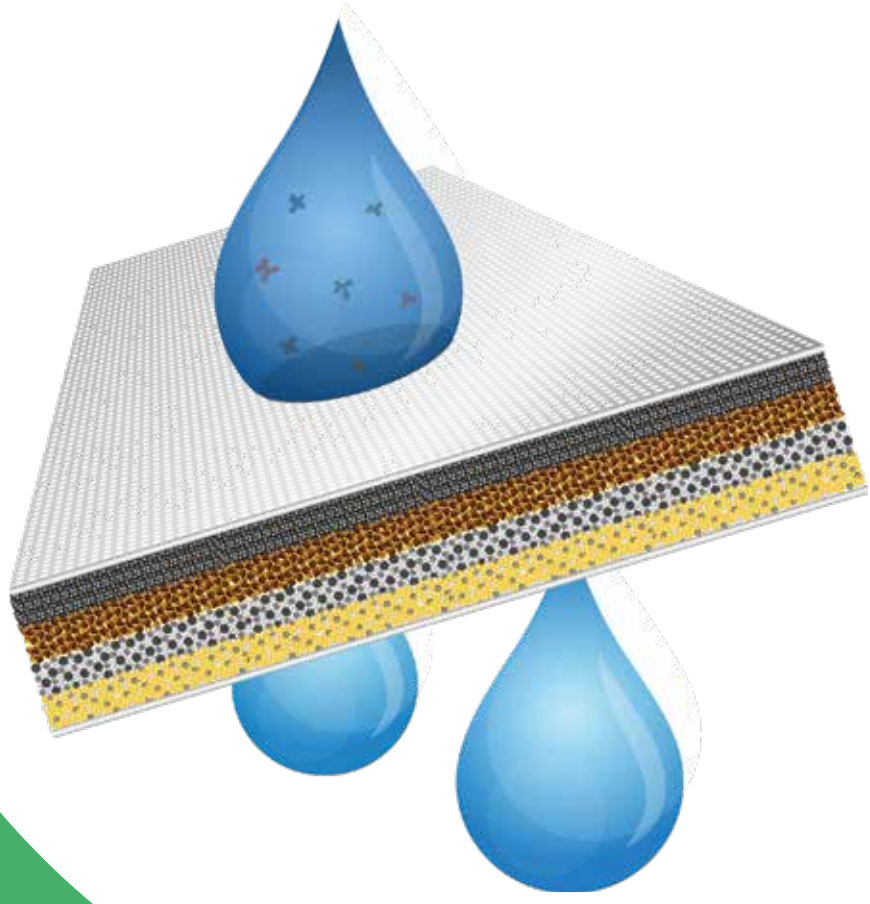
Filtration Aids



Filtration Membranes
Syringe Driven Filters
Glass Fibre Pre-filters & Filter Paper
Blotting Membranes
Vacuum Driven Filters
Filter Holder
Stainless Steel Sterility Test Manifold System

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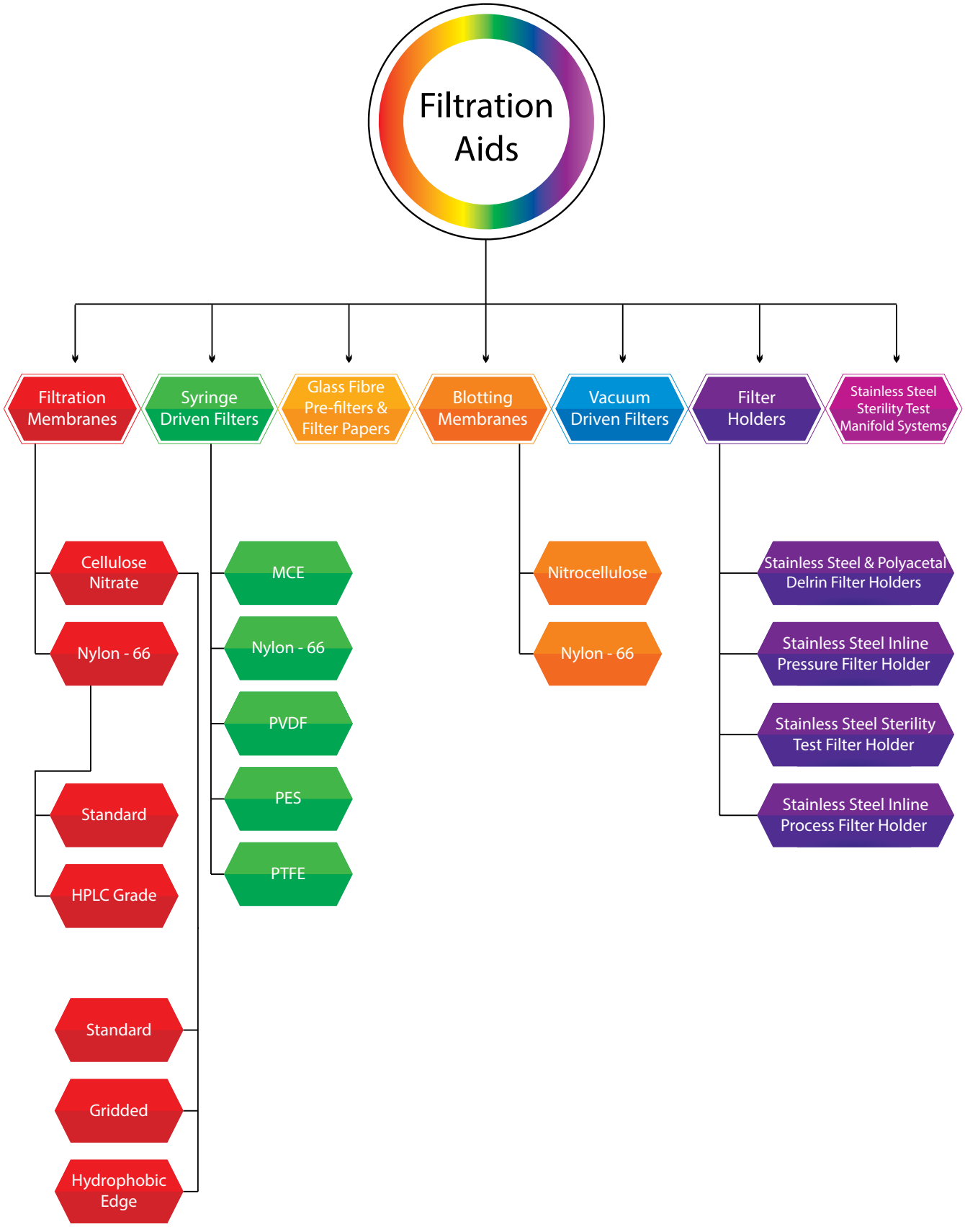
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Filter Holders
Stainless Steel Sterility Test Manifold Systems
Cellulose Nitrate
Nylon - 66
Standard
HPLC Grade
Standard
Gridded
Hydrophobic Edge
MCE
Nylon - 66
PVDF
PES
PTFE
Nitrocellulose
Nylon - 66
Stainless Steel & Polyacetal Delrin Filter Holders
Stainless Steel Inline Pressure Filter Holder
Stainless Steel Sterility Test Filter Holder
Stainless Steel Inline Process Filter Holder

Membrane Selection Guide

Step 1: Select an appropriate pore size

Selection of an appropriate pore size depends on relative size of particles to be filtered. Pore size controls the particle exclusion. As a general rule, small pore size membrane filters (0.2 microns) are used for sterilization of process fluids / gases whereas, the membrane filters with pore size more than 0.2 microns are used for various applications such as clarification of process fluids and removal of particulate matter.

