

McNICHOLS CO.

Chemical Resistance of P.V.C. Matting Products

Introduction

The excellent chemical resistance of polyvinyl chloride (P.V.C.) makes it particularly suitable for a wide range of applications.

Most of the data on the chemical resistance of P.V.C. has been obtained from short term immersion tests carried out in the laboratory. These tests involve qualitative assessment of the effect on a reagent of the surface of a specimen, and it is difficult to use these results to predict the performance of fabricated forms in service. Attack of the surface of specimens in laboratory tests is recorded because it will probably be observed in practice, e.g. as a change of surface appearance, but it does not necessarily mean the P.V.C. is unsuitable for use in contact with the reagent. Even when chemicals actually dissolve or degrade the P.V.C. or cause marked swelling, other factors such as concentration of the reagent and the conditions of service have their effect. Only by trials on the fabricated article under actual or simulated service conditions can the suitability of P.V.C. in a specific application be ascertained.

Resistance of plasticized P.V.C.

Plasticizers are incorporated in P.V.C. compounds so as to confer flexibility and softness. Plasticized compounds can cover a very wide range of flexibility and softness and will also differ in other respects e.g. tensile strength and resilience, according to the type and/or amount of plasticizer(s) used. For example, the type of plasticizer used will effect the chemical resistance, but in these notes it has been assumed that a commonly used, fairly resistant plasticizer Di-isononyl Phthalate (DINP) would be present. The amount of plasticizer incorporated will also effect the chemical resistance, an increase in plasticizer content leading to a deterioration in chemical resistance because the plasticizer is less resistant to attack than is the P.V.C.

Acid & Alkalis

Diluted acids and alkalis have little effect at room temperature, but at elevated temperatures some hydrolysis and extraction of plasticizer may occur. Concentrated acids and alkalis hydrolyze plasticizer slowly in the cold and more rapidly when heated.

Organic Liquids

The main effect of organic liquids on plasticized P.V.C. is to extract the plasticizer and this results in some hardening, particularly when the P.V.C. is removed from contact with the liquid. The compound may become rigid and less tough.

Most organic solvents will extract plasticizer and give rise to these effects, but with aromatic and chlorinated hydrocarbons, aliphatic and aromatic nitro compounds, ketones, aliphatic and cyclic ethers, this plasticizer extraction is accompanied by a softening of the P.V.C. and the overall effect is difficult to predict.

With certain solvents the plasticizer extracted is replaced by the solvents, so that the compound remains flexible provided it remains in contact with the liquid. If the solvent is allowed to evaporate, the material will stiffen and will not soften on re-immersion.

Summary

Information in this publication and otherwise supplied to users is based on our general experience and is given in good faith, but because of the many factors which are outside our knowledge and control that may affect the use of products, no warranty is given or is implied with respect to such information.

PVC MATTING CHEMICAL RESISTANCE CHART

The relative resistances are listed in the following groups:

Chemical Substances

Foodstuffs

Technical Goods & Drugs

Pharmaceuticals & Cosmetics

Legends

1 Resistant 2 Partially resistant 3 Limited resistant 4 Poorly resistant 5 Not resistant

Substance	Concentration (% by weight)	Resistance	
		20°C (68°F)	60°C (140°F)
Acetic acid	100	5	5
Acetic acid, aqueous	50	3	5
Acetic acid, aqueous (see also vinegar)	10	1	3
Acetic anhydride	100	5	5
Acetone (a)	100	5	5
Aluminum salts, aqueous	Any	1	1
Alums, aqueous	Any	1	1
Ammonia, gaseous	100	1	1
Ammonia, aqueous	Concentrated	1	4
Ammonia, aqueous	10	1	3
Ammonium acetate, aqueous	Saturated	1	1
Ammonium carbonate, aqueous	Saturated	1	
Ammonium chloride, aqueous	Saturated	1	1
Ammonium nitrate, aqueous	Saturated	1	1
Ammonium phosphate, aqueous	Saturated	1	
Ammonium sulphate, aqueous	Saturated	1	1
Amyl alcohol, pure		4	5
Aniline	100	5	5
Animony chloride		1	1
Arsenic acid	Concentrated	1	2
Barium salts, aqueous		1	1
Benzaldehyde	100	5	5
Benzaldehyde, aqueous .3%	Saturated	5	5
Benzene	100	5	5
Benzoic acid	100	1	
Benzoic acid aqueous	Saturated	1	
Bismuth carbonate		1	1
Boric acid	100	1	1
Boric acid, aqueous 4.9%	Saturated	1	1
Boric acid	Low	5	
Butane, liquid	100	5	5
Butyl acetate	100	5	5
n-Butyl alcohol	100	5	5
Butyric acid	20	1	
Calcium chloride, aqueous	Saturated	1	1
Calcium nitrate, aqueous	Saturated	1	1
Carbon bisulphate (b)	100	5	
Carbon dioxide		1	1
Carbon tetrachloride	100	5	5
Caustic potash solution	50	3	5
Caustic soda solution	10	1	2
Caustic soda solution	25	2	3
Caustic soda solution	50	5	5
Chlorine, gas, dry (d)	100	5	5
Chlorine, gas, humid (d)	10	5	5

