Rubber Chemical Resistance Chart

This guide outlines the level of suitability of FEP, EPDM, Nitrile and Flexible PVC to resisting property changes as a result of exposure or contact with the specified chemicals.

The above materials are common components of pipe connection products and thus this guide serves as a reference to the performance levels of each material to inform decision making on specific applications.

Fernco offers a dedicated range of chemical couplings specifically designed for resisting the widest range of chemical compounds. Fernco chemical couplings consist of a EPDM standard coupling lined with an FEP liner and PTFE tape.

Materials

EPDM Rubber (Ethylene Propylene Diene Monomer)

Due to its unique combination of physical properties, EPDM can be used in an unusually broad range of products. Aside from applications requiring resistance to oil and hydrocarbon solvents, there is scarcely an application in which EPDM is totally unsuitable. Because of its excellent resistance to ozone, sunlight and severe weather conditions, EPDM is ideal for outdoor service.

EPDM generic temperature range is -50ºC/+150ºC. with continuous operation at 80ºC; intermittent at 100ºC.

EPDM has poor resistance to oil, gasoline and hydrocarbon solvents.

NBR Rubber (Nitrile or Acrylonitrile Butadiene)

The physical properties of NBR meet the requirements of EN 681:1. NBR is used in specific applications for effluent contaminated NBR with hydrocarbons, oils, fats and greases. It should be noted that the nitrile compound is classed as medium grade and is therefore only suitable for drainage applications.

Nitrile or Acrylonitrile Butadiene (NBR) can be offered as an alternative material for instances when drainage effluent is contaminated by hydrocarbons.

Nitrile has a working temperature range of -20ºC/+120ºC.

FEP Liner

FEP has low co-efficient of friction, anti-stick properties and weatherability. The property differences between PTFE and FEP lie mainly in their upper service temperature limitations. FEP is more transparent and has a higher modulus of elasticity at low temperatures than PTFE.

As all fluoropolymers, it can be steam cleaned or chemically sterilized according to any industrial method. FEP is very transparent and together with its weatherability.

FEP meets FDA requirements for repeated contact with food. Non-stick properties allow transport of viscous, sticky materials without line clogging.

Testing & Liability

The chemical compatibility in this chart are based on results from laboratory testing and reflect the relative capabilities of various formulations to withstand specific chemicals.

The ratings do not reflect the extent to which extraction may occur or the extent to which fluids may undergo any physical change as a result of coming into contact with the product. Fernco Ltd make no representation or warranty with respect to the suitability of any fluid to become contaminated or undergo changes in properties or composition as a result of possible extraction of product ingredients by the fluid to be transmitted.

All ratings are based on room temperature (22°C / 73°F) and chemical resistance will be affected by elevated temperatures.

It is the user's responsibility to ensure the suitability and safety of products for all intended uses including establishing the compatibility of any fluids with the product through which it is transmitted.

Chemical compatibility table

Guide to Suitability

A Excellent suitability
Elastomer shows no effect from exposure.

B Good suitability
Minimum effects from exposure with possibly some loss of physical properties.

C Limited suitability
Significant chemical swelling and loss of physical properties after exposure. Additional testing should be carried out.

U Unknown Insufficient information
Insufficient data, seek professional advice

X Unsuitable
The elastomer is unsuitable for this application.

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Acetaldehyde	A	A	X	B
Acetamide	A	A	A	X
Acetic Acid	A	A	C	X
Acetic Anhydride	U	U	U	U
Acetone	A	A	X	X
Acetophenone	A	A	X	U
Acetylene	A	A	A	B
Acrylonitrile	A	X	X	U

