

Chemical Resistance Chart



The resistance of plasticised PVC, Nylon, Polyester Elastomer Lining, low density Polyethylene & Polyurethane to a wide range of chemicals is listed in the following table. The symbols used to denote performance are as follows:-

- ✓ Satisfactory
- Some attack or absorption: the material may be considered for use when alternative materials are unsatisfactory and where limited life is acceptable. When PVC is to be used with such chemicals fullscale trials under realistic conditions are particularly necessary.
- ✗ Unsatisfactory: so rated because of decomposition, solution, swelling, loss of ductility etc. of the samples tested.

In order to give guidance, the resistance of PVC to some chemicals has been predicted from its resistance to other chemicals which have a similar composition. Such predictions are shown using an asterisk (*) with the symbols listed above.

It may be safely assumed that chemical resistance decreases with both increasing temperature and with increasing concentration of reagent, and that the reverse is also true.

No valid assumptions can be made, however, if the temperature and concentration move in compensating directions. The rating 'some attack or absorption'

(symbol - ■) should not be assumed to apply at conditions different from those shown.

- Chemical resistance of polyurethane hoses and composite hoses sleeved with polyurethane. The polyurethane is not recommended for continuous use in contact with water above 40°C (or solutions containing water above 40°C) because of its hydrolysing effect. Hydrolysis can also occur with long exposure to:

- a) high humidity at elevated temperatures,
- b) acid and alkali solutions,
- c) aerated water,
- d) fungi and bacteria.

Some substances having a satisfactory rating may give swelling but this is usually minimal. The assumption should not be made that this indicates deterioration of the polyurethane.

