nitrocellulose, 0.45 $\mu\text{m}$ , white/black grid, packaged <sup>1</sup>	50
10497502	10497601	Monitor, Nitrocellulose 0.45 $\mu\text{m}$ , black/white grid	50
10497503	10497602	Monitor, Nitrocellulose, 0.8 $\mu\text{m}$ , black/white grid	50

<sup>1</sup> Individually wrapped, sterile

#### Ordering information: Analytical Funnel

Analytical Funnels 100 ml (removable membrane) – 47 mm, sterile

Product Code	Description	Qty/ pkg
10497504	Funnel, Nitrocellulose, White/Black Grid Sterile 0.45 $\mu\text{m}$	50
10497506	Funnel, Nitrocellulose, White/Black Grid Sterile 0.45 $\mu\text{m}$ , packaged <sup>1</sup>	50
10497507	Funnel, Nitrocellulose, White/Black Grid Sterile 0.2 $\mu\text{m}$	50
10497508	Funnel, Nitrocellulose, Black/White Grid Sterile 0.45 $\mu\text{m}$	50
10497509	Funnel, Nitrocellulose, Black/White Grid Sterile 0.45 $\mu\text{m}$ , packaged <sup>1</sup>	50
10497510	Funnel, Nitrocellulose, White/Black Grid Sterile 0.2 $\mu\text{m}$ , packaged <sup>1</sup>	50

<sup>1</sup> Individually bagged

#### Ordering information: Manifolds

Product Code	Description	Qty/ pkg
10498761	3-place vacuum manifold	1
10498762	6-place vacuum manifold	1

# MICROBIOLOGY

## 2.2 Savur™ Analytical Filter Unit



GVS Life Sciences analytical filters are ready to use and available in presterilized individual bags. GVS Life Sciences analytical filter funnels with recoverable membranes are ideal for microbiological analysis and for quick, convenient filtration of aqueous or solvent solutions. Funnel capacity is 115 mL with a 47 mm diameter and 14.4 cm<sup>2</sup> filtration area. Complete with low holdup polypropylene support pads, GVS Life Sciences funnels are ideal for quality control, microbiological, bioburden, and water/wastewater testing. Additional applications include patch testing of hydraulic and boiler fluids, sample clarification, particle counting, and gravimetric analysis. Each package of 12 units comes with an extender, which adapts the unit for side-arm flask filtrations. Optional No. 8 rubber stoppers may be ordered for filtering with flask. The nitrocellulose mixed ester media is suitable for bacteria recovery and count and for water and wastewater testing. Thanks to the chemical compatibility, nylon will be dedicated to solvent clarification. Polypropylene will be found for total digest of heavy metals.

### Ordering information: Savur analytical Filter Unit, Sterile

Media	Pore Size (μm)	Gridded		Plain	
		47mm 12/pk	47mm 200/pk	47mm 12/pk	47mm 200/pk
Nitrocellulose	0.22		1214278	1214282	
Nylon	0.22			1213751	
Nitrocellulose	0.45	1214286	1214288	1214293	
Nylon	0.45	1213753	1214232	1214319	1229555
Polypropylene	25.0				1212668*

Product Code	Description	Qty/ pkg
1215262	Savur Funnel Extenders, PS	500/pk

\*non sterile product

# MICROBIOLOGY

## 2.3 Nutrient Liquid Media

### 2.3.1 - Liquid Media



2 ml ampouled media

Ready-to-use media considerably reduce the preparation time in quality control laboratories and also effectively reduce the risks of cross contamination. GVS Life Sciences is cooperating closely with quality assurance managers in the industry in the development of its own media and test kits.

This intensive product development has produced a range of products that is being used to monitor production plants and conduct microbiological checks on raw materials through to final product release in laboratories in more than 40 countries.

#### Features and benefits

- Wide range of products satisfies even special customer requirements
- Optimal media stability, sterility, and reproducibility
- Less time-consuming, higher productivity
- Batch-specific quality certificate in each pack

#### Applications

Microbiological analysis of:

- Drinking water
- Surface water
- Recreational water
- Purified water

#### Media variety and flexibility

Do you use ready-to-use media in 2 ml ampoules? Are you looking for nutrient media that are specifically suited to the cultivation of colonies after microfiltration? Would you perhaps like to fill your own agar plates? No matter what your specific needs, our extensive range of ready-to-use or prepared media products is available for just about any application.

Liquid media products come with a host of advantages, too. Aseptic preparation of nutrient media saves you valuable time and keeps costs to a minimum. All media undergo detailed quality control checks in accordance with recognized methods, guaranteeing uniform media preparation at all times. Lastly, our more comprehensive end product tests ensure optimal growth as well as stable and sterile media.

#### Media Descriptions

##### Brilliant Green Bile Broth 2%

BGBB contains two inhibitors of both gram-positive and selected gram-negative organisms, namely, oxcgall and brilliant green dye. Fermentation is detected by gas production.

##### Cetrimide Broth

*Pseudomonas aeruginosa* is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth. Cetrimide (N-cetyl-NNN-trimethylammonium bromide) is added to inhibit bacteria other than *Pseudomonas aeruginosa*. Its action as a quaternary ammonium cationic detergent causes nitrogen and phosphorous to be released from bacterial cells other than *Pseudomonas aeruginosa*.



Brilliant Green Bile Broth

##### Coli Ceck with MUG

Used for presumptive identification of coliforms and the determination of the presence of *E.coli* in water samples by a presence/absence tech.



EC-Broth: Vial Left: Control; Vial Right: Broth inoculated with *Escherichia coli* ATCC 25922

##### EC Broth

EC Broth contains casein peptone as a source of nutrients. Lactose provides the carbohydrate fermented by coliform bacteria and *Escherichia coli*. In addition, lactose-positive bacteria metabolize lactose with gas formation. Gram-positive bacteria are inhibited by the mixture of bile salts.

##### EC Broth with MUG

The presence of fluorescence using a long-wave UV light source confirms the presence of *Escherichia coli* and no further confirmation is required. MUG detects anaerobic strains, which may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal streptococci. The substrate 4-methylumbelliferyl-β-D-glucuronide is hydrolyzed by an enzyme, β-glucuronidase, possessed by most *Escherichia coli* and a few strains of *Salmonella*, *Shigella* and *Yersinia*, to produce a fluorescent end product, 4-methylumbelliferone.

# MICROBIOLOGY

## Enterococcus Broth

Enterococcus Broth is a modified version of the improved media described by Slanetz and Bartley with TTC. The membrane filtration method is simple to perform, does not require confirmation and permits a direct count of enterococci in 48 hours.

HPC Broth and HPC Broth with TTC HPC is used to determine total count at incubation temperatures of 35°C. All bacteria develop on HPC with indicator media and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

## KF-Streptococcus Broth

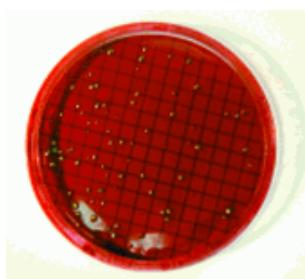
KF-Streptococcus Broth is selective for the determination of fecal streptococci in polluted surface waters. Maltose and lactose are fermentable carbohydrates, sodium azide is the selective agent and brom cresol purple is the indicator dye.

## Lauryl Sulfate or Lauryl Tryptose Broth

This media was developed for the detection of coliform organisms by the American Public Health Association (APHA). It is now the standard medium of choice in the presumptive phase of the standard coliform MPN test for the microbiological examination of water.

## Mannitol Salt Broth

Because of the amount of peptones and beef extract, Mannitol Salt is a nutrient rich medium. Most bacteria (other than staphylococci) are inhibited by the high concentration of sodium chloride. Organisms capable of fermenting mannitol, e.g., *Staphylococcus aureus*, cause a pH change in the media. With phenol red as the pH indicator the colonies appear with a yellow coloration.



M-Endo Coliform Broth

## Membrane Lauryl Sulfate Broth

This media was developed for the detection of coliform organisms and is now the media of choice for the enumeration of total coliforms and *Escherichia coli* in the United Kingdom. This media replaced membrane enriched broth containing 0.4% Teepol 610.

## M-Endo Coliform Broth

M-Endo is a red colored media, which needs to be stored in the dark to prevent discoloration. Gram-positive bacteria are inhibited on this media by the desoxycholate and lauryl sulfate. The addition of ethanol increases the antibacterial nature of the formulation. Lactose fermenting organisms form aldehydes, which react with Schiff's reagent (basic fuchsin and sodium sulfite) to give red colored zones around the colonies. Coliform colonies are therefore red with a characteristic metallic sheen.

## M-FC Broth

Allows the development of fecal coliforms at elevated temperatures (44.5°C).

## M-FC with Rosolic Acid

M-FC with Rosolic Acid acts and functions in the same way as M-FC Broth. Rosolic acid inhibits bacterial growth in general, except for fecal coliforms.

## M-Green Yeast and Mold Broth

M-Green Yeast and Mold Broth is an improved modification of the liquid media. The addition of bromocresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH which aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual bromocresol green to change to yellow.

## M-Green Select Broth

M-Green Select Broth was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of chloramphenicol further inhibits the growth of bacteria to allow for the development and enumeration of yeast and mold.

## MI Broth and MI Agar

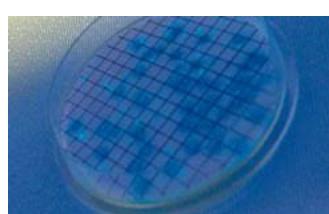
MI Broth detects the presence of coliform bacteria by the production of  $\beta$ -galactosidase, which cleaves the substrate MU-Gal to produce 4-methylumbelliflerone, which fluoresces on exposure to UV light. Non-coliforms do not produce this enzyme and therefore do not fluoresce on the medium. *Escherichia coli* is detected by the compound IBDG. The  $\beta$ -glucuronidase produced by *Escherichia coli* cleaves the substrate to produce a blue indigo color in the colonies. As *Escherichia coli* is also a total coliform, and also produces  $\beta$ -galactosidase, it will also fluoresce. The antibiotic cefsulodin is present to inhibit the growth of gram-positive bacteria and some non-coliform gram-negative bacteria that can cause false positive reactions.

## MRS Broth

MRS medium supports luxuriant growth of all lactobacilli, even the slow growing species.

## M-TGE Total Count Media

All bacteria develop on TGE media and produce a range of different colored and sized colonies.

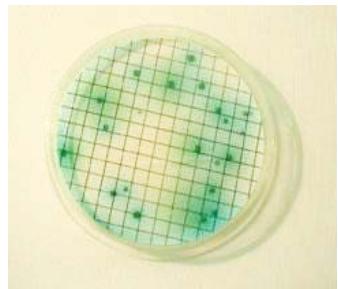


MI-Media: Pure Culture of *Escherichia coli* ATCC 25922 with UV Light

## 2.3 Nutrient Liquid Media

### Orange Serum Media

Organisms known to grow in single strength and concentrated juices are lactic acid and acetic acid bacteria and yeast. Lactobacilli, Leuconostoc and yeast have all been identified as spoilage organisms by numerous authors. Orange serum at pH 5.4 to 5.6 has been reported to yield maximum counts of all types of spoilage organisms in mixed cultures and in single culture comparison tests.



Pseudomonas Media: Typical Growth of *Pseudomonas aeruginosa* ATCC 10145

### Potato Dextrose Broth and Agar Media

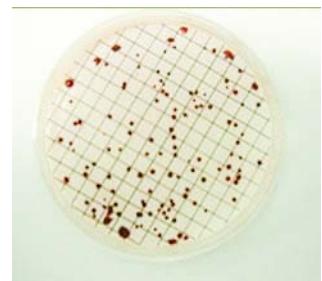
Potato Dextrose Broth is recommended in Standard Methods as the media that gives the most consistent and highest counts for the recoveries of yeast and mold in dairy products. The inclusion of potato extract encourages the growth and development of fungi. Sterile tartaric acid may be added to lower the pH to  $3.5 \pm 0.2$  to further inhibit the growth of conflicting bacteria.

### PRY Broth

Preservative Resistant yeast Broth is a low pH selective medium for the detection of spoilage microorganism in beverages and water.

### Pseudomonas Broth

*Pseudomonas aeruginosa* is characterized by the production of pyocyanin (a blue green, water soluble, non-fluorescent, phenazine pigment) which is stimulated by the inclusion of magnesium chloride and potassium sulfate in the broth. Irgasan, an antimicrobial agent, selectively inhibits gram-positive and gram-negative bacteria other than pseudomonads. Glycerol both serves as an energy source and helps in the promotion of pyocyanin.



Total Count Media with Indicator. *Escherichia Coli* ATCC 25922 and *Staphylococcus Aureus* ATCC 25923 can be Easily Detected according to their Red to Pink Colonies

### Sabouraud Dextrose Broth

Peptone in the media is used as a nitrogen source for the development of fungi. Dextrose acts as an energy source for the growth of microorganisms. The low pH is favorable for the development of fungi, especially dermatophytes, but at the same time inhibits the development of contaminating bacteria from clinical specimens.

### Standard Methods Agar

All bacteria develop on Standard Methods and produce a range of different colored and sized colonies.

### Total Count Media with TTC

All bacteria develop on Total Count Media with indicator and produce a red color as a result of the precipitation of formazan following the reduction of 2,3,5-triphenyltetrazolium chloride (TTC) by bacteria.

### Trypticase Soy Broth – Single Strength

General purpose medium used in qualitative procedures for the cultivation of fastidious and non-fastidious microorganisms. Trypticase Soy Broth – Single Strength complies with the demands of the DIN Norm 10167 for the detection of *Escherichia coli* serotype O157:H7 in foods and FDA-BAM for the isolation of enterohemorrhagic *Escherichia coli* (EHEC). In addition the media conforms to the formula of the US Pharmacopoeia.



Trypticase Soy Broth Double Strength  
(not Innoculated)

### Trypticase Soy Broth – Double Strength

TSB is a medium that will support the growth of a wide variety of microorganisms including aerobic, facultative, and anaerobic bacteria and fungi.

### Wallerstein Nutrient Broth (WL) and WL Differential Broth (WLD)

WL Nutrient Broth is for the cultivation and enumeration of yeast and WL Differential Broth is for determination of bacterial count. Use of the medium at pH 5.5 and incubation at 25°C will give reliable counts for brewer's yeast. Adjustment of the pH to 6.5 and incubation at 30°C allows for the selective growth of baker's and distiller's yeast.

# MICROBIOLOGY

Product Code	Description
<b>2 mL Ampoules</b>	
10496146	Cetrimide Broth, 50/pk
10496120	Enterococcus Broth, 50/pk
10496164	Heterotrophic Plate Count (HPC) Broth, 2 ml , 50/pk
10496151	HPC Broth, 50/pk
10496125	KF-Streptococcus Broth, 50/pk
10496121	Mannitol Salt Broth, 50/pk
10496187	Membrane Lauryl Sulfate PHLs/UK, 50pk
10496103	M-Endo Coliform Broth, 50/pk
10496124	M-FC media, 50/pk
10496114	M-FC Broth with rosolic acid, 50/pk
10496116	M-Green Select Broth, 50/pk
10496101	M-Green Yeast and Mold Broth, 50/pk
10496192	MI-Broth Media, 50/pk
10496112	MRS Broth, 50/pk
10496102	M-TGE Broth, 50/pk
10496104	Orange Serum Broth, 50/pk
10496106	Pry Both 2ml 50/pk
10496119	Pseudomonas Broth, 50/pk
10496113	Total Count Broth with TTC, 50/pk
10496108	Wallerstein Broth, 50/pk
10496109	Wallerstein Differential Broth, 50/pk
<b>9 mL Tubes</b>	
10496710	Brilliant Green Bile Bottled Broth, with Durham tubes, 20/pk
10496714	EC Bottled Broth, with Durham tubes, 20/pk
10496709	EC with MUG, Bottled Broth, 20/pk
10496722	Lauryl Sulfate/ Lauryl Tryplose Broth
<b>Bottled Media</b>	
10496700	M-Endo Coliform Bottled Broth, 50ml 8/pk
10496851	MI Media, Bottled Broth, 50 ml, 1/pk
10496847	MI Media, Bottled Agar, 50 ml, 1/pk
10496705	M-Green Yeast and Mold Bottled Agar, 100 ml, 1/pk
10496713	Orange Serum Bottled Agar, 100ml 1/pk
10496731	Potats Dextros e Bottled Agar, 100ml 1/pk
10496706	Standard Bottled Agar, 100ml 1/pk
10496707	Trypticase Soy Broth (TSB) Single strength, Bottled Broth, 100 ml, 1/pk
10496708	Trypticase Soy Broth (TSB) Double strength, Bottled Broth, 100 ml, 1/pk
<b>Rapid Test Kit</b>	
10496744	ColiCheck with MUG, PIA Test Kit with Sample Bottles, 30/pk

# MICROBIOLOGY

## 2.4 SwabCheck™



### The SwabCheck principle

The surface is wiped with a cellulose swab and any bacteria collected are transferred via the swab into a tube containing a special medium with an indicator dye, which is then incubated. A single bacterium is sufficient to cause a color change. This means that SwabCheck is about 1000 times more sensitive than the conventional ATP method. This accuracy is particularly important in the food industry. With this simple method, it is possible to identify microorganisms such as Listeria monocytogenes, which must not be present in any concentration in food and beverages.

### Features and Benefits:

- The right test for each type of contamination
- Qualitative and semi-quantitative hygiene control
- Sterile packed and ready-for-use
- Easy to handle
- Rapid results
- Long shelf-life

### SwabCheck use

Handling is easy.

Open the sterile pack, remove the swab and wipe it over an area of about 10 x 10 cm. Then twist off the cap of the medium tube and insert the swab so that the cap fits tightly. Label the sample tube and incubate at the appropriate temperature.

A change in color indicates the presence of the microorganism in question. The quicker the color change occurs, the higher the bioburden. If no color change has been observed after the maximum incubation period has elapsed, then the corresponding microorganism is not present. GVS Life Sciences offers SwabCheck in packs of 25 pieces. Shelf-life of 12 months.

### Neutralizing Buffer Swabs

Neutralizing buffer swabs are used in the monitoring of surfaces for total bacterial count. Neutralizing buffer inactivates the bactericidal and bacteriostatic effects of chlorine and quaternary ammonium detergents. However, neutralizing buffer exhibits no toxic effects on microorganisms. This permits the transfer of swabbed organisms to the laboratory without loss in viability. Neutralizing buffer is not designed to culture and enumerate microorganisms.

### Buffer Swabs

Used for the collection of surface contamination from flat or convoluted surfaces prior to transport to a laboratory for culture and enumeration. Buffer swabs contain no bacteriostatic or bactericidal compounds and cannot suppress the action of detergents.

### SwabCheck

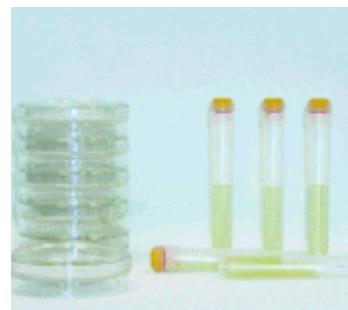
Used as an indication of hygiene on contact surfaces. SwabCheck changes color from purple to yellow. The color change is based on acid reaction with the indicator. The more rapid the color change, the higher the level of bacteria in the sample. SwabCheck is useful in determining the sanitation levels of preparation surfaces, filling ports, and processing areas in beverage and food processing plants, dairies, restaurants, and healthcare facilities.

### Coliform SwabCheck

Escherichia coli and coliforms are used traditionally as indicator organisms for fecal contamination in water and other environmental samples. Detection of these organisms usually points to poor hygiene at some stage in the production process or pollution of water at source. The presence of coliforms is indicated by a color change from brown to yellow. The more rapid the color change the higher the level of coliform bacteria.

### Hygiene SwabCheck

Easy to use: The Hygiene SwabCheck shows an obvious color change from red to yellow. The time taken for this change is an indication of the level of contamination. This should be used in conjunction with known specification levels of your process/product. Rapid screening hygiene test is a same day test that will detect gross bacterial and fungal contamination of work surfaces, equipment machinery or other sampling sites.