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Adipic Acid	U	U	U	U
Aluminium Acetate	A	A	B	U
Aluminium Chloride	A	A	A	A
Aluminium Fluoride	A	A	A	A
Aluminum Hydroxide	U	U	U	U
Aluminium Nitrate	A	A	A	A
Aluminium Phosphate	A	A	A	U
Aluminium Sulphate	A	A	A	A
Ammonia Gas	A	A	A	A
Ammonium Acetate	U	U	U	U
Ammonium Carbonate	A	A	X	A
Ammonium Chloride	A	A	A	A
Ammonium Fluoride	U	U	U	U
Ammonium Hydroxide	A	A	X	A
Ammonium Nitrate	A	A	A	A
Ammonium Oxalate	U	U	U	U
Ammonium Persulphate	A	A	X	A
Ammonium Phosphate	A	A	A	A
Ammonium Sulphate	A	A	A	A
Amyl Acetate	A	C	X	X
Amyl Alcohol	A	A	B	X
Amyl Borate	A	X	A	U
Amyl Chloride	U	U	U	U
Amyl Chloronapthalene	A	X	X	U
Amyl Napthalene	A	X	X	U
Aniline	A	A	X	X
Aniline Hydrochloride	A	B	B	X
Animal Fats	A	B	A	X
Ansul Ether	A	C	C	U
Aqua Regia	A	C	X	X
Arsenic Acid	A	A	A	A
Arsenic Trichloride	A	C	A	U
Asphalt	A	X	B	U
Barium Chloride	A	A	A	A
Barium Hydroxide	A	A	A	A
Barium Sulphate	A	A	A	A
Barium Sulphide	A	A	A	A
Beer	A	A	A	A
Beet Sugar Liquors	A	A	A	A
Benzaldehyde	A	A	X	X
Benzene	A	X	X	X
Benzene Sulphonic Acid	A	C	X	U
Benzoic Acid	A	C	C	A

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Benzyl Alcohol	A	A	X	U
Benzyl Benzoate	A	B	X	U
Benzyl Chloride	A	X	X	U
Bleach Solutions	A	A	X	B
Borax	A	A	B	A
Boric Acid	A	A	A	A
Brine	A	A	A	U
Bromine Trifluoride	A	X	X	U
Bromine Water	A	B	X	X
Bromobenzene	A	X	X	C
Butadiene	A	C	X	X
Butane	A	X	A	X
Butter	A	A	A	X
Butyl Acetate	A	C	X	X
Butyl Acrylate	A	X	X	U
Butyl Alcohol	A	B	A	B
Butyl Amine	A	B	C	U
Butyl Benzoate	A	B	X	U
Butyl Oleate	A	B	X	X
Butyl Stearate	A	C	B	C
Calcium Acetate	A	A	B	U
Calcium Bisulfite	U	U	U	U
Calcium Chloride	A	A	A	A
Calcium Hydroxide	A	A	A	A
Calcium Hypochlorite	A	A	B	B
Calcium Nitrate	A	A	A	A
Calcium Sulphide	A	A	A	U
Cane Sugar Liquors	A	A	A	U
Carbolic Acid	A	B	X	U
Carbon Dioxide	A	B	A	A
Carbon Disulfide	U	U	U	U
Carbon Monoxide	A	A	A	A
Carbon Tetrachloride	A	X	C	X
Carbonic Acid	A	A	B	A
Castor Oil	A	B	A	U
Cellosolve	A	B	X	U
Cellosolve Acetate	A	B	X	U
Chloral Hydrate	U	U	U	U
Chlorine (Wet)	A	C	X	X
Chlorine Dioxide	A	C	X	U
Chlorine Trifluoride	A	X	X	U
Chloroacetic Acid	A	A	X	C
Chloroacetone	A	A	X	U
Chlorobenzene	A	X	X	X
Chloroform	A	X	X	X

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Chlorotoluene	A	X	X	U
Chromic Acid	A	C	X	X
Citric Acid	A	A	A	A
Coconut Oil	A	C	A	X
Cod Liver Oil	A	A	A	X
Copper Acetate	A	A	B	U
Copper Chloride	A	A	A	A
Copper Cyanide	A	A	A	A
Copper Sulphate	A	A	A	A
Cottonseed Oil	A	B	A	C
Creosote (Coal Tar)	A	X	A	U
Cyclohexane	A	X	A	B
Cyclohexanol	A	C	C	X
Cyclohexanone	A	B	X	X
Decalin	A	X	X	A
Decane	A	X	A	U
Detergent Solutions	A	A	A	A
Dextrin	U	U	U	U
Dextrose	U	U	U	U
Diacetone	A	A	X	U
Diacetone Alcohol	A	A	X	U
Dibenzyl Ether	A	B	X	U
Dibutyl Phthalate	A	B	X	X
Dibutyl Sebacate	A	B	X	X
Dichloroethane	U	U	U	U
Dicyclohexylamine	A	X	C	U
Diesel Oil	A	X	A	X
Diethyl Benzene	A	X	X	X
Diethyl Ether	U	U	U	U
Diethylamine	A	B	B	X
Diethylene Glycol	A	A	A	U
Diisobutylene	A	X	B	U
Diisopropyl Benzene	A	X	X	U
Diisopropyl Ketone	A	A	X	U
Dimethyl Aniline	U	U	U	U
Dimethyl Formamide	A	B	B	C
Dimethyl Phthalate	A	B	X	X
Dinitrotoluene	A	X	X	U
Dioxane	A	B	X	U
Dioxolane	A	B	X	U
Epichlorohydrin	A	B	X	U
Ethane	A	X	A	U
Ethanol	U	U	U	U
Ether	U	U	U	U
Ethyl Acetate	A	B	X	X

