

FPM

Chemical Resistance Guide



FIRST EDITION

FPM CHEMICAL RESISTANCE GUIDE

Elastomers:
Fluoropolymer (FPM)



IPEX

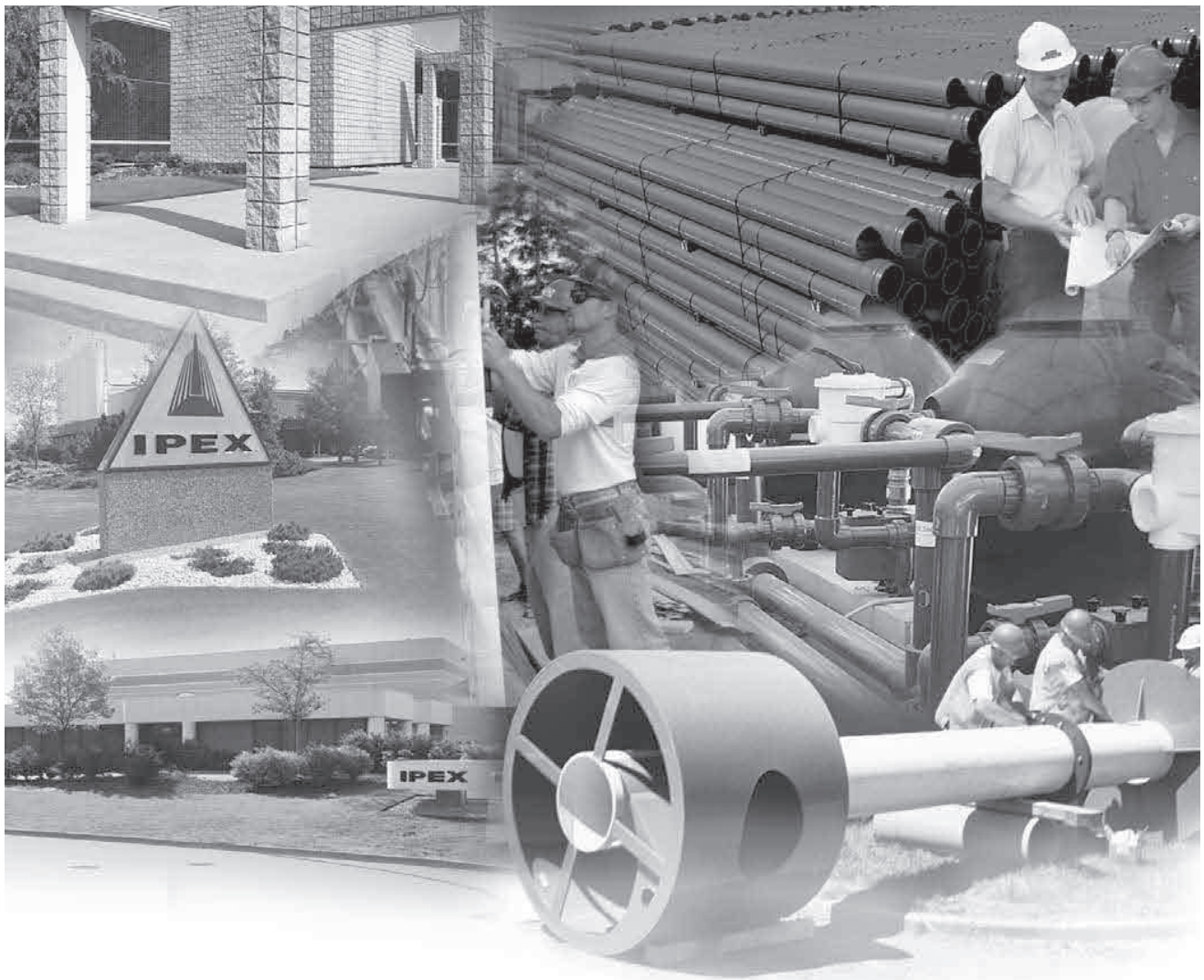
Chemical Resistance Guide

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 known 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.p.A 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)

