FPM Chemical Resistance Guide

FIRST EDITION

IPEX

FPM CHEMICAL RESISTANCE GUIDE

Elastomers:
Fluoropolymer (FPM)

Chemical Resistance Guide

Fluoropolymer (FPM)

1st Edition

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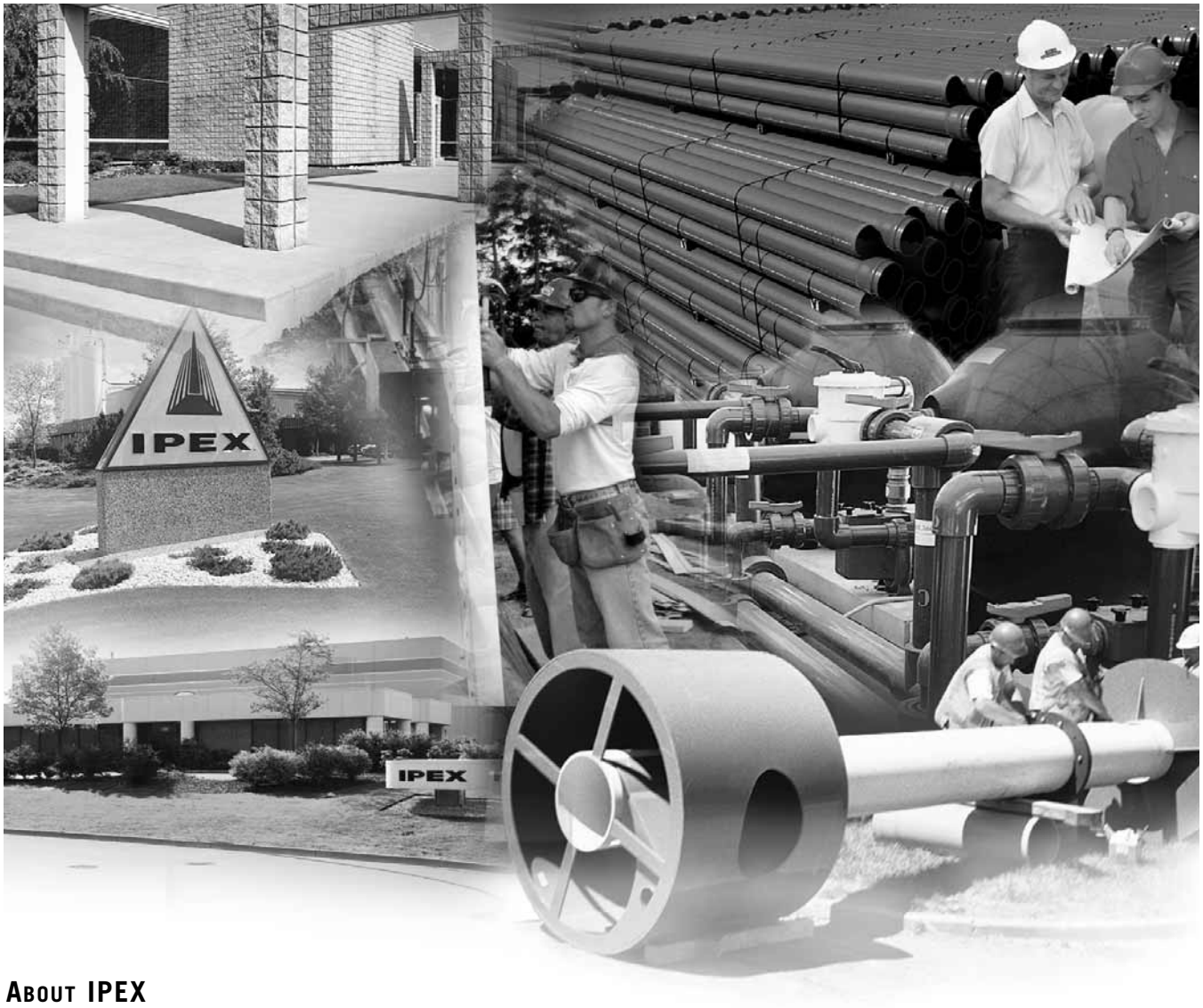

About IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

INTRODUCTION

Elastomers have outstanding resistance to a wide range of chemical reagents. Selecting the correct elastomer for an application will depend on the chemical resistance, temperature and mechanical properties needed.

Resistance is a function both of temperatures and concentration, and there are many reagents which can be handled for limited temperature ranges and concentrations. In borderline cases, it will be found that there is limited attack, generally resulting in some swelling due to absorption. Resistance is often affected (and frequently reduced) when handling a number of chemicals or compounds containing impurities. For this reason, when specific applications are being considered, it may be worthwhile to carry out tests using the actual product that will be encountered in service. The listing that follows does not address chemical combinations.

The following publication tabulates the classes of chemical resistance of FPM elastomeric material used in IPEX valves for the conveyance of industrial fluids. It is generally know that pipes, valves and fittings in thermoplastic material, are widely used in industries where conveyance of highly corrosive fluids requires high-quality construction materials, featuring excellent corrosion resistance.

The listed data is taken from the ISO TR 7471-1981(E),ISO TR 7472-1981(E), ISO TR 7473-1981(E),ISO TR 7474-1981(E) schedules which are based upon immersion test results.

Variations in the analysis of the chemical compounds as well as in the operating conditions (pressure and temperature) can significantly modify the actual chemical resistance of the materials in comparison with this guide indicated value.