Step 2: Select an appropriate membrane type

Hydrophobicity or hydrophilicity	**Hydrophilic membranes** Have affinity for water and are broadly used for aqueous filtrations because of their wettability **Hydrophobic membranes** Suitable for filtration of gases and liquids with low surface tension
Chemical compatibility	This refers to solvation, swelling or weakening of membrane due to contact with the process fluids. Refer Chemical Compatibility Guide (Page No 8)
Thermal stability	Compatibility of the membrane with temperature of process fluid
Binding affinity	It reflects the degree with which the molecules from process fluid stick/ bind to the membrane surface.
Extractables	Extractables are the substances from membrane that might enter the filtrate after filtration. Types of potential extractables depend on the type of process fluid and the selected membrane.
Other factors	**Grid pattern**: Used for bacterial retention, replica plating, colony tracing and water analysis **Hydrophobic edge**: Used for testing samples that contain inhibitors such as drugs, antibiotics and disinfectants.

Step 3: Select an appropriate membrane size / area

To select an appropriate membrane size / area, consider –

- Process fluid volume
- Tentative duration of process
- Pressure tolerance properties of selected membrane type

Generally, for processing large volumes of fluids, high flow rates are desired. High flow rates are achieved with the membranes having larger effective filtration area.

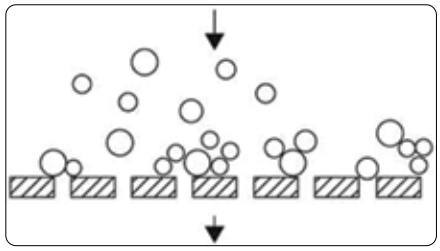
Step 4: Sterilization considerations

- Autoclavable / non-autoclavable
- Possibility of sterilization by gamma irradiation
- Need to use presterilized filters

Concepts and Principles

Membrane Filtration

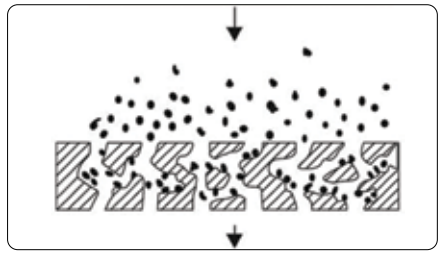
It works on the principle of sieving. Particles are retained on the filter to retain particles on the surface. Capacity of the filter to retain particles is determined by pore size distribution. The sieve effect depends on total load and filter surface area. Microorganisms can form a very compact plaque on filter surface and clog the filter. Cellulose nitrate, Nylon-66, MCE, PVDF, PES and PTFE membranes work on the principle of membrane filtration.



- All particles greater than rated pore size are retained
- Precise microporous structure
- Surface retention of particles
- Limited particle loading capacity
- Does not release fibers
- Stable up to 130°C
- Sensitive to many organic solvents
- Microorganisms retained on the surface of membrane, permitting cultivation and colony counting

Depth Filtration

The depth filtration principle works with a filter that is build up from fibers. Besides the sieve effect that retains larger particles on the surface, smaller particles can also be retained within the filter by obstruction between the fibers and by adsorption on to the fibers. Glass fiber pre-filters and filter papers work on the principle of depth filtration.



- No rated pore size. Efficiencies are expressed in terms of percentage of initial particle penetration
- Random fibrous matrix
- Particles trapped within filter matrix
- High particle loading capacity
- Releases fibers
- Stable up to 500°C
- Resistant to all organic solvents
- Microorganisms not retained on the surface

Membrane	Features
Cellulose Nitrate (CN)	These filters are highly recommended for filtering when protein binding is not of great importance. It is best used for filtering buffers as these filters are non-toxic.
Glass fiber	Glass fibers are commonly used for prefiltering solutions that are loaded with high particles or difficult-to-filter biological fluids. These filters have an excellent loading capacity and best used to filter serum.
Mixed cellulose ester (MCE)	These membrane filters are composed of cellulose acetate and cellulose nitrate. They have a much smoother and uniform surface than pure nitrocellulose filter. Since these membranes are biologically inert, they are widely used in analytical and research applications.
Nylon	Nylon filters do not contain any wetting agents, detergents and surfactants and are naturally hydrophilic in nature. They can be used for filtering strong solutions like DMSO and alcohols. Like cellulose nitrate, nylon membranes binds to macromolecules and proteins and hence is used for filtering protein-free cell culture media.
Polyethersulfone (PES)	PES filters are commonly used to filter cell culture media as it has very low binding and extractables. Filtration process is faster in PES than in cellulose / nylon membranes.
Polytetrafluorethylene (PTFE)	These natural hydrophobic filters are commonly used to filter gases and humidified air. These filters possess chemical resistance, hydrophobicity and must be used only after wetting the filter with a solvent such as ethanol prior to use.
Polyvinylidene fluoride (PVDF)	PVDF membranes are used in applications requiring highest purity. They are resistant to solvents, acids and bases and, therefore, these membranes can be easily stripped and reused to look at other proteins.

Applications

Sterilization

Membrane filtration is used for sterilization of small scale and large scale filtration applications such as for sterilization of tissue culture media and other reagents. Another common use of membrane filtration is sterilization of air for laboratory or industrial use.

Industrial Applications

Sterility Testing

Sterility testing is an important quality control procedure in pharmaceutical, food and beverage industry. Membrane filtration is the method of choice for testing of pharmaceuticals that contain antimicrobial agents since it permits removal of contaminants from the product for viability testing.

Brewing Industry

Membrane filtration is used in brewing industry primarily to increase the keeping qualities of product during storage at room temperature. It eliminates the need for heat pasteurization of the final product.

Clarification and stabilization of wine

Membrane filtration is used for removal of bacteria, yeasts and potential spoilage organisms from wine. Filtration also increases product clarity.

Microscopy

Particles from gas or liquids can be trapped on filter surface and used to study and quantify particulates by microscopic techniques.

Viability counting

If density of organisms in the process fluid is very low, it is not possible to count them by microscopy. In such case, the material to be tested is passed through the filter and the organisms are retained on the surface of the filter. Filter is then placed upon a culture medium and viable microorganisms retained on filter grow into colonies.

Cleaning gases by filtration

For a wide variety of purposes in the laboratory and industry it is necessary to have air or gases that have been scrubbed clean of particulates. Membrane filters of appropriate pore size are widely used for gas filtration.

Pollution monitoring

Microbiological examination of water

The membrane filter technique is legally recognized for checking the quality of drinking water and surface waters that might come in contact with humans.

Virus examination of water

For removal of viruses from large volumes of water, membrane with extremely small pore sizes have been used.

Air filtration and air pollution analysis

Air sampling is a routinely performed practice in industries to analyze microbial load in air. Membrane filtration is also used widely for personnel monitoring, especially where workers are at high risk of exposure to hazardous particulate materials such as asbestos, cotton, coal, cement, sand etc.