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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	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
A							
Acetaldehyde	CH ₃ CHO	2	3	3			
Acetaldehyde 40%	CH ₃ CHO	1	1	2	3		
Acetic Acid Anhydride	(CH ₃ CO) ₂ O	3					
Acetone	CH ₃ COCH ₃	3	3	3			
Acetone 10%	CH ₃ COCH ₃	3	3	3			
Acetonitrile, Not Diluted	CH ₃ CN						
Acetophenone, Not Diluted	CH ₃ COC ₆ H ₅	2	3	3	3		
Acetyl Acetone, Not Diluted	CH ₃ COCH ₂ COCH ₃						
Acetylene, Not Diluted	C ₂ H ₂	1	1	1	1	2	
Acid, Acetic	CH ₃ COOH	3					
Acid, Acetic 80%	CH ₃ COOH	2	2	3	3	3	
Acid, Acetic 60%	CH ₃ COOH	2	2	2	3	3	
Acid, Acetic 30%	CH ₃ COOH	2	2	2	2	3	
Acid, Acetic 10%	CH ₃ COOH	2	2	2	3		
Acid, Adipic, Saturated	HOOC(CH ₂) ₄ COOH	1	2	1	1	1	2
Acid, Anthraquinone Sulfonic, Susp		1					
Acid, Arsenic, Saturated	H ₃ AsO ₄	1	1	1	2	2	
Acid, Benzene Sulfonic 10%	C ₆ H ₅ SO ₃ H	1	1				
Acid, Benzoic, Saturated	C ₆ H ₅ COOH	1	1	1	1	2	
Acid, Boric, Saturated	H ₃ BO ₃	1	1	1	1	2	
Acid, Bromic 10%	HBrO ₃						
Acid, Butyric	CH ₃ CH ₂ CH ₂ COOH	2	2	3			
Acid, Butyric 20%	CH ₃ CH ₂ CH ₂ COOH	1					
Acid, Caprylic	CH ₃ (CH ₂) ₆ COOH						
Acid, Carbonic, Saturated	H ₂ CO ₃	1	1	1	1	2	
Acid, Chloric 20%	HClO ₃	3					
Acid, Chloric 10%	HClO ₃	3					
Acid, Chloro Sulfonic	HCISO ₃	3					
Acid, Chromic 50%	CrO ₃ +H ₂ O	1	1	1			
Acid, Chromic 30%	CrO ₃ +H ₂ O						
Acid, Chromic 10%	CrO ₃ +H ₂ O	1	1	2			
Acid, Citric 50%	C ₃ H ₄ (OH)(COOH) ₃	1					
Acid, Dichloroacetic	Cl ₂ CHCOOH	2	3				
Acid, Dichloroacetic 50%	Cl ₂ CHCOOH	2	2	3			
Acid, Diglycolic, Saturated	HOOCCH ₂ OCH ₂ COOH	1					
Acid, Fatty	R>C ₆	1					
Acid, Fluoboric	HBF ₄	1	1	1	1		
Acid, Fluoboric, Not Diluted	HBF ₄	1	1	1	1		
Acid, Fluosilicic 32%	H ₂ SiF ₆	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	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
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, Monochloroacetic 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	HOCCOOH	1	1	2	3		
Acid, Oxalic 10%	HOCCOOH	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.

1 - High Resistance

2 - Limited Resistance

3 - No Resistance

□ (blank) - Insufficient Data

FLUOROPOLYMER (FPM)

CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Acid, Perchloric 70%	HClO ₄	1	1	1	2		
Acid, Perchloric 10%	HClO ₄	1	1	1			
Acid, Phosphoric 85%	H ₃ PO ₄	1	1	1	1	2	
Acid, Phosphoric 50%	H ₃ PO ₄	1	1	1	1		
Acid, Phosphoric 25%	H ₃ PO ₄	1	1	1	1	1	
Acid, Phthalic	C ₆ H ₄ (COOH) ₂	1					
Acid, Phthalic 50%	C ₆ H ₄ (COOH) ₂	1					
Acid, Picric 1%	C ₆ H ₂ (OH)(NO ₂) ₃	1	1	1	2		
Acid, Propionic 50%	CH ₃ CH ₂ COOH	1	1	2			
Acid, Silicic, All	H ₂ SiO ₃	1					
Acid, Stearic	C ₁₇ H ₃₅ COOH	1	1	2	2		
Acid, Succinic, Not Diluted	COOH(CH ₂) ₂ COOH	1					
Acid, Sulfamic 20%	HSO ₃ NH ₂						
Acid, Sulphuric	H ₂ SO ₄	3	3	3	3	3	
Acid, Sulphuric 98%	H ₂ SO ₄	3					
Acid, Sulphuric 96%	H ₂ SO ₄	2	2	3			
Acid, Sulphuric 90%	H ₂ SO ₄	1	1	1	2	2	3
Acid, Sulphuric 80%	H ₂ SO ₄	1	1	1	2	2	
Acid, Sulphuric 50%	H ₂ SO ₄	1	1	1	1	1	2
Acid, Sulphuric 10%	H ₂ SO ₄	1	1	1	1	1	1
Acid, Sulphurous, Saturated	H ₂ SO ₃	1	1	2	3		
Acid, Tannic, All	C ₇₆ H ₅₂ O ₄₆	1					
Acid, Tartaric, All	COOH(CHOH) ₂ COOH	1	1	1			
Acid, Toluic 50%	CH ₃ C ₆ H ₄ COOH	1	1	1			
Acid, Trichloroacetic	CCl ₃ COOH	3					
Acid, Trichloroacetic 50%	CCl ₃ COOH	3					
Acid, Uric 10%	C ₅ H ₄ N ₄ O ₃						
Acrylonitrile	CH ₂ =CH-CN	2	2	3			
Alcohol, Allyl 96%	CH ₂ =CH-CH ₂ OH	2	2	3			
Alcohol, Amyl	CH ₃ (CH ₂) ₃ CH ₂ OH	1	1	2	2		
Alcohol, Benzyl	C ₆ H ₅ CH ₂ OH	2					
Alcohol, Butyl	CH ₃ (CH ₂) ₃ OH	2	2	2			
Alcohol, Diacetone	(CH ₃) ₂ COHCH ₂ COCH ₃	3					
Alcohol, Ethyl 96%	CH ₃ CH ₂ OH	1	1	1	1		
Alcohol, Furfuryl	C ₅ H ₆ O ₂	3					
Alcohol, Isobutyl	(CH ₃) ₂ CHCH ₂ OH	1					
Alcohol, Isopropyl	(CH ₃) ₂ CHOH	1	1	1	2		
Alcohol, Methyl	CH ₃ OH	2	3	3	3	3	
Alcohol, Polyvinyl, Not Diluted	(-CH ₂ CHOH-)n	1	1	1			
Alcohol, Propyl 97%	C ₃ H ₇ OH	1	1	1	1	1	

