

## AXIVA MEMBRANE FILTER CHEMICAL COMPATIBILITY CHART

Chart below shows the Chemical Compatibility of various types of membrane filters with some commonly used chemicals. All types of membrane filter products were exposed to specified chemicals/reagents for 3 days at 25°C. Upshot: All products retain its Integrity after Chemical compatibility Test.

C = Compatible                      N = Not Compatibility  
L = Limited Compatibility        - = No Data Available

MEMBRANE FILTER CHEMICAL COMPATIBILITY CHART								
CHEMICAL	NYLON	PTFE	PVDF	POLYSULFONE	CELLULOSE ACETATE	POLYPROPYLENE	CELLULOSE NITRATE	REGENERATED CELLULOSE
<b>Acids</b>								
Acetic, 10%	C	C	C	C	C	C	C	C
Boric, 5%	L	C	C	C	C	C	C	C
Hydrochloric, 25%	L	C	C	C	N	C	N	C
Hydrochloric, Conc.	N	L	L	C	N	L	N	L
Sulfuric, 25%	N	C	C	C	N	C	C	C
Sulfuric, Concentrated	N	N	L	N	N	C	N	L
Nitric, 25%	N	L	L	L	L	C	C	C
Nitric, Concentrated	N	L	L	N	N	L	N	N
Phosphoric, 25%	N	C	-	C	N	-	L	C
<b>Bases</b>								
Potassium hydroxide, 6N	C	C	-	C	N	-	N	-
Sodium Hydroxide, 3N	C	C	C	C	N	C	N	-
Ammonium Hydroxide, 25%	C	C	L	C	-	C	N	-
<b>Alcohols</b>								
Amyl Alcohol	C	C	C	C	N	C	-	C
Benzyl Alcohol	L	C	C	N	L	C	L	C
Butyl Alcohol	C	C	-	C	C	-	-	C
Ethanol, 70%	C	C	C	C	N	C	N	C
Ethanol, 98%	C	C	C	L	N	C	N	C
Ethylene Glycol	C	C	C	C	C	C	-	C
Glycerol	L	C	-	C	C	-	L	C
Isopropanol	C	C	C	C	C	C	L	C
Methanol, 98%	C	C	C	C	C	C	N	C
n-Propanol	C	C	C	C	C	C	-	C
Propylene Glycol	C	C	C	C	L	C	-	C
<b>Hydrocarbons</b>								
Benzene	C	C	C	N	C	N	C	C
Hexane, Xylene	C	C	C	N	C	L	C	C
Kerosene, Gasoline	C	C	C	L	C	L	-	C
Tetralin, Decalin	C	C	C	N	C	L	-	-
Toluene	C	C	C	N	C	L	C	C
<b>Halogenated Hydrocarbons</b>								
Carbon Tetrachloride	C	C	C	N	L	L	C	C
Chlorobenzene (Mono)	C	C	C	L	C	C	-	C
Chloroform	L	C	C	N	N	L	N	C
Freon	C	C	C	L	C	C	-	C
Methylene Chloride	L	C	C	N	N	L	-	C
Trichloroethane	C	C	C	N	L	L	L	C
Trichloroethylene	C	C	C	N	C	L	L	C