Concentration	Plasticised PVC (PVC-P)		Nylon		Polyester Elastomer Lining		Polyethylene Low Density, LDP		Polyurethane	
	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
barium sulphide	✓	✓								
beer			✓	✓	✓	✓	✓	✓	✓	●
benzaldehyde	Traces	✗ ^o	✓	✗	✓	✓	✗	✗	✗ ^o	
	100%	✗ ^o								
benzene	✗	✗	✓	■	■	✗ ^o	✗	✗	✗	
benzoic acid		✗ ^o								
benzoyl chloride	✗ ^o	✗ ^o								
benzyl acetate		✗ ^o								
benzyl alcohol			■	✗			✗	✗		
bismuth carbonate	✓ ^o	✓ ^o								
bleach (see calcium hypochlorite)										
borax (sodium tetraborate)	✓ ^o		✓ ^o	✓ ^o	✓	✓ ^o	✓	✓	✓ ^o	●
boric acid	✓ ^o		✓ ^o		✓	✓ ^o	✓	✓	✓ ^o	●
boron trifluoride										
brine	✓ ^o	✓ ^o	✓	✓	✓ ^o	✓ ^o	✓	✓	✓	●
bromine	Traces, gas	✗ ^o								
	100% (dry gas)	✗ ^o	✗	✗			✗	✗		
	Liquid	✗ ^o	✗	✗	✗ ^o	✗ ^o	✗	✗		
butadiene										
butane			✓	✓	✓	✓ ^o	✓		✓ ^o	■
butanediol	✗ ^o	✗ ^o								
butyl acetate	✗	✗ ^o	✓	✓	■				✗	
butyl alcohol (butanol)			✓ ^o	✗	✓ ^o		✓	✓ ^o	■	
butyl chloride	✗ ^o	✗ ^o								
butyl phenol										
butyraldehyde	✗ ^o	✗ ^o								
butyric acid							✗			
	20% aq. solution	✓ ^o								
	Concentrated	✗ ^o	✗ ^o							
calcium arsenate			✓	✓						
calcium bisulphite	✓	✓								
calcium carbonate	✓ ^o	✓ ^o								
calcium chlorate	✓ ^o	✓ ^o								
calcium chloride	Aq. solution	✓	✓	✓	✓	✓ ^o	✓	✓	✓ ^o	●
	20% in methyl alcohol	✓	✗ ^o							
calcium hydroxide (lime solution)	Dilute	✓ ^o	✓ ^o			✓ ^o	✓	✓	✓ ^o	●
calcium hypochlorite (chloride of lime, bleach)	Dilute (5%)	✓		■ ^o		✓		✓	✓	●
calcium nitrate		✓ ^o	✓ ^o							
calcium phosphate		✓ ^o	✓ ^o							
calcium sulphate		✓ ^o	✓ ^o							
carbitol acetate										
carbolic acid (phenol(s))			✗	✗	✗	✗	✗	✗	✗	✗
carbon dioxide	✓ ^o	✓ ^o	✓	✓	✓	✓ ^o	✓	✓	✓	✓
carbon disulphide	✗	✗	✓	✗	■	✗ ^o	✗	✗	■	✗
carbon monoxide	✓ ^o	✓ ^o								
carbon tetrachloride	✗	✗	✗	✗	✗	✗ ^o	✗	✗	✗	✗
carbonic acid	✓	✓ ^o								
casein	✓	✓ ^o								
castor oil	✓				■	■ ^o	✗	✗	✓ ^o	✓ ^o
chloracetic acid		✗ ^o								
chloral hydrate	✗ ^o	✗ ^o								
chloric acid										
chlorine	10% (dry gas)		✗	✗	✗ ^o	✗ ^o				
	100% (dry gas)		✗	✗	(Dry & Wet)	(Dry & Wet)	✗	✗	✗	✗
	10% (moist gas)									
chlorine trifluoride	✗ ^o	✗ ^o								
chlorine water	2%		✗	✗			✓	✓	✗	✗
	Sat. solution	■	✗ ^o				✓	✗		
chlorobenzene	✗	✗								
chloroform	✗ ^o	✗ ^o	✗	✗	✗	✗	✗	✗	✗	✗
chlorosulphonic acid	✗ ^o	✗ ^o								
chrome alum (chrominium potassium sulphate)	✓	✓ ^o								
chromic acid									✗	✗
	Plating solution	✗	✗							
	10%		✗	✗			✓	✓		
cider	✓ ^o		✓	✓	✓ ^o	✓ ^o	✓	✓	✓	●
citric acid	✓		✓	■	✓	✓ ^o	✓	✓	✓ ^o	●
	Dilute								✓ ^o	●
coal gas			✓							
copper chloride	✓ ^o	✓ ^o								
copper cyanide	✓	✓								
copper fluoride	✓ ^o	✓ ^o								
copper nitrate	✓	✓ ^o								
copper sulphate	✓	✓ ^o							✓ ^o	●
creosote	✗	✗	✗ ^o	✗ ^o	✗ ^o	✗ ^o	✗	✗	✗	✗
creols (inc. cresylic acid)	✗	✗	✗ ^o	✗ ^o	✗ ^o	✗ ^o	✗	✗	✗	✗
crotonaldehyde	✗ ^o	✗ ^o								
crude oil					✓ ^o		✗	✗	✓ ^o	✓ ^o
	Petroleum oil		✓	✓						
cupric chloride	✓	✓								
cupric fluoride	✓ ^o	✓ ^o								
cupric nitrate	✓ ^o	✓ ^o								
cupric sulphate	✓	✓								
cyanide									✓ ^o	●
cyclohexane			✓	■	✓		✗	✗	✗ ^o	
cyclohexanol	✗ ^o	✗ ^o								
cyclohexanone	✗ ^o	✗ ^o	✓	✗			✗	✗	✗	
d.d.t. preparation			✓	✓						
decalin			✓	✓						
detergents, alkaline					✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	●
detergent, synthetic	✓ ^o				✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	●
developers, photographic	✓ ^o	✓ ^o								
dextrin (starch gum)	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	●
dextrose	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	✓ ^o	●
di acetone alcohol			✓	■						

Concentration	Plasticised PVC (PVC-P)		Nylon		Polyester Elastomer Lining		Polyethylene Low Density, LDP		Polyurethane	
	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
di ammonium phosphate			✓	■						
diamyl ether	✘ ^o	✘ ^o								
dialzo salts	✘ ^o	✘ ^o	✓							
dibutyl phthalate	✘ ^o	✘ ^o	✓		✓		■	✘	■ ^o	
dichlorodifluoromethane										
dichlorethylene	✘ ^o	✘ ^o								
dichlorobenzene	✘ ^o	✘ ^o								
di chloro ethane			■							
di chloro methane			■							
di ethanolamine	20%		✓	■						
diesel oil			✓	✓■	✘ ^o	✘ ^o	■	✘ ^o	✓	✓
diethylene glycol	✓ ^o				✓ ^o	✓ ^o				
diethyl ether (ether)	✘ ^o	✘	✓				✘	✘	■ ^o	
diethyl ketone	✘ ^o	✘ ^o								
di isocyanate			✓							
dimethylamine										
dimethylcarbinol (isopropyl alcohol)	✓									
di methyl formamide ^o			✓						✘ ^o	
di methyl sulphoxide			✘	✘						
di octyl phosphate			✓	✓						
dioctyl phthalate	✘ ^o	✘ ^o	✓	✓	✓		■	✘	■ ^o	
dioxane	✘	✘								
disodium phosphate emulsifiers	All concentrations	✓ ^o	✓ ^o				✓	✓ ^o		
emulsions, photographic		✓ ^o	✓ ^o							
ethane										
ethyl acetate	✘ ^o	✘ ^o	✓	✓	■		■	✘	✘	✘
ethyl acrylate	✘ ^o	✘ ^o								
ethyl alcohol (ethanol)	40%		✓■	✘	✓				■	✘
	100%						✓	✘		
ethyl butyrate	✘ ^o	✘ ^o								
ethyl chloride	✘	✘ ^o								
ethyl ether			✓				✘	✘	■ ^o	
ethyl formate	✘ ^o	✘ ^o								
ethyl lactate	✘ ^o	✘ ^o								
ethyl sulphate										
ethylene bromide	✘ ^o	✘ ^o								
ethylene chlorhydrin			✘	✘						
ethylene chloride	✘ ^o	✘ ^o	■				✘	✘		
ethylene dibromide	✘ ^o	✘ ^o								
ethylene dichloride (dichloro ethane)	✘ ^o	✘ ^o	■		✘	✘	✘	✘		
ethylene glycol (glycol)	✓		✓	■	✓		✓	✓	■ ^o	
ethylene oxide	✘ ^o	✘ ^o	✓	■	✓		✓			
ethylene oxide										
fatty acids			✓	✓						
ferric chloride	■	■	✓	✓	✓ ^o	✓ ^o	✓	✓	✓ ^o	●
ferric nitrate	✓ ^o	✓ ^o	✓							
ferric sulphate	✓ ^o	✓ ^o								
ferrous ammonium citrate	✓ ^o	✓ ^o								
ferrous chloride	■	■								
ferrous sulphate	✓ ^o	✓ ^o								
fixing solution, photographic	✓ ^o	✓ ^o								
flavours & essences			✓	✓	✓ ^o		✓ ^o		✓ ^o	●
fluorine	✘ ^o	✘ ^o	✘	✘			■	✘		
fluosilicic acid										
formaldehyde	40% w/w in water	✓	✓	✘	■		✓	✓	■	
formic acid	3% aq. solution				■		✓	✓	✘	✘ ^o
	10% aq. solution						✓	✓		
	25% aq. solution						✓	✓		
	50% aq. solution						✓	✓		
	100%	✘ ^o	✘ ^o	✘	✘		✓	✓		
french polish			✓ ^o	✓ ^o			✓		■ ^o	✘ ^o
freon 11 (refrigerant)			✓	■	✓ ^o				■ ^o	
freon 12 (refrigerant)			✓	■	✓ ^o				■ ^o	
freon 22 (refrigerant)			✓	■	✓ ^o				■ ^o	
freon 113 (refrigerant)			✓	■					✘ ^o	
	55°C				✓					
freon 114 (refrigerant)										
fructose	✓ ^o	✓ ^o								
fruit juice			✓		✓ ^o		✓	✓	✓ ^o	●
fruit pulp	✓	✓ ^o								
fuel oil			✓	✓■	✓ ^o	✓ ^o	■	✘	✓	■ ^o
furfural (furfuraldehyde)	✘ ^o	✘ ^o								
furfuryl alcohol			✓	■			✘	✘		
gallic acid	✓									
gas, coal or town - see coal gas										
gas, natural (mainly methane)- see natural gas										
gas oil			✓	■	✓ ^o		■	✘ ^o	✓ ^o	
gaz (liquified petroleum gas)										
glacial acetic acid	✘	✘								
glucose	✓	✓ ^o	✓	✓	✓ ^o	✓ ^o	✓	✓	✓ ^o	●
glycerine	✓ ^o		✓	■	✓	✓ ^o	✓	✓	✓	
glycerol	✓ ^o									
glycerol monobenzyl ether	✘ ^o	✘ ^o								
glycol - see ethylene glycol										
glycolic acid										
grape sugar	✓ ^o	✓ ^o	✓	✓	✓ ^o	✓ ^o	✓	✓	✓ ^o	●
greases, general			✓	✓	✓ ^o	✓ ^o	■	✘ ^o	✓ ^o	
greases, mineral			✓	✓	✓ ^o	✓ ^o	■	✘ ^o	✓ ^o	
ground nut oil			✓ ^o	✓ ^o	✓ ^o	✓ ^o	■	✘ ^o	✓ ^o	✓ ^o
heptane			✓				✘	✘	✓	
hexadecanol (cetyl alcohol)	✓ ^o	✓ ^o								
hexane			✓						✓	
hydrazine					✘	✘			✘ ^o	
hydrobromic acid	50% aq. solution	✓	✓							
	100%	✓ ^o	✓ ^o							

Concentration	Plasticised PVC (PVC-P)		Nylon		Polyester Elastomer Lining		Polyethylene Low Density, LDP		Polyurethane	
	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
hydrochloric acid	Dilute			✓					■	●
	1%		✓	✗						
	10% aq. solution	✓	✓	✓	✗		✓	✓		
	20%					■				
	22% aq. solution	✓	✓				✓	✓		
	37%					✗				
	Concentrated	✓	■	✗	✗		✓	✓	✗	✗
hydrocyanic acid										
hydrofluoric acid	Dilute								■	✗
	4% aq. solution	✓	✓				✓	✓		
	40% aq. solution	✓					✓	✓		
	48,75% and anhydrous					✗	✓	✓		
	60% aq. solution	✗	✗				✓	✓		
	Concentrated	✗	✗				✓	■		
hydro fluosilicic acid	20%			■						
	31%									
hydrogen		✓ ^o	✓ ^o	✓	✓	✓	✓ ^o	✓	✓	✓ ^o
hydrogen bromide	Anhydrous	✓ ^o								
hydrogen chloride	Anhydrous	✓ ^o								
hydrogen fluoride	Anhydrous	✓ ^o								
hydrogen peroxide	3% (10 vol.)	✓					✓	✓		
	6% w/w (20 vols)			✓	✗		✓	✓		
	10%								■ ^o	
	12% (40 vol.)	✓					✓	✓		
	30% (100 vol.)	✓					✓	✓		
	90% and above	✓					✓	✓		
	90% and above						(Up to 90%)			
hydrogen phosphide (phosphine)		✓ ^o	✓ ^o							
hydrogen sulphide		✓								
hydroquinone		✓								
hydroxylamine sulphate										
hypochlorous acid		■	✗ ^o							
industrial methylated spirits (I.M.S.)				✓ ^o	✗ ^o	✓ ^o		■	✗	■
iodine, tincture of										
solution in potassium		✗ ^o	✗ ^o				✗	✗	■	✗ ^o
iodide				✓ ^o			✗	✗	■	✗ ^o
iso cyanates		✗ ^o	✗ ^o							
isophorone				✓	✗	✓	✓		■	✗ ^o
iso propyl alcohol										
jet fuel				✓ ^o		✓		■	✗ ^o	■
kerosene (paraffin oil)				✓	✓	✓ ^o	✓ ^o	■	✗	
lactic acid (dodecanoic acid)	Up to 40°C			✓	✓	✓ ^o			✓	■
	10% aq. solution	✓		✓	✓	✓ ^o		✓	✓	●
	100%	✗ ^o	✗ ^o				✓	✓		
lanoline		✓								
lauric acid		✓								
lauryl chloride										
lead acetate		✓ ^o	✓ ^o				✓	✓	✓ ^o	●
lead arsenate		✓ ^o	✓ ^o							
lead nitrate		✓ ^o	✓ ^o							
lead tetraethyl (see tetraethyl lead)		✓ ^o								
lime solution										
(see calcium hydroxide)										
linoleic acid										
linseed cake				✓	✓					
linseed oil				✓ ^o	✓ ^o	✓ ^o		■	✗	✓
magnesium carbonate		✓	✓ ^o			✓ ^o				
magnesium chloride		✓	✓ ^o			✓ ^o	✓ ^o	✓	✓	✓ ^o
magnesium hydroxide	50%			✓	✓					
	Dilute									
magnesium nitrate		✓ ^o	✓ ^o			✓ ^o		✓	✓	✓ ^o
magnesium sulphate		✓ ^o	✓ ^o							
maleic acid	25% aq. solution									
	50% aq. solution									
	Concentrated		✗ ^o							
manganese sulphate		✓								
melamine acid - catalyst lacquers		✓ ^o	✓ ^o							
mercuric chloride		✗ ^o	✗ ^o							
mercuric cyanide		✓ ^o	✓ ^o							
mercurous nitrate		✓ ^o	✓ ^o							
mercury		✓ ^o	✓ ^o	✓	✓	✓	✓ ^o	✓	✓ ^o	✓ ^o
mesityl oxide		✗ ^o	✗ ^o							
metallic soaps (water soluble)		✓ ^o								
methane										
methyl acetate		✗	✗	✓	✓		✗	✗	✓ ^o	■
methyl alcohol (methanol)				✓	✗	✓			■	✗ ^o
	6%						✓	■ ^o		
	100%							■	✗	
methyl bromide		✗ ^o	✗ ^o	✓	✗					
methyl chloride (chloro methane)		✗ ^o	✗ ^o	✓	✗			✗	✗	
methyl cyclohexanone		✗ ^o	✗ ^o							
methyl ethyl ketone (M.E.K.)		✗ ^o	✗ ^o	✓	■	■		■	✗	✗
methyl isobutyl ketone (M.I.B.K.)		✗ ^o	✗ ^o	✓	■	■ ^o		✗	✗	✗ ^o
methyl methacrylate		✗ ^o	✗ ^o							
methyl sulphate		✗ ^o	✓	■						
methyl sulphonic acid										
methyl sulphuric acid	50% aq. solution									
	60% aq. solution									
	75% aq. solution									
	90% aq. solution									
methylated spirit				✓ ^o	✗ ^o	✓ ^o		■	✗	■
methylene chloride (dichloro methane)		✗	✗	■	✗	✗	✗	✗	✗ ^o	✗ ^o
milk		✓		✓	✓	✓ ^o		✓	✓	●
mineral oils		✓	✗							
mixed acids (sulphuric /nitric)			✗ ^o							
molasses	Various proportions	✓	✓ ^o							

Concentration	Plasticised PVC (PVC-P)		Nylon		Polyester Elastomer Lining		Polyethylene Low Density, LDP		Polyurethane	
	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
monochlorobenzene	✗	✗								
mustard			✓		✓		✓		✓	●
naphtha			✓	✓	✓		✓	✓	■	✗
naphthalen	✗	✗	✓	✓	■		✗	✗		
natural gas (mainly methane)			✓	✓					✓	
nickel chloride	✓	✓								
nickel nitrate	✓	✓								
nickel salts			✓				✓	✓	■	●
nickel sulphate	✓	✓								
nicotine										
nicotinic acid										
nitric acid									■	●
	Dilute									
	5% aq. solution	✓					✓	✓		
	10% aq. solution	✓			■		✓	✓		
	25% aq. solution	✓			✗		✓	✓		
					(30% to conc.)					
	50% aq. solution	✓	■				■	✗		
	70% aq. solution	■	✗				■	✗		
	95% aq. solution	✗	✗				✗	✗		
	All concentrations Concentrated			✗	✗					
nitrobenzene	✗	✗							✗	✗
nitrogen			✓		✓	✓	✓		✓	✓
nitropropane	✗	✗								
nitrous fumes	Moist	✗								
nitrous oxide gas										
oil, ASTM Oil No. 1					✓	✓			✓	✓
oil, ASTM Oil No. 3					(at 149_C)	✓			✓	✓
oil, ASTM Ref. Fuel A					(at 149_C)	✓			✓	✓
oil, ASTM Ref. Fuel B					(at 70_C)	✓			✓	✓
oil, ASTM Ref. Fuel C					(at 70_C)	✓	■		✓	✓
oil, animal					✓		■	✗	✓	✓
oil, crude - see crude oil										
oil, diesel - see diesel oil										
oil, etheral										
oil, fuel - see fuel oil										
oil, gas - see gas oil										
oil, hydraulic, petroleum base				✓					✓	(Mineral)
	synthetic base			✓		✓			✗	✗
				Skydrol 500	Pydraul 312C			(Pydraul) (Skydrol 500)	✓	✓
oil, mineral (including common lubricating oils)				✓	✓	✓	✗	✗	✓	✓
oil, paraffin - see kerosene										
oil, transformer - see transformer oil										
oil, of turpentine - see turpentine										
oil, vegetable			✓	✓	✓		■	✗	✓	✓
oleic acid	✓		✓	✓	✓		✗	✗	■	
oxalic acid	✓		✓	■			✓	✓		■
oxygen	10%	✓	✓	■			✓	✓	✓	
ozone	✓		■	✗			✗	✗	✓	
palmitic acid	✓									
paraffin	■									
penthane										
perchloric acid		✗								
perchloroethylene			■	✗	✗	✗	✗	✗	✗	✗
petrol										
petrol, aliphatic	2 star		✓	✓	✓		✗	✗	✓	
	3 star		✓	✓	✓		✗	✗	✓	
	4 star		✓	✓	✓		✗	✗	✓	
	5 star		✓	✓	✓		✗	✗	✓	
	High Octane		✓	✓	✓		✗	✗	✓	✓
petrol, aromatic (containing benzene)			✓	✓					✓	✓
petrol/benzene mixture	80:20 ratio	✗	✗	✓			✗	✗	■	✗
petroleum ether		✗	✗	✓			✗	✗	■	✗
phenol (s) (carbolic acid)			✗	✗	✗		✗	✗	✗	✗
phenylcarbinol (benyl alcohol)		✗	✗							
phenylhydrazine		✗	✗							
phenylhydrazine hydrochloride		✗	✗							
phosgene	Gas									
	Liquid									
phosphates		✓	✓							
phosphoric acid	Dilute								■	●
	20% aq. solution	✓	✓							
	25%									
	30% aq. solution	✓	✓				✓	✓		
	50% aq. solution			✓	✗		✓	✓		
	90%						✓	✓		
	95% aq. solution									
phosphoric anhydride		✓								
phosphorus										
phosphorus pentoxide		✓		■			✓	✓		
phosphorus trichloride		✗	✗							
photographic developers		✓	✓							
photographic emulsions		✓	✓							
photographic fixing solutions		✓	✓							
phthalic anhydride		✓	✓							
picric acid (trinitro phenol)	1% w/w in water	✓	✓	■	✗		✓			
	10% w/w in alcohol	✓								
polyester emulsions				✓		✓				
polystyrene emulsions				✓		✓				
polyglycol ethers		✗	✗							
potassium acid sulphate		✓	✓							