It is therefore deemed advisable, in special cases to carry out experimental tests on pilot plants so as to verify the real performance of the thermoplastic materials under real operating conditions.

It should be stressed that this publication is only a guide to be used for initial information on the material to be selected. No guarantee can be given in respect of the listed data. FIP S.pA reserves the right to make any modification whatsoever, based upon further researches and experiences.

All Chemical Resistance data for Fluoropolymer (FPM) contained within this manual has been provided, with written consent, by FIP - Kemy 1.

NOTES

FLUOROPOLYMER (FPM)

All Chemical Resistance data forFluoropolymer (FPM) contained within this manual has been provided, with written consent, by FIP - Kemy 1.

Compound Compatibility Rating

Four different classes of chemical resistance are used in this guide i.e.:

1	High Resistance (corrosion proof) All material belonging to this class are completely or almost completely corrosion proof against the conveyed fluid according to the specified operating conditions
2	Limited Resistance The materials belonging to this class are partially attacked by the conveyed chemical compound. The average life of the material is therefore shorter, and it is advisable to use a higher safety factor the one adopted for Class 1 materials
3	No Resistance All material belonging to this class are subject to corrosion by the conveyed fluid and they should therefore not be used
	Insufficient Data The absence of any class indication means that no data are available concerning the chemical resistance of the material in respect of the conveyed fluid

Chemical resistance for FPM applies to IPEX valve products using FPM seals.

FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
A							
Acetaldehyde	CH3CHO	2	3	3			
Acetaldehyde 40%	CH3CHO	1	1	2	3		
Acetic Acid Anhydride	(CH3CO)2O	3					
Acetone	CH3COCH3	3	3	3			
Acetone 10%	CH3COCH3	3	3	3			
Acetonitrile, Not Diluted	CH3CN						
Acetophenone, Not Diluted	CH3COC6H5	2	3	3	3		
Acetyl Acetone, Not Diluted	CH3COCH2COCH3						
Acetylene, Not Diluted	C2H2	1	1	1	1	2	
Acid, Acetic	CH3COOH	3					
Acid, Acetic 80%	CH3COOH	2	2	3	3	3	
Acid, Acetic 60%	CH3COOH	2	2	2	3	3	
Acid, Acetic 30%	CH3COOH	2	2	2	2	3	
Acid, Acetic 10%	CH3COOH	2	2	2	3		
Acid, Adipic, Saturated	HOOC(CH2)4COOH	1	2	1	1	1	2
Acid, Anthraquinone Sulfonic, Susp		1					
Acid, Arsenic, Saturated	H3AsO4	1	1	1	2	2	
Acid, Benzene Sulfonic 10%	C6H5SO3H	1	1				
Acid, Benzoic, Saturated	C6H5COOH	1	1	1	1	2	
Acid, Boric, Saturated	H3BO3	1	1	1	1	2	
Acid, Bromic 10%	HBrO3						
Acid, Butyric	CH3CH2CH2COOH	2	2	3			
Acid, Butyric 20%	CH3CH2CH2COOH	1					
Acid, Caprylic	CH3(CH2)6COOH						
Acid, Carbonic, Saturated	H2CO3	1	1	1	1	2	
Acid, Chloric 20%	HClO3	3					
Acid, Chloric 10%	HClO3	3					
Acid, Chloro Sulfonic	HClSO3	3					
Acid, Chromic 50%	CrO3+H2O	1	1	1			
Acid, Chromic 30%	CrO3+H2O						
Acid, Chromic 10%	CrO3+H2O	1	1	2			
Acid, Citric 50%	C3H4(OH)(COOH)3	1					
Acid, Dichloroacetic	Cl2CHCOOH	2	3				
Acid, Dichloroacetic 50%	Cl2CHCOOH	2	2	3			
Acid, Diglycolic, Saturated	HOOCCH2OCH2COOH	1					
Acid, Fatty	R>C6	1					
Acid, Fluoboric	HBF4	1	1	1	1		
Acid, Fluoboric, Not Diluted	HBF4	1	1	1	1		
Acid, Fluosilicic 32%	H2SiF6	1	1	1			

Chemical concentrations are listed at 100% unless otherwise noted.

1 - High Resistance 2 - Limited Resistance 3 - No Resistance □(blank) - Insufficient Data

FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Acid, Formic	HCOOH	3	3				
Acid, Formic 50%	HCOOH	1	1	2	3		
Acid, Gallic, Saturated	(OH)3C6H2COOH	1					
Acid, Glycolic 37%	HOCH2COOH	1					
Acid, Hydriodic, Saturated	HI	1	1				
Acid, Hydrobromic 48%	HBr	1				3	
Acid, Hydrobromic 10%	HBr	1					
Acid, Hydrochloric	HCl	1	1	1			
Acid, Hydrochloric, Saturated	HCl	2	2	3			
Acid, Hydrochloric 30%	HCl	1	2	2			
Acid, Hydrochloric 10%	HCl	1	1	1	1		
Acid, Hydrochloric 5%	HCl	1	1	1	1		
Acid, Hydrocyanic*	HCN	2					
Acid, Hydrocyanic*, Diluted	HCN	1					
Acid, Hydrofluoric 70%	HF	1					
Acid, Hydrofluoric 40%	HF	1					
Acid, Hydrofluoric 10%	HF	1	1	1	1	1	
Acid, Hypochlorous 10%	HClO	1	2				
Acid, Lactic <=28%	CH3CHOHCOOH	1	1	1	1	1	
Acid, Maleic, Saturated	HOOC-CH=CH-COOH	1	1	2	2		
Acid, Malic, Saturated	HOOCCH2CHOHCOOH	1	1	2			
Acid, Methanesulfonic	CH3SO3H	2				3	
Acid, Methanesulfonic 50%	CH3SO3H	1				3	
Acid, Mixed (chromic,sulphuric) 50/15/35	H2CrO4/H2SO4/H2O	1	1	1			
Acid, Mixed (sulphuric,nitric) 50/50	H2SO4/HNO3/H2O	1	1	1	1	1	
Acid, Mixed (sulphuric,nitric) 48/49/3	H2SO4/HNO3/H2O	1	1	1	1		
Acid, Mixed (sulphuric,nitric) 10/20/70	H2SO4/HNO3/H2O	1					
Acid, Mixed (sulphuric,phosphoric) 30/60/10	H2SO4/H3PO4/H2O	1	1	1			
Acid, Monochloracetic 50%	ClCH2COOH	3	3				
Acid, Nicotinic, Not Diluted	C5H4NCOOH						
Acid, Nitric	HNO3	2					
Acid, Nitric 70%	HNO3	1	2	3			
Acid, Nitric 40%	HNO3	1	1	1	2	3	
Acid, Nitric 20%	HNO3	1	1	1	1		
Acid, Nitrous 10%	HNO2	1					
Acid, Oleic	C17H33COOH	1	2	3			
Acid, Oxalic, Saturated	HOOCCOOH	1	1	2	3		
Acid, Oxalic 10%	HOOCCOOH	1					
Acid, Palmitic 70%	CH3(CH2)14COOH	1	2	3			
Acid, Palmitic 10%	CH3(CH2)14COOH	1	1	1			

Chemical concentrations are listed at 100% unless otherwise noted.

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Acid, Perchloric 70%	HClO4	1	1	1	2		
Acid, Perchloric 10%	HClO4	1	1	1			
Acid, Phosphoric 85%	H3PO4	1	1	1	1	2	
Acid, Phosphoric 50%	H3PO4	1	1	1	1		
Acid, Phosphoric 25%	H3PO4	1	1	1	1	1	
Acid, Phthalic	C6H4(COOH)2	1					
Acid, Phthalic 50%	C6H4(COOH)2	1					
Acid, Picric 1%	C6H2(OH)(NO2)3	1	1	1	2		
Acid, Propionic 50%	CH3CH2COOH	1	1	2			
Acid, Silicic, All	H2SiO3	1					
Acid, Stearic	C17H35COOH	1	1	2	2		
Acid, Succinic, Not Diluted	COOH(CH2)2COOH	1					
Acid, Sulfamic 20%	HSO3NH2						
Acid, Sulphuric	H2SO4	3	3	3	3	3	
Acid, Sulphuric 98%	H2SO4	3					
Acid, Sulphuric 96%	H2SO4	2	2	3			
Acid, Sulphuric 90%	H2SO4	1	1	1	2	2	3
Acid, Sulphuric 80%	H2SO4	1	1	1	2	2	
Acid, Sulphuric 50%	H2SO4	1	1	1	1	1	2
Acid, Sulphuric 10%	H2SO4	1	1	1	1	1	1
Acid, Sulphurous, Saturated	H2SO3	1	1	2	3		
Acid, Tannic, All	C76H52O46	1					
Acid, Tartaric, All	COOH(CHOH)2COOH	1	1	1			
Acid, Toluic 50%	CH3C6H4COOH	1	1	1			
Acid, Trichloroacetic	CCl3COOH	3					
Acid, Trichloroacetic 50%	CCl3COOH	3					
Acid, Uric 10%	C5H4N4O3						
Acrylonitrile	CH2=CH-CN	2	2	3			
Alcohol, Allyl 96%	CH2=CH-CH2OH	2	2	3			
Alcohol, Amyl	CH3(CH2)3CH2OH	1	1	2	2		
Alcohol, Benzyl	C6H5CH2OH	2					
Alcohol, Butyl	CH3(CH2)3OH	2	2	2			
Alcohol, Diacetone	(CH3)2COHCH2COCH3	3					
Alcohol, Ethyl 96%	CH3CH2OH	1	1	1	1		
Alcohol, Furfuryl	C5H6O2	3					
Alcohol, Isobutyl	(CH3)2CHCH2OH	1					
Alcohol, Isopropyl	(CH3)2CHOH	1	1	1	2		
Alcohol, Methyl	CH3OH	2	3	3	3	3	
Alcohol, Polyvinyl, Not Diluted	(-CH2CHOH-)n	1	1	1			
Alcohol, Propyl 97%	C3H7OH	1	1	1	1	1	

Chemical concentrations are listed at 100% unless otherwise noted.