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CHEMICAL	NYLON	PTFE	PVDF	POLYSULFONE	CELLULOSE ACETATE	POLYPROPYLENE	CELLULOSE NITRATE	REGENERATED CELLULOSE
<b>Ketones</b>								
Acetone	C	C	N	N	N	C	N	C
Cyclohexanone	C	C	N	N	N	C	C	C
Isopropylacetone	C	C	N	N	C	-	N	-
Methyl Ethyl Ketone	C	C	L	N	L	C	-	C
Methyl Isobutyl Ketone (MIBK)	C	C	N	N	C	L	-	C
<b>Esters</b>								
2-Ethoxyethyl Acetate	L	L	L	N	L	-	-	C
Amyl Acetate	C	C	C	N	L	L	N	C
Benzyl Benzoate	C	C	-	N	C	-	-	C
Butyl Acetate	C	C	C	N	L	L	N	C
Ethyl Acetate	C	C	C	N	N	L	N	C
Isopropyl Myristate	C	C	-	N	C	-	-	C
Methyl Acetate	L	C	L	N	N	L	-	C
Propyl Acetate	L	N	C	N	N	L	-	C
Propylene Glycol Acetate	L	C	-	N	N	C	-	C
Methyl Cellosolve Acetate	C	C	C	N	N	C	-	C
Tricresyl Phosphate	-	C	-	N	C	-	-	C
<b>Oxides — Ethers</b>								
Acetonitrile (Methyl Cyanide)	C	C	C	N	N	C	N	C
Aniline	L	C	C	N	N	L	-	C
Diethyl Acetamide	C	C	C	-	N	-	-	C
Dimethyl Formamide	C	C	N	N	N	C	N	L
Dimethyl Sulfoxide (DMSO)	C	C	C	N	N	C	N	L
Dioxane	C	C	L	N	N	C	-	L
Ethyl Ether	C	C	C	C	L	L	-	C
Isopropyl Ether	C	C	N	C	C	C	-	-
Pyridine	C	C	L	N	N	L	-	C
<b>Solvents with Nitrogen</b>								
Tetrahydrofuran	C	C	L	N	N	C	-	L
Triethanolamine	C	C	C	-	C	-	-	C
<b>Miscellaneous</b>								
Formaldehyde Solution, 30%	C	C	C	C	L	C	-	L
Hydrogen Peroxide, 30%	N	C	C	C	C	C	-	C
Phenol, Aqueous, 10%	N	C	L	N	N	C	-	C
Silicone Oil & Mineral Oil	C	C	C	C	C	C	-	C

TECHNICAL

## AXIVA SYRINGE FILTER CHEMICAL COMPATIBILITY CHART

Chart below shows the Chemical Compatibility of various types of syringe filters with some commonly used chemicals. All types of membrane filter products were exposed to specified chemicals/reagents for 3 days at 25°C. Upshot: All products retain its Integrity after Chemical compatibility Test.

O = Recommended

X = Not Recommended

\* = Limited resistance

- = No Data Available

SYRINGE FILTER CHEMICAL COMPATIBILITY CHART

Chemical		Cellulose acetate with PP housing	Hydrophilic PVDF with PP housing	Hydrophobic PTFE with PP housing	Nylon with PP housing
ACIDS	3 kmol/m <sup>3</sup> Hydrochloric acid (10%, 3N)	*	O	O	*
	9 kmol/m <sup>3</sup> Hydrochloric acid (30%, 9N)	X	O	O	X
	kmol/m <sup>3</sup> Sulfuric acid (5%, 2N)	O	O	O	*
	4 kmol/m <sup>3</sup> Sulfuric acid (20%, 8N)	X	O	O	X
	1 kmol/m <sup>3</sup> Nitric acid (5%, 1N)	*	O	O	*
	5 kmol/m <sup>3</sup> Nitric acid (20%, 5N)	X	*	*	X
	20% Acetic acid	O	O	O	O
	Glacial acetic acid	X	O	O	X
ACIDS	10% Hydrofluoric acid	X	O	O	X
	35% Hydrofluoric acid	X	O	O	X
	10% Chromic acid	*	*	*	*
	10% Phosphoric acid	O	O	O	*
ALKALIS	2.5 kmol/m <sup>3</sup> Sodium hydroxide (10%, 2.5N)	X	O	O	X
	2 kmol/m <sup>3</sup> Potassium hydroxide (10%, 2N)	X	O	O	O
	8 kmol/m <sup>3</sup> Aqueous ammonia (28%, 8N)	*	O	O	O
ALCOHOLS	Methyl alcohol	O	O	O	O
	Ethyl alcohol	O	O	O	O
	n-Propyl alcohol	O	O	O	O
	Isopropyl alcohol	O	O	O	O
	n-Butyl alcohol	O	O	O	O
	Amyl alcohol	O	O	O	O
	Benzyl alcohol	X	O	O	O
	Ethylene glycol	O	O	O	O
	glycerol	O	O	O	O
ETHERS	Ethyl ether	*	*	*	O
	Isopropyl ether	O	O	O	-
	Tetrahydrofuran (THF)	X	*	*	*
	Dioxane	X	*	*	O
ESTERS	Methyl acetate	X	*	*	O
	Ethyl acetate	X	*	*	-
	Butyl acetate	X	*	*	X
	Amyl acetate	*	*	*	-
KETONES	Acetone	X	O	O	O
	Methyl ethyl ketone (IMEK)	X	*	*	O
	Methyl isobutyl ketone (MIBK)	X	*	*	O
	Cyclohexanone	X	*	*	O
HYDROCARBONS	Benzene	*	*	*	*
	Toluene	*	*	*	*
	Xylene	*	*	*	*
	n-Hexane	*	*	*	O
	Gasoline	O	O	O	O
	Kerosene	*	*	*	O