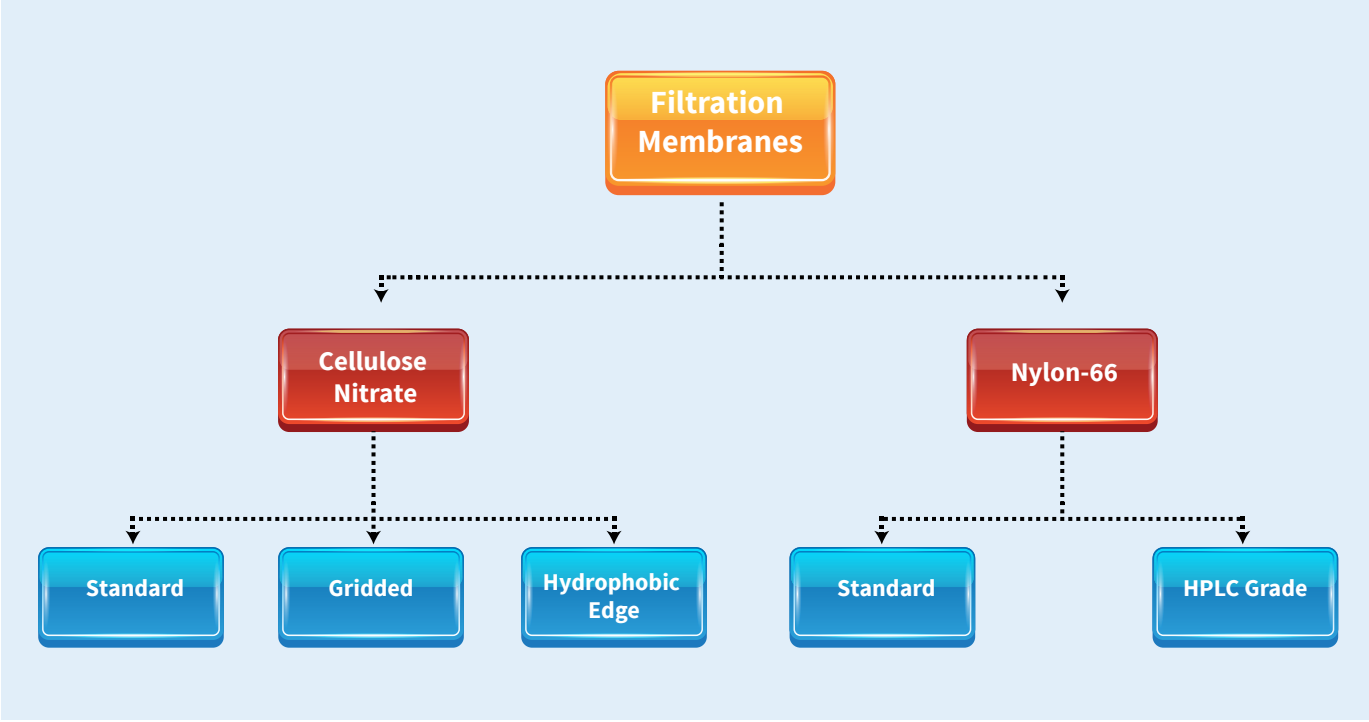
Biomedical and analytical uses

- Chemotaxis and leukocyte migration
- Cell growth synchronization
- Cells size fractionation
- Harvesting and concentrating microorganisms
- HPLC sample preparation

Fermentation Technology

Fermentation requires continuous addition of considerable quantities of sterile air, gases, acids, bases, antifoam and nutrient feeds. These additions are performed through the inlet ports fitted with sterile membranes. In addition to the inlet ports, the outlet ports meant for venting exhaust gases and sampling ports meant for removal of analytical samples are also equipped with sterile membrane filters.

Filtration Membranes

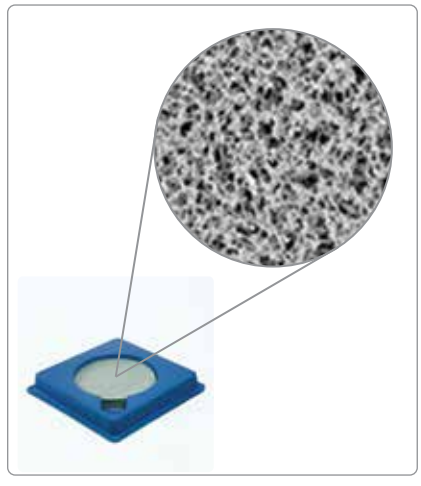


Cellulose Nitrate Membranes

Standard Cellulose Nitrate Membranes

- Available in 6 different diameters with 7 different pore sizes
- Cellulose nitrate material assures effective retention with high flow rates
- Fine, uniform pore structure and high, non-specific adsorption
- Can be sterilized by autoclaving as well as dry heat

Specifications					
Pore size (µ)	0.22	0.45	0.8	1.2	5
Diameter (mm)	13mm, 25mm, 47mm, 90mm, 142mm, 293mm				
Water Flow Rate (ml/min/cm^2) at ΔP=10psi, 20°C	20	46	259	364	780
Maximum operating pressure	3 Kg/cm^2				



Applications

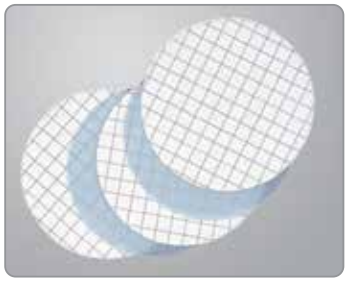
- Large pore size (≥1.2µ)- Cell retention, diagnostic kits, particle retention, clear filtration
- Small pore size (< 1.2µ) - Sterile filtration of reagents and liquids

Filtration Membranes

Pore sizes (µ)	Diameters					
	13mm	25mm	47mm	90mm	142mm	293mm
0.22	SF93A	SF94A	SF95A	SF98A	SF99A	SF100A
0.45	SF93B	SF94B	SF95B	SF98B	SF99B	SF100B
0.80	SF93C	SF94C	SF95C	SF98C	SF99C	SF100C
1.20	SF93D	SF94D	SF95D	SF98D	SF99D	SF100D
3.00	SF93E	SF94E	SF95E	SF98E	SF99E	SF100E
5.00	SF93F	SF94F	SF95F	SF98F	SF99F	SF100F
8.00	SF93G	SF94G	SF95G	SF98G	SF99G	SF100G
0.45µ Sterile, Individually packed	—	—	SF95H	—	—	—

Gridded Cellulose Nitrate Membranes

- Used for microbial testing of water, beverages and food samples
- Grids make counting easier
- Excellent for retention of yeasts and molds



Specifications			
Pore size (µ)	0.22	0.45	0.8
Diameter (mm)	47mm		
Water Flow Rate (ml/min/cm^2) at ΔP=10psi, 20°C	20	46	259
Maximum operating pressure	3 Kg/cm^2		

Pore sizes (µ)	Product code (Bulk packed, Non-sterile)	Product code (Individually packed, sterile)
0.22	SF97A	SF97B
0.45	SF97C	SF97D
0.80	SF97E	SF97F

