Robco INC.

Chemical Resistance of Robco Products

Engineered Solutions Since 1911

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Chemical Resistance of KLINGER® sil Gaskets

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	4201	4300 4401	4408 4409	4324	4433 4430	4439	4500	4509	5400	6327 6400	7400	8200
Acetaldehyde	B	B	B	B	B	B	B	B	C	B	B	A
Acetic Acid 100%	A	A	A	A	A	C	A	C	B	B	B	A
Acetic Acid 10%	A	A	C	A	A	C	A	C	A	A	A	A
Acetic Ether	B	B	B	B	B	B	B	B	B	B	B	B
Acetone	B	B	B	B	B	B	B	B	B	A	A	A
Acetylene	A	A	A	A	A	A	A	A	A	A	A	A
Adipic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Air	A	A	A	A	A	A	A	A	A	A	A	A
Alum	A	A	B	A	A	B	A	B	A	A	A	A
Aluminum Acetate	A	A	B	A	A	B	A	B	A	A	A	A
Aluminum Chloride	A	A	B	A	A	B	A	B	A	A	A	A
Ammonia	A	A	A	A	A	A	A	A	A	B	A	A
Ammonium Bicarbonate	A	A	A	A	A	A	A	A	A	A	A	A
Ammonium Chloride	A	A	C	A	A	C	A	C	A	A	A	A
Ammonium Diphosphate	A	A	A	A	A	A	A	A	A	A	A	A
Ammonium Hydroxide	B	B	B	A	A	B	A	B	B	B	B	A
Amyl Acetate	B	B	B	B	B	B	B	B	A	B	B	B
Aniline	C	C	C	C	C	C	C	C	C	B	B	C
Aviation Fuels	A	A	A	A	A	A	A	A	A	C	C	A
Barium Chloride	A	A	A	A	A	A	A	A	A	A	A	A
Benzene	A	A	A	A	A	A	A	A	B	C	C	A
Benzoic Acid	B	B	B	B	B	B	A	B	A	B	B	A
Boiler Feeder Water	A	A	A	A	A	A	A	A	A	A	A	A
Boric Acid	A	A	A	A	A	A	A	A	A	A	A	A
Butane	A	A	B	A	A	B	A	B	A	C	C	A
Butanone (MEK)	B	B	B	B	B	B	B	B	C	C	C	B
Butyl Acetate	B	B	B	B	B	B	B	B	B	B	B	B
Butyl Alcohol (Butanol)	A	A	A	A	A	A	A	A	A	A	A	A
Butyric Acid	A	A	A	A	A	A	A	A	A	A	A	A
Calcium Chloride	A	A	B	A	A	B	A	B	A	A	A	A
Calcium Hydroxide	A	A	A	A	A	B	A	B	A	A	A	A
Calcium Hypochlorite	A	A	C	A	A	C	A	C	B	A	A	A
Carbon Dioxide	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Disulfide	C	C	C	C	C	C	B	C	B	C	C	C
Carbon Tetrachloride	B	B	B	B	B	B	B	B	C	C	C	C