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### SYRINGE FILTER CHEMICAL COMPATIBILITY CHART

Chemical		Cellulose acetate with PP housing	Hydrophilic PVDF with PP housing	Hydrophobic PTFE with PP housing	Nylon with PP housing
HALOGENATED HYDROCARBONS	Chloroform	X	*	*	*
	Methylene chloride	X	*	*	*
	Trichloroethylene	*	*	*	O
	Carbon tetrachloride	*	O	O	O
	Trichloroethane	X	*	*	O
	Perchloroethylene	X	*	*	O
AMINES	Freon(TMC)	*	*	*	O
	Aniline	X	*	*	*
	Dimethyl formamide	X	*	*	O
	Diethylacetomide	X	*	*	-
	Triethanolamine	O	O	O	-
MISCELLANEOUS	Ethyl acetate cellosolve	X	*	*	*
	Acetonitrile	X	*	*	*
	Pyridine	X	*	*	O
	Sodium Hypochloride	X	O	O	-
	35% Formaldehyde	*	O	O	-
	Iron (II) chloride	O	O	O	O
	Coppersulfate	O	O	O	O
	Mineraloil	*	*	*	*
	Saltwater	O	O	O	O
	10% Hydrogen peroxide	O	O	O	O
	Nitrobenzene	X	*	*	-
	Phenol	X	O	O	-
	Siliconeoil	X	O	O	-
	Petroleumoil	O	O	O	-
	Acetonitrile (70): water (30)	X	O	O	O

# TECHNICAL

O = Compatible      X = Not Compatibility  
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TABLE OF COMPATIBILITIES FOR MANIFOLDS, FILTER HOLDERS, O RINGS, GASKETS.....

ACIDS	POLYCARBONATE	POLYPROPYLENE	PTFE	STAINLESS STEEL	SILICONE
Acetic acid, 25 %	O	O	O	O	O
Acetic acid, 96 %	X	O	O	O	-
Hydrochloric acid, 25 %	*	O	O	X	X
Hydrochloric acid, 37 %	X	O	O	X	X
Hydrofluoric acid, 25 %	X	O	O	X	X
Hydrofluoric acid, 50 %	X	O	O	X	X
Nitric acid, 25 %	X	O	O	X	X
Nitric acid, 65 %	X	X	O	X	X
Perchloric acid, 25%	*	O	O	X	X
Phosphoric acid, 25 %	O	O	O	*	O
Phosphoric acid, 85 %	*	O	O	*	X
Sulphuric acid, 25 %	O	O	O	*	X
Sulphuric acid, 98 %	X	X	O	X	X
Trichloroacetic acid, 25 %	*	O	O	X	X
BASES					
Ammonium hydroxide, 1N	X	O	O	O	X
Ammonium hydroxide, 25%	X	O	O	O	O
Potassium hydroxide, 32 %	X	O	O	O	*
Sodium hydroxide. 32 %	X	O	O	O	*
Sodium hydroxide, 1N	X	O	O	O	O
AQUEOUS SOLUTIONS					
Formaldehyde, 30 %	O	O	O	O	X
Hydrogen peroxide, 35 %	O	O	O	O	O
Sodium hypochlorite, 5 %	O	O	O	O	O
Acetone	O	O	O	O	X
Acetonitrile	*	O	O	O	X
Benzene	X	X	O	O	X
Benzyl alcohol	X	O	O	O	O
n-Butanol	O	O	O	O	O
n-Butyl acetate	X	*	O	O	X
Carbon tetrachloride	X	*	O	O	X
Cellosolve (ethyl)	X	X	O	O	X
Chloroform	X	X	O	O	X
Cyclohexane	O	O	O	O	X
Cyclohexanone	X	O	O	O	X
Diethyl ether	X	*	O	O	X
Diethyl acetamide	X	-	O	O	O
Dimethyl formamide	X	O	O	O	*
Dimethyl sulfoxide	-	-	O	O	*
Dioxane	X	*	O	O	X
Ethanol, 98 %	O	O	O	O	O
Ethyl acetate	X	*	O	O	X
Ethylene glycol	O	O	O	O	O
Formamide	X	O	O	O	X
Gasoline	*	O	O	O	X
Glycerol	*	O	O	O	O

TABLE OF COMPATIBILITIES FOR MANIFOLDS, FILTER HOLDERS, O RINGS, GASKETS.....