Cellulose Nitrate Membranes with Hydrophobic Edge

- Used for microbial testing of samples that contain inhibitors such as antibiotics, drugs, disinfectants, etc
- 6mm hydrophobic edge prevents diffusion of inhibitor into hydrophilic portion of membrane
- Complete removal of inhibitor can be achieved during flushing
- Improved sensitivity and reliability due to unaffected microbial growth

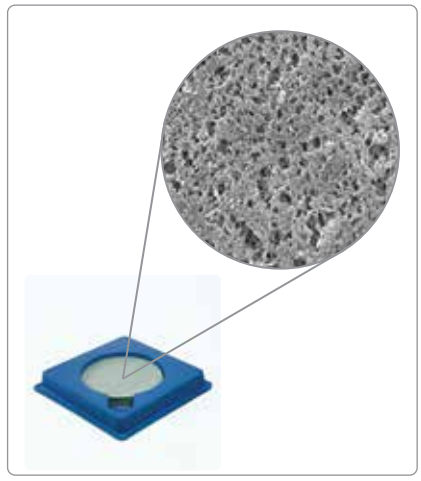
Specifications	
Pore size (µ)	0.45
Diameter (mm)	47mm
Water Flow Rate (ml/min/cm^2) at ΔP=10psi, 20°C	20
Maximum operating pressure	3 Kg/cm^2

Pore sizes (µ)	Product code (Bulk packed, Non-sterile)	Product code (Individually packed, sterile)
0.45	SF96A	SF96B

Filtration Membranes

Nylon-66 Membranes

- Types:
  Standard : Double layered, hydrophilic and biologically inert
  HPLC Grade : Hydrophilic, biologically inert, used for HPLC sample preparation
- Available in 6 different diameters each with 3 pore sizes
- Wide chemical compatibility, resistant to most solvents
- Non-shedding in nature and free of leachable wetting agents
- Do not require presence of wetting agents in the liquid to be filtered in order to be used for aqueous filtration
- Flexible, durable and easily handled
- Can be autoclaved without the fear of damage and do not change the flow characteristics after sterilization.



Applications

- Filter Sterilization
- Clarification of mobile phase in HPLC processes

Specifications						
Pore size (µ)	0.22		0.45		0.8	
Diameter (mm)	13mm, 25mm, 47mm, 90mm, 142mm, 293mm					
Water Flow Rate (ml/min/cm^2) at ΔP=10psi, 20°C	14.5		38.5		125	
Bubble point	52 psi	3.65 kg/ cm^2	33 psi	2.32 kg/ cm^2	14 psi	0.98 kg/ cm^2
Maximum operating	3 Kg/cm^2					

Standard Nylon-66 Membranes

Pore sizes (µ)	Product Code (Diameters)					
	13mm	25mm	47mm	90mm	142mm	293mm
0.22	SF101A	SF102A	SF103A	SF104A	SF105A	SF106A
0.45	SF101B	SF102B	SF103B	SF104B	SF105B	SF106B
0.80	SF101C	SF102C	SF103D	SF104C	SF105C	SF106C
0.45µ Sterile, Individually packed	—	—	SF103C	—	—	—

HPLC Grade Nylon-66 Membranes

Pore sizes (µ)	Product Code (Diameters)		
	13mm	25mm	47mm
0.22	SF101D	SF102D	SF103E
0.45	SF101E	SF102E	SF103F
0.80	SF101F	SF102F	SF103G

Chemical Compatibility Guide

Four different responses of a filter to a solvent are known,

1. No chemical effect - Good compatibility
2. Slight swelling or distortion of the filter. The filter may be compatible with the solvent for short term use.
3. Extensive swelling and slow dissolution of the filter
4. Complete dissolution or disintegration of the filter

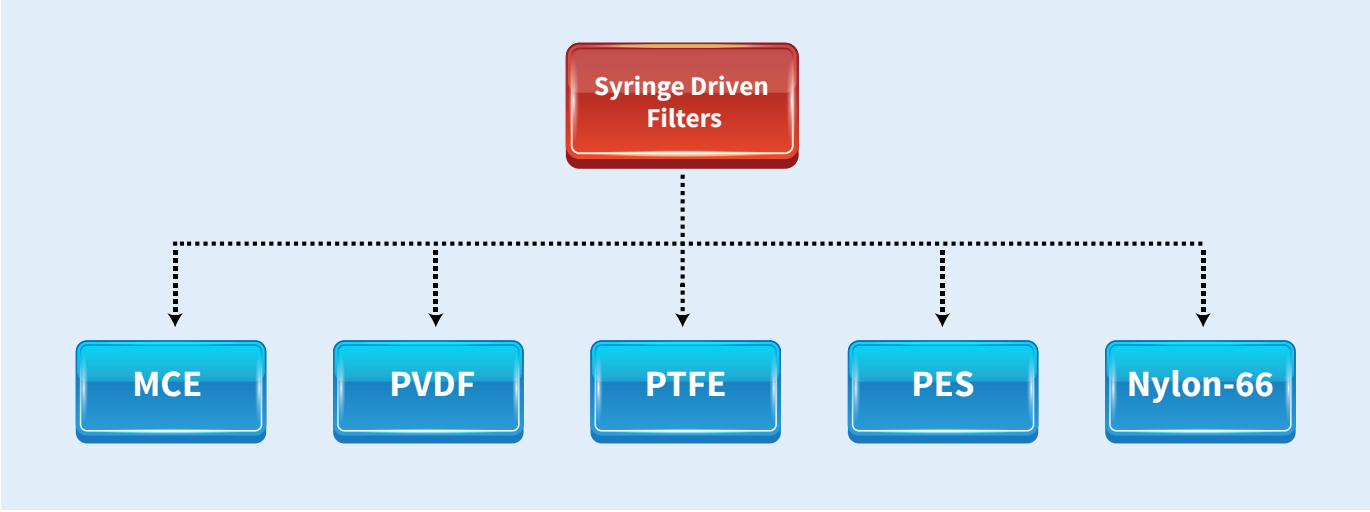
Membrane Type	Membranes			
	Cellulose Nitrate	PTFE	Nylon-66	PVDF
Solvents				
Acetone	N	G	G	N
Acetonitrile	N	G	G	N
Benzone	G	G	G	G
Benzyle Alcohol	N	G	G	G
Benzyle Alcohol 4%	F	G	G	G
Diethyl Ether	N	ND	G	ND
Dimethyl Formamide	N	F	G	N
Ethyl Acetate	N	G	G	G
Ethylene Glycol	N	G	G	G
Hexane	G	G	G	G
Iso Propyl Alcohol	G	G	G	G
Methanol	N	G	G	G
Methylene Chloride	G	G	G	N
n-Butanol	G	F	G	G
Peanut Oil	G	ND	G	ND
Tetrahydrafuran/Water (50:50)	N	F	G	N
Toluene	F	G	G	G
Trichloroethylene	G	G	G	F
Acids				
Hydrochloric Acid 37%	N	G	N	ND
Hydrochloric Acid 10%	G	G	G	F
Nitric Acid 67%	N	ND	N	N
Nitric Acid 7%	G	G	G	G
Sulphuric Acid 10%	G	G	G	ND
Bases				
Ammonium Hydroxide 25%	N	G	G	N
Sodium Hydroxide 32%	N	G	G	G
Potassium Hydroxide 32%	N	G	N	G