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Ethyl Acetoacetate	A	B	X	X
Ethyl Acrylate	A	B	X	X
Ethyl Alcohol	A	A	A	C
Ethyl Benzoate	A	A	X	X
Ethyl Cellosolve	A	X	X	U
Ethyl Chlorocarbonate	A	B	X	U
Ethyl Chloroformate	A	B	X	U
Ethyl Formate	A	B	X	U
Ethylene	A	B	A	U
Ethylene Chloride	U	U	U	U
Ethylene Chlorohydrin	A	B	X	X
Ethylene Dichloride	U	U	U	U
Ethylene Glycol	A	A	A	A
Ethylene Oxide	A	C	X	X
Fatty Acids	A	C	B	X
Ferric Chloride	A	A	A	A
Ferric Nitrate	A	A	A	A
Ferric Sulphate	A	A	A	A
Fish Oil	A	X	A	X
Fluorine (Liquid)	A	X	X	X
Fluorobenzene	A	X	X	U
Fluoroboric Acid	A	A	A	A
Fluorolube	A	A	A	U
Formaldehyde	A	A	C	C
Formic Acid	A	A	B	B
Fuel Oil	A	X	A	X
Gallic Acid	A	B	B	B
Gelatine	A	A	A	U
Glucose	A	A	A	A
Glue, (P.V.A.)	U	U	U	U
Glycerine	A	A	A	A
Glycol	A	A	A	A
Hexane	A	X	A	X
Hexyl Alcohol	A	C	C	C
Hydraulic Oils	A	X	A	X
Hydrazine	A	A	B	U
Hydrobromic Acid	A	A	X	B
Hydrochloric Acid	A	A	C	A
Hydrocyanic Acid	A	A	B	A
Hydrofluoric Acid	A	X	X	X
Hydrofluoric Acid-Anhydrous	A	C	X	X
Hydrogen Gas	A	A	A	A
Hydrogen Peroxide	A	B	X	A
Hydrogen Phosphide	A	X	X	X
Hydrogen Sulphide	A	A	X	A

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Hydroquinone	A	B	C	A
Iodine Pentafluoride	A	X	X	U
Isobutyl Alcohol	A	A	B	B
Isooctane	A	X	A	X
Isophorone	A	C	X	U
Isopropyl Acetate	A	B	X	X
Isopropyl Alcohol	A	A	B	C
Isopropyl Chloride	A	X	X	U
Isopropyl Ether	A	X	B	U
Jet Fuel	U	U	U	U
Kerosene	A	X	A	X
Ketones	U	U	U	U
Lactic Acid	A	X	X	U
Lard	A	B	A	X
Lavender Oil	A	X	B	U
Lead Acetate	A	A	B	A
Lead Nitrate	A	A	A	U
Lead Sulphurate	A	A	B	U
Linseed Oil	A	C	A	X
Lubricating Oils	A	X	A	X
Magnesium Chloride	A	A	A	A
Magnesium Hydroxide	A	A	B	A
Magnesium Nitrate	U	U	U	U
Magnesium Sulphate	A	A	A	A
Malic Acid	A	B	A	A
Mercury	A	A	A	A
Mercury Chloride	A	A	A	X
Methane	A	X	A	U
Methyl Acetate	A	A	X	U
Methyl Acrylate	A	B	X	U
Methyl Alcohol	A	A	A	A
Methylene Chloride	U	U	U	U
Mineral Oil	A	C	A	X
Mono chlorobenzene	A	X	X	U
Naphtha	A	X	B	C
Naphthalene	A	X	X	X
Naphthenic Acid	A	X	B	U
Natural Gas	A	X	A	A
Nickel Acetate	A	A	B	U
Nickel Chloride	A	A	A	A
Nickel Sulphate	A	A	A	A
Nitric Acid	A	X	X	X
Nitrobenzene	A	A	X	X
Nitroethane	A	B	X	U
Nitrogen	A	A	A	A