*A = generally suitable**
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C = critical application-do not use without contacting manufacturer
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Solution	4201	4300 4401	4408 4409	4324	4433 4430	4439	4500	4509	5400	6327 6400	7400	8200
Castor Oil	A	A	A	A	A	A	A	A	A	B	B	A
Chlorine (Dry)	A	A	C	A	A	C	A	C	A	B	B	A
Chlorine (Wet)	C	B	C	B	B	C	C	C	C	B	C	B
Chloroform	B	B	B	B	B	B	C	B	C	C	C	C
Chromic Acid	C	B	C	C	C	C	B	C	C	C	C	B
Citric Acid	A	A	C	A	A	C	A	C	A	A	A	A
Clophen T64	B	B	B	B	B	B	B	B	A	C	C	B
Condensate	A	A	A	A	A	A	A	A	A	A	A	A
Copper Sulfate	A	A	A	A	A	A	A	A	A	A	A	A
Creosote	C	C	C	C	C	C	C	C	B	B	B	C
Cresol	B	B	B	B	B	B	B	B	B	B	B	B
Cyclohexanol	A	A	A	A	A	A	A	A	A	B	B	A
Decalin	A	A	A	A	A	A	A	A	B	C	C	A
Dibenzylether	C	C	C	C	C	C	C	C	C	C	C	C
Dibutylphthalate	A	A	A	A	A	A	A	A	B	C	C	A
Diesel Oil	A	A	A	A	A	A	A	A	B	C	C	A
Dimethylformamide	C	C	C	C	C	C	C	C	C	C	C	C
Diphyl	A	A	A	A	A	A	A	A	B	C	C	A
Dye Liquors	B	A	A	B	A	C	A	C	A	A	A	A
Ethane	A	A	C	A	B	C	A	C	A	A	A	A
Ethyl Acetate	B	B	B	B	B	B	B	B	B	B	B	B
Ethyl Alcohol (Ethanol)	A	A	A	A	A	A	A	A	A	A	A	A
Ethyl Chloride	B	B	B	B	B	B	B	B	B	C	C	B
Ethylene	A	A	C	A	A	C	A	C	A	A	A	A
Ethylene Chloride	C	C	C	C	C	C	C	C	B	B	A	A
Ethylene Glycol	A	A	A	A	A	A	A	A	A	A	A	A
Ethyl Ether	B	A	C	A	B	C	A	C	A	B	B	A
Freon 12	A	A	A	A	A	C	A	C	A	C	C	A
Freon 22	B	A	C	A	B	C	A	C	A	C	C	A
Formaldehyde	A	A	A	A	A	A	A	A	A	A	A	A
Formic Acid 10%	A	A	C	A	A	C	A	C	A	A	A	A
Formic Acid 85%	C	B	C	B	B	C	B	C	B	B	B	A
Glycerine	A	A	A	A	A	A	A	A	A	A	A	A
Heating Oil	A	A	A	A	A	A	A	A	B	C	C	A
Heptane	A	A	A	A	A	A	A	A	A	C	C	A

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Solution	4201	4300 4401	4408 4409	4324	4433 4430	4439	4500	4509	5400	6327 6400	7400	8200
Hydraulic Oil (Glycol Base)	A	A	A	A	A	A	A	A	A	A	A	A
Hydraulic Oil (Mineral)	A	A	A	A	A	A	A	A	A	C	C	A
Hydraulic Oil (Phosphate Ester Based)	B	B	B	B	B	B	B	B	B	B	B	B
Hydrochloric Acid 20%	C	B	C	B	B	C	B	C	B	C	C	A
Hydrochloric Acid 37%	C	C	C	C	C	C	C	C	C	C	C	A
Hydrofluoric Acid 10%	C	C	C	C	C	C	C	C	B	C	C	A
Hydrofluoric Acid 40%	C	C	C	C	C	C	C	C	C	C	C	C
Hydrogen	A	A	C	A	A	C	A	C	A	A	A	A
Hydrogen Peroxide (Up to 6% W.W.)	A	A	C	A	A	C	A	C	A	A	A	A
Hydrogen Chloride (Dry)	A	A	C	A	A	C	A	C	A	A	A	A
Iso-octane	A	A	A	A	A	A	A	A	A	B	B	A
Isopropyl Alcohol	A	A	A	A	A	A	A	A	A	A	A	A
Kerosene	A	A	A	A	A	A	A	A	A	C	C	A
Lactic Acid 50%	A	A	C	A	A	C	A	C	A	A	A	A
Linseed Oil	A	A	A	A	A	A	A	A	A	B	B	A
Magnesium Sulfate	A	A	A	A	A	A	A	A	A	A	A	A
Malic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Methane	A	A	C	A	A	C	A	C	A	A	A	A
Methyl Alcohol	A	A	A	A	A	A	A	A	A	A	A	A
Methyl Chloride	B	B	B	B	B	C	B	C	B	C	C	B
Methylene Chloride	C	C	C	C	C	C	C	C	C	B	C	B
Methyl Ethyl Ketone	B	B	B	B	B	B	B	B	B	C	C	B
Mineral Oil	A	A	A	A	A	A	A	A	A	C	B	A
Mineral Oil, ASTM 1	A	A	A	A	A	A	A	A	A	B	B	A
Monochloromethane	B	B	C	B	B	C	B	C	B	C	C	B
Nitrogen	A	A	A	A	A	A	A	A	A	A	A	A
Naphtha	A	A	A	A	A	A	A	A	B	C	C	A
Nitric Acid 20%	C	C	C	C	C	C	C	C	C	C	C	A
Nitric Acid 40%	C	C	C	C	C	C	C	C	C	C	C	A
Nitric Acid 96%	C	C	C	C	C	C	C	C	C	C	C	C
Octane	A	A	A	A	A	A	A	A	B	C	B	A