G = Good, N = Not Recommended, F = Fair
ND - No Data

Applications At a Glance

Membrane types	Pore size	Application
Nylon	0.22 µm	Sterile filtration, HPLC sample preparation, solvent filtration
	0.22 to 1.2 µm	Particle removal and clarification, solvent filtration, particle analysis, paint monitoring & automotive cleanliness analysis
	0.45 µm	Clarification of aqueous solutions, particle removal & analysis, preparation of aqueous & organic solutions prior to chromatography
PVDF	0.22 µm	Preparation of protein-containing solutions prior to chromatography, particle removal from aqueous & mild organic solutions, sterile filtration of tissue culture media, protein & DNA solutions
	0.1 µm	General filtration, particle separation, protein clarification and sterile filtration, Ultra-low protein binding assays, sterile filtration of tissue culture media, protein solutions or aqueous solutions.
PTFE	0.45 µm	HPLC solvents, solid-phase synthesis, sample recovery & peptide synthesis.
	0.22 µm	Analytical sample preparation, clarifcation of aqueous & organic solutions with high particulate levels.
PES	0.22 µm	Preparation of aqueous solutions prior to chromatography, vacuum filtration of tissue culture media, serum, buffers, or other biological solutions.
	0.45 µm	Receptor binding assays on whole cells and cell fragments, protein kinase/phosphatase precipitation assays & bead/resin based assays
MCE	0.45 µm	Analytical & research applications

Syringe Driven Filters



Syringe driven filters contain membranes bonded to a plastic support plate and sealed into a small disc-shaped unit equipped with luer type connectors attached to the syringe. The solution to be filtered is filled into the syringe and manually pushed through the membrane. These disposable filters are used for bio-applications such as removal of viruses, biological sample preparation, capillary electrophoresis, filtration of colloidal material, HPLC sample preparation and sterile filtration.

When using a syringe filter, it is best to use a syringe larger than 10ml, since smaller ones find to create excessive pressure which might damage the filter. Syringe filters are widely used in pharmaceutical practice. Although many pharmaceutical products are delivered to the hospitals in sterile form, there is frequently the need to add additional substances such as salts, hormones or antibiotics before the products are finally administered to the patient. In this addition process, there is a risk of microbial contamination as well as the possibility of adding inert particles which could harm the patient if administered intravenously. Membrane filtration by syringe driven filters ensures removal of such particles and safe administration.

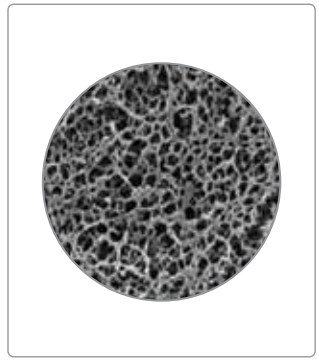
- Available with 5 types of membranes: MCE, Nylon-66, PVDF, PES and PTFE
- Available in two diameters 13mm & 25mm (inner diameters)
- Faster flow rates
- Low hold-up volume

MCE Syringe-driven Filters

- MCE membranes are composed of mixture of cellulose nitrate and cellulose acetate
- They are hydrophilic and biologically inert in nature and hence do not require pre-wetting in order to be used for aqueous filtration
- Surface of MCE membranes is smoother and more uniform than pure cellulose nitrate membranes

Applications

- Filter sterilization of liquids used in tissue culture
- Contamination analysis
- Particle monitoring and particle removal
- Air monitoring
- Dairy microbiology, retention of yeast, molds and algae
- QC analysis of fluid holding, particle collection and analysis



Scanning Electron Microscopy (SEM) of MCE Membrane

Syringe Driven Filters

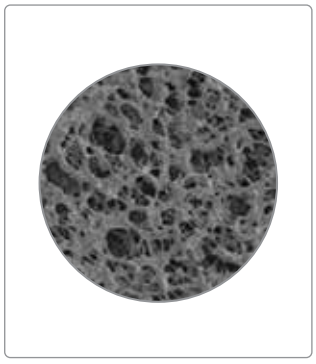
Sterility	Diameter (mm)	Pore sizes (µ)		Prefilter
		0.22	0.45	
Sterile	13	SF1	SF3	No
	25	SF2	SF4	No
	30	SF137	SF138	No

PVDF Syringe-driven Filters

- Incorporates hydrophilic PVDF membrane
- Wide chemical compatibility & thermal stability
- Low-protein binding capacity
- Non-sterile filters can be sterilized by autoclaving

Applications

- Gas filtration
- Vapor filtration
- Sterilization of tissue culture liquids



Scanning Electron Microscopy (SEM) of PVDF Membrane

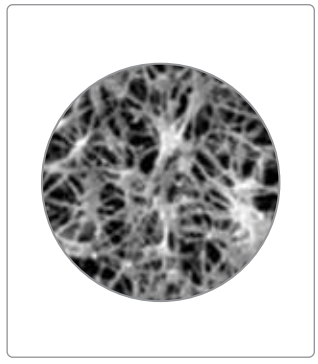
Sterility	Diameter (mm)	Product code Pore size (µ)			Prefilter
		0.1	0.22	0.45	
Sterile	13	SF7	SF9	SF11	No
	25	SF8	SF10	SF12	No
	30	—	SF141	SF142	No
Non-sterile	25	—	SF130	SF131	Yes

PTFE Syringe-driven Filters

- Incorporates hydrophobic PTFE membrane & hence cannot be used directly in the filtration of aqueous solutions
- High protein binding
- Non-sterile filters can be sterilized by autoclaving
- They are resistant to all strong solvents, acids, bases and reactive chemicals (except hydrocarbons at higher temperatures)
- They are the most temperature resistant filters, being stable up to 300°C and down to -100°C

Applications

- Alkali solvent filtration
- Strong acid solvent filtration
- Filtration of organic solvent with strong chemical causticity



Scanning Electron Microscopy (SEM) of PTFE Membrane

Sterility	Diameter (mm)	Product code Pore size (µ)		Prefilter
		0.22	0.45	
Sterile	13	SF17	SF19	No
	25	SF18	SF20	No
	30	SF145	SF146	No
Non-sterile	25	SF132	SF133	Yes

Syringe Driven Filters

PES Syringe-driven Filters

- Incorporates hydrophilic PES membrane
- Low protein binding
- High product recovery
- Non-sterile filters can be sterilized by autoclaving

Applications

- Sterilization of tissue culture liquids
- Sterilization and clarification of protein solutions, serum, virus suspensions and other aqueous solutions

Scanning Electron Microscopy (SEM) of PES Membrane

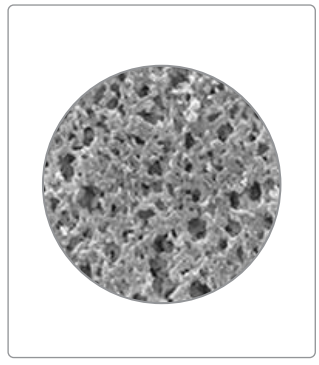
Sterility	Diameter (mm)	Product code Pore size (µ)		Prefilter
		0.22	0.45	
Sterile	13	SF13	SF15	No
	25	SF14	SF16	No
	30	SF143	SF144	No
Non-sterile	25	SF132	SF133	Yes