Total Count Swab Kit



Coliform SwabCheck

# MICROBIOLOGY

## Listeria SwabCheck

Listeria Isolation SwabCheck is designed to be used alongside traditional selective methods to improve the quality system and minimize the risk of Listeria contamination. This simple to use diagnostic test can be applied anywhere in the environment and on foodstuffs where the presence of Listeria species would be critical.

Listeria sp and specifically Listeria monocytogenes are rapidly becoming the most important pathogen in the food industry; regulatory bodies from around the world are insisting that all food products are Listeria free. Listeria Isolation SwabCheck works on an enhanced Esculin media formulation. The hydrolysis of esculin gives a distinctive black/brown precipitate. Inhibitors and antibiotics are present in the media, which will inhibit the growth of non-Listeria species.

## SwabCheck Escherichia coli

Used for the detection of Escherichia coli on surfaces. The presence of fluorescence using a longwave UV light source confirms the presence of Escherichia coli and any further confirmation is not required. MUG detects anaerobic strain that may not be detected in the conventional procedure. Lactose is a source of energy. Casein peptone provides additional nutrients. The mixture of bile salts is inhibiting for gram-positive bacteria, particularly bacilli and fecal streptococci. The substrate 4-methylumbelliferyl- $\beta$ -D-glucuronide is hydrolyzed by an enzyme,  $\beta$ -glucuronidase, possessed by most Escherichia coli and a few strains of Salmonella, Shigella, and Yersinia, to produce a fluorescent end product, 4-methylumbelliferone. The presence of Escherichia coli is detected by the appearance of fluorescence throughout the tube.

## Hygiene SwabCheck



## Total Count Swab Kit

Used for the non-selective development and enumeration of all aerobic bacteria on surfaces in accordance with Hazard Analysis and Critical Control Points (HACCP). The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. All bacteria develop on TGE media and produce a range of different colored and sized colonies. It is not possible using TGE to presumptively identify any bacteria. Identification can only be undertaken using traditional microbiology techniques following initial colony development.

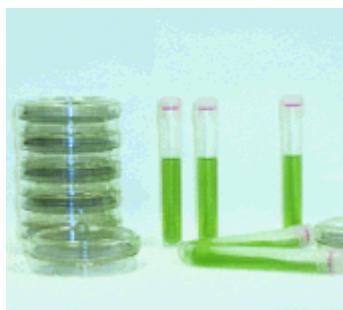
## Listeria SwabCheck



## Yeast and Mold Swab Kit

Used for the enumeration of yeast and molds on surfaces in accordance with HACCP. The kit includes the swabs and culture medium, packaged with a membrane device, providing a quantitative result. M-Green yeast and mold is an improved modification of the liquid medium, and was developed to improve efficiency of detection and enumeration of fungi in sugar based drinks using the membrane filtration method. This medium has a low pH, which inhibits bacterial growth. The addition of brom cresol green, which diffuses into fungal colonies as an alkaline reaction, allows them to be easily identified. Metabolic by-products from the developing colonies diffuse into the surrounding medium, further reducing the pH that aids in the inhibition of bacterial growth, but also produces an acid reaction that causes residual brom cresol green to change to yellow. Green opaque colonies against a yellow background are indicative of the growth of yeasts. Mold colonies are green and filamentous.

## Yeast and Mold Swab Kit



## Polywipe Sponge

Used for the recovery of microorganisms from a surface. Polywipe is a blue sponge that is premoistened with neutralizing buffer to neutralize the effects of surface disinfectants. The sponge material is selected to be free of the preservatives found in commercially available sponges, which can inhibit microorganism growth. Polywipe sponges are biocide free and tested for zero toxicity to microorganisms. Each sponge is individually wrapped in a peel pouch and gamma irradiated to ensure sterility.

## Polywipe Sponge



## Buffer Swabs

Used for the collection of surface contamination from flat or convoluted surfaces prior to transport to a laboratory for culture and enumeration. Buffer swabs contain no bacteriostatic or bactericidal compounds and cannot suppress the action of detergents.

## 2.4 SwabCheck

### Ordering information

Product Code	Description
10498303	Neutralizing Buffer Swabs, 4 ml, 125/pk
10498304	Neutralizing Buffer Swabs, 4 ml, 500/pk
10498305	Buffer Swabs, 4 ml, 125/pk
10498306	Buffer Swabs, 4 ml, 500/pk
10498404	SwabCheck, 4 ml, 125/pk
10498402	SwabCheck Escherichia coli, 4 ml, 125/pk
10498315	Total Count Swab Kit, 30/pk
10498316	Yeast and Mold Swab Kit, 30/pk
10498406	Coliform SwabCheck, units ready to use, 25/pk
10498407	Hygiene SwabCheck, units ready to use, 25/pk
10498408	Listeria SwabCheck, units ready to use, 25/pk
10498521	Polywipe Sponge, ready to use, single packed, 50/pk

# MICROBIOLOGY

## 2.5 Dilution Bottles



### Description and Use

Prefilled sterile dilution bottles are designed for sample dilution of water, dairy products, foods, and pharmaceuticals prior to microbiological testing. Final pH for all solutions is  $7.2 \text{ pH} \pm 0.2 \text{ pH}$  at  $25^\circ\text{C}$ . They come in an easy open, flip-top, plastic container with a tamper-evident seal.

Butterfield's Phosphate Buffer contains monobasic potassium phosphate and is used extensively in the food, dairy, and pharmaceutical industries. Offered in 90 ml and 99 ml volumes for easy 1:10 and 1:100 dilutions. It is recommended as a general diluent in laboratory procedures by the Federal Drug Administrations and in the Bacteriological Analytical Manual. This product is prepared according to Standard Methods for the Examination of Water and Wastewater for use in water testing.

Phosphate Buffer with magnesium chloride is used as the diluents for the preparation of dilutions in plate counts in the dairy and food industries. It is recommended by the APHA for the recovery of injured microorganisms from dairy and food samples. Contains deionized water, monopotassium phosphate, and magnesium chloride.

### Ordering information

Product Code	Description
10498503	Dilution Bottle, Butterfield's Buffer, 99 ml, 72/pk
10498504	Dilution Bottle, Butterfield's Buffer, 90 ml, 72/pk
10498505	Dilution Bottle, Phosphate Buffer Magnesium Chloride, 99 ml, 72/pk

# FILTRATION MEMBRANES



# FILTRATION MEMBRANES

## 3. FILTRATION MEMBRANES

### 3.1 Membranes for Filtration

#### 3.1.1 - Cellulose Acetate (CA) Membrane AcetatePlus™



##### Description and Use

GVS Life Sciences Cellulose Acetate (CA) Filtration Membrane is a supported, hydrophilic membrane that is naturally low binding. It is ideal for use in filtration applications where maximal recovery of protein is critical.

##### Features and Benefits

- Superior strength:** Can withstand aggressive handling or be used with automated equipment without breaking or tearing.
- Low extractables:** Ensures tests will be clean with consistent results.
- Hydrophilic:** Wets out rapidly.
- Lot-to-lot consistency:** Quality checks ensure consistent flow and diffusion rates for dependable results every time.
- Nonlysing of cells:** Prevents contamination of critical solutions.

##### Typical Applications

- Protein and enzyme filtration
- Biological fluid sterilization
- Tissue culture media sterilization
- Cold sterilization

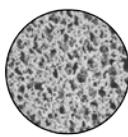


Figure 2: Scanning Electron Micrograph of GVS Life Sciences CA Filtration Membrane

##### Exceptional Strength for Improved Performance

Produced through a proprietary manufacturing process, GVS Life Sciences CA Membrane meets rigorous quality standards throughout every step of production. This process generates consistent lot-to-lot filtration properties among the membranes and ensures product uniformity.

GVS Life Sciences CA Filtration membranes are composed of pure cellulose acetate that is internally supported by an inert polyester web. This web gives each membrane exceptional strength to prevent cracking, tearing, breaking and distortion when handled or creased. The resulting membrane has dimensional stability that can withstand autoclaving or steam sterilizing leaving the membrane unaffected in temperatures up to 274°F (135°C).

The exceptional dimensional strength and low binding characteristics of GVS Life Sciences CA Filtration Membranes provides higher throughputs than competitive offerings and reduces the amount of filter changes needed during proteinaceous solution filtering. Its uniform pore size and consistent flow rates ensure reliable performance.

##### Flexibility for OEM Requirements

GVS Life Sciences CA Filtration Membrane is available in rolls from 25mm to 30cm wide, as well as sheets and cut disks that can be customized to meet your application and size requirements. GVS Life Sciences CA Filtration Membranes are manufactured on-site making customization easy and cost effective.

Table 2: Product Characteristics

USP Class VI testing	Passed
Thickness	65 - 110 $\mu\text{m}$
Maximum Operating Temperature	274°F (135°C)
Sealing Compatibility	Ultrasonics, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.1 to 20 $\mu\text{m}$

Table 3: Performance Characteristics

Pore Size	0.22 $\mu\text{m}$	0.45 $\mu\text{m}$	0.6 $\mu\text{m}$	0.8 $\mu\text{m}$	1.2 $\mu\text{m}$	5.0 $\mu\text{m}$	10.0 $\mu\text{m}$	20 $\mu\text{m}$
Minimum Bubble Point psi (kg/cm²)	50 (3.50)	30 (2.10)	18 (1.26)	14 (0.98)	11 (0.77)	6 (0.42)	5 (0.35)	3 (0.21)
Typical Flow Rate, mL/min/cm² @ 10psi (0.7 kg/cm²)	16.1 (1.13)	54.7 (3.85)	70.9 (4.98)	81.3 (5.72)	180 (12.7)	375 (26.4)	592 (41.6)	1478 (104)

#### Ordering information: Cellulose Acetate (CA) Membrane

Pore sizes	Dimensions Packaging	13mm 100/pk	25mm 100/pk	47mm 100/pk	50mm 100/pk	90mm 25/pk	102mm 25/pk	142mm 25/pk	293mm 25/pk	20x20mm 5/pk	30cmx3m 1/pk
	0.22 $\mu\text{m}$	1212374	1213124	1213804	1221730	1214357		1215074	1215427		1224211
	0.45 $\mu\text{m}$	1215533	1215635	1215676	3052874	1212375	1221546	1212517	1212620		1240382
	0.65 $\mu\text{m}$		1212846	1212942		1213037		1213125		3061196	
	0.8 $\mu\text{m}$	1213305	1213343	1213358				1213516		3034974	3034975
	1.2 $\mu\text{m}$		1213730	1213805				1213958	1214038		3041202
	5.0 $\mu\text{m}$		1214370	1214411		1212648		1214851			3049247

## 3.1 Membranes for Filtration

### 3.1.2 - Nitrocellulose (NC) Membrane - MicronSep™



#### Description and Use

GVS Life Sciences Nitrocellulose (NC) Filtration Membrane is an unsupported, hydrophilic membrane. Its rapid flow rate and high throughput make it ideal for use in diagnostic kit manufacturing applications.

#### Features and Benefits

- High flow rate:** Provides fast filtration rates
- Uniform pore structure:** Provides consistent flow and diffusion rates
- < 4% extractables:** Leads to more consistent results
- Lot-to-lot consistency:** Produces dependable results every time

#### Typical Applications

- Aqueous filtration
- Sterility testing
- Gravimetric analysis with ashing technique
- Microbiological and particulate analysis
- Black for food and beverage applications

#### Consistent Uniformity Improves Control and Performance

Produced through a proprietary manufacturing process, GVS Life Sciences Nitrocellulose meets rigorous quality standards throughout every step of production. This process ensures the membrane has a uniform pore structure and consistent thickness (within 10 µm).

GVS Life Sciences NC Filtration Membranes are composed of a mixture of inert cellulose nitrate and cellulose acetate polymers. The uniform microporous structure of these filters provides the fastest flow rates and highest throughputs available in a membrane filter. Because they are biologically inert, GVS Life Sciences NC Filtration Membranes are ideal for a wide range of clarification, sterilization and analytical applications such as: microbiological analysis, clarification or sterilization of aqueous solutions, industrial hygiene applications, silt density index and particulate-matter analysis. For gravimetric analysis using ashing techniques, GVS Life Sciences NC Membranes yield a residue or less than 0.045% of their initial weight. They are hydrophilic with a noncytotoxic wetting agent and yield extractable levels of less than 4% of their weight. These membranes are autoclavable at 121°C (250°F) for 20 minutes. Sterilized product lifetime is 18months from sterilization date (1 year warranty).

#### Flexibility for OEM Requirements

GVS Life Sciences Nitrocellulose is available in rolls from 25 mm (1.0 in) to 40 cm (31 inches) wide. It is also available in sheets and cut disks gridded, plain, white or black, that can be customized to meet your application and size requirements. Slitting tolerance is from +/- 0.039 inches (+/- 1 mm). Because GVS Life Sciences Nitrocellulose Filtration Membrane is manufactured on-site all customization, such as wicking rate and thickness, is easy and cost-effective.

Table 2: Product Characteristics

Sterilization	Gamma Irradiation or Ethylene Oxide (EtO)
USP Class VI testing	Passed
Thickness	Approx. 6 mil (150 µm) +/- 10µm
Extractables	< 4%
BSA Protein Binding	Approx. 160 µg/cm² (depending on pore size)
Maximum Operating Temperature	356°F (180°C)
Sealing Compatibility	Ultrasonic, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.1 to 8.0 µm

Table 3: Performance Characteristics

Pore Size	0.1µm	0.22µm	0.45µm	0.8µm	1.2µm	5.0µm	8.0µm
Minimum Bubble Point psi (kg/cm²)	80 (5.62)	52 (3.66)	30 (2.11)	11 (0.77)	9 (0.63)	6 (0.42)	4 (0.28)
Typical Flow Rate, mL/min/ cm² @ 10psi (0.7 kg/cm²)	6.9 (0.49)	19 (1.34)	51 (3.59)	198 (13.9)	265 (18.6)	650 (45.7)	2316 (163)

#### Ordering information: Nitrocellulose Gridded Filtration Membrane, White and Black - S-Pak™

Pore sizes	Bulk Packaging*					Individual Sterile Package Without Pad*							
	Dimensions Packaging	25mm 100/pk	25mm 100/pk	47mm 100/pk	47mm 100/pk	47mm 1000/pk	47mm 100/pk	47mm 100/pk	47mm 200/pk	47mm 200/pk	47mm 1000/pk	47mm 1000/pk	50mm 1000/pk
Color	white	black	white	black	white	white	black	white	black	white	black	white	white
0.22 µm			1214839			1216720		1214861		1214396			
0.45 µm		1214969	1215207	1214977	3013416	1216721		1215230	1214991	1214923	1213643	1222980	
0.7 µm						1216722		1215406	1213331	1215408	1221948		
0.8 µm	1225419	1215411	1215421	1215412		1216724	1215590					3057814	
1.2 µm	1215435		1215437										
8 µm				3053377									

# FILTRATION MEMBRANES

	Individual Sterile Package With Pad*			
Dimensions Packaging	47mm 100/pk	47mm 100/pk	47mm 1000/pk	47mm 1000/pk
Color	white	black	white	black
0.45 $\mu\text{m}$	1215237	1214866	1215249	1213145
0.7 $\mu\text{m}$	1215407	1216718	1215409	
0.8 $\mu\text{m}$	1225460	1216723		

\*Larger bulk packaging available, call for details.

## Ordering information: Nitrocellulose Filtration Membrane, White and Black

Dimensions Packaging	13mm 100/pk	25mm 100/pk	25mm 100/pk	37mm 100/pk	47mm 100/pk	47mm* 100/pk
Color	white	white	black	white	white	black
0.1 $\mu\text{m}$		1214527			1214533	
0.22 $\mu\text{m}$	1214882	1214898			1214909	
0.45 $\mu\text{m}$	1215257	1215263	1215019	1215272	1215281	
0.65 $\mu\text{m}$		1215376			1215380	
0.8 $\mu\text{m}$	1215424	1215425	1215415	1215426	1215428	1215416
1.2 $\mu\text{m}$	1215438	1215440			1215441	
5.0 $\mu\text{m}$	1215448	1215450			1215451	
8.0 $\mu\text{m}$	1214456	1215455			1215456	

\*Sterile and bulk packaging available, call for details.

## Ordering information: Nitrocellulose Filtration Membrane, White and Black (cont.)

Dimensions Packaging	90mm 25/pk	142mm 25/pk	293mm 25/pk	20x20cm 5/pk	20x20cm 5/pk
Color	white	white	white	white	black
0.1 $\mu\text{m}$		1214554	1214565		
0.22 $\mu\text{m}$	1214941	1214950	1214959	3031100	
0.45 $\mu\text{m}$	1215305	1215316	1215323	1225781	3053082
0.8 $\mu\text{m}$	1215431	1215432	1215433	3050851	
1.2 $\mu\text{m}$	1215442	1215443			
5.0 $\mu\text{m}$	1215452	1215453			
8.0 $\mu\text{m}$	1215027	1221955	1212631		

## 3.1 Membranes for Filtration

### 3.1.3 - Nylon (NY) Membrane - Magna™



#### Description and Use

GVS Life Sciences Nylon Filtration Membrane is a supported, naturally hydrophilic membrane designed to wet out evenly and retain its superior strength during use in general filtration or medical assays

#### Features and Benefits

- Hydrophilic:** Eliminates the need for wetting agents that can potentially interfere with biological processes
- Super strength:** Eases handling when used with automated equipment
- Low extractables:** Ensures tests will be clean and pure leading to more consistent results
- Lot-to-lot consistency:** Quality checks ensure lot-to-lot consistency, both down and across the polyester web, for dependable results every time

#### Typical Applications

- Sterilization and clarification of aqueous and organic solvent solutions
- HPLC sample preparation

#### Versatile Capabilities, Consistent Performance

Produced through a proprietary manufacturing process, GVS Life Sciences Nylon Filtration Membrane meets rigorous quality standards throughout every step of production. This process generates consistent lot-to-lot flow rates among the membranes ensuring product uniformity.

GVS Life Sciences Nylon Filtration Membrane is internally supported with an inert polyester support web giving it added dimensional strength and stability that prevents cracking, tearing, curling and breaking. This added strength and durability is advantageous during usage that involves aggressive handling or automated equipment.

A naturally hydrophilic membrane, GVS Life Sciences Nylon Filtration Membrane does not require wetting agents that can interfere with biological processes. The resulting membrane has a void volume of 70% to 80% for high diffusion and low-flow resistance.

Table 3: Performance Characteristics

Pore Size	0.1µm	0.22µm	0.45µm	0.6µm	0.8µm	1.2µm	5.0µm	10.0µm	20.0µm
Minimum Bubble Point psi (kg/cm²)	70 (4.92)	50 (3.51)	35 (2.11)	18 (1.27)	13 (0.91)	11 (0.77)	6 (0.42)	5 (0.35)	3 (0.21)
Typical Flow Rate, mL/min/ cm² @ 10psi (0.7 kg/cm²)	4.0 (0.28)	9.9 (0.70)	26.9 (1.89)	59.3 (4.17)	80.5 (5.66)	180 (12.7)	331 (23.3)	552 (38.8)	1448 (101.9)

#### Flexibility for OEM Requirements

GVS Life Sciences Nylon Filtration Membrane is available in rolls from 1cm to 33cm wide, as well as sheets, cut disks and pleated packs that can be customized to meet your application and size requirements. Because the GVS Life Sciences Nylon Filtration Membrane is manufactured on-site, all customization is easy and cost-effective.