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Solution	4201	4300 4401	4408 4409	4324	4433 4430	4439	4500	4509	5400	6327 6400	7400	8200
Oleic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Oxalic Acid	B	B	B	B	B	B	B	B	B	C	C	A
Palmitic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Pentane	A	A	A	A	A	A	A	A	A	C	C	A
Perchlorethylene	B	B	B	B	B	B	B	B	B	C	C	B
Petroleum	A	A	A	A	A	A	A	A	A	B	B	A
Petroleum Ether	A	A	A	A	A	A	A	A	A	B	B	A
Phenol	C	C	C	C	C	C	C	C	B	B	B	B
Phosphoric Acid	A	A	A	A	A	A	A	A	A	A	B	A
Phthalic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Acetate	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Carbonate	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Chlorate	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Chloride	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Cyanide	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Dichromate	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Hydroxide	C	B	B	C	B	B	A	A	B	B	B	A
Potassium Hypochlorite	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Nitrate	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Permanganate	A	A	A	A	A	A	A	A	A	A	A	A
Producer Gas	A	A	C	A	B	C	A	C	A	B	A	A
Propane	A	A	C	A	B	C	A	C	A	B	B	A
Pydrol	A	A	A	A	A	A	A	A	A	C	C	B
Pyridine	C	C	C	C	C	C	C	C	C	B	B	C
Rape Seed Oil	A	A	A	A	A	A	A	A	A	B	B	B
Silicone Oil	A	A	A	A	A	A	A	A	A	A	A	A
Sea Water	A	A	B	A	A	B	A	B	A	A	A	A
Sodium Aluminate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Bicarbonate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Bisulphite	A	A	B	A	A	B	A	B	A	A	A	A
Sodium Chloride	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Hydroxide	C	B	B	C	B	B	A	A	B	B	A	A
Sodium Silicate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Sulphate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Sulphide	A	A	A	A	A	A	A	A	A	A	A	A

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Solution	4201	4300 4401	4408 4409	4324	4433 4430	4439	4500	4509	5400	6327 6400	7400	8200
Steam	B	B	A	B	A	A	A	A	B	B	B	B
Stearic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Sulphur Dioxide	C	C	C	C	C	C	B	C	B	B	B	A
Sulphuric Acid 20%	C	C	C	C	C	C	C	C	B	C	C	A
Sulphuric Acid 50%	C	C	C	C	C	C	C	C	C	C	C	A
Sulphuric Acid 96%	C	C	C	C	C	C	C	C	C	C	C	A
Sulphurous Acid	C	B	C	C	C	C	B	C	B	B	B	B
Tannic Acid	A	A	A	A	A	A	A	A	A	A	A	A
Tartaric Acid	A	A	A	A	A	A	A	A	A	A	A	A
Tetrachlorethane	B	B	B	B	B	B	B	B	B	C	C	B
Tetralin	A	A	A	A	A	A	A	A	B	C	C	A
Toluene	A	A	A	A	A	A	A	A	B	C	C	A
Town's Gas	A	A	C	A	A	C	A	C	A	B	B	A
Transformer Oil	A	A	A	A	A	A	A	A	A	B	B	B
Trichlorethylene	B	B	B	B	B	B	B	B	B	C	C	B
Turpentine	A	A	A	A	A	A	A	A	B	C	C	B
Vinyl Acetate	A	A	A	A	A	A	A	A	B	C	C	A
Water	A	A	A	A	A	A	A	A	A	A	A	A
White Spirit	A	A	A	A	A	A	A	A	A	C	C	A
Xylene	A	A	A	A	A	A	A	A	B	C	C	A