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		20°C (68°F)	60°C (140°F)
Chlorine, liquid	100	5	
Chlorine water	Saturated	3	
Chlorobenzene	100	5	5
Chloroform	100	5	5
Chlorosulphonic acid	100	5	5
Chromium salts (bi-& trivalent), aqueous	Saturated	1	1
Citric acid, aqueous	Saturated	1	
Copper salts, aqueous	Saturated	1	1
Cresols	100	5	5
Cresols, aqueous	Saturated	4	5
Cupric chloride	Any	1	1
Cyclohexane	100	5	5
Cyclohexanol	100	5	5
Cyclohexanone	100	5	5
Decahydronaphthalene	100	5	5
Dimethylformamide	100	5	5
1,4-Dioxane	100	5	5
Disodium phosphate	Any	1	1
Ether	100	5	
Ethyl acetate	100	5	5
Ethyl alcohol, not denatured	100	5	5
Ethyl alcohol, aqueous, not denatured	96	3	5
Ethyl alcohol, aqueous, not denatured	50	3	3
Ethyl alcohol, aqueous, not denatured	10	1	3
Ethyl benzene	100	5	5
Ethyl chloride (c	100	5	
Ethylene chloride	100	5	5
Ethylene glycol	Any	1	
2-Ethyl hexanol	100	5	5
Ferric sulphate	Any	1	1
Formaldehyde, aqueous	40	3	
Formic acid	98	5	5
Formic acid	90	4	3
Formic acid	50	3	5
Formic acid	30	3	
Formic acid	10	1	3
Fructose	Any	1	1
Glycerine	100	2	
Glycerine, aqueous	High	1	3
Glycerine, aqueous	Low	1	1
Glycol	100	2	
Glycol, aqueous	High	1	3
Glycol, aqueous	Low	1	1
Heptane	100	5	5
Hexadecanol	100	1	1
Hydrochloric acid	Concentrated	2	3

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		20°C (68°F)	60°C (140°F)
Hydrochloric acid	10	1	2
Hydrogen chloride, gaseous	High	1	
Hydrogen peroxide, aqueous	10	1	3
Hydrogen peroxide, aqueous	3	1	2
Hydrogen sulphide (e)	Low	1	
Iron salts, aqueous	Saturated	1	1
Isooctane	100	5	5
Isopropyl alcohol	100	5	5
Lactic acid, aqueous	90	3	5
Lactic acid, aqueous	50	3	5
Lactic acid, aqueous	10	1	3
Lead acetate	Any	1	1
Magnesium salts, aqueous	Saturated	1	1
Mercuric salts, aqueous	Saturated	1	
Mercury	100	1	
Methyl alcohol	100	5	5
Methyl alcohol, aqueous	50	3	3
Methylene chloride (f)	100	5	
Methyl ethyl ketone	100	5	5
Naphthalene	100	5	5
Nickel salts, aqueous	Saturated	1	1
Nitric acid	50	4	5
Nitric acid	10	2	
Nitric acid	5	1	1
Nitrobenzene	100	5	5
Nitrobenzene	25	3	4
Nitrobenzene	10	2	3
Oleic acid	100	3	5
Oxalic acid, aqueous	Saturated	1	3
Ozone	Saturated	1	
Phenol, aqueous	Saturated	5	5
Phenol (phenolic)	Saturated	5	5
Phosphoric acid	Saturated	1	3
Phosphoric acid	50	1	1
Phosphoric acid	10	1	1
Phosphorous pentoxide	100	2	
Phthalic anhydride	Any	2	2
Potassium carbonate, aqueous	Saturated	1	
Potassium chlorate, aqueous	Saturated	1	3
Potassium chloride, aqueous	Saturated	1	1
Potassium dichromate, aqueous	Saturated	1	3
Potassium iodide, aqueous	Saturated	1	
Potassium nitrate, aqueous	Saturated	1	
Potassium	Saturated	2	
Potassium persulphate, aqueous	Saturated	1	3
Potassium sulphate, aqueous	Saturated	1	1