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Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Alcoholic Spirit 40%		1					
Allyl Chloride, Not Diluted	CH ₂ =CHCH ₂ Cl	2	2	3			
Alum, Saturated	Al ₂ (SO ₄) ₃ ·K ₂ SO ₄ ·4H ₂ O	1	1	1	1	1	
Alum, Diluted	Al ₂ (SO ₄) ₃ ·K ₂ SO ₄ ·4H ₂ O	1					
Aluminium, Acetate, Saturated	(CH ₃ COO) ₃ Al	1	1	1	1	1	
Aluminium, Bromide, Saturated	AlBr ₃	1	1	1	1		
Aluminium, Chloride, All	AlCl ₃	1	1	1	1	1	
Aluminium, Fluoride, Saturated	AlF ₃						
Aluminium, Hydroxide, All	Al(OH) ₃	1	1	1	1	2	
Aluminium, Nitrate, Saturated	Al(NO ₃) ₃	1	1	1	1	1	
Aluminium, Sulfate, Saturated	Al ₂ (SO ₄) ₃	1	1	1	1		
Aluminium, Sulfate 10%	Al ₂ (SO ₄) ₃	1	1	1	1	1	
Ammonia Gas	NH ₃	3					
Ammonia, Saturated	NH ₃	2	2	3			
Ammonia, Diluted	NH ₃	2					
Ammonium Acetate, Saturated	CH ₃ COONH ₄	1	1	1	2	2	
Ammonium Bifluoride, Saturated	NH ₄ FHF	1	1	1	2	2	
Ammonium Carbonate	(NH ₄) ₂ CO ₃	1	1	1			
Ammonium Chloride, Saturated	NH ₄ Cl	1	1	1	1	1	
Ammonium Fluoride 25%	NH ₄ F	2				3	
Ammonium Hydroxide, Saturated	NH ₄ OH	2	2	3			
Ammonium Hydroxide, Diluted	NH ₄ OH	2					
Ammonium Metaphosphate, All	(NH ₄) ₄ P ₄ O ₁₂	1					
Ammonium Nitrate, Saturated	NH ₄ NO ₃	1	2	2			
Ammonium Persulfate, All	(NH ₄) ₂ S ₂ O ₈	1					
Ammonium Phosphate, All		1	1	1	1		
Ammonium Sulfate, All	(NH ₄) ₂ SO ₄	1	1	1	1		
Ammonium Sulphhydrate, Saturated	NH ₄ OH(NH ₄) ₂ SO ₄	1	1	1			
Ammonium Sulphhydrate, Diluted	NH ₄ OH(NH ₄) ₂ SO ₄	1	1	1			
Ammonium Sulfide, Saturated	(NH ₄) ₂ S	1	2	3			
Ammonium Sulfide 10%	(NH ₄) ₂ S	1	2	3			
Amyl Acetate	CH ₃ COO(CH ₂) ₄ CH ₃	3					
Amyl Borate	(C ₅ H ₁₁) ₃ BO ₃	3					
Amyl Chloride	CH ₃ (CH ₂) ₄ Cl	2					
Aniline	C ₆ H ₅ NH ₂	2	2	2			
Aniline Chlorhydrate, Saturated	C ₆ H ₅ NH ₂ HCl	2	3				
Antimony Trichloride 90%	SbCl ₃	1	1	1	2		
Aqua Regia	3HCl+1HNO ₃	2					
Asphalt, Common		1	1	1	1		

