Saunders

EC Chemical Resistance

HC4 Diaphragm Valves

HC4/122/01/06.04

The EC actuator is manufactured by injection molding in Polyethersulphone (PES).
The chemical resistance of PES has been investigated and a summary of the resistance of PES to various chemicals is given below, and further results are outlined in the table overleaf. The results are derived from tests in which unstressed specimens were completely immersed in a wide range of chemical environments at room temperature.

However, in common with most thermoplastics, the resistance of PES to chemicals is also dependent on stress levels and on temperature. These conditions, particularly those of stress and strain, are difficult to reproduce in the laboratory. The table, therefore, should be used as a guide, and the user should satisfy themself beforehand of the suitablity of PES for the in-service environment.

A summary of the resistances of PES to various chemicals is given below:

• Water

PES is not attacked chemically by water.

• Inorganic chemicals

PES is unaffected by most inorganic reagents. It has good resistance to aqueous acids, bases and most inorganic solutions. PES is attacked by concentrated oxidizing mineral acids e.g. Nitric & Sulphonic acids at room temperature but is not affected by more dilute acids. Resistance to alkalis is good.

• Sterilizing solutions and anaesthetics

Most of the common sterilizing solutions and anaesthetics can be used safely in contact with PES at their recommended concentrations.

The excellent resistance of PES to hot water means that it can be repeatedly steam sterilized. PES can also be sterilized by radiation as it offers high resistance to beta, gamma and x-rays.

• Halogenated cleaning solvents

Many cleaning and degreasing solvents are based on chlorinated and fluorinated hydrocarbons. Unless heavily stressed, PES can be cleaned by most of these solvents.

Solvents not recommended are methylene chloride, 1,1,2-trichloroethane or chloroform. (Some proprietary cleaning solvents consist of 1,1,2-trichloroethane diluted with other solvents – these are suitable for PES.)

• Aromatic solvents

Components made from PES can be used for short-term exposure to solvents such as benzene, xylene and toluene, provided they are not heavily stressed. Polar aromatic solvents such as N-methyl pyrrolidone are often solvents for PES.

Overall, avoid contact with these types of solvent.

• Oils and greases

Tests show that PES is suitable for prolonged contact with most oils and greases at high temperature. The only known exceptions are di-ester and phosphate-ester based oils.

• Petrol

At room temperature, PES can be used in contact with petrol.

Solubility properties of PES:

PES is a polar polymer and therefore tends to dissolve in polar solvents, for example:

- Dimethyl sulphoxide
- N, N-Dimethylformamide
- N-Methylpyrrolidone
- Pyridine
- Quinoline
- Aniline
- 0-Chlorophenol

CRANE

The Resistance Of PES To Chemical Attack:

A = No attack. Little or no absorption at 68°F (20 ºC).

B = Slight attack. Some absorption causes swelling at 68°F (20 ºC). Satisfactory use of PES will depend on the application.

C = Bad attack. PES should not be used for any application where these environmental conditions are present.

The use of a small letter indicates that PES has not been tested specifically with that chemical but that the result can be predicted from tests with similar chemicals.

Chemical	Result	Chemical	Result	Chemical	Result
Acetaldehyde	C	Dichlorobenzene	C	Nitrobenzene	C
Acetic Acid – glacial	A	Diesel oil	A	Oils – vegetable	A
Acetic Acid – 10%	A	Diethylamine	A	Oleic acid	a
Acetone	C	Diethyl ether	A	Oleum	C
Aluminium salts	a	Dimethyl formamide	C	Oxalic acid	A
Ammonia 880	A	Dioctyl phthalate	A	Perchloroethylene	C
Ammonium hydroxide – 10%	A	Dioxane	b	Petrol	A
Ammonium chloride – 10%	A	Edible fats and oils	A	Petroleum ether	A
Amyl acetate	B	Ethyl acetate	C	Phenol	C
Aniline	C	Ethyl alcohol	A	Potassium Hydrox. – 10%	A
'Arcton' prolpellants	a	Ethylene glycol	A	Potassium Hydrox. – 50%	A
Aviation hydraulic fuels	B	Ferric chloride	A	Propane	a
Aviation spirit	A	Formaldehyde	A	Pyridine	C
Barium salts	a	Formic acid	A	Silicone Fluids	A
Benzaldehyde	C	Glycerol	A	Silver nitrate	A
Benzene	A	Heptane	A	Soap Solution	A
Benzoic acid	A	Hexane	A	Sodium Chloride	A
Benzene sulphonic acid	a	Hydrochloric acid – 10%	A	Sodium Hydroxide – 10%	A
Bleach	A	Hydrochloric acid – conc	A	Sodium Hydroxide – 50%	A
Boric Acid	a	Hydrogen peroxide	A	Sodium hypochlorite	a
Brake Fluid	B	Hydrogen sulphide	a	Sulphuric acid – 10%	A
Brine	A	Iodine in Potass. Iodide	B	Sulphuric acid – conc	C
Butane	A	Isopropanol	A	Sulphurous acid	c
Butanol	A	Iso-octane	A	Tar	a
Butyl acetate	b	Kerosene	A	Tartaric acid	a
Calcium nitrate	A	Lactic acid	a	Tetrahydrofuran	C
Calcium hypochlorite	A	Lead acetate	a	Toluene	C
Carbon disulpide	b	Linseed oil	A	Transformer oil	A
Carbon tetrachloride	A	Magnesium sulphate	A	Trichloroethylene	B
Chlorobenzene	C	Mercuric chloride	a	Turpentine	A
Chloroform	C	Mercurous chloride	a	Vaseline	a
Chlorosulphonic acid	c	Mercury	a	Varnish	A
Chromic acid	A	Methanol	A	Water	A
Citric acid	A	Methyl ethyl ketone	C	Wax	a
Copper sulphate	A	Methylene chloride	C	White Spirit	A
Creosote	A	Milk	A	Wines & spirits	a
Cresols	C	Motor oil	A	Xylene	B
Cyclohexane	A	Nickel salts	a	Zinc Salts	a
Dichloroethane	C	Nitric acid – 10%	A		
Dichloroethylene	B	Nitric acid – conc.	C		

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