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Chemical Resistance of KLINGER® Flexible Graphite HL, SLS, PSM

Exhibits a high resistance to most agents including inorganic and organic acids and bases, solvents, hot wax and oils. Exceptions are strong oxidizing compounds such as concentrated nitric acids, highly concentrated sulfuric acid, chromium (VI) and permanganate solutions, chloric acids and molten alkaline and alkaline earth metals.

Medium	*Concentration*	*Temperature*
Inorganic Acids		
Hydrochloric Acid	All	Boiling point
Hydrofluoric Acid	All	Boiling point
Phosphoric Acid	All	Boiling point
Sulphuric Acid	0-70%	Boiling point
Chromic Acid	0-10%	392°F (200°C)
Nitric Acid	0-10%	185°F (85°C)
Nitric Acid	10-20%	140°F (60°C)
Nitric Acid	Over 20%	104°F (40°C)
Organic acids		
Phenylsulfonic Acid	60%	Boiling point
Acetic Acid	All	Boiling point
Acetic Anhydride	100%	Boiling point
Chloracetic Acid	All	Boiling point
Amino Acid	All	Boiling point
Alkalis		
Caustic Soda	All	Boiling point
Sodium Hydroxide	Solid	Melting point
Solvents		
Benzene & Homologues	0-100%	Boiling point
Ethers	0-100%	Boiling point
Alcohols	0-100%	Boiling point
Esters	0-100%	Boiling point
Ketones	0-100%	Boiling point
Halogenated Hydrocarbons	0-100%	Boiling point
Vinyl Chloride	0-100%	Boiling point
Mineral Oils	0-100%	Boiling point

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Chemical Resistance of Nylons

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	Temp° C	Conc %	Rating
Acetaldehyde	23	40	A
Acetamide	23	50	G
Acetic acid	100	5	G
Acetic acid	100	10	P
Acetic acid	23	2	G
Acetic acid	23	10	P
Acetic Anhydride	23	100	P
Acetone	23	100	G
Acetonitrile	23	100	G
Acetyl Chloride	23	100	P
Acetylene	23	100	G
Acrylonitrile	23	100	G
Allyl alcohol	23	100	A
Allyl chloride	23	100	G
Alum	23	SAT	A
Aluminum chloride	23	10	G
Aluminum fluoride	23	100	G
Aluminum hydroxide	23	100	G
Aluminum potassium sulphate	23	10	P
Aluminum sulfate	50	10	G
Ammonia	23	10	G
Ammonia	100	10	G
Ammonium acetate	23	100	G
Ammonium carbonate	23	100	G
Ammonium chloride	23	10	G
Ammonium chloride	23	37	G
Ammonium fluoride	23	100	G
Ammonium hydroxide	23	40	G
Ammonium nitrate	23	100	G
Ammonium persulfate	23	100	G
Ammonium phosphate	23	100	G
Ammonium sulphate	23	100	G
Ammonium sulfide	23	100	G
Amylacetate	23	100	G
Amylalcohol	23	100	G
Amyl chloride	23	100	G
Aniline	23	100	P