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Nitromethane	A	B	X	U
Oleic Acid	A	X	C	C
Olive Oil	A	B	A	X
Oxalic Acid	A	A	B	A
Oxygen-Cold	A	A	B	A
Ozone	A	A	X	C
Paraffin	U	U	U	U
Peanut Oil	A	C	A	X
Perchloric Acid	U	U	U	U
Perchloroethylene	U	U	U	U
Petroleum	A	X	X	X
Phenyl	U	U	U	U
Phenylbenzene	A	X	X	U
Phenyl Hydrazine	A	B	X	X
Phosphine	A	U	U	U
Phosphoric Acid	A	A	X	A
Phosphorus Trichloride	A	A	X	X
Potassium Acetate	A	A	B	U
Potassium Chloride	A	A	A	A
Potassium Cyanide	A	A	A	A
Potassium Dichromate	A	A	A	A
Potassium Hydroxide	A	A	B	A
Potassium Nitrate	A	A	A	A
Potassium Sulphate	A	A	A	A
Propane	A	X	A	A
Propyl Alcohol	A	A	A	C
Propyl Nitrate	A	B	X	U
Propylene	A	X	X	U
Propylene Oxide	A	B	X	C
Pyridine	A	B	X	U
Radiation	A	B	C	U
Rapeseed Oil	A	A	B	X
Rosins B-Good	U	U	U	U
Salicylic Acid	A	A	B	U
Salt Water	A	A	A	A
Silicate Esters	A	X	B	U
Silicone Greases	A	A	A	U
Silicone Oils	A	A	A	U
Silver Nitrate	A	A	B	A
Soap Solutions	A	A	A	A
Sodium Acetate	A	A	B	A
Sodium Bicarbonate	A	A	A	A
Sodium Bisulfite	A	A	A	A
Sodium Borate	A	A	A	U
Sodium Carbonate	A	A	A	A

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Sodium Chloride	A	A	A	A
Sodium Cyanide	A	A	A	A
Sodium Hydroxide	A	A	B	B
Sodium Hypochlorite	A	B	B	A
Sodium Metaphosphate	A	A	A	U
Sodium Nitrate	A	A	B	A
Sodium Peroxide	A	A	B	U
Sodium Phosphate	A	A	A	U
Sodium Silicate	A	A	A	U
Sodium Sulphate	A	A	A	A
Soybean Oil	A	C	A	X
Stannic Chloride	A	A	A	A
Stannous Chloride	A	A	A	A
Stearic Acid	A	B	B	B
Styrene	A	X	X	U
Sucrose Solution	A	A	A	U
Sulphur	A	A	X	A
Sulphur Dioxide	A	A	X	X
Sulphur Hexafluoride	A	A	B	U
Sulphur Trioxide	A	B	X	A
Sulphuric Acid	A	X	X	X
Sulphurous Acid	A	B	B	A
Tannic Acid	A	A	A	A
Tar, Bituminous	A	C	B	X
Tartaric Acid	A	B	A	A
Tetrachloroethylene	U	U	U	U
Tetrahydrofuran	U	U	U	U
Titanium Tetrachloride	A	X	B	X
Toluene	A	X	X	X
Toluene Diisocyanate	A	B	X	U
Trichloroethane	A	X	X	X
Trinitrotoluene	A	X	X	X
Trisodium Phosphate	U	U	U	U
Turpentine	A	X	A	B
Urea	U	U	U	U
Urine	U	U	U	U
Varnish	U	U	U	U
Vegetable Oils	A	C	A	X
Vinegar	U	U	U	U
Vinyl Acetate	U	U	U	U
Vinyl Chloride	A	X	X	U
Water	A	A	A	A
Whiskey, Wines	A	A	A	A
Wood Oil	A	X	A	U
Xylene	A	X	X	X

Chemical Medium	FEP	EPDM	Nitrile NBR	Flexible PVC
Zinc Acetate	A	A	B	U
Zinc Chloride	A	A	A	A
Zinc Sulphate	A	A	A	A

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