

# Whatman GD/X™ 25 mm

## Whatman™ syringe filters

### Instructions for Use

#### Introduction

##### Important

Read these instructions carefully before using the products.

##### Intended use

The products are intended for research use only, and shall not be used in any clinical or *in vitro* procedures for diagnostic purposes.

#### Background

##### Description

The Whatman GD/X™ 25 mm syringe filters are designed to enable the filtration of viscous, hard-to-filter samples greater than 10 mL. They are available in a wide variety of filter choices with a polypropylene housing. The combination of the prefiltration stack and filter housing design enables you to filter samples with high particulate load.

Disposable filtration devices provide labor-saving efficiency while ensuring consistent filtration when compared to hand-assembled reusable filter housings.

This document provides general information on the Whatman GD/X 25 mm syringe filters. The specifications in the Technical Data section are intended to provide a basis for establishing functional use, as well as for setting quality assurance test performance levels.

##### Prefilter media

The Whatman GD/X 25 mm syringe filters contain a prefiltration stack of Multigrade GMF 150 (10:1 µm) and Grade GF/F prefilters.

Multigrade GMF 150 is a combination of two glass microfiber filters in one. Manufactured from 100 % Borosilicate glass, its construction consists of a coarse layer on top, meshed with a fine layer below. The Grade GF/ F Filter will retain fine particles down to 0.7 µm.

The prefiltration technology allows you to filter even the most difficult samples with minimal hand force. Compared to an unprotected membrane, the volume of sample filtered can be three to seven times greater.

##### Typical applications

Filter Media	Typical Application
CA	Aqueous and some organic samples
GMF	Aqueous and/or organic; high loading capacity
NYL	Aqueous and/or organic samples; hydrophilic
PES	Aqueous based samples; low protein binding

Filter Media	Typical Application
PTFE	Organic based samples; hydrophobic membrane
PVDF	Aqueous and/or organic based samples; low protein binding membrane
RC	Aqueous and/or organic based samples; very low nonspecific protein binding membrane

#### Filter media

The following filter media choices are available for Whatman GD/X 25 mm syringe filters.

##### Cellulose Acetate (CA) Membrane

Cellulose Acetate is a common selection for filtering biological solutions. The typically low binding characteristics of the membrane allow maximum recovery of target analytes like proteins. The membrane exhibits good flow characteristics and high loading capacity, which allows fast and complete processing of the complex particle matrix found in biological samples.

##### Glass Microfiber Filter (GMF)

Glass Microfiber Filter media are produced entirely from fine grade borosilicate glass microfiber and contain no binders either as manufacturing aids or as wet strengthening additives. Glass Microfiber Filters are generally resistant to weakening or disruption of the fibrous matrix by inorganic or organic solutions and have broad chemical compatibility.

##### Nylon (NYL) Membrane

Nylon membrane is hydrophilic and can be used for aqueous and aqueous-organic samples. The membrane offers chemical resistance to most common HPLC solvents. However, it has limited resistance to acids, bases, halogenated hydrocarbons, aldehydes, and strong oxidizing agents. The most common application is HPLC sample filtration.

##### Polyethersulfone (PES) Membrane

Polyethersulfone membrane provides durability, high temperature resistance, good chemical compatibility, and low protein absorption. It is particularly suitable for filtration of serum, plasma, and tissue culture solutions as well as other protein containing solutions where minimal adsorptive protein loss is desired.

## Polytetrafluoroethylene (PTFE) Membrane

Polytetrafluoroethylene membrane is hydrophobic and will not allow water to pass except under high pressure. Aqueous solutions can be filtered if the membrane is initially "wetted" with alcohol or another appropriate solvent. Polytetrafluoroethylene membrane will stop aqueous aerosols in gas streams.

## Polyvinylidene Difluoride (PVDF) Membrane

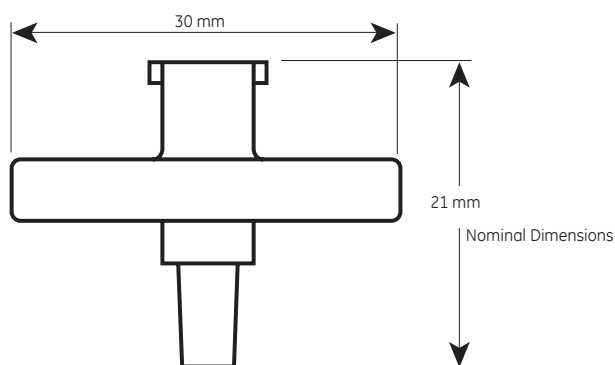
Polyvinylidene Difluoride membrane is a suitable choice for most HPLC sample preparation applications. The membrane is hydrophilic with low water breakthrough values. It offers good chemical resistance to all common HPLC solvents, has low protein binding and negligible extractables.