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Alcoholic Spirit 40%		1					
Allyl Chloride, Not Diluted	CH2=CHCH2Cl	2	2	3			
Alum, Saturated	Al2(SO4)3K2SO4 4H2O	1	1	1	1	1	
Alum, Diluted	Al2(SO4)3K2SO4 4H2O	1					
Aluminium, Acetate, Saturated	(CH3COO)3Al	1	1	1	1	1	
Aluminium, Bromide, Saturated	AlBr3	1	1	1	1		
Aluminium, Chloride, All	AlCl3	1	1	1	1	1	
Aluminium, Fluoride, Saturated	AlF3						
Aluminium, Hydroxide, All	Al(OH)3	1	1	1	1	2	
Aluminium, Nitrate, Saturated	Al(NO3)3	1	1	1	1	1	
Aluminium, Sulfate, Saturated	Al2(SO4)3	1	1	1	1		
Aluminium, Sulfate 10%	Al2(SO4)3	1	1	1	1	1	
Ammonia Gas	NH3	3					
Ammonia, Saturated	NH3	2	2	3			
Ammonia, Diluted	NH3	2					
Ammonium Acetate, Saturated	CH3COONH4	1	1	1	2	2	
Ammonium Bifluoride, Saturated	NH4FHF	1	1	1	2	2	
Ammonium Carbonate	(NH4)2CO3	1	1	1			
Ammonium Chloride, Saturated	NH4Cl	1	1	1	1	1	
Ammonium Fluoride 25%	NH4F	2				3	
Ammonium Hydroxide, Saturated	NH4OH	2	2	3			
Ammonium Hydroxide, Diluted	NH4OH	2					
Ammonium Metaphosphate, All	(NH4)4P4O12	1					
Ammonium Nitrate, Saturated	NH4NO3	1	2	2			
Ammonium Persulfate, All	(NH4)2S2O8	1					
Ammonium Phosphate, All		1	1	1	1		
Ammonium Sulfate, All	(NH4)2SO4	1	1	1	1		
Ammonium Sulfhydrate, Saturated	NH4OH(NH4)2SO4	1	1	1			
Ammonium Sulfhydrate, Diluted	NH4OH(NH4)2SO4	1	1	1			
Ammonium Sulfide, Saturated	(NH4)2S	1	2	3			
Ammonium Sulfide 10%	(NH4)2S	1	2	3			
Amyl Acetate	CH3COO(CH2)4CH3	3					
Amyl Borate	(C5H11)3BO3	3					
Amyl Chloride	CH3(CH2)4Cl	2					
Aniline	C6H5NH2	2	2	2			
Aniline Chlorhydrate, Saturated	C6H5NH2HCl	2	3				
Antimony Trichloride 90%	SbCl3	1	1	1	2		
Aqua Regia	3HCl+1HNO3	2					
Asphalt, Common		1	1	1	1		

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
B							
Barium Carbonate, All	BaCO3	1	1	1	1	1	1
Barium Chloride, All	BaCl2	1	1	1	1	1	1
Barium Hydroxide, Saturated	Ba(OH)2	1	1	1	1		
Barium Nitrate, Saturated	Ba(NO3)2	1	1	1	1	1	1
Barium Sulfate, Saturated	BaSO4	1	1	1	1	1	1
Barium Sulfide, Saturated	BaS	1	1	1	1	1	1
Beer		1	1	1	1		
Benzaldehyde, Saturated	C6H5CHO	3					
Benzene	C6H6	1	1	2	2	2	
Benzene + Benzine 20% / 80%		1	2				
Benzine (free of Pb and aromatic)	C5H12÷C12H26	1	1	2	2		
Benzyl Chloride	C6H5CH2Cl						
Borax, All	Na2B4O7	1	1	1	1		
Brine, Common							
Bromine, Liquid	Br2	1	1	1	1		
Bromine, Vapours, High	Br2	1					
Butadiene	CH2=CH-CH=CH2	1	1	1			
Butane Gas	CH3CH2CH2CH3	1	1	1	1		
Butanediol, Concentrated	OHCH2CH2CH2CH2OH	1					
Butanediol 10%	OHCH2CH2CH2CH2OH	1					
Butyl Acetate	CH3COOCH2CH2CH2CH3	3					
Butyl Acrylate	CH2=CHCOOC4H9	3					
Butyl Amine, Saturated	CH3(CH2)3NH2	3					
Butyl Ether	(CH3(CH2)3)2O	3					
Butyl Phenol	C4H9C6H4OH	2					
Butyl Phthalate	HOOCC6H4COOC4H9	2	2	3			
Butylene Glycol	OHCH2-CH=CH-CH2OH	1	1	2			
Butylene*	CH2=CH-CH2CH3	1					
C							
Calcium Acetate, Saturated	Ca(CH3COO)2	1	1	1	1		
Calcium Bisulfite, Saturated	Ca(HSO3)2	1	1	1	2		
Calcium Carbonate, All	CaCO3	1	1	1	1	1	
Calcium Chlorate, Saturated	Ca(ClO3)2	1	1	1			
Calcium Chloride, All	CaCl2	1	1	1	1	1	
Calcium Hydroxide, All	Ca(OH)2	1	1	1	1	1	
Calcium Hypochlorite, Saturated	Ca(ClO)2	1	1	1			
Calcium Nitrate 50%	Ca(NO3)2	1	1	1	1	1	

Chemical concentrations are listed at 100% unless otherwise noted.

