User Guide

Nonsterile 33 mm Millex® Syringe Filters

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Introduction

This document provides chemical compatibility information, operating steps, and specifications for the Nonsterile 33 millimeter (mm) Millex® Syringe Filter with male Luer-slip outlet. This syringe filter is recommended for filtering 10–100 milliliter (mL) volumes to remove particles prior to instrumentation analysis. The single-use, disposable filter removes particles larger than the membrane's rated pore size.

The Millex® syringe filter consists of a membrane sealed in a polypropylene housing. For details on the type of membrane in your Millex® syringe filter, refer to the table below.

Filter	Membrane	Application
LG	0.20 µm hydrophilic PTFE (polytetrafluoroethylene)	Filtration of protein-containing solutions, and aqueous or organic solutions
LCR	0.45 µm hydrophilic PTFE	Filtration of protein-containing solutions, and aqueous or organic solutions
GV	0.22 µm PVDF (polyvinylidene fluoride)	Filtration of protein-containing solutions, and aqueous or mild organic solutions
HV	0.45 µm PVDF	Filtration of protein-containing solutions, and aqueous or mild organic solutions
GN	0.20 µm nylon	Filtration of aqueous or organic solutions
HN	0.45 µm nylon	Filtration of aqueous or organic solutions
GP	0.22 µm PES (polyethersulfone)	Filtration of protein-containing solutions, and aqueous or mild organic solutions
HP	0.45 µm PES	Filtration of protein-containing solutions, and aqueous or mild organic solutions
FG	0.20 µm hydrophobic PTFE	Filtration of organic solutions
FH	0.45 µm hydrophobic PTFE	Filtration of organic solutions

Chemical Compatibility

Millex® syringe filters are compatible with aqueous, mild organic, and organic solutions. You can use them to filter the agents listed in the following table. This information was developed from technical publications, materials suppliers, and laboratory tests, and is believed to be accurate and reliable. However, because of variability in temperature, concentrations, exposure time, and other factors beyond our control that may affect the use of the unit, no warranty is provided or implied with respect to such information. Agents not listed in the following table should be tested with the Millex® syringe filter prior to use.

NOTE: For low extractable HPLC instrumentation analysis applications, it is recommended that you discard the first 1 mL or rinse with 1 to 2 mL of primary solvent before sample filtration.

Chemical	*	Chemical	*	Chemical	*
Acetic acid, glacial	1	Formaldehyde		Nitrogen	
Acetone	2, 3	Formic acid (50%)	1, 3	Ozone (10 ppm in water)	
Acetonitrile	3	Freon® (TF or PCA) solvent		Paraldehyde	
Ammonium hydroxide	1, 3	Gasoline	3	Perchloroethylene	1, 3
Ammonium sulfate (saturated)	2, 3	Glycerine (glycerol)		Petroleum based oils	3
Amyl acetate	3	Helium		Petroleum ether	3
Amyl alcohol		Hexane	3	Phenol (10%)	
Benzyl alcohol		Hydrochloric acid	1	Potassium hydroxide	1, 3
Boric acid		Hydrofluoric acid	1	Pyridine	1, 2, 3
Butyl alcohol		Hydrogen		Silicone oils	
Cellosolve® (ethyl) solvent	3	Hydrogen peroxide (3%)		Sodium carbonate (aqueous solution)	1, 3
Chloroform	1, 3	Hypo (sodium thiosulfate)	3	Sodium chloride (2 M)	
Cyclohexane	3	Isobutyl alcohol		Sodium hydroxide (3 N)	1, 3
Cyclohexanone	2, 3	Isopropyl acetate	3	Sulfuric acid (3 N)	1
Dimethylacetamide	2, 3	Isopropyl alcohol		Tetrahydrofuran	3
Dimethylformamide	2, 3	Kerosene	3	Toluene	3
Dimethylsulfoxide	2, 3	Lactic acid (50%)	1, 2, 3	Trichloroacetic acid (aqueous solution)	1, 3
Dioxane	3	Methyl alcohol		Trichloroethane	1, 3
Ethers	3	Methylene chloride	1, 3	Trichloroethylene	1, 3
Ethyl acetate	3	Methyl ethyl ketone	2, 3	Trifluoroacetic acid	1, 3
Ethyl alcohol		Methyl isobutyl ketone	2, 3	Urea (8 M)	3
Ethylene glycol		Mineral spirits	3	Xylene	3

* 1-Not compatible with GN and HN
2-Not compatible with GV and HV
3-Not compatible with GP and HP

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How to Use 33 mm Millex® Syringe Filters

WARNINGS:

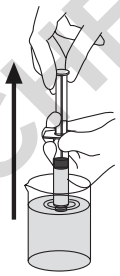
- The 33 mm Millex® Syringe Filter is intended for laboratory use only and is not a medical device for direct patient care applications.
- Do not use with syringes smaller than 10 mL because pressures in excess of the maximum pressure rating may be reached, potentially causing damage to the filter unit and/or personal injury.