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1 - High Resistance

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
B							
Barium Carbonate, All	BaCO ₃	1	1	1	1	1	1
Barium Chloride, All	BaCl ₂	1	1	1	1	1	1
Barium Hydroxide, Saturated	Ba(OH) ₂	1	1	1	1		
Barium Nitrate, Saturated	Ba(NO ₃) ₂	1	1	1	1	1	1
Barium Sulfate, Saturated	BaSO ₄	1	1	1	1	1	1
Barium Sulfide, Saturated	BaS	1	1	1	1	1	1
Beer		1	1	1	1		
Benzaldehyde, Saturated	C ₆ H ₅ CHO	3					
Benzene	C ₆ H ₆	1	1	2	2	2	
Benzene + Benzine 20% / 80%		1	2				
Benzine (free of Pb and aromatic)	C ₅ H ₁₂ +C ₁₂ H ₂₆	1	1	2	2		
Benzyl Chloride	C ₆ H ₅ CH ₂ Cl						
Borax, All	Na ₂ B ₄ O ₇	1	1	1	1		
Brine, Common							
Bromine, Liquid	Br ₂	1	1	1	1		
Bromine, Vapours, High	Br ₂	1					
Butadiene	CH ₂ =CH-CH=CH ₂	1	1	1			
Butane Gas	CH ₃ CH ₂ CH ₂ CH ₃	1	1	1	1		
Butanediol, Concentrated	OHCH ₂ CH ₂ CH ₂ CH ₂ OH	1					
Butanediol 10%	OHCH ₂ CH ₂ CH ₂ CH ₂ OH	1					
Butyl Acetate	CH ₃ COOCH ₂ CH ₂ CH ₂ CH ₃	3					
Butyl Acrylate	CH ₂ =CHCOOC ₄ H ₉	3					
Butyl Amine, Saturated	CH ₃ (CH ₂) ₃ NH ₂	3					
Butyl Ether	(CH ₃ (CH ₂) ₃) ₂ O	3					
Butyl Phenol	C ₄ H ₉ C ₆ H ₄ OH	2					
Butyl Phthalate	HOOC ₆ H ₄ COOC ₄ H ₉	2	2	3			
Butylene Glycol	OHCH ₂ -CH=CH-CH ₂ OH	1	1	2			
Butylene*	CH ₂ =CH-CH ₂ CH ₃	1					
C							
Calcium Acetate, Saturated	Ca(CH ₃ COO) ₂	1	1	1	1		
Calcium Bisulfite, Saturated	Ca(HSO ₃) ₂	1	1	1	2		
Calcium Carbonate, All	CaCO ₃	1	1	1	1	1	
Calcium Chlorate, Saturated	Ca(ClO ₃) ₂	1	1	1			
Calcium Chloride, All	CaCl ₂	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(NO ₃) ₂	1	1	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	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Calcium Sulfate, Saturated	CaSO ₄	1	1	1	1	1	
Calcium Sulfide, Saturated	CaS	1	1	1	1	1	
Carbon Dioxide	CO ₂	1	1	1	1	1	
Carbon Dioxide, Not Diluted	CO ₂ +H ₂ O	1	1	1	1	1	
Carbon Disulfide	CS ₂	1	2				
Carbon Monoxide	CO	1	1	1	1	1	
Carbon Tetrachloride	CCl ₄	1	1	1			
Chloramine, Diluted	C ₆ H ₅ SO ₂ NNaCl	1					
Chlorine	Cl ₂	1					
Chlorine 10%	Cl ₂	1	1				
Chlorine Dioxide	ClO ₂	3					
Chlorine Gas, All	Cl ₂	1					
Chlorine Liquid	Cl ₂	2					
Chloro Benzene	C ₆ H ₅ Cl	1					
Chlorobiphenyl	C ₆ H ₅ C ₆ H ₄ Cl	1					
Chloroform	CHCl ₃	2					
Chrome Alum, Saturated	KCr(SO ₄) ₂	1	1	1	1	1	
Chrome Alum, Not Diluted	KCr(SO ₄) ₂	1	1	1	1	1	
Compressed Air with Oil		1					
Copper Acetate, Saturated	Cu(COOCH ₃) ₂	1	1				
Copper Borofluoride, Not Diluted	CuBF ₄	1					
Copper Carbonate, Saturated	CuCO ₃						
Copper Chloride, Saturated	CuCl ₂	1	1	1	1	1	
Copper Cyanide, All	Cu(CN) ₂	1					
Copper Fluoride, All	CuF ₂	1					
Copper Nitrate, Not Diluted	Cu(NO ₃) ₂	1	1	1	1	1	
Copper Sulfate, Saturated	CuSO ₄	1	1	1	1	1	
Copper Sulfate, Diluted	CuSO ₄	1	1				
Cresol, Diluted	CH ₃ C ₆ H ₄ OH	1					
Cresol >=90	CH ₃ C ₆ H ₄ OH	2					
Croton Aldehyde	CH ₃ -CH=CH-CHO	1					
Cryolite, Saturated	Na ₃ AlF ₆						
Cyclohexane	C ₆ H ₁₂	1					
Cyclohexanol	C ₆ H ₁₁ OH	1	1				
Cyclohexanone	C ₆ H ₁₀ O	3					
D							
Decalin (Decahydronaftalene)	C ₁₀ H ₁₈	1					
Detergents, Common		1	1	1			

Chemical concentrations are listed at 100% unless otherwise noted.