Nylon-66 Syringe-driven Filters

- Incorporates hydrophilic Nylon-66 membrane
- Wide chemical compatibility
- Non-sterile filters can be sterilized by autoclaving

Applications

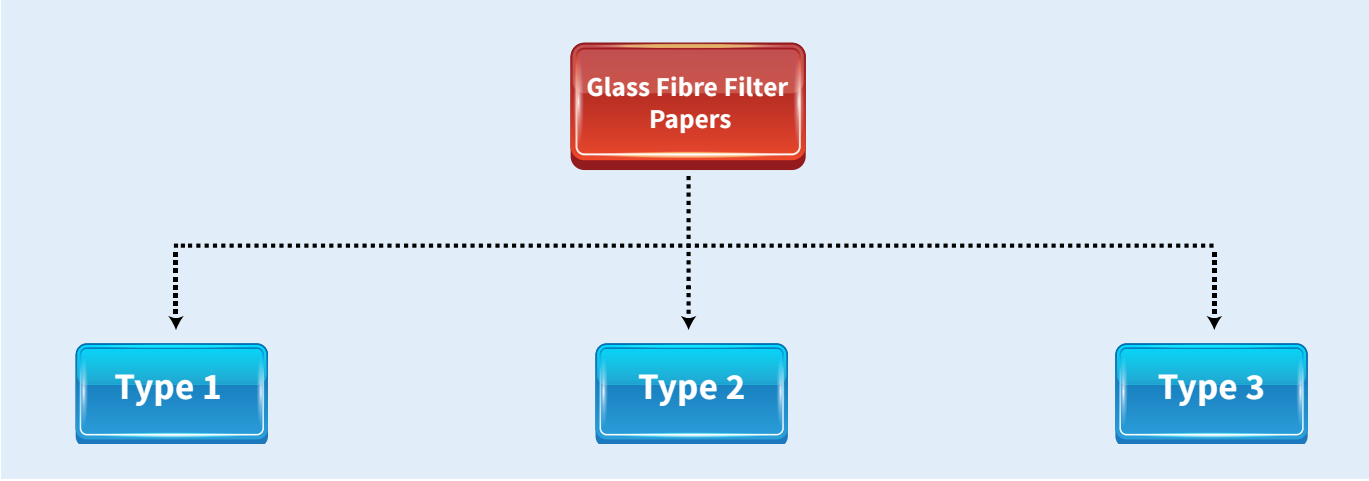
- Chemical filtration
- Beverage filtration
- Sample preparation in HPLC and GC



Scanning Electron Microscopy (SEM) of Nylon-66 Membrane

Sterility	Diameter (mm)	Product code Pore size (µ)		Prefilter
		0.22	0.45	
Sterile	13	—	SF5	No
	25	SF127	SF6	No
	30	SF139	SF140	No
Non-sterile	25	SF128	SF129	Yes
	25	SF126	—	No

Glass Fibre Filter Papers & Pre-filters



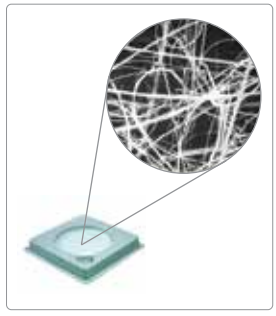
Glass fiber pre-filters and filter papers are the depth filters used to remove large particles and increase shelf life of final membrane filters. The ideal arrangement for filter sterilization and for clarification of large volume of liquids, is the use of a depth filter to remove large particles, followed by a membrane filter. The main membrane filter clogs quickly in the absence of pre-filter resulting in low throughput. With a depth filter as a pre-filter, much greater throughput is possible. It is important that the pre-filter be matched properly to the membrane filter. If depth filter is too coarse, insufficient removal of clogging particles will occur and membrane will clog quickly. On the other hand, if the depth filter is too tight, it will have insufficient dirt-handling ability and will itself clog quickly.

Glass Fibre Pre-Filters

- Available in 6 diameters with 2 different pore sizes
- Low hygroscopicity
- Biologically inert with high chemical and thermal resistance
- Unaffected by humidity and can be stored indefinitely
- Effective removal of large volumes of suspended solids from a process and protection of downstream filter membranes from fouling and clogging
- Reduction in cleaning cost

Applications

- 1.5µ - Clinical specimen filtration
- 2.0µ - Air pollution monitoring
  - Biochemical biological filtration of cells and precipitated proteins
- Scintillation counting
- Radioimmunoassays



Glass Fibre Pre-filters

Pore sizes (µ)	Product code (Diameters)					
	47mm	90mm	127mm	142mm	279mm	293mm
1.50	SF115A	SF116A	SF117A	SF118A	SF119A	SF120A
2.00	SF115B	SF116B	SF117B	SF118B	SF119B	SF120B

Glass Fibre Filter Papers

- Available as circular discs as well as pre-cut sheets
  - Type 1 • Type 2 • Type 3
- Circular membranes available in 4 different diameters
- Biologically inert with high chemical and thermal resistance

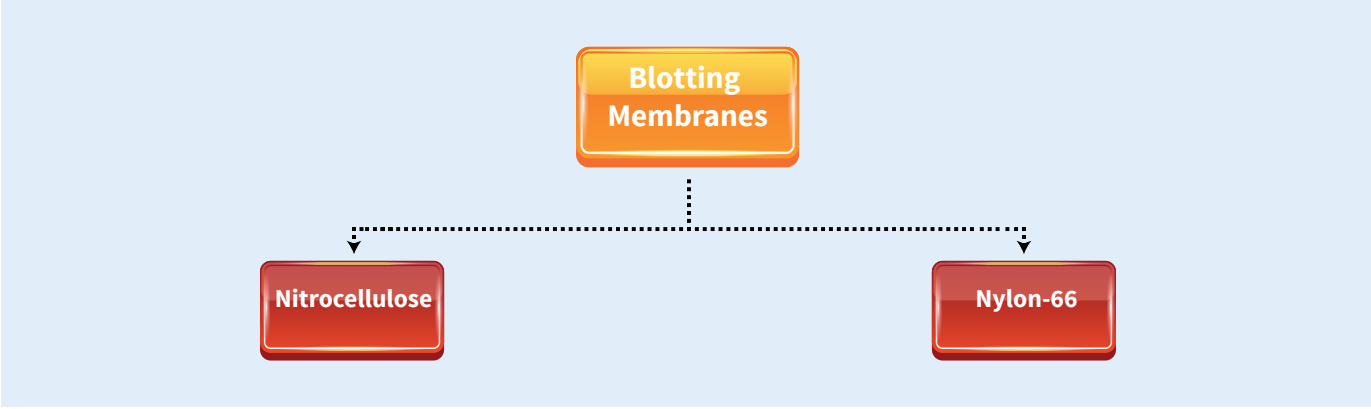
Type	Basic Weight (gms/m^2)	Thickness (mm)	Partical Retention Size (Liquid)µ	Pressure Drop @32 LPM/100cm^2
1	53	0.3	1.6	40
2	70	0.44	1.2	40
3	54	0.3	1.2	40

Glass Fibre Pre-filters & Filter Papers

	Type 1 (1.6 µm)	Type 2 (1.2 µm)	Type 3 (1.2 µm)
Characteristics	High flow rate	Manufactured from 100% pure borosilicate glass of special purity	High flow rate
	Efficient collection of fine particles	High retention efficiency	Biologically inert
	High dirt holding capacity	High dirt holding capacity	High dirt holding capacity
	High stability at varying humidity		
Applications	Routine monitoring of air pollution	Specialized monitoring of solid pollutants, microorganisms, oil and smoke air	Gravimetric determination of air borne particulate matter
	Chemical analysis of trace pollutants	Air sampling	
	Liquid scintillation counting	Binding assays	

Diameter / Dimensions	Product Code		
37mm	SF121A	—	SF123A
47mm	SF121B	—	SF123B
110mm	SF121C	—	SF123C
125mm	SF121D	—	SF123D
8'' x 10''	SF121E	SF122	SF123E

Blotting Membranes



Blotting is the transfer of large molecules on to the surface of an immobilizing membrane. Technology of blotting broadens the possibilities of detection of electrophoretically separated fractions such as proteins and nucleic acids.