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Calcium Sulfate, Saturated	CaSO4	1	1	1	1	1	
Calcium Sulfide, Saturated	CaS	1	1	1	1	1	
Carbon Dioxide	CO2	1	1	1	1	1	
Carbon Dioxide, Not Diluted	CO2+H2O	1	1	1	1	1	
Carbon Disulfide	CS2	1	2				
Carbon Monoxide	CO	1	1	1	1	1	
Carbon Tetrachloride	CCl4	1	1	1			
Chloramine, Diluted	C6H5SO2NNaCl	1					
Chlorine	Cl2	1					
Chlorine 10%	Cl2	1	1				
Chlorine Dioxide	ClO2	3					
Chlorine Gas, All	Cl2	1					
Chlorine Liquid	Cl2	2					
Chloro Benzene	C6H5Cl	1					
Chlorobiphenyl	C6H5C6H4Cl	1					
Chloroform	CHCl3	2					
Chrome Alum, Saturated	KCr(SO4)2	1	1	1	1	1	
Chrome Alum, Not Diluted	KCr(SO4)2	1	1	1	1	1	
Compressed Air with Oil		1					
Copper Acetate, Saturated	Cu(COOCH3)2	1	1				
Copper Borofluoride, Not Diluted	CuBF4	1					
Copper Carbonate, Saturated	CuCO3						
Copper Chloride, Saturated	CuCl2	1	1	1	1	1	
Copper Cyanide, All	Cu(CN)2	1					
Copper Fluoride, All	CuF2	1					
Copper Nitrate, Not Diluted	Cu(NO3)2	1	1	1	1	1	
Copper Sulfate, Saturated	CuSO4	1	1	1	1	1	
Copper Sulfate, Diluted	CuSO4	1	1				
Cresol, Diluted	CH3C6H4OH	1					
Cresol >=90	CH3C6H4OH	2					
Croton Aldehyde	CH3-CH=CH-CHO	1					
Cryolite, Saturated	Na3AlF6						
Cyclohexane	C6H12	1					
Cyclohexanol	C6H11OH	1	1				
Cyclohexanone	C6H10O	3					
D							
Decalin (Decahydronaftalene)	C10H18	1					
Detergents, Common		1	1	1			

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Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Dextrine, Common		1	1	1	1	1	
Dextrose, All	C6H12O6	1	1	1	1	1	
Dibutyl Amine	(C4H9)2NH	3					
Dibutyl Ether	(CH3(CH2)3)2O	1	1	2			
Dibutyl Phthalate	C6H4(COOC4H9)2	2					
Dibutyl Sebacate	C8H16(COOC4H9)2	1					
Dichloro Benzene	C6H4Cl2	1					
Dichloroacetic Acid Methyl Ester	Cl2CHCOOCH3	3					
Dichloroethylene	CHCl=CHCl	2					
Diethylamine	(C2H5)2NH	3					
Diethylether	C2H5OC2H5	3					
Di-Isobutyl Ketone	(CH3)2CHCH2COCH2CH(CH3)2	3					
Diisobutylene	C8H16	1	1	1			
Di-Isopropyl Ketone	((CH3)2CH)2CO	3					
Dimethyl Amine	(CH3)2NH	3					
Dimethyl Formamide	HCON(CH3)2	3					
Dimethyl Phthalate	C6H4(COOCH3)2	2					
Dinonyl Phthalate	C6H4(COOC9H19)2	1					
Dioctyl Phthalate	C6H4(COOC8H17)2	1					
Dioxane	(CH2)4O2	3					
E							
Epichlorohydrin	C3H5ClO	3					
Ethyl Acetate	CH3COOCH2CH3	3	3	3			
Ethyl Acetoacetate	CH3COCH2COOCH2CH3	3					
Ethyl Acrylate	CH2=CHCOOCH2CH3	3					
Ethyl Benzene	C6H5C2H5	2					
Ethyl Chloride	CH3CH2Cl	1	1				
Ethyl Ether	CH3CH2OCH2CH3	3					
Ethylene Chlorohydrin	ClCH2CH2OH						
Ethylene Diamina	NH2CH2CH2NH2	2	2	3			
Ethylene Dichloride	CH2ClCH2Cl	1	1	2			
Ethylene Glycol	HOCH2-CH2OH	1	1	1	2		
Ethylene Oxide	C2H4O	3					
F							
Ferric Chloride,, Saturated	FeCl3	1	1	1			
Ferric Chloride 10%	FeCl3	1	1	1			

Chemical concentrations are listed at 100% unless otherwise noted.

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Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Ferric Nitrate, Not Diluted	Fe(NO3)3	1					
Ferric Sulfate, Saturated	Fe2(SO4)3	1					
Ferrous Chloride, Saturated	FeCl2						
Ferrous Hydroxide, Saturated	Fe(OH)2	1	1	1	1	1	
Ferrous Nitrate, Saturated	Fe(NO3)2	1	1	1	1	1	
Ferrous Sulfate, Saturated	FeSO4	1	1	1	1	2	
Fertilizer Salts, Saturated		1	1	1	1		
Fertilizer Salts 10%		1	1	1	1		
Fluorine Gas Dry	F2	2					
Formaldehyde 37%	CH2O	1	1	1		3	
Formamide	HCONH2	2					
Freon F-11	CCl3F	2					
Freon F-12	CCl2F2	2					
Freon F-21	CHCl2F	3					
Freon F-22	CHClF2	3					
Freon F-113	CClF2-CCl2F	2					
Freon F-114	CClF2-CClF2	2	2				
Fructose, Saturated	C6H12O6	1	1	1	1	1	
Fruit Pulp and Juice, Common		1	1	1			
Furfural		2	2	3			
G							
Gas Exhaust Acid, Not Diluted							
Gas Exhaust with Nitrous Vapours, Trace		1					
Gas Illuminating		1					
Gas Natural		1	1	1	2		
Gelatine		1	1	1	1	1	
Gin, Common		1	1	1	1	1	
Glucose, All	C6H12O6	1	1	1	1	1	
Glycerine, All	C3H5(OH)3	1	1				
Glycocoll 10%	NH2CH2COOH	1	1				
H							
Heptane	C7H16	1					
Hexane	C6H14						
Hydrazine	NH2-NH2	3					
Hydrazine Hydrate, Diluted	NH2-NH2 H2O	1					
Hydrogen Gas	H2	1	1	1	1	1	