1 - High Resistance

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Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Dextrine, Common		1	1	1	1	1	
Dextrose, All	C ₆ H ₁₂ O ₆	1	1	1	1	1	
Dibutyl Amine	(C ₄ H ₉) ₂ NH	3					
Dibutyl Ether	(CH ₃ (CH ₂) ₃) ₂ O	1	1	2			
Dibutyl Phthalate	C ₆ H ₄ (COOC ₄ H ₉) ₂	2					
Dibutyl Sebacate	C ₈ H ₁₆ (COOC ₄ H ₉) ₂	1					
Dichloro Benzene	C ₆ H ₄ Cl ₂	1					
Dichloroacetic Acid Methyl Ester	Cl ₂ CHCOOCH ₃	3					
Dichloroethylene	CHCl=CHCl	2					
Diethylamine	(C ₂ H ₅) ₂ NH	3					
Diethylether	C ₂ H ₅ OC ₂ H ₅	3					
Di-Isobutyl Ketone	(CH ₃) ₂ CHCH ₂ COCH ₂ CH(CH ₃) ₂	3					
Diisobutylene	C ₈ H ₁₆	1	1	1			
Di-Isopropyl Ketone	((CH ₃) ₂ CH) ₂ CO	3					
Dimethyl Amine	(CH ₃) ₂ NH	3					
Dimethyl Formamide	HCON(CH ₃) ₂	3					
Dimethyl Phthalate	C ₆ H ₄ (COOCH ₃) ₂	2					
Dinonyl Phthalate	C ₆ H ₄ (COOC ₉ H ₁₉) ₂	1					
Diocetyl Phthalate	C ₆ H ₄ (COOC ₈ H ₁₇) ₂	1					
Dioxane	(CH ₂) ₄ O ₂	3					
E							
Epichlorohydrin	C ₃ H ₅ ClO	3					
Ethyl Acetate	CH ₃ COOCH ₂ CH ₃	3	3	3			
Ethyl Acetoacetate	CH ₃ COCH ₂ COOCH ₂ CH ₃	3					
Ethyl Acrylate	CH ₂ =CHCOOCH ₂ CH ₃	3					
Ethyl Benzene	C ₆ H ₅ C ₂ H ₅	2					
Ethyl Chloride	CH ₃ CH ₂ Cl	1	1				
Ethyl Ether	CH ₃ CH ₂ OCH ₂ CH ₃	3					
Ethylene Chlorohydrin	ClCH ₂ CH ₂ OH						
Ethylene Diamina	NH ₂ CH ₂ CH ₂ NH ₂	2	2	3			
Ethylene Dichloride	CH ₂ ClCH ₂ Cl	1	1	2			
Ethylene Glycol	HOCH ₂ -CH ₂ OH	1	1	1	2		
Ethylene Oxide	C ₂ H ₄ O	3					
F							
Ferric Chloride,, Saturated	FeCl ₃	1	1	1			
Ferric Chloride 10%	FeCl ₃	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	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Ferric Nitrate, Not Diluted	Fe(NO ₃) ₃	1					
Ferric Sulfate, Saturated	Fe ₂ (SO ₄) ₃	1					
Ferrous Chloride, Saturated	FeCl ₂						
Ferrous Hydroxide, Saturated	Fe(OH) ₂	1	1	1	1	1	
Ferrous Nitrate, Saturated	Fe(NO ₃) ₂	1	1	1	1	1	
Ferrous Sulfate, Saturated	FeSO ₄	1	1	1	1	2	
Fertilizer Salts, Saturated		1	1	1	1		
Fertilizer Salts 10%		1	1	1	1		
Fluorine Gas Dry	F ₂	2					
Formaldehyde 37%	CH ₂ O	1	1	1		3	
Formamide	HCONH ₂	2					
Freon F-11	CCl ₃ F	2					
Freon F-12	CCl ₂ F ₂	2					
Freon F-21	CHCl ₂ F	3					
Freon F-22	CHClF ₂	3					
Freon F-113	CClF ₂ -CCl ₂ F	2					
Freon F-114	CClF ₂ -CClF ₂	2	2				
Fructose, Saturated	C ₆ H ₁₂ O ₆	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	C ₆ H ₁₂ O ₆	1	1	1	1	1	
Glycerine, All	C ₃ H ₅ (OH) ₃	1	1				
Glycocoll 10%	NH ₂ CH ₂ COOH	1	1				
H							
Heptane	C ₇ H ₁₆	1					
Hexane	C ₆ H ₁₄						
Hydrazine	NH ₂ -NH ₂	3					
Hydrazine Hydrate, Diluted	NH ₂ -NH ₂ H ₂ O	1					
Hydrogen Gas	H ₂	1	1	1	1	1	