Types of Blotting Membranes

Nitrocellulose Blotting Membranes

Nitrocellulose is the most commonly used membrane for blotting. Major advantage of these membranes is that the proteins adsorbed on them can be reversibly stained so that the total protein can be estimated before specific detection. Nitrocellulose is occasionally also used for preparatory methods and the proteins can be eluted again for further application.

Nylon 66 Blotting Membranes

Nylon membranes possess high mechanical stability and high binding capacity due to electrostatic interactions.

Blotting Membrane Selection Chart

Membrane Type	Nitrocellulose	Nylon-66
Biomolecules		
Nucleic Acids	R	HR
Proteins	R	R
Transfer Method		
Dot Blot	R	R
Colony or Plaque Lift	HR	R
Electrotransfer	R*	HR
Capillary Blot	R	R
Vaccum Blot	R	R
Alkaline Transfer	NR	R
Molecule Fixation		
Baking	R	R
Drying	R	R
UV Crosslinking	P	HR
Alkali Fixation	NR	R
Molecule Removal	NR	NR
Detection Method		
Colorimetric	HR	R
Radiolabeled	R	R
Luminescent	R	P
Fluorescent	R	P
Staining	R	P
Reprobing		
Once	NR	R
Multiple	NR	R

HR = Highly Recommended, R = Recommended,
R* = Recommended for Proteins only, P = Possible,
NR = Not Recommended

Blotting Membranes

Nitrocellulose Blotting Membranes

- Available in pre-cut sheets and rolls with two different pore sizes
- Uniform pore structure
- Compatible with colorimetric and radiolabeling detection methods
- Molecular fixation by baking, drying, alkali treatment and UV crosslinking is possible
- High strength and durability, preventing distortion or contamination in multiple reprobings
- Capable of binding wide range of fragment sizes
- Inherently charged

Applications

- Capillary blot
- Electrotransfer
- Northern and Southern blotting

Specifications		
Pore size (µ)	0.22	0.45
Dimensions (cm x cm)	15x15, 20x20, 30x30, 30x300	

Pore sizes (µ)	Product code Pre-cut Sheets Dimensions (cm x cm)			Product code Rolls Dimensions (cm x m)
	15 x 15	20 x 20	30 x 30	30cm x 3m
0.22	SF107A	SF108A	SF109A	SF110A
0.45	SF107B	SF108B	SF109B	SF110B

Nylon-66 Blotting Membranes

- Available in pre-cut sheets and rolls with two different pore sizes
- Uniform pore structure
- Compatible with colorimetric, radiolabeled, chemiluminescent, fluorescent and staining detection methods
- Molecular fixation by baking and drying is possible
- Can be easily blocked by normal blocking methods
- High signal to noise ratio
- High strength offers ease of handling

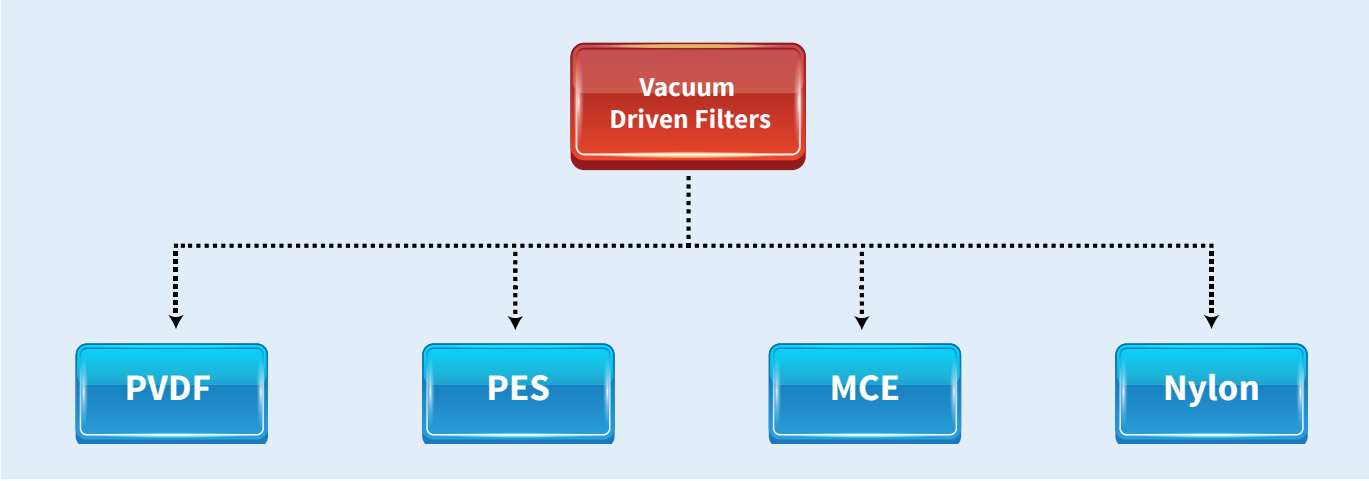
Applications

- Protein binding
- Dot-Blot screening
- Nucleic acid blotting
- Colony/ Plaque screening

Specifications		
Pore size (µ)	0.22	0.45
Dimensions (cm x cm)	15x15, 20x20, 30x30, 30x3m	

Pore sizes (µ)	Product code Pre-cut Sheets Dimensions (cm x cm)			Product code Rolls Dimensions (cm x m)
	15 x 15	20 x 20	30 x 30	30cm x 3m
0.22	SF111A	SF112A	SF113A	SF114A
0.45	SF111B	SF112B	SF113B	SF114B