CAUTIONS:

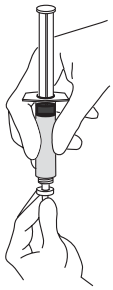
- Do not use the syringe filter at temperatures above 45 °C (113 °F).
- Do not use the same 33 mm syringe filter to filter solutions in both directions.
- Do not reuse the syringe filter.
- Do not use the syringe filter to filter emulsions or suspensions.
- Perform a binding study before use if there is a concern about loss of analyte (proteins, nucleic acids, active pharmaceuticals) due to binding.

Instructions for Use

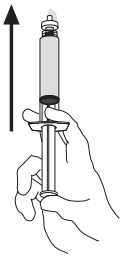
1. Fill the syringe with the solution to be filtered.



2. Attach the syringe to the Millex® syringe filter.

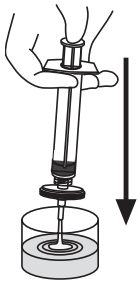


3. Hold the syringe with filter pointing up and "top off" by pushing a few drops through the filter.



4. Push the syringe plunger to deliver the filtered solution.

   Optional: To purge the syringe filter and maximize sample throughput, remove the Millex® filter from the syringe and draw air into the syringe. Then reattach the Millex® filter, and push the plunger to force some of the air through the filter.



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Specifications

Housing	Polypropylene
Membrane	
LG, LCR	Hydrophilic PTFE
FG, FH	Fluoropore™ Hydrophobic PTFE
GV, HV	Hydrophilic Durapore® PVDF
GN, HN	Hydrophilic Nylon
GP, HP	Hydrophilic Millipore Express® PES
Dimensions	
Inlet to outlet	27 mm (1.1 in.)
Diameter	33 mm (1.3 in.)
Filtration surface area	4.5 cm^2 (0.7 $in.^2$)
Pore size	
GV, GP	0.22 µm
LG, GN, FG	0.20 µm
LCR, HV, HN, HP, FH	0.45 µm
Temperature limit	45 °C (113 °F)
Connections	Female Luer-Lok™ inlet, male Luer-slip outlet
Pressure limit at 21 °C	8.6 bar (125 psi) differential
Filtration volume	10–100 mL
Hold-up volume	≤ 80 µL after air purge at pressure that exceeds bubble point of the membrane

Performance

Membrane Type	Typical Flow Rate at 21 °C and 2.1 bar (30 psi)	Bubble Point	Solvent
LG	185 mL/min	≥ 2.8 bar (≥ 41 psi)	Water
LCR	438 mL/min	≥ 1.5 bar (≥ 22 psi)	Water
GV	94 mL/min	≥ 3.4 bar (≥ 50 psi)	Water
HV	423 mL/min	≥ 1.5 bar (≥ 22 psi)	Water
GN	75 mL/min	≥ 2.9 bar (≥ 42 psi)	Water
HN	169 mL/min	≥ 2.1 bar (≥ 30 psi)	Water
GP	240 mL/min	≥ 4.3 bar (≥ 63 psi)	Water
HP	480 mL/min	≥ 2.0 bar (≥ 29 psi)	Water
FG	259 mL/min	≥ 0.8 bar (≥ 12 psi)	Methanol
FH	407 mL/min	≥ 0.6 bar (≥ 8 psi)	Methanol

HPLC Certification

Millex®-LG, LCR, GN, and HN syringe filters are tested for UV-absorbing extractables. HPLC analysis of 1 mL samples of both acetonitrile and water collected after discarding the first 1 mL of solvent showed no peaks greater in intensity than 0.004 AUFS (after the column frontal volume) at either 214 nm or 254 nm. Representative samples of all lots manufactured are tested.

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PFAS Validation

Millex®-GP 33 mm syringe filters are validated for low levels of 42 PFAS compounds. Briefly, a PFAS-free DI water sample was filtered through a Millex®-GP syringe filter, and into an SPE cartridge. The sample bottles and tubes were rinsed with basic methanol, passed through the filter and into the cartridge. The entire sample was subjected to SPE, concentrated to 1 mL and analyzed by LC-MS/MS. All compounds were below the reporting limit (BRL). The full list of compounds is listed below. Testing was performed at an independent third-party laboratory.