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Hydrogen Peroxide 90%	H ₂ O ₂	2					
Hydrogen Peroxide 50%	H ₂ O ₂	1	2				
Hydrogen Peroxide 10%	H ₂ O ₂	1	2	3			
Hydrogen Sulfide, Saturated	H ₂ S	1	1	1	2		
Hydrogen Sulfide Dry	H ₂ S	1	1	2	3		
Hydroquinone, Saturated	C ₆ H ₄ O ₂	1	1				
Hydrosulphite <=10%		1					
Hydroxylamine Sulphate, All	(NH ₂ OH) ₂ -H ₂ SO ₄	1	1				
I							
Iodine Dry and Wet 3%	I ₂	2					
Iodine Tincture 3%	I ₂	1					
Iso-Octane	C ₈ H ₁₈	1					
Isopropyl Acetate	CH ₃ COOCH(CH ₃) ₂	3					
Isopropyl Chloride, Not Diluted	(CH ₃) ₂ CHCl	1					
Isopropyl Ether	(CH ₃) ₂ CHOCH(CH ₃) ₂	3					
K							
Kerosene		1					
L							
Lanoline, Common		1	1	1			
Lard Oil, Common		1	1	1			
Lead Acetate, Saturated	Pb(CH ₃ COO) ₂	1	1	1	1	1	
Lead Chloride, Saturated	PbCl ₂	1	1	1	1	1	
Lead Nitrate, Saturated	Pb(NO ₃) ₂	1	1	1	1	1	
Lead Sulfate, Saturated	PbSO ₄	1	1	1	1	1	
Lead Tetraethyl	Pb(C ₂ H ₅) 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	MgCO ₃	1	1	1	1	1	
Magnesium Chloride, Saturated	MgCl ₂	1	1	1	1		

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Magnesium Hydroxide, All	Mg(OH) ₂	1	1	1	1		
Magnesium Nitrate, Not Diluted	Mg(NO ₃) ₂	1	1	1	1	1	
Magnesium Sulfate, Saturated	MgSO ₄	1	1	1	1	1	
Manganese Sulfate, Not Diluted	MnSO ₄	1	1	1	1	1	
Mercuric Chloride, Saturated	HgCl ₂	1	1	1			
Mercuric Cyanide, All	Hg(CN) ₂	1	1	1			
Mercuric Sulfate, Saturated	HgSO ₄	1					
Mercurous Nitrate, Saturated	HgNO ₃	1					
Mercury	Hg	1	1	1			
Methane	CH ₄	1					
Methyl Acetate	CH ₃ COOCH ₃	3					
Methyl Acrylate	CH ₂ =CHCOOCH ₃	3					
Methyl Amine 32%	CH ₃ NH ₂	1					
Methyl Bromide	CH ₃ Br	1					
Methyl Chloride	CH ₃ Cl	3					
Methyl Ether, Not Diluted	CH ₃ OCH ₃	3					
Methyl Ethyl Ketone	CH ₃ COCH ₂ CH ₃	3					
Methyl Isobutyl Ketone	CH ₃ COCH ₂ CH(CH ₃) ₂	3					
Methyl Isopropyl Ketone	CH ₃ COCH(CH ₃) ₂	3					
Methylene Bromide	CH ₂ Br ₂	1					
Methylene Chloride	CH ₂ Cl ₂	2					
Methylene Iodine, Not Diluted	CH ₂ I ₂	1	1	1	1	1	
Milk		1					
Molasses, Common		1					
Monochloroacetic Acid Ethyl Ester	ClCH ₂ COOCH ₂ CH ₃	2					
N							
Naphtha, Common		1					
Naphthalene	C ₁₀ H ₈	1	1	1			
Nickel Acetate, Saturated	(CH ₃ COO) ₂ Ni	3					
Nickel Chloride, All	NiCl ₂	1	1	1	1	1	
Nickel Nitrate, Saturated	Ni(NO ₃) ₂	1	1	1	1	1	
Nickel Sulfate, Saturated	NiSO ₄	1	1	1	1	2	
Nickel Sulfate, Diluted	NiSO ₄	1					
Nicotine, Not Diluted	C ₁₀ H ₁₄ N ₂						
Nitrobenzene	C ₆ H ₅ NO ₂	2					
Nitroethane	CH ₃ CH ₂ NO ₂	3					
Nitromethane	CH ₃ NO ₂	3					
Nitrotoluene	CH ₃ C ₆ H ₄ NO ₂	2	3				

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□ (blank) - Insufficient Data

FLUOROPOLYMER (FPM)

CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Nitrous Gases, Diluted	NO _x	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%	H ₂ SO ₄ +SO ₃	2					
Oleum Vapours, High	H ₂ SO ₄ +SO ₃	2					
Oleum Vapours, Trace	H ₂ SO ₄ +SO ₃	1					
Oxygen, All	O ₂	1	1	1	1	1	1
Ozone, Saturated	O ₃	1	2	3			
Ozone Gas >2%	O ₃	2					
P							
Paraffin, Common		1					
Paraffin Emulsions, Common		1	1	1			
Petroleum		1	1	2			
Petroleum Ether		1	1	2			
Phenol 90%	C ₆ H ₅ OH	1	2				
Phenol 1%	C ₆ H ₅ OH	1	1	1	1		
Phenylhydrazine	C ₆ H ₅ NHNH ₂	1	1	2			
Phenylhydrazine Hydrochloride, Saturated	C ₆ H ₅ NHNH ₂ HCl	1	2	2			
Phosgene Gas	COCl ₂						