Vacuum - Driven Filters

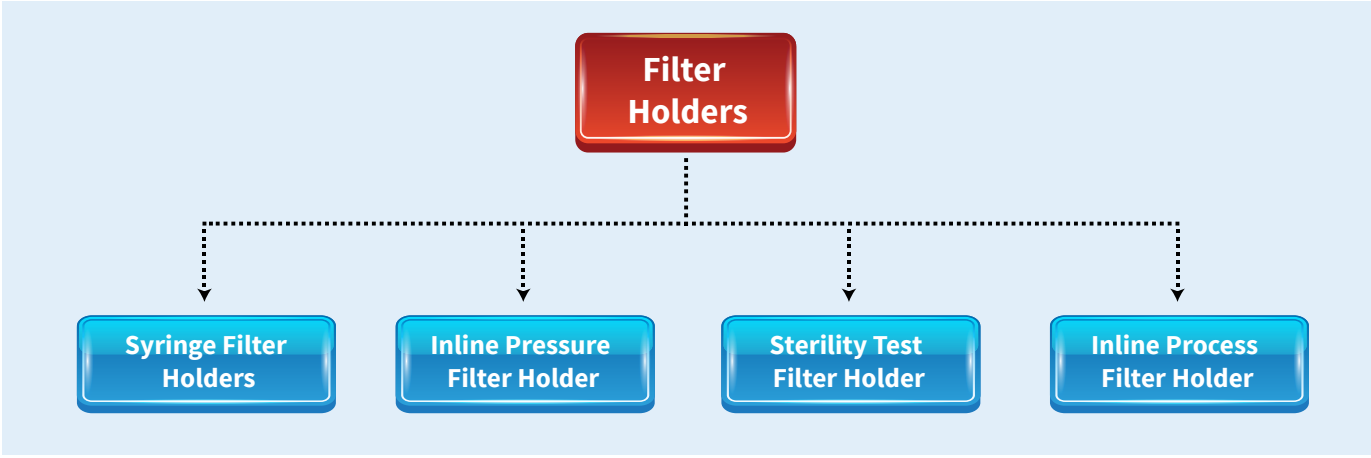


- Vacuum Filtration Systems come in three volume capacities 150, 250 and 500ml, three membrane pore sizes 0.10, 0.22, 0.45 µm and four membrane materials PVDF, PES, MCE & Nylon
- Funnel is manufactured from optically clear polystyrene and graduated
- Receiver bottle has ergonomically designed easy grip sidewalls and graduation marks
- Receiver bottle and filter adapter are manufactured from 100% virgin polypropylene
- The filter adaptor is preprinted with filter type and pore size
- Hose connector is designed to accept multiple hose diameter and features easy grip collar to simplify tightening/ loosening and adjustments
- Cap for receiver bottle is sterile and individually wrapped
- Each individual unit is lot-numbered for easy identification and tracking
- Individually wrapped sterile, non-pyrogenic
- For single use only. Cannot be autoclaved

Membrane Material	Funnel capacity	Product code (As per pore size)		
		0.1	0.22	0.45 (µm)
PVDF	150ml	VD10	VD13	VD16
	250ml	VD11	VD14	VD17
	500ml	VD12	VD15	VD18
PES	150ml	-	VD19	VD22
	250ml	-	VD20	VD23
	500ml	-		
MCE	150ml	-	VD1	VD4
	250ml	-	VD2	VD5
	500ml	-	VD3	VD6
Nylon	150ml	-	-	VD7
	250ml	-	-	VD8
	500ml	-	-	VD9

Funnel Capacity	Filter Diameter (mm)	Process volume	Hold-up Volume after purge	Max. Operating Temp.	Fitting Outlet (Thread)	Full Unit Overall height	Housing Material
150mL	50mm	150mL	=3mL	45	45mm	156mm	ABS
250mL	50mm	250mL	=3mL	45	45mm	200mm	ABS
500mL	50mm	500mL	=3mL	45	45mm	300mm	ABS

Filter Holders



Filter holders are excellent tools for sterilization of small quantities of material. They have a female Luer-Lock inlet for attachment of a syringe and a male Luer slip outlet.

Stainless Steel and Polyacetal Syringe Filter Holders

A simple membrane filtration assembly for small volume filtration using syringe.

- Made up of stainless steel 316 and specially designed for leak proof sealing
- Stainless steel support screen to avoid breakage of membrane against high differential pressure
- Complete unit can be autoclaved with membrane in place
- **Stainless Steel** filter holders available in two diameters - 13mm and 25mm
- **Polyacetal filter** holders available in three diameter - 13mm, 25mm, 47mm

Applications

- Microfiltration or Sterilization of liquids

Diameter (mm)	Product code (Stainless Steel)	Product code (Polyacetal)
13	SF75	SF93
25	SF76	SF94
47	—	SF95

Stainless Steel Inline Pressure Filter Holder

- Made up of stainless steel 316
- Locknut type filter holder enables replacing membrane filter without removing holder, hence prevents filter damage
- High pressure filter holder needs to be equipped with pressure support screen to prevent membrane rupture at high pressures.
- The complete unit can be autoclaved with membrane in place
- S.S filter holders available in two diameters - 25mm and 47mm

Applications

- Microfiltration of strong chemicals and microbiological samples.
- Sterilization of gases and liquids

Diameter (mm)	Product code (Locknut)	Product code (High pressure)
25	SF77	—
47	SF78	SF79

Stainless Steel Sterility Test Filter Holder

Ultra light weight stainless steel filter holder with funnel for vacuum filter applications

- Stainless steel 316 funnel, lid, base and support screen
- Stainless steel 304 spring clamp and silicone stopper
- Unique stainless steel support screen to avoid rupture of membrane disc during filtration

Filter Holders

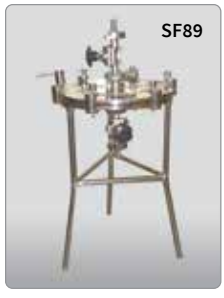
- Standard silicone rubber stopper for mounting filtration assembly on 1L filtration flask or on SS Sterility Test Manifold System
- Complete unit can be autoclaved with membrane in place
- Available in three diameters -13mm, 25mm and 47mm and four volume capacities - 15ml, 300ml, 500ml and 1000ml

Applications

- Sterility testing of antibiotics and pharmaceuticals
- Vacuum filtration of biomass, waste water and particulate contamination analysis
- Microbiological analysis of retained particles
- Yeast and mold detection Vacuum filtration of solvents and aqueous solutions

Diameter (mm)	13	25	47		
Volume (ml)	15	150	300	500	1000
Product Codes	SF80	SF81	SF82	SF83	SF84

S.S Inline Process Filter Holder



A reliable and convenient device for large volume filtration

- Made of stainless steel 316
- Provided with stainless steel support screen and integrity tester
- Complete unit can be autoclaved with membrane in place
- Available in three diameters - 90mm, 142mm and 293mm

Applications

- Large volume process filtration of pharmaceuticals
- Sterilization of tissue culture media and blood plasma fractions
- Sterilizing large volume of fluids, gases and hazardous acids and solvents

Diameter (mm)	Product code (Without integrity tester)	Product code (With integrity tester)
90	SF87	SF88
142	SF89	SF90
293	SF91	SF92

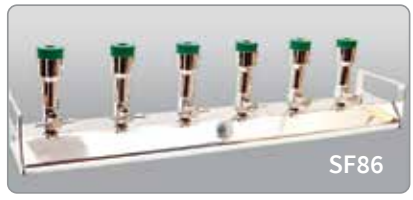
Stainless Steel Sterility Test Manifold System

An integrated filtration system for filtering multiple samples using single vacuum source

- Made of stainless steel 316
- Rugged side supports keep the system rigid and firm even when fully loaded
- Available with 3 stations and 6 stations

Applications

- Sterility testing of antibiotics and pharmaceuticals
- Vacuum filtration of biomass, waste water and particulate contamination analysis
- Microbiological analysis of retained particles
- Yeast and mold detection
- Vacuum filtration of solvents and aqueous solutions



No. of stations	Product Code
3	SF85
6	SF86

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