## Regenerated Cellulose (RC) Membrane

Regenerated Cellulose is a hydrophilic membrane that is resistant to a wide range of solvents. This membrane is suitable for use with aqueous or organic solvents. This membrane has low extractables profile and very low protein binding capacity, which makes it a particularly suitable choice for protein recovery applications.

## Technical information

### Illustration of Whatman GD/X 25 mm syringe filters



## Technical data

<b>Dimensions:</b>	30 mm × 21 mm
<b>Weight:</b>	Approximately 3 grams
<b>Filtration area:</b>	4.6 cm <sup>2</sup>
<b>Maximum operating pressure:</b>	0.5 MPa (5.2 bar, 75 psi)
<b>Housing:</b>	Polypropylene
<b>Hold-up volume:</b>	Full housing 1.4 mL with air purge 250 µL (approx)
<b>Flow direction:</b>	Flow should enter from the inlet
<b>Connectors:</b>	Inlet - Female Luer Lock (FLL) Outlet - Male Slip Luer (MSL)s
<b>Autoclaving:</b>	Autoclave at 121°C max at 0.1 MPa (1.0 bar, 15 psi) for 20 minutes (Not recommended for Nylons)
<b>Glass microfiber:</b>	100% Borosilicate
<b>Prefiltration media:</b>	GMF 150 10 µm: 1 µm GMF/F 0.7 µm

## Operating instructions

### Safety

When considering the specific factors of your application, see *Technical data* for correct use. Do not exceed the pressure, temperature, or chemical compatibility recommendations.

High pressures can be obtained when using syringes. The smaller the syringe, the higher the pressure that can be generated. As general guideline, the following pressures can be obtained by hand with the syringes indicated:

Syringe size	20 mL	10 mL	5 mL	3 mL	1 mL
Pressure obtained by hand	0.2 MPa (2.1 bar, 30 psi)	0.3 MPa (3.4 bar, 50 psi)	0.5 MPa (5.2 bar, 75 psi)	0.7 MPa (6.9 bar, 100 psi)	1.0 MPa (10 bar, 150 psi)

Determine the pressure generated by hand with a specific size syringe and take appropriate safety precautions not to exceed the recommended rating for the device used.



### CAUTION

If the Maximum operating pressure is exceeded, bursting of the device can occur resulting in loss of sample or personal injury.

### Efficiency

To maximize filtration throughput, use the largest pore size filter that will provide the required purity. To extend filter life, use low flow rates or pressures.

### Air locks

Air locks can seriously limit flow rates. To eliminate air locks, point the outlet of the filter device upward during the initiation of liquid flow.

### To filter a solution with a syringe

Follow these steps to filter a solution with a syringe.

Step	Action
1	Fill the syringe with the solution to be filtered.
2	Secure the filled syringe to the FLL inlet of the syringe filter with a twisting motion.
3	With the outlet pointed upward, gradually apply thumb pressure to the syringe plunger to initiate flow.
4	Continue thumb pressure until all the air in the syringe is displaced with liquid.
5	Once liquid starts to exit the syringe filter from the outlet, stop applying pressure, point the syringe downward and away from the user.
6	Orient the syringe filter over a suitable collection container or other apparatus and apply pressure again to filter the sample.

### Integrity test

### Bubble point test

Follow these steps to perform a bubble point test if required for your application.

Step	Action
1	Flush the filter device with 1.4 mL or more of the test fluid.
2	After the filter is completely wet, with the outlet pointed upward, apply air under controlled pressure to the inlet until air breaks through the filter and bubbles can be seen at the outlet.
3	The pressure at which air passes through the wetted filter is the bubble point.

Refer to the table for typical bubble point values.

### Bubble point data

Description	Pore size (µm)	Minimum bubble point		
		(MPa)	(bar)	(psi)
Cellulose Acetate	0.2	0.3	3.2	46
Cellulose Acetate	0.45	0.2	2.0	29
Polytetrafluoroethylene <sup>1</sup>	0.2	0.1	1.0	15
Polytetrafluoroethylene <sup>1</sup>	0.45	0.06	0.6	9
Nylon	0.2	0.3	3.0	43
Nylon	0.45	0.15	1.5	21
Polyethersulfone	0.2	0.3	3.2	46
Polyethersulfone	0.45	0.2	2.1	30
Polyvinylidene Fluoride	0.2	0.3	3.1	45
Polyvinylidene Fluoride	0.2	0.1	1.4	21
GF/A	1.6	N/A	N/A	N/A
GF/B	1.0	N/A	N/A	N/A
GF/C	1.2	N/A	N/A	N/A
GF/D	2.7	N/A	N/A	N/A
GF/F	0.7	N/A	N/A	N/A
934-AH	1.5	N/A	N/A	N/A
GMF	0.45	N/A	N/A	N/A
RC	0.2	0.3	2.8	40
RC	0.45	0.1	1.4	21

<sup>1</sup> Bubble point determined with IPA. All others determined with water.

### Chemical compatibility of membrane

Solvent	CA	GMF	NYL	PES	PTFE	PVDF	RC
Acetic Acid, 5%	LR	R	R	R	R	R	R
Acetic Acid, Glacial	NR	R	LR	R	R	R	NR
Acetone	NR	R	R	NR	R	NR	R
Acetonitrile	NR	R	R	NR	R	R	R
Ammonia, 6N	-	LR	R	R	R	LR	LR
Amyl Acetate	NR	R	R	LR	R	LR	R
Amyl Alcohol	LR	R	R	NR	R	R	R
Benzene*	R	R	LR	R	R	R	R
Benzyl Alcohol*	LR	R	LR	NR	R	R	R
Boric Acid	R	R	LR	-	R	R	R
Butyl Alcohol	R	R	R	R	R	R	R
Butyl Chloride*	-	R	NR	-	R	R	-
Carbon Tetrachloride*	NR	R	LR	NR	R	R	R
Chloroform*	NR	R	NR	NR	R	R	R
Chlorobenzene*	-	R	NR	NR	R	R	R
Citric Acid	-	R	LR	R	R	R	R
Cresol*	NR	R	NR	NR	R	NR	R
Cyclohexanone	NR	R	NR	NR	R	R	R

Solvent	CA	GMF	NYL	PES	PTFE	PVDF	RC
Cyclohexane*	NR	R	NR	NR	R	R	R
Diethyl Acetamide	NR	R	R	-	R	NR	R
Dimethyl Formamide	NR	R	R	NR	R	NR	LR
Dioxane	NR	R	R	LR	R	LR	R
DMSO	NR	R	R	NR	R	LR	LR
Ethanol	R	R	R	R	R	R	R
Ethers*	LR	R	R	R	R	LR	R
Ethyl Acetate	NR	R	R	NR	R	NR	R
Ethylene Glycol	LR	R	R	R	R	R	R
Formaldehyde*	LR	R	R	R	R	R	LR
Freon TF*	R	R	NR	R	R	R	-
Formic Acid	LR	R	NR	R	R	R	LR
Hexane	R	R	R	R	R	R	R
Hydrochloric Acid, Conc*	NR	R	NR	R	R	R	NR
Hydrofluoric Acid*	NR	NR	NR	-	R	R	NR
Isobutyl Alcohol	LR	R	R	-	R	R	R
Isopropyl Alcohol	R	R	R	-	R	R	R
Methanol	R	R	R	R	R	R	R
Methyl Ethyl Ketone	LR	R	R	NR	R	NR	R
Methylene Chloride*	NR	R	NR	NR	R	R	R
Nitric Acid, Conc*	NR	R	NR	NR	R	R	NR
Nitric Acid, 6N*	LR	R	NR	LR	R	R	LR
Nitrobenzene*	NR	R	LR	NR	R	R	R
Pentane*	R	R	R	R	R	R	R
Perchloro Ethylene*	R	R	LR	NR	R	R	R
Phenol 0.5%	LR	R	NR	NR	R	R	R
Pyridine	NR	R	LR	NR	R	NR	R
Sodium Hydroxide, 6N	NR	NR	LR	R	R	NR	NR
Sulfuric Acid, Conc*	NR	R	NR	NR	R	NR	NR
Tetrahydrofuran*	NR	R	R	NR	R	R	R
Toluene*	LR	R	LR	NR	R	R	R
Trichloroethane*	NR	R	LR	NR	R	R	R
Trichloroethylene*	-	R	NR	NR	R	R	R
Water	R	R	R	R	R	R	R
Xylene*	R	R	LR	LR	R	R	R

**Legend:** R = Resistant; LR = Limited Resistant; NR = Non Resistant; \* = Short term resistance of housing; \*\* = membrane may need pre-wetting with isopropanol/methanol if filtering a polar liquid

### Ordering information

For ordering information, visit [cytiva.com](http://cytiva.com).



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