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1 - High Resistance 2 - Limited Resistance 3 - No Resistance □ (blank) - Insufficient Data

FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Hydrogen Peroxide 90%	H2O2	2					
Hydrogen Peroxide 50%	H2O2	1	2				
Hydrogen Peroxide 10%	H2O2	1	2	3			
Hydrogen Sulfide, Saturated	H2S	1	1	1	2		
Hydrogen Sulfide Dry	H2S	1	1	2	3		
Hydroquinone, Saturated	C6H4O2	1	1				
Hydrosulphite <=10%		1					
Hydroxylamine Sulphate, All	(NH2OH)2-H2SO4	1	1				
I							
Iodine Dry and Wet 3%	I2	2					
Iodine Tincture 3%	I2	1					
Iso-Octane	C8H18	1					
Isopropyl Acetate	CH3COOCH(CH3)2	3					
Isopropyl Chloride, Not Diluted	(CH3)2CHCl	1					
Isopropyl Ether	(CH3)2CHOCH(CH3)2	3					
K							
Kerosene		1					
L							
Lanoline, Common		1	1	1			
Lard Oil, Common		1	1	1			
Lead Acetate, Saturated	Pb(CH3COO)2	1	1	1	1	1	
Lead Chloride, Saturated	PbCl2	1	1	1	1	1	
Lead Nitrate, Saturated	Pb(NO3)2	1	1	1	1	1	
Lead Sulfate, Saturated	PbSO4	1	1	1	1	1	
Lead Tetraethyl	Pb(C2H5)4	1					
Liqueurs, Common		1					
Liquor, White <=60%		1					
Lithium Bromide 60%	LiBr	1	1	1	1	1	
Lye, Bleaching 12.5Cl	NaClO+NaCl	1					
M							
Magnesium Carbonate, All	MgCO3	1	1	1	1	1	
Magnesium Chloride, Saturated	MgCl2	1	1	1	1		

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Magnesium Hydroxide, All	Mg(OH)2	1	1	1	1		
Magnesium Nitrate, Not Diluted	Mg(NO3)2	1	1	1	1	1	
Magnesium Sulfate, Saturated	MgSO4	1	1	1	1	1	
Manganese Sulfate, Not Diluted	MnSO4	1	1	1	1	1	
Mercuric Chloride, Saturated	HgCl2	1	1	1			
Mercuric Cyanide, All	Hg(CN)2	1	1	1			
Mercuric Sulfate, Saturated	HgSO4	1					
Mercurous Nitrate, Saturated	HgNO3	1					
Mercury	Hg	1	1	1			
Methane	CH4	1					
Methyl Acetate	CH3COOCH3	3					
Methyl Acrylate	CH2=CHCOOCH3	3					
Methyl Amine 32%	CH3NH2	1					
Methyl Bromide	CH3Br	1					
Methyl Chloride	CH3Cl	3					
Methyl Ether, Not Diluted	CH3OCH3	3					
Methyl Ethyl Ketone	CH3COCH2CH3	3					
Methyl Isobutyl Ketone	CH3COCH2CH(CH3)2	3					
Methyl Isopropyl Ketone	CH3COCH(CH3)2	3					
Methylene Bromide	CH2Br2	1					
Methylene Chloride	CH2Cl2	2					
Methylene Iodine, Not Diluted	CH2I2	1	1	1	1	1	
Milk		1					
Molasses, Common		1					
Monochloroacetic Acid Ethyl Ester	ClCH2COOCH2CH3	2					
N							
Naphtha, Common		1					
Naphthalene	C10H8	1	1	1			
Nickel Acetate, Saturated	(CH3COO)2Ni	3					
Nickel Chloride, All	NiCl2	1	1	1	1	1	
Nickel Nitrate, Saturated	Ni(NO3)2	1	1	1	1	1	
Nickel Sulfate, Saturated	NiSO4	1	1	1	1	2	
Nickel Sulfate, Diluted	NiSO4	1					
Nicotine, Not Diluted	C10H14N2						
Nitrobenzene	C6H5NO2	2					
Nitroethane	CH3CH2NO2	3					
Nitromethane	CH3NO2	3					
Nitrotoluene	CH3C6H4NO2	2	3				