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SOLVENTS	POLYCARBONATE	POLYPROPYLENE	PTFE	STAINLESS STEEL	SILICONE
<i>n-Heptane</i>	O	O	O	O	O
<i>n-Hexane</i>	O	O	O	O	X
<i>Isobutanol</i>	O	O	O	O	O
<i>Isopropanol</i>	X	O	O	O	O
<i>Isopropyl acetate</i>	O	O	O	O	X
<i>Methanol, 98 %</i>	X	O	O	O	O
<i>Methyl acetate</i>	-	O	O	O	X
<i>Methylene chloride</i>	X	X	O	O	X
<i>Methyl ethyl ketone</i>	X	O	O	O	X
<i>Methyl isobutyl ketone</i>	X	-	O	O	X
<i>Monochlorobenzene</i>	X	O	O	O	X
<i>Nitrobenzene</i>	X	*	O	O	X
<i>n-Pentane</i>	X	O	O	O	X
<i>Perchloroethylene</i>	X	*	O	O	X
<i>Pyridine</i>	O	*	O	O	X
<i>Tetrahydrofuran</i>	X	*	O	O	X
<i>Toluene</i>	X	O	O	O	X
<i>Trichloroethane</i>	X	-	O	O	X
<i>Trichloroethylene</i>	X	X	O	O	X
<i>Xylene</i>	X	*	O	O	X

CROSS REFERENCE GUIDE

AXIVA	WHATMAN	SCHLEICHER & SCHULL	PALL	BINZER & MUKTELL (EDEROL)	MACKEREY NAGEL
QUALITATIVE FILTER PAPER					
100R	No1	591 A or 597	P1	15	615
102R	No 2	-	P2	12	616
103R	No 3	593a	P3	20	618
104R	No 4	-	P4	11	
50R	50	576 or 577	P50	14	
54R	54	-	P54	11	
QUANTITATIVE (ASHLESS) FILTER PAPERS					
400R	40	598 White	P40	390	640 M
410R	41	589 Black	P41	389	640 W
420R	42	589 Red	P42	393	640 D
440R	44	589 Blue			
HARDENED ASHLESS FILTER PAPERS					
540R	540		P540		
541R	541		P541	388	
542R	542		P542		
GLASSFIBRE FILTER PAPERS					
GF/AF	GF/A	31	A/E	MG A	Gf 1
GF/BF	GF/B	32	A/B	MG B	Gf 2
GF/CF	GF/C	30/25	A/C	MG C	Gf 3
GF/DF	GF/D	40	A/B	MG D	Gf 4
GF/FF	GF/F	20	A/F	MG F	Gf 5