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Phosphorous Penta-Trichloride	PCl ₅ -PCl ₃	1					
Phosphorous Pentoxide	P ₂ O ₅	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	(CH ₃ COOCHCH ₂ -) _n	1					
Potassium Acetate, Saturated	CH ₃ COOK	1					
Potassium Bicarbonate, Saturated	KHCO ₃	1	1	1	1	1	
Potassium Bichromate, Saturated	K ₂ Cr ₂ O ₇	1	1	1	1	1	
Potassium Bisulfate, Not Diluted	KHSO ₄	1	1	1	1	1	
Potassium Borate, Saturated	K ₃ B ₃ O ₃	1	1	1			
Potassium Bromate, Saturated	KBrO ₃	1	1	1	1	1	
Potassium Bromide, Saturated	KBr	1	1	1	1	1	
Potassium Carbonate, Saturated	K ₂ CO ₃	1	1				
Potassium Chlorate, Saturated	KClO ₃	1	1	1	1		
Potassium Chloride, Saturated	KCl	1	1	1	1	1	
Potassium Chromate, Saturated	K ₂ CrO ₄	1	1	1			
Potassium Cyanide, Saturated	KCN	1					
Potassium Ferricyanide, Saturated	K ₄ Fe(CN) ₆ H ₂ O	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	KNO ₃	1	1	1	1	1	
Potassium Perborate, Not Diluted	KBO ₃	1					
Potassium Perchlorate, Saturated	KClO ₄	1	1	1	1		
Potassium Permanganate, Saturated	KMnO ₄	1	1	1	1	1	1
Potassium Permanganate 10%	KMnO ₄	1	1	1			
Potassium Persulfate, Saturated	K ₂ S ₂ O ₈	1	1	1	1	1	
Potassium Phosphates Acids, All	K ₂ HPO ₄ KH ₂ PO ₄	1	1	1	1	1	
Potassium Sulfate, Saturated	K ₂ SO ₄	1	1	1	1	1	

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Propane Gas	CH ₃ CH ₂ CH ₃	1					
Propane Liquid	CH ₃ CH ₂ CH ₃	1					
Propyl Acetate	CH ₃ COOCH ₂ CH ₂ CH ₃	3					
Propylene Glycol	CH ₃ CHOHCH ₂ OH	1	1	2			
Propylene Oxide		3					
Pyridine	C ₅ H ₅ N	3					
S							
Silver Cyanide, All	AgCN	1					
Silver Nitrate, Saturated	AgNO ₃	1	1	1	2	2	
Silver Sulfate, Saturated	Ag ₂ SO ₄	1	1	1	1	1	
Soap, Aqueous Solution, All		1	1	1	1		
Sodium Acetate, Saturated	CH ₃ COONa	3					
Sodium Alum, Saturated	NaAl(SO ₄) ₂	1	1	1	1		
Sodium Benzoate, Saturated	C ₆ H ₅ COONa	1	1	1	2		
Sodium Bicarbonate, Saturated	NaHCO ₃	1	1	1	1		
Sodium Bichromate, Saturated	Na ₂ Cr ₂ O ₇	1	1	1	1	1	
Sodium Bisulfate 10%	NaHSO ₄	1	1	1	1	1	
Sodium Bisulfite	NaHSO ₃	1	1				
Sodium Borate, Saturated	Na ₂ B ₄ O ₇	1	1	1	1		
Sodium Bromate, All	NaBrO ₃	1	1	1			
Sodium Bromide, Saturated	NaBr	1	1	1	1		
Sodium Carbonate (Soda), Saturated	Na ₂ CO ₃	1	1	1			
Sodium Chlorate, All	NaClO ₃	1	1	1	1		
Sodium Chloride, Saturated	NaCl	1					
Sodium Chloride, Diluted	NaCl	1		1	1	1	
Sodium Chlorite 25%	NaClO ₂	3					
Sodium Chromate, Diluted	Na ₂ CrO ₄	1	1	1			
Sodium Cyanide, All	NaCN	1	1	1	1	2	
Sodium Disulphite, All	Na ₂ S ₂ O ₅	1	1	1			
Sodium Ferrocyanide, Saturated	Na ₄ FeCN ₆	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	Na ₂ S ₂ O ₄						
Sodium Iodide, All	NaI	1	1	1			