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Nitrous Gases, Diluted	NOx	1	1	1			
O							
Oil, Camphor, Common		1					
Oil, Castor, Common		1					
Oil, Cottonseed, Common		1	1	1			
Oil, Diesel		1	1				
Oil, Fuel		1					
Oil, Linseed, Common		1	1	1			
Oil, Lubricating, Common		1	1	1	2		
Oil, Lubricating (Non-aromatic), Common		1	1	1			
Oil, Maize, Common		1	1	1			
Oil, Mineral, Common		1					
Oil, Motor, Common		1					
Oil, Olive, Common		1	1	1			
Oil, Paraffin, Common		1	1	1	2		
Oil, Peanut, Common		1					
Oil, Silicone, Common		1	1				
Oil, Transformer, Common		1					
Oil, Vaseline, Common		1					
Oil, Vegetable and Fats, Common		1	1	1			
Oleum 10%	H2SO4+SO3	2					
Oleum Vapours, High	H2SO4+SO3	2					
Oleum Vapours, Trace	H2SO4+SO3	1					
Oxygen, All	O2	1	1	1	1	1	1
Ozone, Saturated	O3	1	2	3			
Ozone Gas >2%	O3	2					
P							
Paraffin, Common		1					
Paraffin Emulsions, Common		1	1	1			
Petroleum		1	1	2			
Petroleum Ether		1	1	2			
Phenol 90%	C6H5OH	1	2				
Phenol 1%	C6H5OH	1	1	1	1		
Phenylhydrazine	C6H5NHNH2	1	1	2			
Phenylhydrazine Hydrochloride, Saturated	C6H5NHNH2HCl	1	2	2			
Phosgene Gas	COCl2						

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1 - High Resistance 2 - Limited Resistance 3 - No Resistance □(blank) - Insufficient Data

FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Phosphorous Penta-Trichloride	PCl5-PCl3	1					
Phosphorous Pentoxide	P2O5	1	1	1			
Photographic Developer, Common							
Photographic Emulsion, Common		1	1				
Plating Solutions, Cadmium, Common		1					
Plating Solutions, Chrome, Common							
Plating Solutions, Copper, Common		1					
Plating Solutions, Gold, Common		1					
Plating Solutions, Lead, Common		1					
Plating Solutions, Nickel, Common		1					
Plating Solutions, Rhodium, Common		1					
Plating Solutions, Silver, Common							
Plating Solutions, Tin, Common		1	1	1	2		
Plating Solutions, Zinc, Common		1					
Polyvinyl Acetate, Saturated	(CH3COOCHCH2-)n	1					
Potassium Acetate,, Saturated	CH3COOK	1					
Potassium Bicarbonate, Saturated	KHCO3	1	1	1	1	1	
Potassium Bichromate, Saturated	K2Cr2O7	1	1	1	1	1	
Potassium Bisulfate, Not Diluted	KHSO4	1	1	1	1	1	
Potassium Borate, Saturated	K3BO3	1	1	1			
Potassium Bromate, Saturated	KBrO3	1	1	1	1	1	
Potassium Bromide, Saturated	KBr	1	1	1	1	1	
Potassium Carbonate, Saturated	K2CO3	1	1				
Potassium Chlorate, Saturated	KClO3	1	1	1	1		
Potassium Chloride, Saturated	KCl	1	1	1	1	1	
Potassium Chromate, Saturated	K2CrO4	1	1	1			
Potassium Cyanide, Saturated	KCN	1					
Potassium Ferricyanide, Saturated	K4Fe(CN)63H2O	1	1	1			
Potassium Fluoride, Saturated	KF	1	1	1	1	1	
Potassium Hydroxide <=60%	KOH	3					
Potassium Hypochlorite, ND	KClO	1					
Potassium Iodide, Saturated	KI	1	1	1	1	1	
Potassium Nitrate, Saturated	KNO3	1	1	1	1	1	
Potassium Perborate, Not Diluted	KBO3	1					
Potassium Perchlorate, Saturated	KClO4	1	1	1	1		
Potassium Permanganate, Saturated	KMnO4	1	1	1	1	1	1
Potassium Permanganate 10%	KMnO4	1	1	1			
Potassium Persulfate, Saturated	K2S2O8	1	1	1	1	1	
Potassium Phosphates Acids, All	K2HPO4 KH2PO4	1	1	1	1	1	
Potassium Sulfate, Saturated	K2SO4	1	1	1	1	1	

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Propane Gas	CH3CH2CH3	1					
Propane Liquid	CH3CH2CH3	1					
Propyl Acetate	CH3COOCH2CH2CH3	3					
Propylene Glycol	CH3CHOHCH2OH	1	1	2			
Propylene Oxide		3					
Pyridine	C5H5N	3					
S							
Silver Cyanide, All	AgCN	1					
Silver Nitrate, Saturated	AgNO3	1	1	1	2	2	
Silver Sulfate, Saturated	Ag2SO4	1	1	1	1	1	
Soap, Aqueous Solution, All		1	1	1	1		
Sodium Acetate, Saturated	CH3COONa	3					
Sodium Alum, Saturated	NaAl(SO4)2	1	1	1	1		
Sodium Benzoate, Saturated	C6H5COONa	1	1	1	2		
Sodium Bicarbonate, Saturated	NaHCO3	1	1	1	1		
Sodium Bichromate, Saturated	Na2Cr2O7	1	1	1	1	1	
Sodium Bisulfate 10%	NaHSO4	1	1	1	1	1	
Sodium Bisulfite	NaHSO3	1	1				
Sodium Borate, Saturated	Na2B4O7	1	1	1	1		
Sodium Bromate, All	NaBrO3	1	1	1			
Sodium Bromide, Saturated	NaBr	1	1	1	1		
Sodium Carbonate (Soda), Saturated	Na2CO3	1	1	1			
Sodium Chlorate, All	NaClO3	1	1	1	1		
Sodium Chloride, Saturated	NaCl	1					
Sodium Chloride, Diluted	NaCl	1		1	1	1	
Sodium Chlorite 25%	NaClO2	3					
Sodium Chromate, Diluted	Na2CrO4	1	1	1			
Sodium Cyanide, All	NaCN	1	1	1	1	2	
Sodium Disulphite, All	Na2S2O5	1	1	1			
Sodium Ferrocyanide, Saturated	Na4FeCN6	3					
Sodium Fluoride, Saturated	NaF	1	1	1			
Sodium Hydroxide 50%	NaOH	3					
Sodium Hydroxide 30%	NaOH	3					
Sodium Hydroxide 10%	NaOH	2	3				
Sodium Hypochlorite 12.5%	NaClO	1					
Sodium Hypochlorite 3%	NaClO	1					
Sodium Hyposulphite, Not Diluted	Na2S2O4						
Sodium Iodide, All	NaI	1	1	1			

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Sodium Metasilicate <5%	Na2SiO3	1	1	1	1	1	
Sodium Nitrate, Saturated	NaNO3	1	1	1	1	1	
Sodium Nitrite, Saturated	NaNO2	1	1	1	1	1	
Sodium Oxalate, Saturated	Na2C2O4	1					
Sodium Perborate, All	NaBO3	1					
Sodium Perchlorate, Not Diluted	NaClO4						
Sodium Peroxide, Diluted	Na2O2						
Sodium Persulphate, Saturated	Na2S2O8	1	1	1	1	1	
Sodium Phosphate, Saturated	Na3PO4	1	1	1			
Sodium Phosphate Biacid, Saturated	NaH2PO4	1	1	1	1	2	
Sodium Phosphate Monoacid, Saturated	Na2HPO4	1					
Sodium Silicate	Na2SiO3	1	1	1			
Sodium Sulfate, Saturated	Na2SO4	1	1	1	1	2	
Sodium Sulfide, Saturated	Na2S	1	1				
Sodium Sulfide, Diluted	Na2S	1					
Sodium Sulfite, Saturated	Na2SO3	1	1	1	1	2	
Sodium Thiocyanate, Not Diluted	NaSCN	1	1	1	1		
Sodium Thiosulphate, Saturated	Na2S2O3	1	1	1			
Stannic Chloride, Saturated	SnCl4						
Stannous Chloride, Saturated	SnCl2	1	1	1			
Styrene	C6H5CH=CH2	2					
Sugar Syrup, Saturated		1					
Sulphur	S	1	1	1	1		
Sulphur Chloride, Not Diluted	S2Cl2	1					
Sulphur Dichloride, Not Diluted	SCl2	1					
Sulphur Dioxide, Saturated	SO2	1					
Sulphur Dioxide Dry	SO2	1	2	3			
Sulphur Dioxide Liquid	SO2	2					
Sulphur Trioxide	SO3	2					
T							
Tallow Emulsion, Common		1					
Tetrachloroethane	CHCl2CHCl2	2					
Tetrachloroethylene	Cl2C=CCl2	1	1	1			
Tetrahydrofurane	(CH2)4O	3					
Tetrahydronaphthalene	C10H12	1					
Thionyl Chloride	SOCl2	3					
Thiophene	C4H8S	3					
Titanic Sulfate, Diluted	Ti(SO4)2						

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CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
Titanous Sulfate, Diluted	Ti2(SO4)3						
Toluene	C6H5CH3	2	3				
Tributylphosphate	(C4H9)3PO4	3					
Trichlorethylene	ClCH=CCl2	1					
Trichloroethane	CH3CCl3	1					
Tricresylphosphate	(CH3C6H4O)3PO4	3					
Triethanolamine	N(CH2CH2OH)3	1					
Triethylamine	N(CH2CH3)3	2					
Trioctylphosphate	(C8H17)3PO4	2					
Turpentine Oil		1					
U							
Urea 33%	NH2CONH2	1	1	1			
Urea <=10%	NH2CONH2	1					
Urine, Not Diluted		1	1	1			
V							
Vinyl Acetate	CH2=CHOOCCH3	3					
Vinyl Chloride	CH2=CHCl	1					
W							
Water	H2O	1	1	1			
Water, Bromine, Saturated	Br2+H2O	1	1				
Water, Chlorine, Saturated	Cl2+H2O	2					
Water, Condensed	H2O	1	1	1	1		
Water, Demineralizate	H2O	1	1	1	1	1	
Water, Distilled	H2O	1	1	1	1	1	
Water, Potable	H2O	1	1	1	1	1	
Water, Rain	H2O	1	1	1	1	1	
Water, Salt, Saturated	H2O+NaCl	1	1	1	1		
Water, Sea		1	1	1	1	1	
Whisky, Common		1	1	1			
Wine Vinegar, Common		3					
Wines, Common		1	1				

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FLUOROPOLYMER (FPM)
CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20ºC (68ºF)	40ºC (104ºF)	60ºC (140ºF)	80ºC (176ºF)	100ºC (212ºF)	120ºC (248ºF)
X							
Xylene	C6H4(CH3)2	1	2	3			
Z							
Zinc Acetate, Not Diluted	Zn(CH3COO)2	1	1	1	1	1	
Zinc Chloride, Saturated	ZnCl2	1	1	1	1	1	
Zinc Chloride, Diluted	ZnCl2	1					
Zinc Chromate, Not Diluted	ZnCrO4						
Zinc Cyanide, All	Zn(CN)2						
Zinc Nitrate, Not Diluted	Zn(NO3)2	1	1	1	1	1	
Zinc Sulfate, Saturated	ZnSO4	1	1	1	1	1	
Zinc Sulfate, Diluted	ZnSO4	1	1	1	1		

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SALES AND CUSTOMER SERVICE

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