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		20°C (68°F)	60°C (140°F)
Propane, liquid	100	5	
Pyridine	100	5	5
Sodium bicarbonate, aqueous	Saturated	1	
Sodium bisulphate, aqueous	Saturated	1	
Sodium carbonate, aqueous	Saturated	2	3
Sodium chlorate, aqueous	25	1	
Sodium chloride, aqueous	Saturated	1	1
Sodium chlorite, aqueous	5	1	
Sodium hypochlorite, aqueous (Bleach) (h	5	1	
Sodium nitrate, aqueous	Saturated	1	
Sodium perborate, aqueous	Saturated	1	2
Sodium phosphates, aqueous	Saturated	1	
Sodium sulphate, aqueous	Saturated	1	
Sodium sulphide, aqueous	Saturated	1	
Sodium sulphite, aqueous	Saturated	1	
Sodium thiosulphate, aqueous	Saturated	1	
Stannous chloride	Saturated	1	
Succinic acid, aqueous	Saturated	1	
Sulphur	100	1	
Sulphur dioxide	Low	1	
Sulphuric acid	96	5	5
Sulphuric acid	50	2	
Sulphuric acid	25	1	3
Sulphuric acid	10	1	1
Stearic acid	100	1	3
Tartaric acid, aqueous	Saturated	1	
Tetrachloroethane	100	5	5
Trichlorethylene	100	5	5
Tetrahydrofuran	100	5	5
Tetrahydro naphthalene	100	5	5
Thiophen	100	5	5
Toluene	100	5	5
Trichlorethylene	100	5	5
Urea, aqueous	Saturated	1	3
Water	100	1	1
Xylene	100	5	5
Zinc salts, aqueous	Saturated	1	1
Foodstuffs			
Beef suet		3	5
Common salt, dry		1	
Lard		3	5
Lemonades	Any	1	
Lemon juice	Any	1	
Mayonnaise		2	
Milk	Any	1	
Pickled herring		1	

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Substance	Concentration (% by weight)	Resistance	
		20°C (68°F)	60°C (140°F)
Salad oil, animal	Any	3	5
Salad oil, vegetable	Any	3	5
Salted water	Any	1	1
Soda water	Any	1	
Soybean oil	Any	3	5
Starch solution, aqueous	Any	1	
Sugar, dry		1	
Sugar beet syrup	Any	1	1
Sugar solution, aqueous	Any	1	1
Tomato juice	Any	1	
Vinegar	Any	1	3
Vinegar essence	Any	3	5
Wine, mulled claret	Any	1	
Technical Goods & Drugs			
Alum	Saturated	1	
Antifreeze agent (auto) (j)		1	3
Aqua regia		5	5
Asphalt (j)		3	4
Bleaching solution (h)		1	
Bone oil		3	5
Borax, aqueous	Saturated	1	
Chloride of lime		3	
Chromic/sulphuric acid		5	5
Chromium plating		3	
Cresol solution		4	5
Detergents, synthetic (i)	High	1	3
Detergents, synthetic (i)	Ready for use	1	1
Dish-washing agents, liquid (j)		1	
Dixan solution	Ready for use	1	2
Fixing salt	100	1	1
Floor wax (j)		3	5
Formalin		3	
Fuel petrol (normal DIN 51 635)		5	5
Petrol, regular		5	5
Petrol, super		5	5
Diesel oil (J)		4	5
Fuel oil*		4	5
Furniture polish (j)		5	5
Ink (j)		5	5
Lanolin		3	5
Linseed oil		3	5
Lysol		4	5
Mineral oil (without aromatic hydrocarbons)	3	5	
Moth balls		5	
Motor oil, auto (j)		3	5
Oil No 3 (according to ASTM D 380-59)	100	3	5

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		20°C (68°F)	60°C (140°F)
Oleum	Any	5	5
Paraffin	100	3	5
Paraffin oil	100	3	5
Pectin	Saturated	1	
Petroleum	100	5	5
Petroleum ether	100	5	5
Pine needle oil	100	5	
Storage battery acid	100	1	3
Photographic developers	Ready for use	2	
Sagrotan	100	4	5
Sea water	100	1	1
Shoe polish	100	3	5
Tar (j)	100	3	4
Transformer oil (j)	100	3	
Turpentine oil	100	5	5
Two-stroke oil	100	3	5
Typewriter oil	100	3	
Water glass	100	1	
White spirit	100	5	5
Pharmaceuticals & Cosmetics			
Hair shampoo (j)	100	1	
Nail polish (j)	100	5	5
Nail polish remover (j)	100	5	5
Perfume (m)	100	5	5
Soap, cake soap	100	1	
Soap solution	100	1	
Toothpaste	100	1	1
Vaseline	100	3	5

Notes:

(a Boiling point 133.34°F

(b Boiling point 115.16°F

(c Boiling point 55.58°F

(d Boiling point 94.28°F

(e Discoloration with lead stabilizers

(f Boiling point 106.88°F

(h Mechanical properties of PVC unaffected, but color will be affected by prolonged exposure to bleaching solutions.

(k Chemical resistance depends on the composition.

(m Permeability of scents should be considered.

(i Without solvent, plasticizers and other additives.

June 2003

For more information on **McNICHOLS® Matting Solutions** and for substances that are not shown, please contact a Customer Service Specialist at 800.237.3820.

mcnichols.com