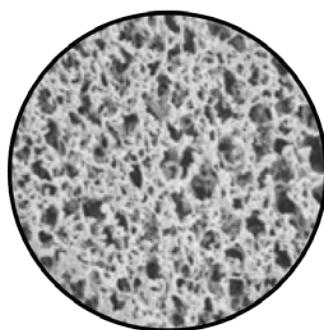


Figure 2: Scanning Electron Micrograph of GVS Life Sciences Nylon Filtration Membrane

Table 2: Product Characteristics

Sterilization	Gamma Irradiation or Ethylene Oxide (EtO)
USP Class VI toxicity	Passed
Thickness	65 - 125 µm
Extractables	< 0.2% (< 0.0015 mg/cm²)
BSA Protein Binding	Approx. 120 µg/cm²
Maximum Operating Temperature	356°F (180°C)
Sealing Compatibility	Ultrasonics, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.1 to 20 µm

# FILTRATION MEMBRANES

## Ordering information: Nylon Membrane

Dimensions Packaging	13mm 100/pk	25mm 100/pk	37mm 100/pk	47mm 100/pk	47mmGRD 100/pk
0.1 $\mu\text{m}$	1213760	1213761		1213762	
0.22 $\mu\text{m}$	1213766	1213768		1213769	
0.45 $\mu\text{m}$	1213774	1213775	1228824	1213776 1220671**	1213825 1213845~
0.65 $\mu\text{m}$		1213782		1213783	
0.8 $\mu\text{m}$	1213788	1213789	1214881	1213790	3013826
1.2 $\mu\text{m}$	1213794	1213796	1230356	1213797	1214880
5.0 $\mu\text{m}$	1213810	1213811	1236904	1213812	3048260
10.0 $\mu\text{m}$	1213817	1213818		1213819	
20.0 $\mu\text{m}$	1213801	1213802		1213803	

Dimensions Packaging	90mm 25/pk	142mm 25/pk	293mm 25/pk	200x200mm 5/pk	30cmx3m 1/pk
0.1 $\mu\text{m}$	1213763	1213764	1213765	1222859	1241477
0.22 $\mu\text{m}$	1213770	1213771	1213772	1222858	1224690
0.45 $\mu\text{m}$	1213778	1213779	1213780	1222857	1225982
0.65 $\mu\text{m}$	1213784	1213786		1222856	3052148
0.8 $\mu\text{m}$	1213791	1213792	1213793	1222855	
1.2 $\mu\text{m}$	1213798	1213799	1213800	1222854	1214956
5.0 $\mu\text{m}$	1213813	1213815	1213816	1222851	1221441
10.0 $\mu\text{m}$	1213820		1213823	1222852	
20.0 $\mu\text{m}$	1213807	1213808	1213809	1222853	

GRD = Gridded

\*\*sterile

## 3.1 Membranes for Filtration

### 3.1.4 - Polyethersulfone (PES) Membrane - UltraSep™



#### Description and Use

GVS Life Sciences Polyethersulfone (PES) Filtration Membrane is hydrophilic and cast from pure polyethersulfone polymer. It is designed to remove particulates during general filtration and its low protein and drug binding characteristics make it ideally suited for use in life science applications.

#### Features and Benefits

- Hydrophilic:** Eliminates the need for wetting agents that can potentially interfere with analyses
- Low extractables:** Ensures test results will not be compromised by wetting agents or other extractables
- Low drug and protein binding:** Maximizes recovery of critical drugs or proteins
- Wide range of pore sizes:** Pore size range of 0.03  $\mu\text{m}$  to 5.0  $\mu\text{m}$  enables specific pore size selection for given applications
- Superior burst strength:** Protects the integrity of the membrane under high pressure
- Lot-to-lot consistency:** Quality checks, both down and across the membrane, ensure dependable results every time

#### Typical Applications

- Protein and enzyme filtration and sterilization
- Biological fluid filtration and sterilization
- Pharmaceutical sterilization
- Environmental water studies

Table 3: Performance Characteristics

Pore Size	0.03 $\mu\text{m}$	0.1 $\mu\text{m}$	0.22 $\mu\text{m}$	0.45 $\mu\text{m}$	0.65 $\mu\text{m}$	0.8 $\mu\text{m}$	1.2 $\mu\text{m}$	5.0 $\mu\text{m}$
Flow Time (secs)	200-500	100-200	35-70	20-40	12-25	80-160	65-130	50-100
Volume/Vacuum (mls/in Hg)	250/20	250/20	250/20	250/20	250/20	500/5	500/5	500/5
Flow Rate (ml/min/cm <sup>2</sup> @10psi)	7.95-3.18	15.91-7.95	45.45-22.72	79.53-39.77	132.55-63.63	159-80	196-98	255-127
Bubble Point (psi)	90-110	70-90	50-70	35-50	21-32	13-28	11-22	6-13
Thickness ( $\mu\text{m}$ )	110/150	110/150	110/150	110/150	110/150	110/150	110/150	110/150

#### Ordering information: Polyethersulfone Filtration Membrane

Pore sizes	Dimensions Packaging	25mm 100/pk	47mm 100/pk	90mm 25/pk	293mm 25/pk	200x200mm 5/pk	30cmx3m 1/pk
	0.03 $\mu\text{m}$	3032876	3029505	3018505		1235748	3057106
	0.1 $\mu\text{m}$		1214756	1222230		1225881	3026365
	0.22 $\mu\text{m}$	1214193	1214465	1214920	1214759	1223871	1226664
	0.45 $\mu\text{m}$	1214532	1214475	1215368	1214760	1225882	1226665
	0.65 $\mu\text{m}$		1224487		1224490	1225883	1225985
	0.8 $\mu\text{m}$	1214604	1214568	1214669		1225884	3037376
	1.2 $\mu\text{m}$	1222267	1221008	1224492		1223340	1242278
	3.0 $\mu\text{m}$					1232921	
	5.0 $\mu\text{m}$	1224003	1215396	1224496		1236292 1233863*	3030900

\*30pk

#### Product Uniformity and High Sensitivity Maximize Performance

GVS Life Sciences PES Filtration Membrane is produced through a proprietary manufacturing process that employs high-quality standards throughout every step of production. This level of quality generates lot-to-lot consistency and product uniformity that results in reliable flow rates, particle retention and fluid purification.

This strong, microporous film membrane is constructed from a high-temperature polyethersulfone polymer that is acid and base resistant. Its strength and durability are advantageous during usage that involves aggressive handling or automated equipment. GVS Life Sciences PES Filtration Membrane is naturally hydrophilic without added wetting agents and has low extractables.

Due to its inherent uniform porosity and controlled pore size, GVS Life Sciences PES Filtration Membrane efficiently removes particulates from solutions during general filtration. Additionally, its low protein and drug binding characteristics maximize recovery of critical drugs used in I.V. therapy, chemotherapy and open-heart surgery.

#### Flexibility for OEM Requirements

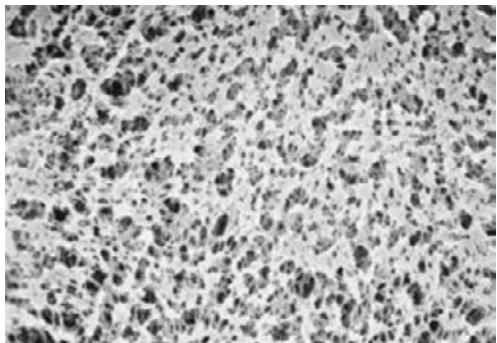
GVS Life Sciences PES is available in rolls 1.3cm - 79cm wide, as well as sheets, cut disks, capsules, pleat packs and cartridges that can be customized to meet your application requirements. Because the GVS Life Sciences PES is manufactured on-site, all customization can be done easily and cost-effectively.

Table 2: Product Characteristics

Endotoxin levels and Class VI toxicity	Passed
Thickness	110 - 150 $\mu\text{m}$
Extractables	< 2% (< 0.015 mg/cm <sup>2</sup> )
Maximum Operating Temperature	266°F (130°C)
Sealing Compatibility	Ultrasonics, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.03 to 5.0 $\mu\text{m}$

# FILTRATION MEMBRANES

## 3.1.5 - Polypropylene (PP) Membrane - PolySep™



### Description and Use

GVS Life Sciences polypropylene membrane filters are composed of pure polypropylene with absolute pore size ratings. These filters offer broad chemical compatibility allowing its use with aqueous and organic solvent samples. The polypropylene filter has extremely low extractable levels designed to provide accurate, consistent analysis results for sensitive ion chromatography applications while prolonging

column life. GVS Life Sciences polypropylene filter is the preferred filter membrane for HPLC applications where the detection levels are below 230 nm. The filters also exhibit negligible protein binding which, is essential for maximum sample recovery of critical, small volume protein samples. GVS Life Sciences filters are available in 0.1, 0.22 and 0.45-micron pore sizes in a wide range of disc diameters.

### Features and Benefits

- Broad chemical compatibility
- Hydrophobic
- HPLC applications - detection levels < 230 nm

### Typical Applications

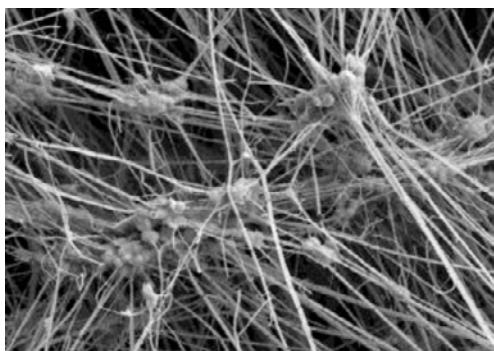
- Aqueous and organic solvent filtration
- HPLC sample preparation requiring low detection levels
- Ion chromatography
- Total digest for heavy metals

### Ordering information: Polypropylene Membrane

Dimensions Packaging	25mm 100/pk	47mm 100/pk	90mm 25/pk	142 mm 25/pk	200x200 mm 5/pk	254x3000 mm 1/pk
0.1 $\mu\text{m}$	1222102	1214237	1220824	1222103	1225932	1269206
0.22 $\mu\text{m}$	1214238	1214239	1214240	1214241	3095433	1224966
0.45 $\mu\text{m}$	1212379	1212380	1212381	1212383		
1.2 $\mu\text{m}$	1212390	1212391	1212392	1212394		
10.0 $\mu\text{m}$		1225792				

## 3.1 Membranes for Filtration

### 3.1.6 - Polytetrafluoroethylene (PTFE) Membrane - PTFESep™



#### Description and Use

PTFE (fine powder resin) is expanded into a 3-dimensional web-like structure called PTFE which creates billions of microscopic pores. This structure utilizes the inherent hydrophobic (water-resistant) and non-stick nature of PTFE to allow removal of particulate captured on the membrane surface. This allows air to pass

easily through the membrane while collecting particulate as small as 0.1 micron on its surface. PTFE membranes and laminates provide device manufacturers with a consistent, temperature and chemical compatible barrier to microbes and particulate matter. The optimal combination of air flow and water entry pressure adds value to most device designs.

#### Features and Benefits

- Naturally hydrophobic
- Compatible with strong acids and aggressive solutions
- Improved durability and handling

#### Typical Applications

- Filtration of strong acids and aggressive solutions
- Venting applications
- Phase separations
- Aerosol samplings

#### Ordering information: Polytetrafluoroethylene Membrane

Pore sizes	Dimensions Packaging	13 mm 100/pk	25 mm 100/pk	47 mm 100/pk
0.22 µm		1215485	1215486	1215487
0.45 µm		1215491	1215492	1215493
1.0 µm		1215502	1215503	1215504 3013362*

Pore sizes	Dimensions Packaging	90 mm 25/pk	142 mm 25/pk	293 mm 25/pk	200x200 mm 5/pk	305x305 mm 50/pk
0.22 µm		1215488	1215489	1215490	3026028	1267681
0.45 µm		1215494	1215495	1215496	1237423	3034300
1.0 µm		1215505	1215506	1215507	1214443	1235299

\*25/pk

# FILTRATION MEMBRANES

## 3.1.7 - Polytetrafluoroethylene (PTFE) Hydrophilic Membrane



**Membrane Material:** Polytetrafluoroethylene  
**Membrane Diameter (mm):** 25 and 47  
**Sterile:** No  
**Sterilization:** ETO, autoclave 30 min at 121 C  
**Max operating temp (°C):** 135

**General Application:**  
 Filtration of Aqueous and Organic Solutions  
 Analytical Sample Prep, HPLC  
 Chromatography  
 Clarification  
 Fuel Hydraulic Fluids and Machined Parts

### Ordering information: Polytetrafluoroethylene Hydrophilic Membrane

Product Code	Description	Pore Size	Water flow rate (ml/min/cm²) @10 psi	Water Bubble Point (psi)
MEO25NPH002BC01	Membrane Ø25mm PTFE hydrophilic 0.2 µm GVS Life Sciences 100/pc	0.22 µm	16	45
ME047NPH002BC01	Membrane Ø47mm PTFE hydrophilic 0.2 µm GVS Life Sciences 100/pc	0.22 µm	54	27

## 3.1.8 - Regenerated Cellulose (RC) Membrane



**Membrane Material:** Regenerated Cellulose  
**Membrane Diameter (mm):** 25 and 47  
**Sterile:** No  
**Sterilization:** Autoclave 121C, or dry heat at 180C for 2 hours, or Gamma (25 kGy), or ETO  
**Max operating temp (°C):** 134

**General Application:**  
 Filtration of Aqueous and Organic Solutions  
 Analytical Sample Prep, uHPLC  
 Chromatography  
 Clarification  
 Protein Chemistry

**Detailed Application:** General filtration, particle separation, degassing solvents, filtration requiring a strong supporting membrane. Resistant to many solvents, and to aqueous solutions in the pH range from 3 to 12. Often used for ultra-cleaning and de-gassing solvents and mobile phases for HPLC. Excellent chemical compatibility and resistance to organic solvents. Compatible with almost all solvents. Superior thermal resistance. Features low nonspecific adsorption (bovine serum albumin < 10 micrograms/cm²).

### Ordering information: Regenerated Cellulose Membrane

Product Code	Description	Pore Size	Water flow rate (ml/min/cm²) @10 psi	Water Bubble Point (psi)
MEO25NRC002BC01	Membrane, Ø25 mm, RC 0.20 µm	0.20 µm	16	57
MEO25NRC004BC01	Membrane, Ø25 mm, RC 0.45 µm	0.45 µm	28	36
ME047NRC002BC01	Membrane, Ø47 mm, RC 0.20 µm	0.20 µm	16	57
ME047NRC004BC01	Membrane, Ø47 mm, RC 0.45 µm	0.45 µm	28	36

## 3.1.9 - Polyvinylidene Fluoride (PVDF) Hydrophilic Membrane



**Membrane Material:** Polyvinylidene Fluoride  
**Membrane Diameter (mm):** 25 and 47  
**Sterile:** No  
**Sterilization:** Autoclave (121 °C at 1 bar), Gamma, Beta, ETO  
**Max operating temp (°C):** 85

**General Application:**  
 Filtration of Aqueous and Organic Solutions  
 Analytical Sample Prep, uHPLC  
 Chromatography  
 Clarification  
 Protein Chemistry

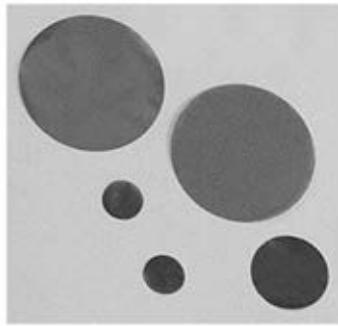
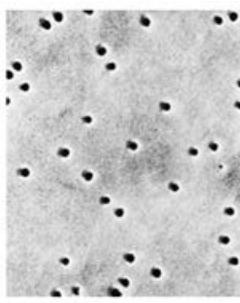
**Detailed Application:** Sterilizing filtration of biological solutions. Excellent chemical compatibility with aggressive solvents, acids and alcohols. HPLC.

### Ordering information: Polyvinylidene Fluoride Hydrophilic Membrane

Pore Size	25 mm 100pk	47mm 100pk	90mm 25pk
0.22	3044272	3044270	3044271
0.45	3037802	3037800	3037801

## 3.1 Membranes for Filtration

### 3.1.10 - Polycarbonate Track Etched (PCTE) Membrane - Poretics™



#### Description and Use

GVS Life Sciences PCTE Membrane is made from a thin, microporous polycarbonate film material. It is ideally suited for use in blood assays and high-purity and general filtration.

Standard membrane is hydrophilic due to PVP treatment. PVP-free hydrophobic membrane also available.

#### Typical Applications

- General filtration
- Removal of red blood cells from plasma
- Flow control of reagents through assay
- Precise filtration and prefiltration

Table 2: Product Characteristics

Sterilization	Gamma Irradiation or Ethylene Oxide (EtO)
USP Class VI Testing	Passed
Extractables	Very Low
BSA Protein Binding	5 µg/cm²
Maximum Operating Temperature	284°F (140°C)
Sealing Compatibility	Ultrasonic, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.1 to 20 µm

#### Features and Benefits

- Absolute pore size and density:** Provides flow control for liquids moving through the membrane capturing 100 percent of cells larger than pore size
- Smooth, thin, glass-like surface:** Planar surface makes it ideal for particle identification by microscopy
- Superior strength:** Tensile strength of 207 bar (> 3000 psi) maintains pore size and density, and will not stretch
- Low extractables:** Ensures tests will be clean promoting consistent results
- Low protein binding:** Low binding of < 5 µg/cm² minimizes loss of protein analytes
- Negligible absorption/adsorption:** Maximizes critical solution recovery
- Available as hydrophilic or hydrophobic:** Allows for a wide range of product applications

Table 3: Nominal Product Characteristics

Thickness	5 - 12 µm
Refractive Indices	Birefringent at 1.584 and 1.625
Water Adsorption (% wt. gain 24-hr immersion)	0.24%
Residual Ash Weight Average	0.92 µg/cm²
Specific Gravity	0.94-0.97
Autoclavable	Yes
Leachables	Negligible
Wetting Characteristics	Hydrophilic or Hydrophobic
Wetting Agent (hydrophilic)	Polyvinylpyrrolidone (PVP)
Burst Strength Minimum	0.7 bar (10 psi)
Migration of Filter Media	0
Optical Properties	Semi-translucent

Table 4: Performance Characteristics

Pore Size (a) (µm)	Pore Density (b) (pores/cm²)	Nominal Thickness (c) (µm)	Min. Bubble Point (d) (psi)	Typical Flow Rates	
				Water (e) (mL/min/cm²)	Air (L/min/cm²)
20	4 x 10⁴	3	1	1000	11 (g)
14	5 x 10⁴	6	0.2	1400	63.5 (g)
12	1 x 10⁵	8	0.4	1250	63.5 (g)
10	1 x 10⁵	10	0.5	1150	34.5 (g)
8	1 x 10⁵	7	0.7	1000	30 (g)
5	4 x 10⁵	10	1.2	700	30 (g)
3	2 x 10⁶	9	2	440	37.5 (g)
2	2 x 10⁶	10	3	300	16.5 (f)
1	2 x 10⁷	11	6	130	20 (f)
0.8	3 x 10⁷	9	7	90	18 (f)
0.6	3 x 10⁷	9	9	60	7.5 (f)
0.4	1 x 10⁸	10	12	33	7.5 (f)
0.2	3 x 10⁸	10	20	10	3 (f)
0.1	4 x 10⁸	6	30	2.5	1.5 (f)
0.08	4 x 10⁸	6	38	0.6	0.75 (f)
0.05	6 x 10⁸	6	50	0.4	0.37 (f)
0.03	6 x 10⁸	6	NA	0.2	0.075 (f)
0.01	6 x 10⁸	6	NA	0.1	0.0075 (f)

(a) Tolerance + 0%, -20%

(b) Tolerance + / - 15%

(c) Tolerance + / - 10%

(d) Measured using Isopropanol (IPA)

(e) Initial flow rates using prefiltered water at 10 psid (0.7 kg/cm²)

(f) Initial flow rates using prefiltered air at 10 psid (0.7 kg/cm²)

(g) Initial flow rates using prefiltered air at 5 psi (0.35 kg/cm²)

# FILTRATION MEMBRANES

## Precise Pore Size and Density

GVS Life Sciences PCTE Membrane is produced through a two-step, proprietary manufacturing process that employs high quality standards. This unique process allows for increased control over pore size and density to ensure the physical properties of each membrane precisely fit your specifications.

The resulting membrane is a thin, translucent and microporous polycarbonate film with a smooth, flat surface. All particles larger than the pore size are captured on its surface. It is ideal for use when collecting samples for blood assays or for high-purity and general filtration.