# TECHNICAL

## Reference • Physical Properties of AXIVA VOLEX Labware

	Max. Use Temp. (°C) <sup>2</sup>	HDT <sup>1</sup> Temp. (°C)	Brittleness Temp. (°C) <sup>3</sup>	Transparency	Microwavability <sup>2</sup>	Autoclaving	Sterilization				Specific Gravity	Flexibility	Permeability (cc.-mil/100in <sup>2</sup> -24 hr.-atm)			Water Absorption (%)	Non-Cytotoxicity (%)	Suitability for Food and Beverages Use	
							Gas	Dry Heat	Radiation	Disinfectants			N <sub>2</sub>	O <sub>2</sub>	Co <sub>2</sub>			Rating	
HDPE	120	65	-100	Translucent	No	No	Yes	No	Yes	Yes	0.95	rigid	42	185	580	<0.01	Yes	Yes	
LDPE	80	45	-100	Translucent	Yes	No	Yes	No	Yes	Yes	0.92	excel	180	500	2700	<0.01	Yes	Yes	
PC	135	138	-135	Clear	Marginal <sup>3</sup>	Yes <sup>5</sup>	Yes	No	Yes	Some	1.2	rigid	50	300	1075	0.35	Yes	Yes	
PP	135	107	0	Translucent	Yes	Yes	Yes	No	No	Yes	0.9	rigid	48	240	800	<0.02	Yes	Yes	
PPCO	121	90	-40	Translucent	Marginal <sup>3</sup>	Yes	Yes	No	No	Yes	0.9	mod	45	200	650	<0.02	Yes	Yes	
PS	90	105	20	Clear	No	No	Yes	No	Yes	Some	1.05	rigid	55	300	1150	0.05	Yes	Yes	
PSF	165	174	-100	Clear Yellow	Yes	Yes	Yes	Yes <sup>5</sup>	Yes	Some	1.24	rigid	55	300	700	0.3	Yes	Yes	
PVDF	150	139	-62	Translucent	-	Yes	Yes	No	No	Yes	1.75	rigid	9	14	505	0.05	Yes	Yes	
SILICONE	200	46	-117	Translucent	-	Yes	Yes		Yes	Yes	1.15	excel	43000	123000	312000	0.1	Yes	Yes	

3 Plastic will absorb heat.

#### 4 STERILISATION

- a. Autoclaving (121 C, 15psig for 20 minutes)- clean and rise items with distilled water before autoclaving.(Always completely disengage threads before autoclaving) Certain chemicals which have no appreciable effect on resins at room temperature may cause deterioration at autocalving temperatures unless removed with distilled water beforehand
- b. Gas- Ethylene Oxide, formaldehyde, hydrogen peroxide
- c. Dry Heat ( 160 C, 120 minutes)
- d. Disinfectants-Benzalkonium chloride, formalin/formaldehyde, ethanol etc
- e. Radiation-gamma irradiation at 25 kGy ( 2.5 MRad) with unstabilized plastic.

5 Sterilisation reduces mechanical strength. Do not use PC vessels for vacuum applications if they have been autoclaved.

### CLEANING OF SONAR & VOLEX PLASTICWARE

- Plasticware may be cleaned by washing in mild detergent. Detergent should be rinsed off with tap water and then with distilled water.
- Avoid abrasive cleaners of scouring implements. Polycarbonate must not be exposed to strong alkaline cleaning agents.

# TECHNICAL

## Chemical Resistance Summary \*

Class of Substances at 20°C	HDPE	LDPE	PC	PP/PPCO	PS	PSF	PVDF
Acids, dilute or weak	E	E	E	E	E	E	E
Acids, ** strong and concentrated	E	E	N	E	F	G	E
Alcohols, aliphatic	E	E	G	E	E	G	E
Aldehydes	G	G	F	G	N	F	E
Bases	E	E	N	E	E	E	E
Esters	G	G	N	G	N	N	G
Hydrocarbons, aliphatic	G	F	F	G	N	G	E
Hydrocarbons, aromatic	G	F	N	F	N	N	E
Hydrocarbons, halogenated	F	N	N	F	N	N	N
Ketones	G	G	N	G	N	N	N
Oxidizing Agents, strong	F	F	N	F	N	G	G

\*\* Except for oxidizing acids : for oxidizing acids, see "Oxidizing Agents, strong."

\*\*\* Detailed chemical compatibility chart can be submitted if desired.

- E** 30 days of constant exposure cause no damage. Plastic may even tolerate for years.
- F** Little or no damage after 30 days of constant exposure to the reagent.
- G** Some effect after 7 days of constant exposure to the reagent. Depending on the plastic, the effort may be crazing, cracking, loss of strength or discoloration. Solvents may cause softening, swelling and permeation losses with LDPE, HDPE, PP, PPCO and PMP. The solvent effects on these five resins are normally reversible, the part will usually return to its normal condition after evaporation.
- N** Not recommended for continuous use, Immediate damage may occur. Depending on the plastic, the effect will be a more severe crazing, cracking, loss of strength, discoloration, deformation, dissolution or permeation loss.

TECHNICAL

### RESIN CODES

HDPE	high-density polyethylene
LDPE	low-density polyethylene
PC	polycarbonate
PP	polypropylene
PPCO	polypropylene copolymer
PS	polystyrene
PSF	polysulfone
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride