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CHEMICAL RESISTANCE LIST

The resistance of plastic pipe materials to a wide range of chemical is listed in the tables of British Standard Code of practice 312: Part 1. The information provided is designated to be used as a guide and all information must be checked on a project basis. The provided data is based upon room temperature unless otherwise stated. Elevated temperatures will increase the effect of the chemicals upon elastomers. No guarantees can be given in respect of the information printed in this document.

Drain Pipes and Fittings
The expected behaviour for PVC-U to various chemicals, based upon laboratory tests is summarised below. Additional information based upon practical experiences for the fabricated articles has been given in some instances.

Acids
Whilst PVC-U is highly resistant to strong acids, some oxidising acids particularly in high concentrates can attack the material. The following is a brief guideline on the use of acids:

- Hydrochloric acid - Can be used at al concentrations at temperatures up to 60°C
- Sulphuric acid - At less than 90% concentration has no effect on temperatures up to 60°C, however concentrations of 90 – 95% should not be carried at temperatures in excess of 50°C
- Cold Nitric acid- Satisfactory at concentrates up to 50%, hot concentrated acid will attack PVC-U

Alkalis
Alkalis will not attack PVC-U at all concentrations at temperatures up to 60°C.

Halogens
Whilst dry chlorine gas will not attack PVC-U at room temperatures, there will be some attack at elevated temperatures if the gas is moist. Both Bromine and fluorine, even in low concentrations, will attack PVC-U at room temperatures.

Organic Liquids and Vapours
PVC-U is resistant to most alcohols, fats, oils and petrol.

Oxidising Agents
PVC-U is resistant to all but the most severe oxidising conditions.
Hydrogen peroxide at all concentrations has no effect, and even concentrated solutions, oxidising solution or of oxidising salts such as potassium permanganate causes only superficial attack.

Reducing Agents
Up to temperatures of 60°C these reagents have practically no effect on PVC-U.

Water and Dilute
There is evidence or failures of PVC-U pipes observed due to contact with water or aqueous solutions of the type, which conforms to the relevant British Standard.

General
PVC is not suitable for use with:

- Aromatic and Chlorinated Hydrocarbons
- Ketones
- Nitro Compounds
- Easters and Cyclic Ethers

All of these substances will penetrate the PVC and cause considerable swelling and softening of the product.

Petrol-based fuels containing benzene can cause swelling to PVC-U products.

Penetrating solvents may be harmful to PVC-U, even when dilute. However as they become more dilute their effects noticeably fall off. Very low concentrates such as those present in effluent, can be safely used with PVC-U.

It is not advisable to use PVC-U pipes for conveying gas. Careful consideration must be taken on detailed information concerning the constituents, especially any aromatic constituents of the gas.

Chemical Medium	Flexiflo
A	
Acetaldehyde	✔
Acetamide	✖
Acetic Acid, 30%	✔
Acetic Acid, Glacial	✖
Acetone	✖
Acetophenone	✖
Acetyl Chloride	✖
Acetylene	✔
Acrylonitrile	✖
Alcohols (Aliphatic)	✔
Alcohols (Aromatic)	✖
Acetaldehyde	✖
Aldehyes (Aliphatic)	✖
Aldehyes (Aromatic)	✖
Alkalines (up to 60°C)	✔
Aluminum Acetate (aqueous solution)	✖
Aluminum Chloride (aqueous solution)	✔
Aluminum Fluoride (aqueous solution)	✔
Aluminum Nitrate (aqueous solution)	✔
Aluminum Phosphate (aqueous solution)	✖
Aluminum Sulphate (aqueous solution)	✔
Ammonia Gas (cold)	✔
Ammonia Gas (hot)	✔

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Chemical Medium	Flexiflo
Ammonium Carbonate (aqueous solution)	✔
Ammonium Chloride (aqueous solution)	✔
Ammonium Hydroxide (concentrated)	✔
Ammonium Nitrate (aqueous solution)	✔
Ammonium Nitrite (aqueous solution)	✖
Ammonium Persulphate (aqueous solution)	✔
Ammonium Phosphate (aqueous solution)	✔
Ammonium Salts (up to 600°C)	✔
Ammonium Sulphate (aqueous solution)	✔
Amyl Acetate	✖
Amyl Alcohol	✖
Amyl Borate	✖
Amyl Chloronapthalene	✖
Amyl Napthalene	✖
Aniline	✖
Aniline Dyes	✖
Aniline Hydrochloride	✖
Animal Oils	✔
Ansul Ether (Anesthetics)	✖
Aqua Regia	✖
Arsenic Acid	✔
Arsenic Trichloride (aqueous solution)	✖
Asphalt	✖
Aqueous Solutions (Dilute)	✔
B	
Barium Chloride (aqueous solution)	✔
Barium Hydroxide (aqueous solution)	✔
Barium Sulphate (aqueous solution)	✔
Barium Sulphide (aqueous solution)	✔
Beer	✔
Beet Sugar Liquors	✔
Benzaldehyde	✖
Benzene	✖
Benzene Sulphonic Acid	✖
Benzonic Acid	✖
Benzoyl Chloride	✖
Benzyl Alcohol	✖
Benzyl Benzoate	✖
Benzyl Chloride	✖
Blast Furnace Gas	✖
Bleach Solutions	✔
Borax	✔
Bordeaux Mixture	✖
Boric Acid	✔
Brine	✔

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Chemical Medium	Flexiflo
Bromine Trifluoride	✖
Bromine Water	✖
Bromine (anhydrous)	✖
Bromobenzene	✔
Butadiene	✖
Butane	✔
Butter	✖
Butyl Acetate	✖
Butyl Acrylate	✖
Butyl Alcohol	✔
Butyl Amine	✖
Butyl Benzoate	✖
Butyl Oleate	✖
Butyl Stearate	✔
C	
Calcium Acetate (aqueous solution)	✖
Calcium Chloride (aqueous solution)	✔
Calcium Hydroxide (aqueous solution)	✔
Calcium Hypochlorite (aqueous solution)	✔
Calcium Nitrate (aqueous solution)	✔
Calcium Sulphide (aqueous solution)	✖
Cane Sugar Liquors	✖
Carbolic Acid	✖
Carbon Dioxide	✔
Carbon Disulphate	✖
Carbon Monoxide	✔
Carbon Tetrachloride	✖
Carbonic Acid	✔
Castor Oil	✔
Cellosolve	✖
Cellosolve Acetate	✖
Chloral Hydrate	✖
Chlorine (Dry)	✖
Chlorine (Wet)	✖
Chlorine Dioxide	✖
Chlorine Trifluoride	✖
Chloroacetic Acid	✔
Chloroacetone	✖
Chlorobenzene	✖
Chlorobromomethane	✖
Chloroform	✖
Chlorotoluene	✖
Chlorsulphonic Acid	✖
Chromic Acid	✖
Cider	✔

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Chemical Medium	Flexiflo
Citric Acid	✔
Coconut Oil	✖
Cod Liver Oil	✖
Coke Oven Gas	✖
Copper Acetate (aqueous solution)	✖
Copper Chloride (aqueous solution)	✔
Copper Cyanide (aqueous solution)	✔
Copper Sulphate (aqueous solution)	✔
Cottonseed Oil	✔
Creosote (Coal Tar)	✖
Cresols	✔
Cyclohexane	✔
Cyclohexanol	✖
Cyclohexanone	✖
D	
Decalin	✔
Decane	✖
Detergents (up to 600°C)	✔
Developers (up to 600°C)	✔
Diacetone	✖
Diacetone Alcohol	✖
Dibenzyl Ether	✖
Dibutyl Ether	✖
Dibutyl Phthalate	✖
Dibutyl Sebecate	✖
Dichlorobenzene	✖
Dicyclohexylamine	✖
Diesel Oil	✖
Diethyl Benzene	✖
Diethylamine	✖
Diethylene Glycol	✖
Diisobutylene	✖
Diisopropyl Benzene	✖
Diisopropyl Ketone	✖
Dim ethylamine	✔
Dimethyl Formamide	✔
Dimethyl Phthalate	✖
Dinitrotoluene	✖
Dioctyl Phthalate	✔
Dioxane	✖
Dioxolane	✖
E	
Emulsifiers	✔
Emulsion (Photographic)	✔
Epichlorohydrin	✖

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Chemical Medium	Flexiflo
Esters	✖
Ethane	✔
Ethanol	✔
Ether	✖
Ethyl Acetate	✖
Ethyl Acetoacetate	✖
Ethyl Acrylate	✖
Ethyl Alcohol	✔
Ethyl Benzoate	✖
Ethyl Cellosolve	✖
Ethyl Chlorocarbonate	✖
Ethyl Chloroformate	✖
Ethyl Chloride	✖
Ethyl Formate	✖
Ethyl-Methyl-Ketone	✖
Ethylene	✖
Ethylene Chlorohydrin	✖
Ethylene Glycol	✔
Ethylene Oxide	✖
F	
Fatty Acids (higher)	✔
Ferric Chloride (aqueous solution)	✔
Ferric Nitrate (aqueous solution)	✔
Ferric Sulfate (aqueous solution)	✔
Fish Oil	✖
Fixing Solution (Photographic)	✔
Fluorine (Liquid)	✖
Fluorobenzene	✖
Fluoroboric Acid	✔
Fluorolube	✖
Formaldehyde (RT)	✔
Formic Acid	✔
Fruit Pulp	✔
Fruit Juices	✔
Fructose	✔
Fuel Oil	✔
Fumaric Acid	✖
Furfural	✖
Furfural Alcohol	✖
G	
Gallic Acid	✔
Gelatin	✖
Gin	✔
Glucose	✔
Glycerin	✔

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Chemical Medium	Flexiflo
Glycerol	✔
Glycol	✔
H	
Halogenated Hydrocarbons	✖
Hexane	✖
Hexyl Alcohol	✔
Hydraulic Oils	✖
Hydrazine	✖
Hydrobromic Acid	✔
Hydrobromic Acid 40%	✖
Hydrocarbons (Aliphatic)	✔
Hydrocarbons (Aromatic)	✔
Hydrocarbon Liquids	✖
Hydrochloric Acid (Cold) 37%	✔
Hydrochloric Acid (Hot) 37%	✔
Hydrocyanic Acid	✔
Hydrocylamic Acid (10%)	✔
Hydrofluoric Acid (Aqueous)	✔
Hydrofluoric Acid (Conc.)	✖
Hydrofluoric Acid-Anhydrous	✖
Hydrogen Bromide	✔
Hydrogen Chloride	✔
Hydrogen Gas	✔
Hydrogen Peroxide (90%)	✔
Hydrogen Sulphide (Wet) Cold	✔
Hydrogen Sulphide (Wet) Hot	✔
Hydroquinone	✔
Hypochlorous Acid	✔
I	
Inks	✔
Iodine in KI Solution	✖
Iodine Pentafluoride	✖
Isobutyl Alcohol	✔
Isooctane	✖
Isophorone	✖
Isopropyl Acetate	✖
Isopropyl Alcohol	✔
Isopropyl Chloride	✖
Isopropyl Ether	✖
K	
Kerosene	✖
Ketones	✖
L	
Lactic Acid (Cold)	✔
Lactic Acid (Hot)	✖

Chemical Medium	Flexiflo
Lard	✖
Lavender Oil	✖
Lead Acetate (aqueous solution)	✔
Lead arsenate	✔
Lead Nitrate (aqueous solution)	✖
Lead Sulphamate (aqueous solution)	✖
Linoleic Acid	✖
Linseed Oil	✔
Lubricating Oils (Petroleum)	✖
Lubrication Oil (Petroleum)	✔
M	
Magnesium Chloride (aqueous solution)	✔
Magnesium Hydroxide (aqueous solution)	✔
Magnesium Nitrate	✔
Magnesium Sulphate (aqueous solution)	✔
Malic Acid	✔
Margarine	✔
Mercury	✔
Mercury Chloride (aqueous solution)	✖
Metallic Soaps (Water Soluble)	✔
Metal Salts and Solutions	✔
Methane	✖
Methyl Acetate	✖
Methyl Acrylate	✖
Methyl Alcohol	✔
Methylene Bromide	✔
Methylene Chloride	✔
Methyl-Ethyl Ketone	✖
Methylated Spirits	✔
Milk	✔
Mineral Oil	✔
Molasses	✔
Monochlorobenzene	✖
N	
Naphtha	✔
Naphthalene	✖
Naphthalenic Acid	✖
Natural Gas	✔
Nickel Acetate (aqueous solution)	✖
Nickel Chloride (aqueous solution)	✔
Nickel Sulphate (aqueous solution)	✔
Nicotine	✔
Nitric Acid (Conc.)	✖
Nitric Acid (Cold conc. up to 50%)	✔
Nitric Acid- Fuming	✖