## Flexibility for OEM Requirements

GVS Life Sciences PCTE Membrane is available in rolls measuring 0.66 - 50 cm (1.0 to 20 inches) wide, or sheets, cut disks, capsules and cartridges, with pore sizes ranging from 0.01  $\mu\text{m}$  to 20  $\mu\text{m}$ . This membrane is also available with a black surface for special use in staining applications, or in its natural hydrophobic state for use in chemotaxis. All varieties of the membrane can be custom manufactured to meet your specific membrane size, pore size and pore densities requirements. Tables 2, 3 and 4 show the product and performance characteristics of the GVS Life Sciences PCTE Membrane.

### Ordering information: Polycarbonate Track Etched (PCTE) AOX Membrane

Dimensions Packaging	25mm 100/pk	47mm 100/pk	
Pore sizes	0.4 $\mu\text{m}$	3026431	1215071

### Ordering information: Polycarbonate Track Etched (PCTE) Hydrophilic Black Membrane

Dimensions Packaging	13mm 100/pk	25mm 100/pk	47mm 100/pk	293 20/pk	203x254mm 100/pk
Pore sizes	0.1 $\mu\text{m}$	1215311	1215315	1221503	3048982
0.2 $\mu\text{m}$	1215185	1215609	1213889	3027176	
0.4 $\mu\text{m}$	1215142	1212790	1214567		1227213
0.6 $\mu\text{m}$	1222025	1215290	1215198	3048300	3054144*
0.8 $\mu\text{m}$	1215236	1215138	1222028	3022140	
1 $\mu\text{m}$	1221181	1215161	1222035		
2 $\mu\text{m}$		1215297		3033301	
3 $\mu\text{m}$		1222452	3032159	3033302	
5 $\mu\text{m}$	1221286	1215188	1221230		
8 $\mu\text{m}$		1229540			1236363

\*100/pk

### Ordering information: Polycarbonate Track Etched (PCTE) Hydrophilic Membrane (sheets/rolls)

Dimensions Packaging	19x42mm 100/pk	25x80mm 50/pk	203x254mm 30/pk	300x3000mm 1/pk
Pore sizes	0.01 $\mu\text{m}$		1215116	1225184
0.03 $\mu\text{m}$			1227264	1239558
0.05 $\mu\text{m}$			1215271	3027177
0.08 $\mu\text{m}$				
0.1 $\mu\text{m}$			1215117	1239556
0.2 $\mu\text{m}$			1215118	1239557
0.4 $\mu\text{m}$			1215274	
0.6 $\mu\text{m}$			1222027	3034261
0.8 $\mu\text{m}$			1222030	
1 $\mu\text{m}$		1268126	1221429	1267667
2 $\mu\text{m}$			1221232	3034567
3 $\mu\text{m}$	3019515		1215275	3002536
5 $\mu\text{m}$	1221295	1215041	1222080	1264835
8 $\mu\text{m}$	1220867	1220686	1222085	3033093
10 $\mu\text{m}$			1220823	3033092
12 $\mu\text{m}$				1235494
20 $\mu\text{m}$			1221231	

### 3.1 Membranes for Filtration

#### Ordering information: Polycarbonate Track Etched (PCTE) PVPF Hydrophobic Membrane

Dimensions Packaging	13mm 100/pk	25mm 100/pk	47mm 100/pk	90mm 30/pk	203x254mm 100/pk	25x80 50/pk
0.1 $\mu\text{m}$	1221504	1215059			1232919	
0.2 $\mu\text{m}$		1222017	1222018		1223036	
0.4 $\mu\text{m}$		1220835	1215073		1233373	
0.8 $\mu\text{m}$		1222032				
1.0 $\mu\text{m}$		1222037	1222038		1224067	
3.0 $\mu\text{m}$	1215050	1221871	1222077		1228132	1221296
5.0 $\mu\text{m}$	1215051	1221746	1222081	1222082	1225120	1221331
8.0 $\mu\text{m}$	1215052	1221293	1215148	1222086	1225783	1215042
10.0 $\mu\text{m}$	1215053	1222089	1220941		1234298	1215043
12.0 $\mu\text{m}$	1215055	1221300				1215044
14.0 $\mu\text{m}$	1221297					

#### Ordering information: Polycarbonate Track Etched (PCTE) Hydrophilic Membrane (disks)

Dimensions Packaging	13mm 100/pk	19mm 100/pk	25mm 100/pk	37mm 100/pk	47mm 100/pk
0.01 $\mu\text{m}$	1215046	1227352	1215321		1215068
0.03 $\mu\text{m}$	1215047		1215057		1215069
0.05 $\mu\text{m}$	1215048	1221229	1220868		1215070
0.08 $\mu\text{m}$	1222092	1220668	1215058		1222093
0.1 $\mu\text{m}$	1215605	1215056	1215606		1215608
0.2 $\mu\text{m}$	1215610	1220694	1215611		1215612
0.4 $\mu\text{m}$	1215613	1215147	1215614	1215615	1215617
0.6 $\mu\text{m}$	1215618		1215619		1215620
0.8 $\mu\text{m}$	1215621		1215622	1215623	1215624
1 $\mu\text{m}$	1215625	1227203	1215627	1221302	1215628
2 $\mu\text{m}$	1215985		1215062		1215629
3 $\mu\text{m}$	1215049		1215063		1215036
5 $\mu\text{m}$	1215630		1215631		1215632
8 $\mu\text{m}$	1215633	3013894	1215634		1215637
10 $\mu\text{m}$	1221009		1215638		1212661
12 $\mu\text{m}$	1215054		1215984		3027598
14 $\mu\text{m}$	1222063	3013893	1222064		1215077
20 $\mu\text{m}$	1222072		1222073		1215078

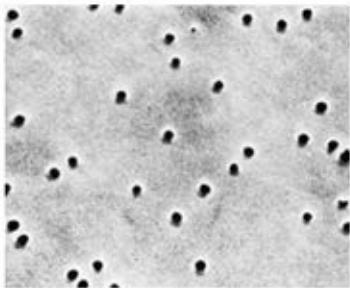
# FILTRATION MEMBRANES

## Ordering information: Polycarbonate Track Etched (PCTE) Hydrophilic Membrane (disks)

Dimensions Packaging	62mm 100/pk	76mm 30/pk	78mm 100/pk	90mm 30/pk	142mm 20/pk	293mm 20/pk
0.01 $\mu\text{m}$			3032862	1220988		
0.03 $\mu\text{m}$				1220987		
0.05 $\mu\text{m}$			1221291	1221227	1221290	1222091
0.08 $\mu\text{m}$				1222094	1222095	1222096
0.1 $\mu\text{m}$			1220970	1215150	1215304	1215219
0.2 $\mu\text{m}$	3038824		1220891	1215151	1215215	1215385
0.4 $\mu\text{m}$	3023783		1228342	1215303	1215152	1215317
0.6 $\mu\text{m}$		1224680		1222028	1221485	1220861
0.8 $\mu\text{m}$			1225894	1215194	1215309	
1 $\mu\text{m}$			1220860	1215153	1216611	1215145
2 $\mu\text{m}$				1222070	1222071	1221005
3 $\mu\text{m}$	3023784		3013824	1222074		1222075
5 $\mu\text{m}$	3023785		3013825	1221004	1215388	1221329
8 $\mu\text{m}$			3034848	1215403	1215201	1222084
10 $\mu\text{m}$			1267014	1222482	1221292	1222088
12 $\mu\text{m}$			1264834	1239192		
14 $\mu\text{m}$				1222479		

## 3.1 Membranes for Filtration

### 3.1.11 - Polyester Track Etched (PETE) Membrane - Poretics™



#### Typical Applications

- General filtration
- Removal of red blood cells from plasma
- Flow control of reagents through assay
- Precise filtration and prefiltration

#### Flexibility for OEM Requirements

GVS Life Sciences PETE Membrane is available in rolls measuring 25mm to 50.8cm (1.0 to 20 inches) wide, or sheets, cut disks, capsules and cartridges, with pore sizes ranging from 0.2 $\mu$ m to 10 $\mu$ m. The membrane can be custom manufactured to meet your specific membrane size, pore size and pore density requirements.

#### Product Uniformity and High Sensitivity Maximize Performance

GVS Life Sciences PETE Membrane is produced through a two-step proprietary manufacturing process that employs high quality standards throughout production. This unique process allows for increased control over pore size and pore density to ensure the physical properties of each membrane precisely fit customer specifications.

The resulting membrane is a thin, translucent, microporous polyester film with a smooth, flat surface containing pores of controlled diameter and number. The membrane has better solvent resistance than polycarbonate and captures all particles smaller than the precisely controlled pore size on its surface. GVS Life Sciences PETE is ideal for use when analyzing blood samples or particle analysis by microscopy.

#### Description and Use

GVS Life Sciences PES is available in rolls up to 31 inches (0.66 - 79cm) wide, as well as sheets, cut disks, capsules, pleat packs and cartridges that can be customized to meet your application requirements. Because the GVS Life Sciences PES is manufactured on-site, all customization can be done easily and cost-effectively.

#### Features and Benefits

- Naturally hydrophilic
- High range of chemical compatibility: Resistant to a wide range of chemicals
- Smooth, thin, glass-like surface: Captures all particles on the surface larger than the pore size
- Precise pore size and density: Provides flow control for liquids moving through the membrane capturing 100 percent of cells larger than pore size
- Low extractables: Ensures tests will be clean promoting consistent results
- Low protein binding: Low binding prohibits absorption of cells being filtered
- Negligible absorption/adsorption: Maximizes critical solution recovery

Table 2: Product Characteristics

Sterilization	Gamma Irradiation or Ethylene Oxide (EtO)
USP Class VI Testing	Passed
Thickness	10 - 20 $\mu$ m
Extractables	Low
BSA Protein Binding	< 5 $\mu$ g/cm <sup>2</sup>
Maximum Operating Temperature	284°F (140°C)
Sealing Compatibility	Ultrasonic, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.2 to 10 $\mu$ m

Table 3: Nominal Product Characteristics

Water Adsorption (% wt. gain 24-hr immersion)	0.24%
Residual Ash Weight Average	0.92 $\mu$ g/cm <sup>2</sup>
Specific Gravity	0.94-0.97
Autoclavable	Yes
Leachables	Negligible
Wetting Characteristics	Naturally Hydrophilic
Burst Strength Minimum	0.7 bar (10 psi)
Migration of Filter Media	0
Optical Properties	Semi-translucent

Table 4: Performance Characteristics

Pore Size (a) ( $\mu$ m)	Pore Density (b) (pores/cm <sup>2</sup> )	Nominal Thickness (c) ( $\mu$ m)	Min. Bubble Point (d) (psi)	Typical Flow Rates	
				Water (e) (mL/min/cm <sup>2</sup> )	Air (L/min/cm <sup>2</sup> )
10	1 x 10 <sup>5</sup>	9	0.5	1150	34.5 (g)
8	1 x 10 <sup>5</sup>	7	0.7	1000	30 (g)
5	4 x 10 <sup>5</sup>	10	1.2	700	30 (g)
3	2 x 10 <sup>6</sup>	9	2	440	37.5 (g)
2	2 x 10 <sup>6</sup>	10	3	300	16.5 (f)
1	2 x 10 <sup>7</sup>	11	6	130	20 (f)
0.8	3 x 10 <sup>7</sup>	9	7	90	18 (f)
0.6	3 x 10 <sup>7</sup>	9	9	60	7.5 (f)
0.4	1 x 10 <sup>8</sup>	10	12	33	7.5 (f)
0.2	3 x 10 <sup>8</sup>	10	20	10	3 (f)

- (a) Tolerance + 0%, -20%  
(b) Tolerance + / - 15%  
(c) Tolerance + / - 10%  
(d) Measured using Isopropanol (IPA)  
(e) Initial flow rates using prefiltered water at 10 psid (0.7 kg/cm<sup>2</sup>)  
(f) Initial flow rates using prefiltered air at 10 psid (0.7 kg/cm<sup>2</sup>)  
(g) Initial flow rates using prefiltered air at 5 psi (0.35 kg/cm<sup>2</sup>)

# FILTRATION MEMBRANES

## Ordering information: Polyester Track Etched (PETE) Membrane

Dimensions Packaging	13mm 100/pk	25mm 100/pk	47mm 100/pk	90mm 30/pk	142mm* 20/pk	293mm 20/pk	203x254mm 30/pk	
Pore sizes	0.2 µm	1220969	1221383	1215288	1222240	1221385		1220886
	0.4 µm	1221387	1221388	1215373	1220702	1221389		1222242
	0.8 µm	1221397	1221398	1215374	1221399		1221401	1222246
	1.0 µm	1215379	1215308	1220871	1221402	1222248	1222249	1221334
	2.0 µm	1221403	1221404	1221405	1221406			1222251
	3.0 µm	1221409	1221410	1215367	1222253	1221411	1221412	1222254
	5.0 µm	1215324	1221413	1215183	1221414	1221415	1221416	1222256
	8.0 µm	1221417	1221418	1221419	1221420			1222258
	10.0 µm	1221423	1220827	1215173	1221424		1221426	1222260

\*Bulk packaging available

## 3.1.12 - Drain Disc



### Description and Use

The polyester spun-bonded "drain" type disc prevents "pore blinding" or blockage of the capillary pores in screen membranes resulting in higher flow rates and increased throughputs. The new drain disc also increases flow and capture ability by lifting off of screen supports and exposing all the pores. This ensures efficient performance when placed between two filters in a serial filtration stack too. The spacers prevent air locking of the downstream screen, or function as filters by binding a percentage of pores in the upstream filter. The spacer may be sized to fit within the diameter of the O-ring in the filter holder. For example , use a 42 mm spacer under a 47 mm filter.

### Features and Benefits

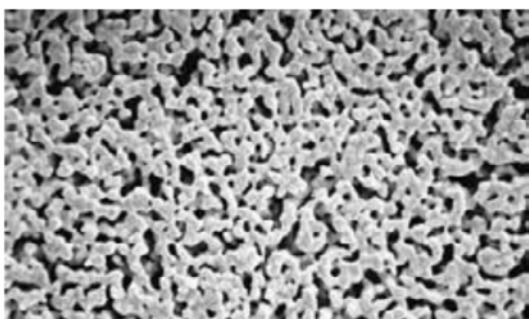
- Frequently used with PCTE (Polycarbonate) and PETE (Polyester) membranes to increase flow
- Spacer between stacked membranes

## Ordering information: Drain disc

Product Code	Description
1215141	FLT, Drain Disc, 25 mm, 100/pk
1215163	FLT, Drain Disc, 47 mm, 100/pk
1215218	FLT, Drain Disc, 13 mm, 100/pk
1215500	FLT, Drain Disc, 42 mm, 100/pk
1215522	FLT, Drain Disc, 124 mm, 25/pk
1215534	FLT, Drain Disc, 257 mm, 25/pk
1221182	FLT, Drain Disc, 90 mm, 25/pk
3007164	FLT, Drain Disc, 293 mm, 25/pk
3008749	FLT, Drain Disc, 275 mm, 25/pk
3014223	FLT, Drain Disc, 30 x 30 cm, 25/pk
3014503	FLT, Drain Disc, 50 x 55 mm, 100/pk
1238010	FLT, Drain Disc, 37 mm, 100/pk
Clearing Glass Slides	
1215730	Clearing Glass Slides for Track etched membranes 100 szt./op.

## 3.1 Membranes for Filtration

### 3.1.13 - Silver Membrane



GVS Life Sciences silver membranes are composed entirely of 99.97% pure metallic silver. They combine excellent chemical resistance and high-temperature characteristics with a retention range of  $0.2\mu\text{m}$  to  $5\mu\text{m}$ . Although silver membranes are used in a large number and variety of applications, their unique chemical and thermal stability is especially valuable for those applications involving aggressive fluids and/or high temperatures. They are ideal collection media for analysis of crystalline silica by X-ray diffraction and for analysis of organic materials by other instrumentation techniques, such as the analysis of Polyaromatic Hydrocarbons (PAH) and Total Organic Carbons (TOC).

Most applications of silver membranes can be divided into two broad categories: clarification/polishing and analytical. In the use of the silver membrane, orientation of the membrane can be important. There is a distinct difference in surface

characteristics of the silver membrane, with one side appearing shinier than the other. For scanning electron microscopy, use the shinier side. For all other filtration applications and analytical work, including X-ray diffraction, the duller of the two sides should be used.

#### Features and Benefits

- 99.97% pure silver
- High temperature resistance
- Tolerant of chemically or aggressive fluids
- Economical - can be cleaned & reused
- No dissolution or migration of the filter
- Smooth surface for particle capture and easy observation
- Intrinsic bacteriostatic property

#### Applications

- Airborne asbestos fibers by X-ray diffraction
- Dissolved Organic Carbons (DOC)
- Analysis of airborne silica in foundries, glass plants, quarries, mines, ceramic
- X-ray diffraction applications
- Coke oven emissions analysis
- Carbon and carbon black
- Fly ash - high temperature
- Cleaning liquids, coolants, dopant gases and photoresists

#### Ordering information: Silver Membrane

Pore sizes	Dimensions Packaging	13mm 100/pk	25mm 50/pk	37mm 25/pk	47mm 25/pk
	0.22 $\mu\text{m}$		1145336	1145342	1145348
	0.45 $\mu\text{m}$		1145335	1145341	1145347
	0.8 $\mu\text{m}$	1145328	1145334		1145346
	1.2 $\mu\text{m}$		1145333		1145345
	3.0 $\mu\text{m}$		1145332		
	5.0 $\mu\text{m}$		1145331	1145337	1145343

# FILTRATION MEMBRANES

## **3.2 Filter Papers**

### **3.2.1 - Qualitative Papers**

## ***Low Ash / Very Fast***



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
85	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
210	> 30
<b>Retention (μm)</b>	<b>General Application</b>
20-25	Qualitative analysis
<b>Ash content %</b>	Analysis of Biological and organic fluids.
< 0,06	Air monitoring
<b>Filtration Time for Distilled Water (secs)</b>	Food analysis
10	

## **Ordering information**

Product Code	Description
FP090DXF04QALC01	Qualitative Papers - Low Ash - Very Fast, 20.00 µm retention, Ø90 mm, 210 µm thickness
FP110DXF04QALC01	Qualitative Papers - Low Ash - Very Fast, 20.00 µm retention, Ø110 mm, 210 µm thickness
FP125DXF04QALC01	Qualitative Papers - Low Ash - Very Fast, 20.00 µm retention, Ø125 mm, 210 µm thickness
FP150DXF04QALC01	Qualitative Papers - Low Ash - Very Fast, 20.00 µm retention, Ø150 mm, 210 µm thickness

**Box Dimension:** 090 / 0110: 11,7 x 12,0 x 30 cm - **Box Weight:** 090 / 0110: 110 g - **Quantity / Box:** 100 Units  
0125: 13,5 x 13,7 x 30 cm 0125: 145 g  
0150: 15,7 x 15,7 x 30 cm 0150: 180 g

**Detailed Application:** Very fast filtration combined with excellent retention of particles and precipitates (ferric and aluminum hydroxide). Rapid filter for clean-up of biological fluids or organic extracts. High flow rates in air monitoring. Analysis in food industry.

### ***Low Ash / Medium***



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
85	90, 110, 125, and 150 mm
<b>Thickness (µm)</b>	<b>Wet Bursting Strength (kPa)</b>
190	>5
<b>Retention (µm)</b>	<b>General Application</b>
10	Qualitative analysis
<b>Ash content %</b>	Clarifying liquids.
<0,06	Soil analysis and seed testing
<b>Filtration Time for Distilled Water (secs)</b>	Food analysis
45	Air monitoring

## **Ordering information**

Product Code	Description
FP090DME01QALC01	Qualitative Papers - Low Ash - Medium, 10.00 $\mu\text{m}$ retention, Ø90 mm, 190 $\mu\text{m}$ thickness
FP110DME01QALC01	Qualitative Papers - Low Ash - Medium, 10.00 $\mu\text{m}$ retention, Ø110 mm, 190 $\mu\text{m}$ thickness
FP125DME01QALC01	Qualitative Papers - Low Ash - Medium, 10.00 $\mu\text{m}$ retention, Ø125 mm, 190 $\mu\text{m}$ thickness
FP150DME01QALC01	Qualitative Papers - Low Ash - Medium, 10.00 $\mu\text{m}$ retention, Ø150 mm, 190 $\mu\text{m}$ thickness

**Box Dimension:** Ø90 / Ø110: 11,7 x 12,0 x 30 cm - **Box Weight:** Ø90 / Ø110: 110 g - **Quantity / Box:** 100 Units  
Ø125: 13,5 x 13,7 x 30 cm Ø125: 145 g  
Ø150: 15,7 x 15,7 x 30 cm Ø150: 180 g

**Detailed Application:** Medium retention and flow rate. Wide range of applications. Separation of precipitates (lead sulfate, calcium oxalate, calcium carbonate). Soil analysis. Seed testing. Separation of solid foodstuff or extracting liquid. Atmospheric dust collection. Gas detection. Rapid filtration of fine precipitates.

## 3.2 Filter Papers

### Low Ash / Medium-Slow



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
85	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
180	> 5
<b>Retention (μm)</b>	<b>General Application</b>
7	Qualitative analysis
<b>Ash content %</b>	General filtration
< 0,06	Soil analysis
<b>Filtration Time for Distilled Water (secs)</b>	Air monitoring
60	

### Ordering information

Product Code	Description
FP090DMS02QALC01	Qualitative Papers - Low Ash - Medium-Slow, 7.00 μm retention, Ø90 mm, 180 μm thickness
FP110DMS02QALC01	Qualitative Papers - Low Ash - Medium-Slow, 7.00 μm retention, Ø110 mm, 180 μm thickness
FP125DMS02QALC01	Qualitative Papers - Low Ash - Medium-Slow, 7.00 μm retention, Ø125 mm, 180 μm thickness
FP150DMS02QALC01	Qualitative Papers - Low Ash - Medium-Slow, 7.00 μm retention, Ø150 mm, 180 μm thickness

**Box Dimension:** Ø90 / Ø110: 11,7 x 12,0 x 30 cm - **Box Weight:** Ø90 / Ø110: 110 g - **Quantity / Box:** 100 Units  
 Ø125: 13,5 x 13,7 x 30 cm Ø125: 145 g  
 Ø150: 15,7 x 15,7 x 30 cm Ø150: 180 g

**Detailed Application:** Medium-high retention and medium-slow filtration speed. Filtration of fine precipitates; Monitoring of specific contaminants in environment and soil tests.

### Low Ash / Medium-Slow/Thick



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
200	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
320	> 15
<b>Retention (μm)</b>	<b>General Application</b>
5	Qualitative analysis
<b>Ash content %</b>	Buchner funnels
< 0,06	High absorbency
<b>Filtration Time for Distilled Water (secs)</b>	
55	

### Ordering information

Product Code	Description
FP090DMS03QLTC01	Qualitative Papers - Low Ash - Medium-Slow, 5.0 μm retention, Ø90 mm, 320 μm thickness
FP110DMS03QLTC01	Qualitative Papers - Low Ash - Medium-Slow, 5.0 μm retention, Ø110 mm, 320 μm thickness
FP125DMS03QLTC01	Qualitative Papers - Low Ash - Medium-Slow, 5.0 μm retention, Ø125 mm, 320 μm thickness
FP150DMS03QLTC01	Qualitative Papers - Low Ash - Medium-Slow, 5.0 μm retention, Ø150 mm, 320 μm thickness

**Box Dimension:** Ø90 / Ø110: 11,7 x 12,0 x 30 cm - **Box Weight:** Ø90 / Ø110: 110 g - **Quantity / Box:** 100 Units  
 Ø125: 13,5 x 13,7 x 30 cm Ø125: 145 g  
 Ø150: 15,7 x 15,7 x 30 cm Ø150: 180 g

**Detailed Application:** Detailed Application: Medium-high retention and medium-slow filtration speed, with double thickness. Suitable for Buchner funnels. Sample carrier paper for loading greater quantities of solutes due to the high absorbency.

# FILTRATION MEMBRANES

## ***Low Ash / Very Slow***



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
85 - 170	90, 110, 125, and 150 mm
<b>Thickness</b>	<b>Wet Bursting Strength (kPa)</b>
170	>20
<b>Retention (µm)</b>	<b>General Application</b>
3	Qualitative analysis
<b>Ash content %</b>	Clarifying liquids
<0,06	Water analysis
<b>Filtration Time for Distilled Water (secs)</b>	Soil analysis
300	

## **Ordering information**

Product Code	Description
FP090DXS05QALC01	Qualitative Papers - Low Ash - Very Slow, 3.0 $\mu\text{m}$ retention, Ø90 mm, 170 $\mu\text{m}$ thickness
FP110DXS05QALC01	Qualitative Papers - Low Ash - Very Slow, 3.0 $\mu\text{m}$ retention, Ø110 mm, 170 $\mu\text{m}$ thickness
FP125DXS05QALC01	Qualitative Papers - Low Ash - Very Slow, 3.0 $\mu\text{m}$ retention, Ø125 mm, 170 $\mu\text{m}$ thickness
FP150DXS05QALC01	Qualitative Papers - Low Ash - Very Slow, 3.0 $\mu\text{m}$ retention, Ø150 mm, 170 $\mu\text{m}$ thickness

**Box Dimension:** Ø90 / Ø110; 11,7 x 12,0 x 30 cm - **Box Weight:** Ø90 / Ø110: 110 g - **Quantity / Box:** 100 Units  
Ø125: 13,5 x 13,7 x 30 cm Ø125: 145 g  
Ø150: 15,7 x 15,7 x 30 cm Ø150: 180 g

**Detailed Application:** Maximum particle retention. Slow flow rate. High retention of fine particles in chemical analysis. Clarification of cloudy suspensions (wine); Water and soil analysis.

### **3.2.2 - Quantitative Papers**

## **Ashless / Fast**



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
80	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
190	40
<b>Retention (μm)</b>	<b>General Application</b>
20	Quantitative analysis
<b>Ash content %</b>	Air monitorin
< 0,007	
<b>Filtration Time for Distilled Water (secs)</b>	
21	

## **Ordering information**

Product Code	Description
FP090DFA41QANC01	Quantitative Papers - Ashless - Fast, 20.00 µm retention, Ø90 mm, 190 µm thickness
FP110DFA41QANC01	Quantitative Papers - Ashless - Fast, 20.00 µm retention, Ø110 mm, 190 µm thickness
FP125DFA41QANC01	Quantitative Papers - Ashless - Fast, 20.00 µm retention, Ø125 mm, 190 µm thickness
FP150DFA41QANC01	Quantitative Papers - Ashless - Fast, 20.00 µm retention, Ø150 mm, 190 µm thickness

**Box Dimension:** 090 / 0110: 11,7 x 12,0 x 30 cm - **Box Weight:** 090 / 0110: 110 g - **Quantity / Box:** 100 Units  
0125: 13,5 x 13,7 x 30 cm 0125: 145 g  
0150: 15,7 x 15,7 x 30 cm 0150: 180 g

**Detailed Application:** Very fast ashless filter paper. Analytical procedures with large particles or gelatinous precipitates (iron or aluminum hydroxides). Air pollution analysis to determinate gaseous compounds.

## ***3.2 Filter Papers***

## **Ashless / Medium**



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
80	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
180	30
<b>Retention (μm)</b>	<b>General Application</b>
14	Quantitative analysis
<b>Ash content %</b>	Food analysis
< 0,007	Soil analysis
<b>Filtration Time for Distilled Water (secs)</b>	Industrial analysis
50	

## **Ordering information**

Product Code	Description
FP090DME43QANC01	Quantitative Papers - Ashless - Medium, 14.00 µm retention, Ø90 mm, 180 µm thickness
FP110DME43QANC01	Quantitative Papers - Ashless - Medium, 14.00 µm retention, Ø110 mm, 180 µm thickness
FP125DME43QANC01	Quantitative Papers - Ashless - Medium, 14.00 µm retention, Ø125 mm, 180 µm thickness
FP150DME43QANC01	Quantitative Papers - Ashless - Medium, 14.00 µm retention, Ø150 mm, 180 µm thickness

**Box Dimension:** 090 / 0110: 11,7 x 12,0 x 30 cm - **Box Weight:** 090 / 0110: 110 g - **Quantity / Box:** 100 Units  
0125: 13,5 x 13,7 x 30 cm 0125: 145 g  
0150: 15,7 x 15,7 x 30 cm 0150: 180 g

**Detailed Application:** Medium retention and fast flow. Foodstuff and soil analysis. Air pollution monitoring. Analysis in mining, construction and steel industries.

### **Ashless / Medium-Slow**



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
80	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
14	36
<b>Retention (μm)</b>	<b>General Application</b>
7	Quantitative analysis
<b>Ash content %</b>	Gravimetric analysis
< 0,007	Soil analysis
<b>Filtration Time for Distilled Water (secs)</b>	Air monitoring
50	

#### **Ordering information**

Product Code	Description
FP090DMS40QANCO1	Quantitative Papers - Ashless - Medium-Slow, 7.00 µm retention Ø90 mm, 170 µm thickness
FP110DMS40QANCO1	Quantitative Papers - Ashless - Medium-Slow, 7.00 µm retention, Ø110 mm, 170 µm thickness
FP125DMS40QANCO1	Quantitative Papers - Ashless - Medium-Slow, 7.00 µm retention, Ø125 mm, 170 µm thickness
FP150DMS40QANCO1	Quantitative Papers - Ashless - Medium-Slow, 7.00 µm retention, Ø150 mm, 170 µm thickness

**Box Dimension:** Ø90 / Ø110: 11,7 x 12,0 x 30 cm - **Box Weight:** Ø90 / Ø110: 110 g - **Quantity / Box:** 100 Units  
Ø125: 13,5 x 13,7 x 30 cm Ø125: 145 g  
Ø150: 15,7 x 15,7 x 30 cm Ø150: 180 g

**Detailed Application:** Medium speed and retention. Analysis of components in cements, clays, iron and steel products. Soil analysis. Sediments in milk. Filtration of solutions prior to atomic absorption spectrophotometry: High purity filter in atmosphere analysis.

# FILTRATION MEMBRANES

## **Ashless / Slow**



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
80	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
160	52
<b>Retention (μm)</b>	<b>General Application</b>
2	Quantitative analysis
<b>Ash content %</b>	
< 0,007	
<b>Filtration Time for Distilled Water (secs)</b>	
292	

## **Ordering information**

Product Code	Description
FP090DSL44QANC01	Quantitative Papers - Ashless - Slow, 2.00 µm retention Ø90 mm, 160 µm thickness
FP110DSL44QANC01	Quantitative Papers - Ashless - Slow, 2.00 µm retention, Ø110 mm, 160 µm thickness
FP125DSL44QANC01	Quantitative Papers - Ashless - Slow, 2.00 µm retention, Ø125 mm, 160 µm thickness
FP150DSL44QANC01	Quantitative Papers - Ashless - Slow, 2.00 µm retention, Ø150 mm, 160 µm thickness

**Box Dimension:** 090 / 0110: 11,7 x 12,0 x 30 cm - **Box Weight:** 090 / 0110: 110 g - **Quantity / Box:** 100 Units  
0125: 13,5 x 13,7 x 30 cm      0125: 145 g  
0150: 15,7 x 15,7 x 30 cm      0150: 180 g

**Detailed Application:** Slow flow rate. Very high retention. Very fine crystalline precipitates.

## ***Ashless / Very Slow***



<b>Weight (g/m<sup>2</sup>)</b>	<b>Diameter (mm)</b>
100	90, 110, 125, and 150 mm
<b>Thickness (μm)</b>	<b>Wet Bursting Strength (kPa)</b>
160	52
<b>Retention (μm)</b>	<b>General Application</b>
2	Quantitative analysis
<b>Ash content %</b>	Critical gravimetric analysis.
<0,007	
<b>Filtration Time for Distilled Water (secs)</b>	
292	

## **Ordering information**

Product Code	Description
FP090DXS42QANCO1	Quantitative Papers - Ashless - Very Slow, 2.00 $\mu\text{m}$ retention Ø90 mm, 160 $\mu\text{m}$ thickness
FP110DXS42QANCO1	Quantitative Papers - Ashless - Very Slow, 2.00 $\mu\text{m}$ retention, Ø11, 160 $\mu\text{m}$ thickness
FP125DXS42QANCO1	Quantitative Papers - Ashless - Very Slow, 2.00 $\mu\text{m}$ retention Ø125 mm, 160 $\mu\text{m}$ thickness
FP150DXS42QANCO1	Quantitative Papers - Ashless - Very Slow, 2.00 $\mu\text{m}$ retention Ø150 mm, 160 $\mu\text{m}$ thickness

**Box Dimension:** 090 / 0110: 11,7 x 12,0 x 30 cm - **Box Weight:** 090 / 0110: 110 g - **Quantity / Box:** 100 Units  
0125: 13,5 x 13,7 x 30 cm 0125: 145 g  
0150: 15,7 x 15,7 x 30 cm 0150: 180 g

**Detailed Application:** Highest retention and very slow flow. Extremely difficult filtrations. Analytical precipitates: barium sulphate, metastannic acid and finely precipitated calcium carbonate.

## ***3.2 Filter Papers***

### ***3.2.3 Glass Microfiber***

Fast



<b>Weight (g/m<sup>2</sup>)</b>	52	<b>Diameter (mm)</b>	47, 55, 90, 110 and 125 mm
<b>Thickness (µm)</b>	0,26	<b>Dry Bursting Strength (kPa)</b>	20
<b>Retention (µm)</b>	1,6	<b>Max. Operating Temperature (°C)</b>	500
<b>Filtration Time for Distilled Water (secs)</b>	40	<b>General Application</b>	General purpose laboratory filtration Food analysis Water analysis
<b>Air Resistance (mbar)</b>	36		

## **Ordering information**

Product Code	Description
FP047DFAFAGLFC01	Glass Microfiber - Fast, 1.60 µm retention, Ø47 mm, 0,26 mm thickness
FP055DFAFAGLFC01	Glass Microfiber - Fast, 1.60 µm retention Ø55 mm, 0,26 mm thickness
FP090DFAFAGLFC01	Glass Microfiber - Fast, 1.60 µm retention Ø90 mm, 0,26 mm thickness
FP110DFAFAGLFC01	Glass Microfiber - Fast, 1.60 µm retention Ø110 mm, 0,26 mm thickness
FP125DFAFAGLFC01	Glass Microfiber - Fast, 1.60 µm retention Ø125 mm, 0,26 mm thickness

**Box Dimension:** Ø47 / Ø55; 13,5 x 13,7 x 30 cm - **Box Weight:** Ø47: 102 g - **Quantity / Box:** 100 Units  
Ø90: 11,7 x 12,0 x 30 cm Ø55: 105 g  
Ø110 / Ø125: 15,7 x 15,7 x 30 cm Ø90: 108 g  
Ø110: 164 g  
Ø125: 180 g

**Detailed Application:** Fine retention with fast flow. Water pollution and air pollution monitoring. Foodstuff analyses. Protein filtration. Filtration of water, algae and bacteria cultures.

## *Medium*



<b>Weight (g/m<sup>2</sup>)</b>	53	<b>Diameter (mm)</b>	47, 55, 90, 110 and 125 mm
<b>Thickness (µm)</b>	0,26	<b>Dry Bursting Strength (kPa)</b>	20
<b>Retention (µm)</b>	1,2	<b>Max. Operating Temperature (°C)</b>	500
<b>Filtration Time for Distilled Water (secs)</b>		<b>General Application</b>	Cell culture Water analysis
<b>Air Resistance (mbar)</b>	51		

## **Ordering information**

Product Code	Description
FP047DMEFCGLFC01	Glass Microfiber - Medium, 1.20 µm retention, Ø47 mm, 0,26 mm thickness
FP055DMEFCGLFC01	Glass Microfiber - Medium, 1.20 µm retention, Ø55 mm, 0,26 mm thickness
FP090DMEFCGLFC01	Glass Microfiber - Medium, 1.20 µm retention, Ø90 mm, 0,26 mm thickness
FP110DMEFCGLFC01	Glass Microfiber - Medium, 1.20 µm retention, Ø110 mm, 0,26 mm thickness
FP125DMEFCGLFC01	Glass Microfiber - Medium, 1.20 µm retention, Ø125 mm, 0,26 mm thickness

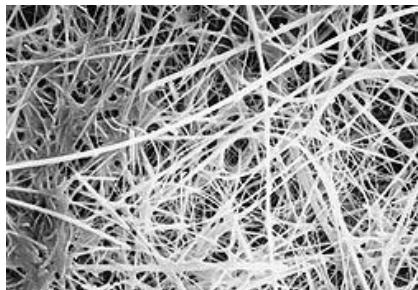
**Box Dimension:** Ø47 / Ø55: 13,5 x 13,7 x 30 cm - **Box Weight:** Ø47: 102 g - **Quantity / Box:** 100 Units  
Ø90: 11,7 x 12,0 x 30 cm Ø55: 105 g  
Ø110 / Ø125: 15,7 x 15,7 x 30 cm Ø90: 108 g  
Ø110: 164 g  
Ø125: 180 g

**Detailed Application:** Fine retention with medium flow. Suspended solids analysis in water and industrial wastes; Cell harvesting. Aqueous clarification and monitoring.

# FILTRATION MEMBRANES

## 3.3 Glass Fiber Filters - PreSep™

### Glass Fiber Filters with Binder



#### Description and Use

GVS Life Sciences Glass Fiber membranes are biologically inert, autoclavable and highly resistant to oxidizing agents and weak acids. Glass fiber can be used to extend the life of a final filter as a prefilter or they can be used alone for low cost sample clarification. GVS Life Sciences Glass Fiber membranes with binders are composed of borosilicate glass fibers woven into a porous matrix and bonded by an

acrylic resin. This bonding produces a filter that reduces media migration and has the strength required for high-volume aqueous filtrations. Glass Fiber membranes with a binder are usually recommended for filtrations of long duration under pressure. Glass Fiber membranes without binders are designed for solvent filtration or gravimetric analysis to avoid binder extractables. Filters without binders are recommended for analytical and gravimetric determinations.

#### Features and Benefits

- Acrylic binder
- High dirt holding capacity
- Biologically inert
- Bonding reduces media migration

### Ordering information: Glass Fiber Filters

Dimensions Packaging	10mm 100/pk	13mm 100/pk	22 mm 100/pk	25 mm 100/pk	42 mm 100/pk	47mm 100/pk	75 mm 25/pk	90 mm 25/pk
Pore sizes 0.5 µm			1215543	1215544	1215547	1215548	1215549	1215550
1.0 µm (G20)		1215557		1215559	1215561	1215562	1215563	1215564
1.0 µm (G25)	1215570	1215571	1215572	1215573	1215576	1215577	1215578	1215579

Dimensions Packaging	124 mm 25/pk	127 mm 25/pk	142 mm 25/pk	257 mm 25/pk	293 mm 25/pk	24x24 cm 10/pk
Pore sizes 0.5 µm	1215551		1215553	1215554	1215555	1266844
1.0 µm (G20)	1215565	1215566	1215567	1215568	1215569	1268603
1.0 µm (G25)	1215580		1215582	1215583	1215584	

### Ordering information: Glass Fiber Filters Binderless

Dimensions Packaging	6 mm 500/pk	7 mm 500/pk	10 mm 500/pk	25 mm 100/pk	37 mm 500/pk	47 mm 100/pk	65mm 100/pk	82 mm 100/pk
Pore sizes 0.7 µm		3029939		1215162		1215540		
1.0 µm	3003072		1214912	1213325*	1215588	1215589*	1221996	1214974

Dimensions Packaging	85 mm 100/pk	90 mm 25/pk	102 mm 100/pk	110 mm 25/pk	142 mm 25/pk	257 mm 100/pk	293 mm 25/pk
Pore sizes 0.7 µm		1215541			1215542		
1.0 µm	3015810	1225509 1212763**	1214671	3034573	3034574	1220678	1220887

\*500/pk \*\*100/pk

# TRANSFER MEMBRANES



# TRANSFER MEMBRANES

## 4. TRANSFER MEMBRANES

### 4.1 Neutral Nylon - MagnaNeutral™



#### Description and Use

GVS Life Sciences Neutral Nylon Transfer Membrane is a pure polymer impregnated by an inert polyester web. It is naturally hydrophilic and optimized for protein binding and for high, reproducible binding of nucleic acids.

#### Features and Benefits

- Supported:** Has added strength and durability preventing distortion or contamination in multiple reprobings
- High binding capacity:** With a nucleic acid binding capacity of approximately 350 µg/cm<sup>2</sup>, Magna Nylon - Transfer Membrane can bind a wide range of fragment sizes, increasing the efficiency of transfers
- Hydrophilic:** Eliminates the need for wetting agents that can potentially interfere with biological processes
- Lot-to-lot consistency:** Quality checks ensure lot-to-lot consistency, both down and across the polyester web, for dependable results every time

Table 2: Product Characteristics

USP Class VI testing	Passed
Thickness	65 - 125 µm
Extractables	< 0.2% (< 0.0015 mg/cm <sup>2</sup> )
Nucleic Acid Binding	350 µg/cm <sup>2</sup>
Maximum Operating Temperature	356°F (180°C)
Sealing Compatibility	Ultrasonics, Heat, Radio Frequency and Insert Molding
Pore Size Range	0.22 to 0.45 µm

#### Typical Applications

- Southern transfers
- Northern transfers
- Protein binding
- Microarrays
- Macroarrays
- Dot/Slot blots
- Radiolabeled detection systems
- Non-radiolabeled detection systems
- Colony lifts
- Plaque lifts
- Library screening

#### Reliable Quality, Increased Efficiencies

Produced through a proprietary manufacturing process, GVS Life Sciences Neutral Nylon Transfer Membrane meets rigorous quality standards throughout every step of production. This process generates consistent lot- to-lot binding among the membranes ensuring product uniformity.

This controlled microporous nylon membrane is cast on an inert, internal support web that gives it added dimensional strength and stability to prevent cracking, tearing, curling and breaking. This added strength and durability is essential in protocols that require aggressive handling, such as colony lifts and plaque lifts. In addition to the dimensional strength and durability of GVS Life Sciences Neutral Nylon Transfer Membrane, its retention of macromolecules can also be enhanced using UV cross-linking. This process can be used to maximize the signal retention of nucleic acids and preserve the integrity of DNA or RNA transfers. The purity and consistency of GVS Life Sciences Neutral Nylon Transfer Membrane, coupled with its added durability and sensitivity, make it an ideal membrane for use in medical research, scientific studies or test confirmations where precise biological pattern replications, such as DNA and RNA transfers, are integral to the success of the procedure.

#### Flexibility for OEM Requirements

GVS Life Sciences Neutral Nylon Transfer Membranes are available in rolls up to 13 inches (33cm) wide, as well as sheets, cut disk, and pleat packs that can be customized to meet your application and size requirements. Because the membrane is manufactured on-site, all customization is easy and cost-effective.

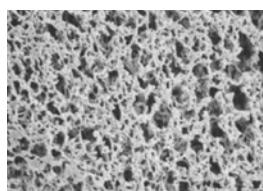


Figure 2: GVS Life Sciences Neutral Nylon Transfer Membrane

#### Ordering information: Neutral Nylon Transfer Membrane

Dimensions Packaging	82mm 50/pk	85mm 50/pk	132mm* 50/pk	137mm 50/pk	102x133mm 10/pk	115x160mm 10/pk	150x150mm 5/pk	200x200mm 5/pk	
Pore sizes	0.22 µm	1213409	1213410	1213411	1213412	1213422		1213416	1213419
	0.45 µm	1213370 1214428*	1213372	1213373 1214509*	1213375 1214245*	1213384	1213391	1213379	1213380 1215310**

\*100/pk   \*\*25/pk

Dimensions Packaging	220x220mm 5/pk	225x225mm 10/pk	300x300mm 5/pk	300x500mm 5/pk	150x3000mm 1/pk	200x3000mm 1/pk	300x3000mm 1/pk	4.75x11in 10/pk
Pore sizes	0.22 µm				1213442	1213441	1213405	
	0.45 µm	1213382	1224585	1213383	1213395	1213404	1213364	1214994

# TRANSFER MEMBRANES

## 4.2 Reprobing Charged Nylon - *MagnaProbe*™



### Description and Use

GVS Life Sciences Nylon Reprobing, Charged transfer membrane is an inherently charged nylon membrane, specifically designed to allow for numerous reprobings. GVS Life Sciences Nylon has been tested to provide consistent results through 12 or more reprobings.

### Ordering information: Reprobing Charged Nylon Transfer Membrane

Pore sizes	Dimensions Packaging	82mm 50/pk	82mm 100/pk	85mm 50/pk	132mm 50/pk	132mm 100/pk	137mm 50/pk	137mm 100/pk
0.45 µm		1226559	1226561	1226560	1226563	1226565	1226562	1226564
Pore sizes	Dimensions Packaging	102x133mm 10/pk	150x150mm 5/pk	150x150mm 25/pk	200x200mm 5/pk	200x200mm 25/pk	220x220mm 5/pk	300x300mm 5/pk
0.45 µm		1226570	1226566	1226572	1226567	1226573	1226568	1226569
Pore sizes	Dimensions Packaging	300x300mm 25/pk	300x500mm 5/pk	300x500mm 25/pk	150x3000mm 1/pk	200x3000mm 1/pk	300x3000mm 1/pk	
0.45 µm		1226575	1226571	1226574	1226558	1226557	1226556	

The high binding capacity of 450 mg/cm<sup>2</sup> makes GVS Life Sciences Nylon ideal for all Southern and Northern applications, including alkaline blotting. GVS Life Sciences Nylon is ideally suited for all probes both radioactive and non-radioactive, including chemiluminescent and biotinylated detection systems.

GVS Life Sciences Nylon offers significantly increased binding, maximum "lot-to-lot" consistency, and excellent signal retention. The inherent charge on this nylon membrane along with its hydrophilic nature makes consistent repeatable results a reality for researchers.

After 12 rounds of reprobing, GVS Life Sciences Nylon has a lower background and higher signal.

### Features and Benefits

- Supported charged nylon membrane
- Specifically designed for multiple reprobings
- Used for both radiolabelled & non-radiolabelled detection systems
- Can be used for alkaline blotting
- Nucleic acid binding is 450 µg/cm<sup>2</sup>

### Typical Applications

- Radiolabelled & non-radiolabelled detection systems
- Northerns
- Southerns
- Multiple Reprobings
- Alkaline Blotting
- UV Crosslinking

# TRANSFER MEMBRANES

## 4.3 Nitrocellulose (MCE) - NitroBind™



### Description and Use

GVS Life Sciences Pure Nitrocellulose Transfer Membrane is the membrane of choice for all protein or immunoblotting applications. The high sensitivity of GVS Life Sciences Pure Nitrocellulose Transfer Membrane ensures excellent results in all transfers, especially in protein blotting.

### Features & Benefits

- For procedures that require optimum resolution
- Membrane of choice for protein or immunoblotting applications
- Low background, easily blocked
- BSA binding capacity up to 100 $\mu$ g/cm<sup>2</sup>
- Wets out naturally
- Compatible with all detection systems

### Typical Applications

- Westerns
- Protein & immunoblotting
- Northerns
- Southern
- Dot/slot blots
- Radiographic, chromogenic and chemiluminescent detection systems

### Ordering information: Pure Nitrocellulose Transfer Membrane

	Dimensions(mm) Packaging	82 50/pk	82 100/pk	85 50/pk	132 50/pk	137 50/pk	70x84 10/pk	70x100 10/pk	90x120 10/pk	100x100 10/pk	102x133 10/pk	140x160 10/pk	150x150 5/pk
Pore sizes	0.22 $\mu$ m	1215459		1215460			1213991	1215394		1213999	1215466		1215463
	0.45 $\mu$ m	1215472	1214243	1215473	1215474	1215475 1221974*	1213888		1214911	1213314	1215481	1221981	1215476

	Dimensions(mm) Packaging	150x150 25/pk	200x200 5/pk	200x200 25/pk	220x220 5/pk	250x250 5/pk	300x300 5/pk	300x500 5/pk	300x500 25/pk	150x3m 1/pk	200x3m 1/pk	300x3m 1/pk
Pore sizes	0.22 $\mu$ m		1215464	1215392	1213121		1215465	1215467		1215470	1215469	1215458
	0.45 $\mu$ m	1215170	1215477	1221976	1215478	1223273	1215480	1215482	1221983	1215484	1215483	1215471

# TRANSFER MEMBRANES

## 4.4 Supported Nitrocellulose (MCE) - NitroPure™



### Description and Use

GVS Life Sciences Supported Nitrocellulose Transfer Membrane combines the binding characteristics of nitrocellulose membrane with the strength of nylon membrane. In all protocols using nitrocellulose transfer membrane, GVS Life Sciences Supported Nitrocellulose Transfer membrane may be substituted without requiring any changes to the protocol.

### Features & Benefits

- Supported for procedures requiring rigorous handling
- Strong - will not curl, bend or crack after baking
- High sensitivities, low backgrounds
- Multiple reprobing
- BSA binding capacity up to  $100\mu\text{g}/\text{cm}^2$
- Triton Free

### Typical Applications

- Northerns
- Southern
- Multiple re-hybridizations
- Colony/plaque lifts
- Dot/slot blots
- Radiographic detection systems
- Chemiluminescent detection systems
- Biotinylated detection systems

### Ordering information: Supported Nitrocellulose Transfer Membrane

Pore sizes	Dimensions(mm) Packaging	82 50/pk	85 50/pk	132 50/pk	137 50/pk	137 100/pk	70x84 10/pk	70x100 10/pk	90x120 10/pk	100x100 10/pk	100x150 10/pk	102x133 10/pk
0.22 $\mu\text{m}$		1212640		1214126					1222287	1214560		1213190
0.45 $\mu\text{m}$	1212591 1214247*	1212592	1212594	1215475 1221974**	1214248	1214978	1215319		1213943	1222295	1212600	

Pore sizes	Dimensions(mm) Packaging	140x160 25/pk	150x150 5/pk	200x200 5 /pk	200x200 25/pk	220x220 5/pk	300x300 5/pk	300x500 5/pk	150x3000 1/pk	200x3000 1/pk	300x3000 1/pk
0.22 $\mu\text{m}$			1212669	1212689			1213195	1213141	1212721	1212690	1212632
0.45 $\mu\text{m}$	1214935	1212596	1212597	1214762	1212598	1212599	1212601	1212604	1212602	1212590	

\* 100/pk \*\*gridded

# TRANSFER MEMBRANES

## 4.5 Polyvinylidene Fluoride - PVDF-Plus™



- **BSA protein binding capacity :** 125 mg/cm<sup>2</sup>
- **High range of chemical:** Resistant to most commonly used chemicals compatible with chemically aggressive solvents

### Typical Applications

- Western blots
- Immunoblotting
- Solid phase assays
- Amino acid or protein analyses

### Exceptional Strength and Chemical Compatibility

Exceptional Strength and Chemical Compatibility Produced through a proprietary manufacturing process, GVS Life Sciences PVDF Transfer Membrane meets rigorous quality standards throughout every step of production. This process generates membranes with consistent lot-to-lot protein binding and ensures excellent product uniformity.

GVS Life Sciences PVDF is a naturally hydrophobic, unsupported transfer membrane. It has a high binding capacity, which prevents protein from passing through the membrane, and a low background that provides for an excellent signal-noise ratio. It also has exceptional tensile strength, preventing it from cracking, tearing, breaking or curling.

This membrane also has broad chemical compatibility, which is important when used with common stains such as Amido Black, Colloidal Gold, Coomassie Blue, India Ink and Ponceau-S. GVS Life Sciences PVDF will not degrade, distort or shrink when a high concentration of methanol is used for destaining.

Its exceptional strength, high binding capacity and chemical compatibility make GVS Life Sciences PVDF ideal for use in Western blots, immunoblotting, and solid phase assays and plaque lifts.

### Flexibility for OEM Requirements

GVS Life Sciences PVDF Transfer Membrane is available in rolls from 0.6cm - 30cm (12 inches) wide, as well as sheets and cut disks that can be customized to meet your application and size requirements. Because the GVS Life Sciences PVDF Transfer Membrane is manufactured on-site in GVS Life Sciences facilities, all customization is easy and cost-effective.

### Description and Use

The GVS Life Sciences PVDF Transfer Membrane is a naturally hydrophobic, unsupported transfer membrane. It has a high binding capacity and low backgrounds and is ideal for use in protein binding applications such as Western blots, solid phase assays and immunoblotting procedures.

### Features & Benefits

- **Superior strength:** Can withstand aggressive handling or be used with automated equipment without breaking or tearing
- **Low extractables:** Ensures tests will be clean with consistent results
- **Exceptional sensitivity:** Detects low-level components
- **Hydrophobic:** For high protein binding
- **Lot-to-lot consistency:** Quality checks ensure consistent binding for dependable results every time

### Ordering information: PVDF (Polyvinylidene Fluoride) Transfer Membrane

Pore sizes	Dimensions(mm) Packaging	70x84 10/pk	90x100 10/pk	90x120 10/pk	100x100 10/pk	100x150 10/pk	100x200 10/pk	150x150 5/pk
0.22 µm		1214588	1222216	1214423				1215037
0.45 µm		1213992	1214558	1212642	1212644	1212643	1214391	1212636

Pore sizes	Dimensions(mm) Packaging	150x150 25/pk	200x200 5/pk	200x200 25/pk	240x240 10/pk	260x500 10/pk	150x3000 1/pk	200x3000 1/pk	300x3000 1/pk
0.22 µm			1215032				1214842	1214726	1214429
0.45 µm		1222218	1212637	1214802	1214600	1212638	1212781	1212783	1212639

# PROTEIN ARRAY



# PROTEIN ARRAY

## 5. FAST™ - protein array solutions



GVS Life Sciences, is proud to reintroduce the entire line of FAST protein microarray products:

- FAST Slides
- FAST PAK Starter Kits
- FAST Quant Kits for multiplexed immunoassays
- Full line of Buffers and Accessories
- Scanning, Data Analysis and Development Services

Brought to you by the team who developed and has improved the FAST line of products over the last decade, we welcome your business with products optimized for performance and reliability, using a Quality Management System registered to the ISO 9001 standard.

### BACKGROUND

Protein microarrays have begun to fulfill their great potential. They are now recognized as critical tools for proteomics, biomarker research and drug discovery. They allow discovery and analysis of protein expression patterns, posttranslational modifications and protein interactions involved in cell growth and differentiation, environmental and drug responses and disease progression such as in cancer. Cited in more than 150 publications, FAST Slides have proven to be the surface of choice for designing and building protein microarrays. The surface is a proprietary nitrocellulose coating that non-covalently binds proteins maintaining their native structure. Nitrocellulose provides a homogeneous 3-D surface for uniform protein binding and significantly greater binding capacity than 2-D or ultrathin coatings. With sensitivities down to attamoles (10-18 molar) and near quantitative capture over a broad dynamic range of four orders of magnitude, FAST Slides offer unparalleled detection ability, reproducibility and reliability.

### FAST PROTEIN ARRAYS ARE IDEAL FOR MANY APPLICATIONS

Protein arrays are now recognized as a key tool for proteomics research. FAST Slides offer unmatched binding capacity, sensitivity and reproducibility ideal for all of your protein array applications. GVS Life Sciences provides a full line of products and services that allow you to apply the FAST Slide technology to any multiplex need.

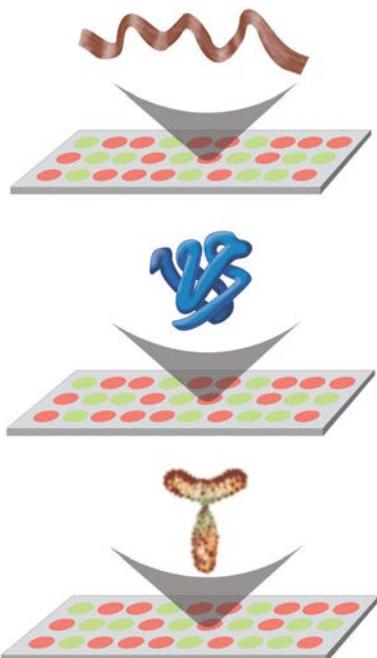
### PROTEIN ARRAYS

The high reproducibility and microporous structure of FAST Slides make them excellent for protein arrays used to diagnose infection and autoimmune diseases and for vaccine development and immunity monitoring. In protein arrays, a purified protein is spotted on the FAST Slide surface and the array is used to detect the presence of antibodies or other binding proteins in clinical or experimental samples.

### REVERSE PHASE PROTEIN ARRAYS (RPPAs)

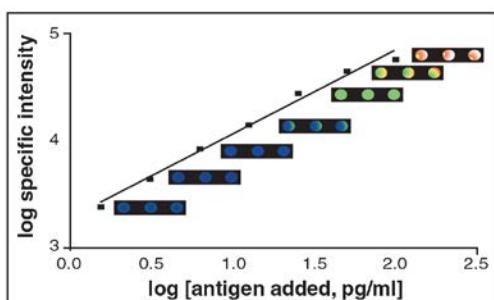
The high binding capacity, sensitivity and reproducibility of FAST Slides make them ideal for Reverse Phase Protein Arrays (RPPAs) used for biomarker discovery and characterization and in clinical trials to monitor drug effectiveness and disease progression.

FAST Slides allow quantitative binding across the broad dynamic range of protein concentration found in complex biological samples, such as cell lysates or tumor aspirates, arrayed directly onto the slides. The expression of specific proteins is detected with antibodies to the biomarkers of interest. GVS Life Sciences's quality-controlled FAST Slide production ensures a consistent surface that allows multiple clinical samples to be interrogated with a variety of antibodies simultaneously.



### ANTIBODY ARRAYS or MICRO-SPOT ELISA

FAST Slides are arrayed with multiple antibodies and the presence of specific proteins is detected by applying a complex biological sample to the slide. When used in combination with a standard curve, the unsurpassed binding capacity that retains the native conformation of proteins bound on FAST Slides allows detection and quantitation of multiple proteins in a single sample.



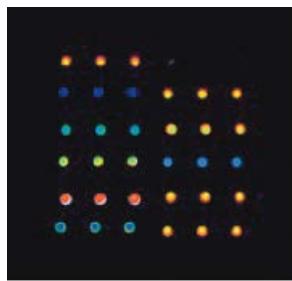
### FAST™ SLIDES PROVIDE AND OPTIMUM IMMUNOASSAY SURFACE

The high binding capacity and broad dynamic range provide the highest sensitivity assuring near-quantitative protein recoveries (94-96%) from complex biological samples such as plasma.

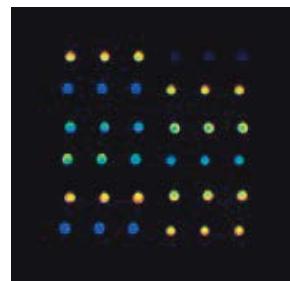
# PROTEIN ARRAY

## FAST SLIDES OFFER LONG-TERM STABILITY

FAST Slides provide a stabilizing environment such that proteins arrayed with the GVS Life Sciences Protein Arraying Buffer retain their binding characteristics for more than a year. As shown, there is no deterioration in the fluorescent signal on a FAST Quant Slide from 3-12 months in storage. The long-term stability offers the flexibility of being ready whenever you are. For your convenience, GVS Life Sciences offers a number of pre-arrayed FAST Slide kits packaged with the buffers and reagents necessary to accommodate your research needs.



3 Months



12 Months

## FAST SLIDES ARE A BROADLY COMPATIBLE OPEN PLATFORM

FAST Slides are ready for printing (arraying) right out of the box with no activation. They come in five different pad formats compatible with contact and non-contact printing methods and with existing manual arrayers, robots, scanners and all methods of detection including fluorescence, chemiluminescence, colorimetric and isotopic. Their compatibility make FAST Slides easy to set up and use with low costs and minimal start-up time.