Solution	Temp° C	Conc %	Rating
Aniseed Oil	23	100	G
Antimony trichloride	23	10	P
Arochlor 1248	23	100	G
Arsenic Acid	23	100	G
Barium chloride	23	15	G
Barium chloride	50	100	G
Barium hydroxide	23	100	G
Barium nitrate	23	100	G
Barium sulfate	23	15	G
Barium sulfide	23	100	G
Beer	23	100	G
Beet liquids	23	100	G
Benzaldehyde	23	100	P
Benzaldehyde	23	0.3	G
Benzene	23	100	G
Benzoic acid	23	100	P
Benzyl alcohol	23	100	G
Benzyl chloride	23	100	G
Borax	23	SAT	G
Boric acid	23	10	A
Brandy	23	100	G
Bromine	23	100	G
Bromine	23	10	G
Butane	23	100	G
Butanol	23	100	G
Butter	23	100	G
Buttermilk	23	100	G
Butylacetate	23	100	G
Butylene	23	100	A
Butylene Glycol	23	100	G
Butyric acid	23	100	A
Calcium bisulfide	23	100	G
Calcium bisulfite	50	100	G
Calcium carbonate	23	100	G
Calcium chloride	23	SAT	G
Calcium chloride	100	SAT	P
Calcium hydroxide	50	100	G

G = Good resistance, no long term effects
A = Average resistance, mild effect
Q = Questionable resistance, confirm through testing
P = Poor resistance, signs of attack, not recommended

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Chemical Resistance of Nylons

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Solution	Temp° C	Conc %	Rating
Calcium hypochlorite	23	100	G
Calcium sulfate	23	100	P
Camphor	23	100	G
Carbon disulfide	23	100	G
Carbon tetrachloride	23	100	G
Carbonated beverages	23	100	G
Castor oil	23	100	G
Catechol	23	100	P
Catsup	23	100	G
Caustic potash	23	40	G
Caustic soda	23	40	G
Celluloseacetate	23	100	G
Chloric acid	23	10	G
Chlorine	23	100	P
Chlorine	23	5	Q
Chloroacetic acid	23	100	P
Chlorobenzene	23	100	G
Chlorobromomethane	23	100	A
Chloroethanol	23	100	G
Chloroform	23	100	G
Chlorolhydrate	23	AQ	P
Chlorosulfonic acid	23	100	Q
Chocolate syrup	23	100	G
Chrome alum	23	10	G
Chromic acid	23	10	P
Citric acid	23	100	P
Citric acid	23	10	G
Cocoa	23	100	G
Coconut oil	23	100	G
Coffee	23	100	G
Copper chloride	23	100	G
Copper cyanide	23	100	G
Copper nitrate	23	100	P
Copper sulfate	23	SAT	G
Cotton seed oil	23	100	G
Cream	23	100	G
Cresol	23	100	P

Solution	Temp° C	Conc %	Rating
Cyclohexane	23	100	G
Cyclohexanol	23	100	P
Cyclohexanone	23	100	G
Decalin	23	100	G
Dextrin	23	100	G
Diacetonealcohol	23	100	G
Dibutyl phthalate	23	100	G
Dichloroacetic acid	23	100	G
Dichloroethylene	23	100	G
Diesel oil	23	100	G
Diethylamine	23	100	G
Dimethyl formamide	23	100	G
Dioctyl phthalate	23	100	G
Dioxane	23	100	G
Diphenyl ether	23	100	A
Ethanolamine	23	100	G
Ethylacetate	50	100	G
Ethyl alcohol	23	100	G
Ethyl ether	23	100	G
Ethylene chloride	23	100	G
Ethylene diamine	23	100	G
Ethylene Glycol	23	85	G
Ethylene oxide	23	100	G
Ferric chloride	23	5	G
Ferric chloride	23	SAT	P
Ferric chloride	100	5	P
Ferric nitrate	23	100	G
Ferric sulfate	23	100	G
Ferrous chloride	23	100	A
Ferrous sulfate	23	100	G
Fluorine	23	100	G
Fluorsilicic acid	23	100	P
Fluroboric acid	23	100	P
Foramide	23	100	A
Formaldehyde	23	30	G
Formic acid	23	10	P
Freon 11	23	100	G