Chemical Medium	Flexiflo
Nitric Acid (Hot)	✖
Nitrobenzene	✖
Nitroethane	✖
Nitrogen	✔
Nitromethane	✖
O	
Octadecane	✖
Oils and fats	✔
Oleic Acid	✔
Olive Oil	✖
Oxalic Acid	✔
Oxidising Acids	✖
Oxygen-Cold	✔
Ozone	✔
P	
Paraffin	✔
Peanut Oil	✖
Perch loric Acid	✔
Petrol	✔
Petroleum-Above 120°C	✖
Petroleum-Below 120°C	✖
Petroleum Ether	✖
Phenol	✔
Phenylbenzene	✖
Phenyl Hydrazine	✖
Phosphoric Acid (Conc.)	✔
Phosphoric Acid-45%	✔
Phosphorus Trichloride	✖
Potassium Acetate (aqueous solution)	✖
Potassium Chloride (aqueous solution)	✔
Potassium Cupro Cyanide (aqueous solution)	✖
Potassium Cyanide (aqueous solution)	✔
Potassium Dichromate (aqueous solution)	✔
Potassium Hydroxide (aqueous solution)	✔
Potassium Nitrate (aqueous solution)	✔
Potassium Sulphate (aqueous solution)	✔
Propane	✔
Propyl Alcohol	✔
Propyl Nitrate	✖
Propylene	✖
Propylene Oxide	✔
Pyridine	✖
R	
Radiation	✖

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Chemical Medium	Flexiflo
Rapeseed Oil	✖
S	
Salicylic Acid	✖
Salt Water	✔
Silicate Esters	✖
Silicone Greases	✖
Silicone Oils	✖
Silver Nitrate	✔
Soap Solutions	✔
Sodium Acetate (aqueous solution)	✔
Sodium Bicarbonate (aqueous solution)	✔
Sodium Bisulphite (aqueous solution)	✔
Sodium Borate (aqueous solution)	✖
Sodium Carbonate (aqueous solution)	✔
Sodium Chloride (aqueous solution)	✔
Sodium Cyanide (aqueous solution)	✔
Sodium Hydroxide (aqueous solution)	✔
Sodium Hypochlorite (aqueous solution)	✔
Sodium Metaphosphate (aqueous solution)	✖
Sodium Nitrate (aqueous solution)	✔
Sodium Peroxide (aqueous solution)	✖
Sodium Phosphate (aqueous solution)	✖
Sodium Silicate (aqueous solution)	✖
Sodium Sulphate (aqueous solution)	✔
Soybean Oil	✖
Stannic Chloride (aqueous solution)	✔
Stannous Chloride (aqueous solution)	✔
Stearic Acid	✔
Styrene	✖
Sucrose Solution	✖
Sugars	✔
Sulphur	✔
Sulphur Dioxide (Dry)	✔
Sulphur Dioxide (Wet)	✖
Sulphur Hexafluoride	✖
Sulphur Trioxide	✔
Sulphuric Acid (up to 80%)	✔
Sulphuric Acid (Conc.)	✖
Sulphuric Acid (Dilute)	✔
Sulphurous Acid	✔
Surface Active Agents (normal solutions of.)	✔
T	
Tannic Acid	✔
Tanning Extracts	✔

Chemical Medium	Flexiflo
Tar, Bituminous	✖
Tartaric Acid	✔
Tetrahydrofuram	✖
Titanium Tetrachloride	✖
Toluene	✖
Toluene Diisocyanate	✖
Transformer Oil	✔
Trichlorobenzene	✖
Trichloroethane	✖
Triethanolamine	✔
Trinitrotoluene	✖
Turpentine	✔
U	
Urine	✔
V	
Vegetable Oils	✖
Vinegar	✔
Vinyl Chloride	✖
W	
Water	✔
Whiskey, Wines	✔
Whey	✔
Wines and Spirits	✔
Wood Oil	✖
X	
Xylene	✖
Z	
Zinc Acetate (aqueous solution)	✖
Zinc Chloride (aqueous solution)	✔
Zinc Sulphate (aqueous solution)	✔