CAS Number	Compound Name	Abbreviation	Reporting Limit, PPB*	Results, PPB*
375-22-4	Perfluorobutanoic acid	PFBA	0.001	BRL
2706-90-3	Perfluoropentanoic acid	PFPeA	0.001	BRL
307-24-4	Perfluorohexanoic acid	PFHxA	0.001	BRL
375-85-9	Perfluoroheptanoic acid	PFHpA	0.001	BRL
335-67-1	Perfluorooctanoic acid (Linear & Total)	PFOA	0.001	BRL
375-95-1	Perfluorononanoic acid	PFNA	0.001	BRL
335-76-2	Perfluorodecanoic acid	PFDA	0.001	BRL
2058-94-8	Perfluoroundecanoic acid	PFUnDA	0.001	BRL
307-55-1	Perfluorododecanoic acid	PFDoA (PFDoDA)	0.001	BRL
72629-94-8	Perfluorotridecanoic acid	PFTrDA	0.001	BRL
376-06-7	Perfluorotetradecanoic acid	PFTA (PFTeDA)	0.02	BRL
375-73-5	Perfluorobutane sulfonic acid	PFBS	0.001	BRL
355-46-4	Perfluorohexane sulfonic acid (Linear & Total)	PFHxS	0.001	BRL
375-92-8	Perfluoroheptane sulfonic acid	PFHpS	0.001	BRL
1763-23-1	Perfluorooctane sulfonic acid (Linear & Total)	PFOS	0.001	BRL
67905-19-5	Perfluorohexadecanoic acid	PFHxDA	0.04	BRL
335-77-3	Perfluorodecanesulfonic acid	PFDS	0.02	BRL
27619-97-2	6:2 Fluorotelomersulfonic acid	6:2 FTS/ 6:2 FTSA	0.02	BRL
39108-34-4	8:2 Fluorotelomersulfonic acid	8:2 FTS/ 8:2 FTSA	0.02	BRL
678-41-1	8:2 Fluorotelomerphosphate diester	8:2 DiPAP	0.02	BRL
754-91-6	Perfluorooctanesulfonamide (Linear & Total)	PFOSA/FOSA	0.001	BRL
31506-32-8	N-methylperfluorooctanesulfonamide (Linear & Total)	N-MeFOSA (MePFOSA)	0.02	BRL
4151-50-2	N-ethylperfluorooctanesulfonamide (Linear & Total)	N-EtFOSA (EtPFOSA)	0.02	BRL
2355-31-9	N-methylperfluorooctanesulfonamidoacetic acid	N-MeFOSAA (MePFOSAA)	0.001	BRL
2991-50-6	N-Ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA (EtPFOSAA)	0.02	BRL
13252-13-6	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid/ Hexafluoropropylene oxide dimer acid	HFPO-DA	0.02	BRL
919005-14-4	4,8-Dioxa-3H-perfluorononanoic acid	ADONA(DONA)	0.001	BRL
2706-91-4	Perfluoropentane sulfonic acid	PFPeS	0.001	BRL
68259-12-1	Perfluorononane sulfonic acid	PFNS	0.001	BRL
749786-16-1	Perfluoroundecane sulfonic acid	PFUnDS	0.02	BRL
79780-39-5	Perfluorododecane sulfonic acid	PFDoDS	0.02	BRL
791563-89-8	Perfluorotridecane sulfonic acid	PFTrDS	0.02	BRL
120226-60-0	10:2 Fluorotelomersulfonic acid	10:2 FTS	0.02	BRL
646-83-3	Perfluoro-4-ethylcyclohexanesulfonic acid	PFECHS	0.001	BRL
30334-69-1	Perfluorobutanesulfonamide	PFBSA	0.001	BRL
41997-13-1	Perfluorohexanesulfonamide	PFHxSA	0.001	BRL
68298-12-4	N-methylperfluorobutanesulfonamide	MePFBSA (N-MeFBSA)	0.02	BRL
159381-10-9	N-Methyl-perfluorobutanesulfonylamidoacetate	MePFBSAA (N-MeFBSAA)	0.001	BRL
757124-72-4	4:2 Fluorotelomersulfonic acid	4:2 FTS	0.02	BRL
57677-95-9	6:2 Fluorotelomerphosphate diester	6:2 DiPAP	0.02	BRL
943913-15-3	6:2/8:2 Fluorotelomerphosphate diester	6:2/8:2 DiPAP	0.02	BRL
16517-11-6	Perfluorooctadecanoic acid	PFOcDA/ PFODA	0.1	BRL

* Parts per billion (PPB)

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Product Ordering

You can purchase these products online at SigmaAldrich.com.

Syringe filter	Ring Color	50/pk	250/pk	1000/pk
Millex®-LG, hydrophilic PTFE 0.20 µm	Light Blue	SLLG033NS	SLLG033NB	SLLG033NK
Millex®-LCR, hydrophilic PTFE 0.45 µm	Light Blue	SLCR033NS	SLCR033NB	SLCR033NK
Millex®-GV, PVDF, 0.22 µm	Yellow	SLGV033NS	SLGV033NB	SLGV033NK
Millex®-HV, PVDF, 0.45 µm	Yellow	SLHV033NS	SLHV033NB	SLHV033NK
Millex®-GN, Nylon 0.20 µm	Purple	SLGN033NS	SLGN033NB	SLGN033NK
Millex®-HN, Nylon 0.45 µm	Purple	SLHN033NS	SLHN033NB	SLHN033NK
Millex®-GP, PES, 0.22 µm	Green	SLGP033NS	SLGP033NB	SLGP033NK
Millex®-HP, PES, 0.45 µm	Green	SLHP033NS	SLHP033NB	SLHP033NK
Millex®-FG, hydrophobic PTFE, 0.20 µm	Red	SLFG033NS	SLFG033NB	SLFG033NK
Millex®-FH, hydrophobic PTFE, 0.45 µm	Red	SLFH033NS	SLFH033NB	SLFH033NK

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