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Sodium Metasilicate <5%	Na ₂ SiO ₃	1	1	1	1	1	
Sodium Nitrate, Saturated	NaNO ₃	1	1	1	1	1	
Sodium Nitrite, Saturated	NaNO ₂	1	1	1	1	1	
Sodium Oxalate, Saturated	Na ₂ C ₂ O ₄	1					
Sodium Perborate, All	NaBO ₃	1					
Sodium Perchlorate, Not Diluted	NaClO ₄						
Sodium Peroxide, Diluted	Na ₂ O ₂						
Sodium Persulphate, Saturated	Na ₂ S ₂ O ₈	1	1	1	1	1	
Sodium Phosphate, Saturated	Na ₃ PO ₄	1	1	1			
Sodium Phosphate Biacid, Saturated	NaH ₂ PO ₄	1	1	1	1	2	
Sodium Phosphate Monoacid, Saturated	Na ₂ HPO ₄	1					
Sodium Silicate	Na ₂ SiO ₃	1	1	1			
Sodium Sulfate, Saturated	Na ₂ SO ₄	1	1	1	1	2	
Sodium Sulfide, Saturated	Na ₂ S	1	1				
Sodium Sulfide, Diluted	Na ₂ S	1					
Sodium Sulfite, Saturated	Na ₂ SO ₃	1	1	1	1	2	
Sodium Thiocyanate, Not Diluted	NaSCN	1	1	1	1		
Sodium Thiosulphate, Saturated	Na ₂ S ₂ O ₃	1	1	1			
Stannic Chloride, Saturated	SnCl ₄						
Stannous Chloride, Saturated	SnCl ₂	1	1	1			
Styrene	C ₆ H ₅ CH=CH ₂	2					
Sugar Syrup, Saturated		1					
Sulphur	S	1	1	1	1		
Sulphur Chloride, Not Diluted	S ₂ Cl ₂	1					
Sulphur Dichloride, Not Diluted	SCl ₂	1					
Sulphur Dioxide, Saturated	SO ₂	1					
Sulphur Dioxide Dry	SO ₂	1	2	3			
Sulphur Dioxide Liquid	SO ₂	2					
Sulphur Trioxide	SO ₃	2					
T							
Tallow Emulsion, Common		1					
Tetrachloroethane	CHCl ₂ CHCl ₂	2					
Tetrachloroethylene	Cl ₂ C=CCl ₂	1	1	1			
Tetrahydrofurane	(CH ₂) ₄ O	3					
Tetrahydronaphthalene	C ₁₀ H ₁₂	1					
Thionyl Chloride	SOCl ₂	3					
Thiophene	C ₄ H ₈ S	3					
Titanic Sulfate, Diluted	Ti(SO ₄) ₂						

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FLUOROPOLYMER (FPM) CHEMICAL RESISTANCE DATA

Chemical & Concentration	Formula	20°C (68°F)	40°C (104°F)	60°C (140°F)	80°C (176°F)	100°C (212°F)	120°C (248°F)
Titanous Sulfate, Diluted	Ti ₂ (SO ₄) ₃						
Toluene	C ₆ H ₅ CH ₃	2	3				
Tributylphosphate	(C ₄ H ₉) ₃ PO ₄	3					
Trichlorethylene	ClCH=CCl ₂	1					
Trichloroethane	CH ₃ CCl ₃	1					
Tricresylphosphate	(CH ₃ C ₆ H ₄ O) ₃ PO ₄	3					
Triethanolamine	N(CH ₂ CH ₂ OH) ₃	1					
Triethylamine	N(CH ₂ CH ₃) ₃	2					
Trioctylphosphate	(C ₈ H ₁₇) ₃ PO ₄	2					
Turpentine Oil		1					
U							
Urea 33%	NH ₂ CONH ₂	1	1	1			
Urea ≤10%	NH ₂ CONH ₂	1					
Urine, Not Diluted		1	1	1			
V							
Vinyl Acetate	CH ₂ =CHOOCCCH ₃	3					
Vinyl Chloride	CH ₂ =CHCl	1					
W							
Water	H ₂ O	1	1	1			
Water, Bromine, Saturated	Br ₂ +H ₂ O	1	1				
Water, Chlorine, Saturated	Cl ₂ +H ₂ O	2					
Water, Condensed	H ₂ O	1	1	1	1		
Water, Demineralizate	H ₂ O	1	1	1	1	1	
Water, Distilled	H ₂ O	1	1	1	1	1	
Water, Potable	H ₂ O	1	1	1	1	1	
Water, Rain	H ₂ O	1	1	1	1	1	
Water, Salt, Saturated	H ₂ O+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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X							
Xylene	C ₆ H ₄ (CH ₃) ₂	1	2	3			
Z							
Zinc Acetate, Not Diluted	Zn(CH ₃ COO) ₂	1	1	1	1	1	
Zinc Chloride, Saturated	ZnCl ₂	1	1	1	1	1	
Zinc Chloride, Diluted	ZnCl ₂	1					
Zinc Chromate, Not Diluted	ZnCrO ₄						
Zinc Cyanide, All	Zn(CN) ₂						
Zinc Nitrate, Not Diluted	Zn(NO ₃) ₂	1	1	1	1	1	
Zinc Sulfate, Saturated	ZnSO ₄	1	1	1	1	1	
Zinc Sulfate, Diluted	ZnSO ₄	1	1	1	1		

Chemical concentrations are listed at 100% unless otherwise noted.

1 - High Resistance

2 - Limited Resistance

3 - No Resistance

□ (blank) - Insufficient Data

NOTES

SALES AND CUSTOMER SERVICE

Canadian Customers call IPEX Inc.

Toll free: (866) 473-9462

www.ipexinc.com

U.S. Customers call IPEX USA LLC

Toll free: (800) 463-9572

www.ipexamerica.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

This literature is published in good faith and is believed to be reliable. However it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.



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