Our focus on quality at GVS Life Sciences (registered to the ISO 9001 standard) ensures production of the most consistent surface possible providing the most reproducible results with every slide, every time. The FAST line from GVS Life Sciences provides an unparalleled set of protein analysis products and services for all of your quantitative and non-quantitative multiplexed assays.

## FAST Slides

Nitrocellulose-coated glass slides offered in 1-, 2-, 8-and 16-pad formats in 10 or 20 Slide packs.

## FAST PAK

Complete FAST Slide kits containing 1-, 2-, 8-, or 16-pad FAST Slides packaged with reaction reagents to create and analyze your own protein microarrays.

## FAST Quant Kits

16-pad FAST Slides pre-arrayed with specific cytokine antibody panels and packaged with reaction buffers and reagents.

1. Human Th1/Th2: panel of antibodies to 9 cytokines associated with the human Th1/Th2 immune response
2. Human Cytokine II: panel of antibodies to 10 commonly requested cytokines
3. Human Angiogenesis: panel of antibodies to 8 cytokines associated with angiogenesis
4. Human Chemokine: antibodies to 9 commonly requested chemokines
5. Human Cytokine 35: panel of antibodies to 35 of the most-requested cytokines



## Reaction Buffers

1. Protein Arraying Buffer
2. Protein Array Washing Buffer
3. Protein Array Blocking Buffer

## Array Accessories

1. Incubation chambers to fit multi-pad FAST Slides
2. FAST Frame to hold up to four FAST Slides
3. FAST Slide holder (Chip Clip™) for a single FAST Slide
4. MicroCaster™ for printing your own arrays onto FAST Slides
5. Other parts and accessories

## Scanning and Data Analysis Service

Slide scanning and data analysis service for FAST Slide or FAST Quant users who do not have access to a fluorescent scanner.

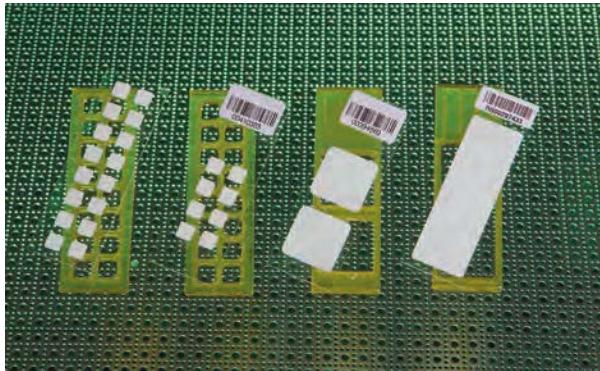
## Microarray Assay Development

Contact GVS Life Sciences Customer Care to discuss your protein array development needs.



# PROTEIN ARRAY

## 5.1 FAST™ Slides - protein array surface



FAST Slides are the premier surface for protein microarray applications. FAST Slides are glass slides coated with a proprietary nitrocellulose polymer. The polymer binds proteins in a noncovalent, irreversible manner and can be probed using the same method as in traditional blots. The three-dimensional surface of a FAST Slide maintains reactivity of proteins and gives excellent reproducible results. It is usable with fluorescent, colorimetric, chemiluminescent or isotopic detection systems and is compatible with microarray scanners and robots. Perhaps the most significant advantage of FAST Slides over modified glass surfaces is that the matrix retains arrayed proteins in near-quantitative fashion. This property translates into antibody arrays with unparalleled sensitivity below 1 pg/ml in antigen concentration. These qualities make FAST Slides the most reliable surface for microarray experiments and provide a high level of confidence.

### Array Accessories

- Incubation chambers to fit multi-pad FAST Slides
- Fast Frame to hold up to four FAST Slides
- FAST Slide Holder (Chip Clip™) for a single FAST Slide
- MicroCaster™ for printing your own arrays onto FAST Slides

### Ordering information: FAST Slides

Product Code	Description	Specification
10484182	FAST SLIDE1 20 x 51 mm BC, 20 Pk	up to 10,000 spots (150 µm spot size, 300 µm pitch)
10486111	FAST SLIDE1 20 x 60 mm BC, 20 Pk	up to 10,000 spots (150 µm spot size, 300 µm pitch)
10485317	FAST SLIDE2 20X20 mm BC, 10Pk	up to 3600 spots per pad (150 µm spot size, 300µm pitch)
10485320	FAST SLIDE8 6X6 mm BC, 10Pk	pad spacing: 9 mm (microplate spacing) up to 256 spots (150 µm spot size, 300 µm pitch)
10485323	FAST SLIDE16 6x6 mm UC, 10Pk	pad spacing: 9 mm (microplate spacing) up to 256 spots (150 µm spot size, 300 µm pitch)

### Features & Benefits

- Superior protein binding capacity
- Highest sensitivity and dynamic range
- Excellent long-term stability of printed proteins
- Compatible with all detection methodologies
- Compatible with commercially available arraying robots

FAST Slides are suitable for many types of protein microarrays including protein arrays, reverse phase protein arrays and micro-spot ELISAs, also known as antibody arrays.

There are tremendous advantages to using FAST Slides for immunoassays over traditional ELISAs including less sample required, better sensitivity, linearity and quantitation.

A major advantage of FAST Slide technology is that hundreds or thousands of antibodies or samples can be screened simultaneously. Compared to other microarray surfaces, FAST Slides provide superior binding properties, allowing quantitative detection of proteins over four orders of magnitude in concentration. Our focus on quality at GVS Life Sciences (registered to the ISO 9001 standard) ensures production of the most consistent surface possible providing the most reproducible results with every slide, every time.

### FAST PAK

Complete FAST Slide starter kits containing 1-, 2-, 8- or 16-pad FAST Slides packaged with reaction buffers to create and analyze your own protein microarrays.

### Reaction Buffers

- Protein Arraying Buffer
- Protein Array Washing Buffer
- Protein Array Blocking Buffer

# PROTEIN ARRAY

## 5.2 FAST™ PAK - protein array kit



FAST PAKs (protein array kits) provide the necessary components for researchers to conveniently build and process their own protein microarrays.

FAST PAKs are available in all FAST Slide pad formats (1-, 2-, 8-, and 16-pads). Each kit contains 10 FAST Slides, 10 incubation chambers, 10 ml Protein Arraying Buffer (2X), 15 ml Protein Array Blocking Buffer, and 125 ml Protein Array Washing Buffer (10X). A reusable Slide Holder (sold separately) is also needed, either a FAST Frame for up to four slides or a Chip Clip™ for a single FAST Slide.

### Ordering information: FAST Slides

Each kit contains 10 FAST Slides, 10 incubation chambers, 10 ml Protein Arraying Buffer (2X), 15 ml Protein Array Blocking Buffer, and 125 ml Protein Array Washing Buffer (10X).

Product Code	Description
10485262	FAST PAK 1-pad protein array kit 1PK
10485319	FAST PAK 2-pad protein array kit 1PK
10485322	FAST PAK 8-pad protein array kit 1PK
10485325	FAST PAK 16-pad protein array kit 1PK

## 5.3 FAST™ BUFFERS- optimized protein array



GVS Life Sciences Protein Array Buffers have been optimized for use on FAST Slides. The buffers include Protein Arraying Buffer, Protein Array Blocking Buffer, and Protein Array Washing Buffer. They are included with several GVS Life Sciences kits, such as the FAST PAKs and FAST Quant , as well as sold separately.

### Ordering information: Protein Array Buffers

Product Code	Description
10485331	Protein Arraying Buffer (2X) 10ml 4PK
10485356	Protein Array Blocking Buffer (1X) 100ml 1PK
10485330	Protein Array Washing Buffer (10X) 125ml 4PK

### Features & Benefits

- 1, 2, 8, or 16 array pads on each slide
- Suitable for multiplex experiments, side-by-side comparisons, and control experiments all on the same slide
- Multi-well formats allow generation of quantitative arrays
- Reproducible results from slide-to-slide and pad-to-pad
- Increased protein stability and enhanced signal intensity for proteins immobilized with Protein Arraying Buffer
- Proprietary Protein Array Blocking Buffer ensure optimum signal-to-noise ratios and promotes specific binding in immunoassay applications
- Flexibility for detection by fluorescent, chemiluminescent, colorimetric, and isotopic methods

### Applications

- ELISA format (sandwich assay) experiments using antibody arrays
- Reverse phase protein arrays using cell or tissue lysates
- Purified protein arrays
- Antigen arrays for antibody screening and autoimmune detection
- Carbohydrate arrays
- Lipids and other materials which can be arrayed on nitrocellulose

### PROTEIN ARRAYING BUFFER

Supplied as a 2X concentrate in 10 ml plastic bottles.

- Enhances long-term protein stability and molecular recognition activity of arrayed proteins
- Enhances activity of arrayed proteins
- Optimized for use on FAST Slides

### PROTEIN ARRAY BLOCKING BUFFER

Supplied neat in 100ml plastic bottles.

- Demonstrates superior blocking of protein microarrays
- Exhibits strong reduction of nonspecific antibody-antibody interactions
- Exhibits minimal effects on specific antibody-antigen interactions
- Results in superior signal-to-noise ratios in protein microarray applications with very low backgrounds
- Compatible with all detection methods

### PROTEIN ARRAY WASHING BUFFER

Supplied as a 10X concentrate in 125 ml plastic bottles.

- Excellent washing buffer for protein microarrays
- Preserves protein-protein interactions
- Optimized for use on FAST Slides

# PROTEIN ARRAY

## 5.4 FAST™ Quant - human cytokine assays



FAST Quant kits provide high-throughput multiplexed cytokine quantification. Built on FAST technology, FAST Quant combines the high-throughput capabilities of array technology with the quantitative nature of traditional ELISA. With FAST Quant, a researcher can accurately determine the concentration of multiple cytokines in dozens of biological samples simultaneously, using familiar ELISA immunochemistry. Due to the high protein binding capacity of the FAST Slide, FAST Quant immunoassays exhibit greater sensitivity and reproducibility than traditional ELISA.

and require significantly smaller sample volumes. Each FAST Quant kit contains 64 arrays, each comprised of 8 to 10 antibodies to human cytokines. Anti-cytokine antibodies are arrayed in triplicate on each array.

Using four 16-pad FAST Slides placed in a FAST Frame (sold separately) FAST Quant offers an 8 x 12 cm footprint - the same as the traditional microplate format. A standard curve can be generated by creating a dilutional series from the recombinant antigen cocktails included in the kit. FAST Quant with the standard curve allows for highly sensitive quantitation of human cytokine concentrations in complex biological samples.

The FAST Quant family of productions includes five human cytokine assay kits. Each kit contains four 16-pad FAST Slides pre-arrayed with one of the cytokine antibody panels, four 16-well incubation chambers, recombinant antigen cocktails for generating a standard curve, biotinylated detection antibody cocktails, Protein Array Blocking Buffer, and Protein Array Washing Buffer.

A reusable Slide Holder (sold separately) is also needed: either a FAST Frame for up to four slides or a Chip Clip for a single FAST Slide. Data analysis is seamless using standard data analysis software, or GVS Life Sciences will fluorescently scan the slides and analyze the data for you. Call Customer Care for details.

### Ordering information: FAST Quant Kits

Product Code	Description	Antigens Recognized			
10486031	Human Th1/Th2: antibodies to 9 cytokines associated with the human Th1/Th2 immune response	IL-1 $\beta$ IL-6 IFN $\gamma$	IL-2 IL-10	IL-4 IL-13	IL-5 TNF $\alpha$
10486060	Human Cytokine II: antibodies to 10 commonly requested human cytokines	IL-1 $\beta$ IL-8 RANTES	IL-2 IL-10 MCP-1	IL-4 IL-12p70	IL-6 GM-CSF
10486063	Human Angiogenesis: antibodies to 8 cytokines associated with angiogenesis	PDGF-BB MCP-3 MIP-1 $\alpha$	VEGF MCP-4 MCP-1	FGF $\beta$ IL-8	Angiogenin Angiopoietin-2
10486064	Human Chemokine: antibodies to 9 commonly requested chemokines	Eotaxin MCP-3 MIP-1 $\alpha$	RANTES MCP-4	MCP-1 IL-8	MCP-2 IP-10
10486257	Human Cytokine 35: antibodies to 35 of the most requested cytokines	IL-1 $\alpha$ IL-5 IL-12p70 MMP-9 TGF- $\alpha$ ICAM-1 IL-12p40 Fibronectin TNFR-II	IL-1 $\beta$ IL-6 IL-13 MCP-1 TGF- $\beta$ 3 IGF-I FGF basic PDGF-BB VEGF	IL-2 IL-8 IFN $\gamma$ IGF-II Angiogenin IP-10 FAS ligand TGF- $\beta$ 1 RANTES	IL-4 IL-10 TNF $\alpha$ TNFR-1 Eotaxin GM-CSF MCP-3 TIMP-1

### Ordering information: FAST Slide Holders

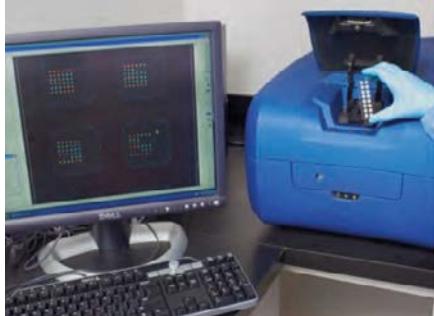
Required for processing FAST Quant Arrays

Product Code	Description
10486001	FAST Frame Slide Holder for processing up to four FAST Slides INC CHAMBER 2WELL 1/pk
10486081	Chip Clip™ Slide Holder for processing a single FAST Slide 1/pk

# PROTEIN ARRAY

## 5.5 FAST™ Services - array development and analysis

### Scanning and Data Analysis



Using leading-edge automated microarray technologies, GVS Life Sciences provides scanning and data analysis services for FAST Slide users without access to a fluorescent scanner. Whether you are using FAST Quant®, or have created your own arrays using FAST PAK, GVS Life Sciences will fluorescently scan your FAST Slides and analyze your protein microarray data. You will receive raw fluorescent values and fluorescent values corrected for local background along with some fundamental statistical values such as standard deviation and coefficient of variation. The analysis of FAST Quant results will include generation of antigen specific standard curves and determination of antigen concentrations in experimental samples. Please call GVS Life Sciences's Customer Care to discuss you specific scanning and data analysis needs.

### Microarray Assay Development

Work directly with GVS Life Sciences's protein microarray scientists to create your assay using FAST Slides and either your immunochemicals or immunochemistries provided by GVS Life Sciences. FAST products provide the flexibility, compatibility and reproducible results to meet any assay development requirements. We will work with you to develop and then manufacture a multiplex assay. Project plans will incorporate a gated development approach with go/no go decision points for the most cost effective effort. Typical assay development project results include limits of detection, cross-reactivity and dynamic range for each analyte. GVS Life Sciences's long history and expertise in protein microarray design, development and production make us your ideal partner for all of your microarray assay development needs.  
For all FAST Protein Microarray Services, please call GVS Life Sciences's Customer Care.



# PROTEIN ARRAY

## 5.6 FAST™ Accessories - protein array processing



Increase the ease and convenience of handling and processing FAST Slides and ensure reproducible, consistent results with every slide, every time.

### FAST Slide Incubation Chambers

Used in conjunction with the FAST Frame or Chip Clip™ Slide Holder, GVS Life Sciences incubation chambers have a secure gasket design forming a tight, leak-proof seal with the FAST Slides to provide a convenient means to conduct binding reactions on protein microarrays. Incubation chambers are designed specifically to fit all FAST Slide formats (1-, 2-, 8- and 16-pad). Simply remove the reusable incubation chamber when the reaction is finished.

### Features & Benefits

- Superior protein binding capacity
- Highest sensitivity and dynamic range
- Excellent long-term stability of printed proteins
- Compatible with all detection methodologies
- Compatible with commercially available arraying robots

### Ordering information: FAST Slide Incubation Chambers

Product Code	Description	Specification
10486137	INC CHMBER SNGLE WELL, 20x51, 10/PK	External dimension: 79 x 25.4 mm Well dimension: 53 x 22 x 4 mm (L x W x D) Volume: 600 to 700 µl
10486087	INC CHAMBER 2WELL 10/PK	External dimension: 79 x 25.4 mm Well dimension: 21 x 21 x 4 mm (L x W x D) Volume: 300 to 400 µl
10486046	INC CHMBER 16 WELL 10/PK	External dimension: 79 x 25.4 mm Well dimension: 7 x 7 x 4 mm (L x W x D) Volume: 60 to 100 µl

### Ordering information: FAST Slide Holders

Product Code	Description
10486001	FAST Frame Slide Holder for processing up to four FAST Slides
10486081	Chip Clip™ Slide Holder for processing a single FAST Slide

### Ordering information: MicroCaster™ Parts and Accessories

Product Code	Description
10485047	MicroCaster System: 8-pin system hand tool, 8-pin system slide holder, pin conditioner and spare replicator pins, 1/pk
10485061	MicroCaster pin conditioner, 30 ml, 1/pk
10485326	MicroCaster replacement pin, 1/pk
10485370	MicroCaster pad (pin support pad), 1/pk
10486043	Wash and blot station, 1/pk
10486044	96-well microplate indexer, 1/pk

# FILTRATION GUIDE

## Membrane information

Filtration through a membrane means that the filter material will stop particles larger than the pore size rating. This enables an absolute pore size rating for the membranes for which they are clearly classified. Bacterial retention claims can be made based on the pore size of the membrane.

## Hydrophilic – Hydrophobic Membranes

- **Hydrophilic membranes** have permeability of aqueous solutions and once wetted, they stop gasses. This means that aqueous solutions pass through hydrophilic membranes but gas is stopped when the membrane is wet until the applied pressure exceeds the “bubble point”, at which time the air will evacuate the pore, the liquid is expelled, and the gas will go through. Dry hydrophilic membrane allows gas to pass through. Our HI-FLO PES membranes are hydrophilic membranes.
- **Hydrophobic membranes** have permeability to the gas, but they stop aqueous solutions. In other words, they do the opposite job when compared to hydrophilic membranes. This means that gas will pass through these membranes, but aqueous solutions will be stopped. If air or gas can reach the hydrophobic membrane, it will go through, but if the contact with the hydrophobic membrane is not possible, then the gas will not pass through. The pressure at which aqueous solutions will pass through a hydrophobic membrane is called the water breakthrough (WBT) or water intrusion pressure (WIP). PTFE membranes are hydrophobic membranes. PES membranes are hydrophilic membranes.

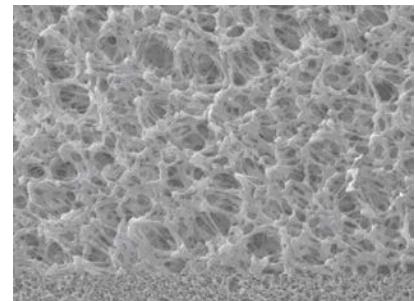
## Pore size

Pore size is determined by the size of the particle that is expected to be retained with a defined with a high degree of efficiency. Pore size is typically stated in micrometers or microns ( $\mu\text{m}$ ), and should clearly be designated as either nominal or absolute. Nominal pore size is the ability to retain a majority (60% - 98%) of particles having a specific dimension. Retention efficiency is also depending on such process conditions as concentration, operating pressure etc. Rating parameters can vary among manufacturers. When the pore size, or retention, is “nominal”, it should be stated at a particle size and a percent, i.e., 99.97% retention of 0.3  $\mu\text{m}$  particles. Absolute pore size is the ability to retain the 100% of particles of a specific dimension under defined test conditions (particle size, challenge pressure, concentration, detection method).

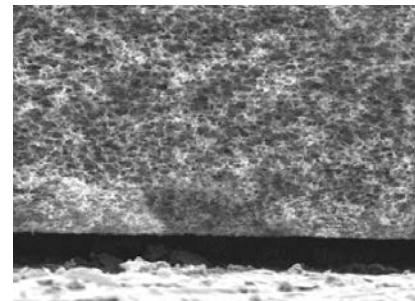
## Pore Size Challenge Organism

- 0.1 micron *Acholeplasma laidlawii*
- 0.2 micron *Brevundimonas diminuta*
- 0.45 micron *Serratia marcescens*
- 0.8 micron *Lactobacillus* species
- 1.2 micron *Candida albicans*

The above table shows proper pore size of hydrophilic membranes to be used to retain the corresponding bacteria. Hydrophobic membranes are about ten times more efficient in retaining bacteria in air than they are in liquids using the same pore size.



Membrane outside wall



Membrane cross section

## **Chemical compatibility**

This is the ability of the membrane to resist to chemicals without mechanical or chemical damage from chemical exposure. Information about the liquid used with a specific filter material should be outlined before application to determine compatibility. GVS Life Sciences can assist customers in choosing the proper filter (and housing) materials.

## **Extractables**

Extractables are contaminants (typically chemicals) that elute from the filter which might affect quality of the effluent. Wetting agents (surfactants), manufacturing or sterilization residuals are the main cause of undesired extractables. Typical problems caused by extractables are found in the following applications:

- HPLC analysis (strange result)
- Cell culture (cytotoxicity)
- Microbiological analysis (affects the microorganism)
- Environmental analysis (contaminants)

Flushing of the line prior to use can reduce Extractables and their adverse effects.

## **Binding**

This is the property of substances to be filtered having affinity with membranes. This could be a positive effect in some circumstances, but most of the time it can create adverse effects. Particularly it could lead to loss of active components of the liquid to be filtered reducing its beneficial effect. Our PES HI-FLO membrane is low protein binding.

## **Thermal Stability**

This characteristic allows unchanged performance at elevated temperatures. Some membranes can only be sterilized by EtO. Others can be gamma, beta or e-beam sterilized, as well as EtO. Others can be also steam sterilized with no adverse affects. Membrane performance is sometimes reduced at temperature higher than 25°C, and high temperatures can also reduce chemical stability. PTFE membrane is widely stable (any type of sterilization) if the product is designed properly. PES membrane is suggested for EtO and irradiation (no steam sterilization).

## **Biosafety**

These tests are conducted in compliance with ISO-10993 and USP class VI, see specifications Tests that are conducted are: – Cytotoxicity – Sensitization – Irritation intracutaneous reactivity – Systemic toxicity (acute) – Hemocompatibility (Hemolysis)

## **Pyrogenicity**

Pyrogens are chemicals on the filter media and other components that are caused by the waste of dead bacteria. When introduced to a patient, they can elevate the patient's temperature, and can cause complications – even death. Filters that are pyrogenic can make solutions pyrogenic.

They cannot be removed by sterilization, so it is very important that non-pyrogenic filter media and components are used in the production of medical filter devices. The test to determine the pyrogenicity is the LAL test (Limulus Amebocyte Lysate test).

## **Bubble Point (BP)**

Typically this test that is performed on hydrophilic membranes. The BP pressure is the pressure to force air through a wetted hydrophilic membrane. These tests are typically performed with water; however, this test can be conducted on hydrophobic membranes using liquids other than water that will wet the membrane. The BP is an indication of the membrane pore size, as related to actual bacterial retention. This test can also be performed on hydrophobic membranes if the correct solvent (instead of aqueous solution) is used, and is compatible with the entire product.

## **Water Breakthrough (WBT)**

This is the test performed on hydrophobic membranes, and it is also related to the pore size of the membrane. The WBT pressure (sometimes referred to as water intrusion pressure) is the pressure it takes to force an aqueous solution through a hydrophobic membrane.

## **Water Flow Rate (WFR)**

Typically this test is performed on hydrophilic membranes. The BP pressure is the pressure to force air through a wetted hydrophilic membrane, and is an indication of the membrane pore size, as related to actual bacterial retention. This test is



typically performed with water; however, it can be performed with other solutions, as long as the filter media is compatible with the liquid, and it is correlated back to the water bubble point and bacterial retention. The BP test can also be performed on hydrophobic membranes if the correct solvent (instead of aqueous solution) is used, and is compatible with the entire device.

#### **Air Flow (AF)**

This is a flow rate typically related to hydrophobic membranes. It is the amount of air that passes through a fixed surface of membrane with a specific applied pressure.

#### **Filter Efficiency (FE)**

Quantity of particulate or bacteria retained compared to the total quantity of particulate or bacteria to which the filter is challenged. It is expressed in % and referred to a specific size of particles.

#### **Effective Filtration Area (EFA)**

This is the actual filtration area in a device that is subject to filtration. For instance, whereas a 25 mm device may start out with a disc of filter media that is cut to 25 mm, the sealing surfaces should be eliminated from the calculations of the device EFA.

**Main membranes used are:**

**Cellulose Acetate (CA):** Hydrophilic membrane. Low protein binding , (reducing filter changes when filtering proteinaceous solutions?). Ideal for protein , cell culture media and enzymes filtrations, tissue culture media sterilization, biological fluid filtration and other filtration applications where maximum recovery of proteins is critical.

**Nylon (NY):** Hydrophilic membrane. Ideal for use in general filtration or medical assays. Superior strength, resistant to a range of organic solvents. Low extractables. High protein binding capacity. Lot-to-lot consistency.

**Polyethersulfone (PES):** Hydrophilic membrane. designed to remove particulates during general filtration, low protein and drug binding characteristics make it ideally suited for use in life science applications. Its strength and durability are advantageous during usage that involves aggressive handling or automated equipment. Low protein and drug binding characteristics maximize recovery of critical drugs used in I.V. therapy, chemotherapy and open-heart surgery.

**Nitrocellulose Mixed Esters (MCE):** Hydrophilic membrane. Aqueous clarification and particulate capture. Consistent high flow rate for faster filtration. Uniform pore structure for selectivity. Hydrophilic, inert cellulose nitrate. High binding capacity. Manufactured thickness within 10 microns

**Polyvinylidene Difluoride (PVDF):** Hydrophilic membrane. Ideal for use in Sterilizing and Clarifying filtration of biological solutions. High Flow Rates. Low Extractables. Broad Chemical Compatibility. Very low protein binding.

**Polytetrafluoroethylene (PTFE):** Hydrophobic membrane. Ideal for filtration of strong acids and aggressive solutions, venting applications, phase separations, aerosol samplings. Chemically and biologically inert. Superior chemical resistance. Can withstand high temperatures.

**Glass Fiber (GF):** Hydrophilic material. Used also as a pre-filter to extend membrane life. Eliminate sample contamination. Excellent wet strength for each handling and filter integrity. Ideal for water/air pollution analysis, liquid clarification and cell harvesting.

**Regenerated Cellulose (RC):** Hydrophilic membrane. Resistant to a very wide range of solvents. Suitable for use with either aqueous solutions or organic solvents. Compatible with HPLC solvents. Very low protein binding capacity and hence excellent for protein recovery applications.



## **Polymers information**

Thermoplastics and thermosets are the two basic groups of plastic materials. Thermoplastic resins can be repeatedly melted and solidified by heating and cooling so that any scrap generated in processing can be theoretically reused. No chemical change generally takes place during forming. Usually, thermoplastic polymers are supplied in the form of pellets, which often contain additives to enhance processing or to provide necessary characteristics in the finished product (e.g., color, conductivity, etc.). The temperature service range of thermoplastics is limited by their loss of physical strength and eventual melting at elevated temperatures.

Main Thermoplastic resin used are:

### **Polypropylene (PP)**

It is similar to polyethylene, but each unit of the chain has a methyl group attached. It is translucent, autoclavable, and has no known solvent at room temperature. It is slightly more susceptible to strong oxidizing agents than conventional polyethylene because of its many branches (methyl groups, in this case). Polypropylene is noted for its excellent chemical resistance in corrosive environments. This polymer is easily welded and machined.

TYPICAL PROPERTIES OF PP ARE:

- Clean/High Purity
- Good Dimensional Stability
- Good Organoleptic Properties
- High Clarity
- High Flow
- High Stiffness
- Homopolymer
- Low Warpage
- Narrow Molecular Weight Distribution
- Nucleated

### **Polyethylene (PE) Plastic**

Huge family of resins obtained by polymerizing ethylene gas, and it is available in a range of flexibilities. Polyethylene can be formed by a wide variety of thermoplastic processing methods and is particularly useful where moisture resistance is required. Low-density polyethylene (LDPE) has more extensive branching, resulting in a less compact molecular structure. High-density polyethylene (HDPE) has minimal branching, which makes it more rigid and less permeable than LDPE. Linear low-density polyethylene (LLDPE) combines the toughness of low-density polyethylene with the rigidity of high-density polyethylene.

TYPICAL PROPERTIES OF PE ARE:

- Good Processability
- Food Contact Acceptable
- Antioxidant
- High ESCR (Stress Crack Resist.)
- Low Density
- High Impact Resistance

### **Acrylic-based polymer**

Acrylic polymer developed especially for use in the Medical Device Industry. The material is transparent and tough offer gamma and ETO sterilization resistance, and they are easy to process and weld easily to PVC. Typical applications include disposable medical diagnostic devices such as cassettes and cuvettes.

TYPICAL PROPERTIES OF acrylic-based polymer compounds are:

- Excellent chemical resistance to fats and oils
- Excellent bonding and welding capabilities
- Excellent bonding to PVC tubing
- Good impact strength



- Good light transmission
- Good resistance to EtO, gamma and E-beam sterilization
- Superior resistance to lipids and alcohol
- Excellent ductility

### **Nylon (PA6)**

This is a group of linear polymers with repeated amide linkages along the backbone. These are produced by an amidation of diamines with dibasic acids, or polymerisation of amino acids. Nylon is strong and tough. It resists abrasion, fatigue and impact. Nylon offers excellent chemical resistance with negligible permeation rates when used with organic solvents. However, it has poor resistance to strong mineral acids, oxidizing agents and certain salts.

### **TYPICAL PROPERTIES OF PA 6 ARE:**

- Good Chemical Resistance
- Good Colorability
- Good Corrosion Resistance
- Good Processability
- Good Toughness
- Good Wear Resistance
- High Rigidity
- High Strength
- Low Friction



# COMPATIBILITY CHART

		Filter Media																Housing						
		Cellulose Acetate	Nitrocellulose	Polyethersulfone	Nylon	PTFE (unlaminated)	PTFE (laminated)	PVDF Philic	RC	Polypropylene	Glass Fiber (binder)	Glass Fiber (no binder)	Silver	Polycarbonate	Polyester	Modified Acrylic	Polysulfone	Polystyrene	Polypropylene					
Chemical		ca	nc	pes	ny	ptu	ptl	pvdf	rc	pp	gfb	gfn	ag	pc	pet	ac	ps	pst	pp					
ACIDS	Acetic Acid 5%	R	R	R	R	R	R	R	R	R	T	R	R	R	R	N	R	R	R					
	Acetic Acid 10%	N	N	R	L	R	R	R	R	R	R	T	R	R	R	R	N	R	R	R				
	Acetic Acid, Glacial	N	N	R	N	R	R	R	R	R	R	N	R	R	L	R	N	R	R	L				
	Boric Acid	R	R	T	L	R	R	T	T	R	T	T	R	R	R	N	R	R	R	N	R	R	R	
	Hydrochloric, 6N	L	N	R	N	R	R	L	N	R	N	R	R	R	R	L	N	R	R	N	R	R	T	
	Hydrochloric, Conc.	N	N	R	N	R	R	R	N	R	N	R	R	R	R	N	N	R	R	N	N	R	R	T
	Hydrofluoric, 10%	N	N	T	N	R	R	R	L	R	N	N	N	R	R	R	T	T	T	R				
	Hydrofluoric, 35%	N	N	T	N	R	T	R	N	T	N	N	N	R	R	R	T	T	T	T				
	Nitric Acid, 6N	L	R	N	N	R	L	T	N	L	N	L	N	R	R	N	N	L	T	N	N	L	T	
	Nitric Acid, Conc.	N	N	N	N	R	N	R	N	N	N	N	L	N	R	N	N	N	N	N	N	N	N	T
	Sulfuric Acid, 6N	L	R	T	N	R	L	R	L	L	N	R	N	R	R	N	N	N	N	N	N	N	N	T
	Sulfuric Acid, Conc.	N	N	N	N	R	N	T	N	N	N	N	R	N	N	N	N	N	N	N	N	N	N	T
ALCOHOLS	Amyl Alcohol	R	N	N	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	N	R		
	Benzyl Alcohol	L	R	N	L	R	R	R	R	R	R	N	N	R	L	R	R	R	R	R	R	N	R	
	Butyl Alcohol	R	R	R	R	R	R	R	R	T	R	R	R	R	R	R	R	R	R	R	R	R	T	R
	Butyl Cellosolve	L	N	T	R	R	R	R	T	T	R	R	R	R	R	L	R	T	L	T	T			
	Ethyl Alcohol < 80%	R	R	R	R	R	R	R	T	R	R	R	R	R	R	R	R	R	L	R	L	T	T	
	Ethyl Alcohol > 80%	R	L	R	R	R	R	R	T	R	R	R	R	R	R	R	R	R	L	R	N	T		
	Ethylene Glycol	R	L	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T	R	T	R	T	
	Glycerine (Glycerol)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T	R	T	R	T	
	Isobutyl alcohol	R	R	T	R	R	R	R	R	T	R	N	N	R	R	R	R	R	R	R	R	R	R	T
	Isopropanol	R	L	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T	R	T	T	T	
	Methanol	R	N	R	L	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T
	Methyl Cellosolve	L	L	T	R	R	R	R	R	T	R	R	R	R	N	R	T	R	T	T	T	T	T	
	Propanol	R	R	T	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T	R	T	T	R	
BASES	Ammonium Hydroxide, 6N	N	N	R	N	R	R	R	L	R	N	R	R	N	L	R	R	R	T	R	R	T		
	Potassium Hydroxide, 6N	N	N	T	R	R	R	R	L	R	N	T	R	N	N	N	T	R	T	T	T	T		
	Sodium Hydroxide, 6N	N	N	R	N	R	R	R	L	R	N	T	R	N	L	T	T	T	T	T	T	T	T	
SOLVENTS	Acetone	N	N	N	R	R	R	R	N	R	R	R	R	R	L	R	N	N	N	N	N	N	R	
	Acetonitrile	N	N	R	R	R	R	R	R	R	R	R	R	R	T	R	T	L	R	N	N	N	R	
	Amyl Acetate	L	N	L	R	R	R	R	R	R	R	N	R	R	R	R	R	R	N	N	N	N	L	
	aniline	N	N	R	R	R	R	R	T	R	R	T	T	T	R	N	R	T	N	T	L			
	Benzene	L	R	R	R	R	R	L	R	R	L	N	R	R	L	R	N	N	N	N	N	N	N	L
	Bromoform	N	R	T	R	R	R	T	T	R	R	R	R	R	N	R	R	T	N	T	T	T		
	Butyl Acetate	L	N	L	R	R	R	R	T	R	R	N	R	R	R	R	R	R	N	N	N	N	L	
	Carbon Tetrachloride	L	R	R	R	R	R	L	R	R	L	N	N	R	L	R	N	N	N	N	N	N	N	N
	Cellosolve	R	N	T	R	R	R	R	T	R	R	R	R	R	R	R	R	R	N	N	T	T	T	

		Filter Media												Housing					
		Cellulose Acetate	Nitrocellulose	Polyethersulfone	Nylon	PTFE (unlaminated)	PTFE (laminated)	PVDF Phobic	RC	Polypropylene	Glass Fiber (binder)	Glass Fiber (no binder)	Silver	Polycarbonate	Polyester	Modified Acrylic	Polysulfone	Polystyrene	Polypropylene
SOLVENTS	Chloroform	N	R	N	R	R	L	R	R	L	R	R	R	N	R	N	L	N	L
	Cyclohexane	R	R	T	R	R	R	T	R	R	R	R	R	R	R	N	R	T	R
	Cyclohexanone	N	N	N	R	R	R	N	R	R	R	R	R	L	R	N	N	N	R
	Diethyl Acetamide	N	N	T	R	R	N	T	R	N	R	R	R	L	R	N	N	N	T
	Dimethyl Formamide	N	N	N	R	R	R	N	L	R	N	R	R	N	R	N	N	N	R
	Dimethyl Sulfoxide (DMSO)	N	N	N	R	R	R	N	R	R	N	R	T	N	R	N	N	N	T
	Dioxane	N	N	L	R	R	R	R	R	R	R	R	R	N	R	N	N	N	R
	Ethyl Ether	L	L	R	R	R	R	R	R	R	T	R	R	R	R	N	L	N	N
	Ethylene Dichloride	L	L	T	R	R	R	T	T	R	R	R	R	N	R	T	N	T	T
	Formaldehyde	L	N	R	R	R	R	R	T	R	R	R	R	R	R	N	R	N	R
	Freon TF	R	R	R	R	R	R	R	T	R	R	R	R	R	R	L	R	N	T
	Gasoline	R	R	T	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N
	Hexane	R	R	T	R	R	R	R	R	R	L	R	R	R	R	N	R	N	T
	Isopropyl Acetate	N	N	T	R	R	R	N	R	R	N	R	R	R	R	N	N	N	R
	Kerosene	R	R	T	R	R	R	R	R	R	R	R	R	R	R	N	N	N	T
	Methyl Acetate	N	N	T	R	R	R	R	R	R	N	R	R	N	R	N	N	N	R
	Methyl Ethyl Ketone (MEK)	N	N	N	R	R	R	N	R	R	R	R	R	L	R	N	N	N	T
	Methyl Isobutyl Ketone	N	N	T	R	R	R	N	R	R	R	R	R	L	T	N	N	N	T
	Methylene Chloride	N	N	N	L	R	R	R	R	R	R	R	R	N	R	N	N	N	N
	Nitrobenzene	N	N	N	R	R	R	R	R	R	R	N	N	T	N	R	N	N	R
	Pentane	R	R	R	R	R	L	R	R	L	R	R	R	R	R	N	R	N	T
	Perchloroethylene	R	R	N	R	R	R	T	R	R	N	N	R	R	T	N	L	N	L
	Pyridine	N	N	N	R	R	R	N	R	R	N	R	R	N	R	N	N	N	L
	Tetrahydrofuran	N	N	N	L	L	N	R	L	T	L	R	N	R	N	N	N	N	L
	Toluene	L	R	N	R	R	L	R	R	L	N	R	R	L	R	N	N	N	L
	Trichloroethane	L	N	R	R	R	R	T	R	R	T	T	T	R	N	T	N	N	N
	Trichlorethylene	R	R	R	R	L	L	R	R	L	N	N	R	B	R	N	N	N	N
	Triethylamine	R	L	T	R	R	R	T	R	R	R	R	R	L	R	T	N	T	T
	Xylene	R	R	L	R	R	L	R	R	L	R	R	R	R	R	N	N	N	R
MISCELLANEOUS	Cottonseed Oil	R	R	T	R	R	R	T	T	R	L	R	R	R	T	T	R	T	R
	Hydrogen Peroxide (30%)	R	R	T	R	R	R	R	R	R	R	R	R	R	R	T	R	T	R
	Kodak KMER FTFR	N	N	T	R	R	R	T	T	R	N	N	R	R	R	N	R	N	T
	Peanut Oil	R	R	T	R	R	R	T	T	R	R	R	R	R	R	T	R	T	T
	Petroleum Oils	T	R	L	T	R	T	R	R	T	T	T	T	R	R	T	T	T	R
	Sesame Oil	R	R	T	R	R	R	T	T	R	R	R	R	R	R	T	R	T	T
	Shipley (AS-111,340,1350)	N	N	T	R	R	R	T	T	R	N	N	R	R	R	N	R	N	T
	Silicone Oils	R	R	R	R	R	R	R	R	R	R	R	R	R	R	T	R	T	R
	Turpentine	R	R	T	R	R	R	T	T	R	R	R	R	R	R	T	R	T	T
	Waycoat 59	N	N	T	R	R	R	T	T	R	N	N	R	R	R	N	R	N	T

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