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Solution	Temp° C	Conc %	Rating
Freon 113	23	100	G
Freon 12	23	100	G
Freon 22	23	100	G
Freon TF	23	100	P
Friut Juices	23	100	G
Furfurol	23	100	A
Gallic acid	23	100	A
Gasoline	23	100	G
Glucose	23	100	G
Glycerine	23	100	G
Heptane	23	100	G
Hexane	23	100	G
Hexyl alcohol	23	100	G
Horse raddish	23	100	G
Hydrobromic acid	23	10	P
Hydrochloric acid	23	10	P
Hydrofluoric acid	23	40	P
Hydrogen peroxide	23	10	Q
Hydrogen peroxide	23	2	G
Hydrogen peroxide	23	30	P
Hydrogen sulfide	23	5	G
India ink	23	100	G
Iodine	23	5	P
Iodoform	23	100	G
Isobutyl alcohol	23	100	G
Isooctane	23	100	G
Isopropyl acetate	23	100	G
Isopropyl alcohol	23	100	G
Isopropyl ether	23	100	G
Jam	23	100	G
Lactic acid	23	50	Q
Lactic acid	23	90	P
Lactic acid	23	10	G
Lanolin	23	100	G
Lead acetate	23	10	G
Lead stearate	23	100	G
Lead sulfamate	23	100	A

Solution	Temp° C	Conc %	Rating
Lemon juice	23	100	A
Linseed oil	23	100	G
Liquers	23	100	G
Magnesium chloride	23	10	G
Magnesium hydroxide	23	10	G
Magnesium nitrate	23	100	G
Magnesium sulfate	23	100	G
Maleic acid	23	100	A
Malic acid	23	100	P
Malonic acid	23	100	P
Manganese sulfate	23	10	G
Margarine	23	100	G
Mayonaise	23	100	G
Melamine	23	100	G
Mercuric chloride	23	SAT	G
Mercuric cyanide	23	100	G
Mercurous chloride	23	10	P
Mercury	23	100	G
Methanol	23	100	G
Methyl acetate	50	100	G
Methyl bromide	23	100	G
Methyl cellosolve	23	100	G
Methyl chloride	23	100	G
Methyl isobutyl ketone	23	100	G
Methyl isopropyl ketone	23	100	A
Methyl-dichloroacetate	23	100	G
Methyl-monochloroacetate	23	100	G
Methylene chloride	23	100	A
Methylethyl ketone	23	100	G
Methylglycol	23	100	G
Milk	23	100	G
Mineral oil	23	100	G
Monochloroacetic acid	23	10	P
Moth balls	23	100	G
Nail polish	23	100	G
Naphtalene	23	100	G
Nickel chloride	23	100	Q

G = Good resistance, no long term effects
A = Average resistance, mild effect
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Chemical Resistance of Nylons

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	Temp° C	Conc %	Rating
Nickel sulfate	23	100	G
Nitric acid	23	10	P
Nitrobenzene	23	100	A
Nitromethane	23	100	G
Octane	23	100	G
Octyl alcohol	23	100	G
Oil of lavender	23	100	G
Oil of pine	23	100	G
Oil of terpentine	23	100	G
Oleic acid	23	100	G
Olive oil	23	100	G
Oxalic acid	23	10	G
Ozone	23	1 PPM	G
Ozone	23	100	Q
Parafin oil	23	100	G
Peanut oil	23	100	G
Peppermint oil	23	100	G
Perchloric acid	23	10	P
Perchloroethylene	23	100	G
Phenol	23	100	P
Phenlethyl alcohol	23	100	A
Phosphoric acid	23	10	P
Phtalic acid	23	100	A
Picric acid	23	100	Q
Pineapple juice	23	100	G
Potassium acetate	100	50	G
Potassium bichromate	23	5	G
Potassium bromide	23	10	G
Potassium chlorate	23	7	Q
Potassium chlorate	23	5	A
Potassium chloride	23	100	A
Potassium chromate	23	100	G
Potassium cyanide	23	100	G
Potassium dichromate	23	100	P
Potassium ferrocyanide	23	30	G
Potassium hypochloride	23	100	A
Potassium iodide	23	10	G

Solution	Temp° C	Conc %	Rating
Potassium nitrate	23	10	G
Potassium permanganate	23	1	P
Potassium persulphate	23	100	G
Potassium sulfate	23	10	G
Potassium-aluminum sulfate	23	100	G
Propane	23	100	G
Propanol	23	100	G
Propyl acetate	23	100	G
Pyridine	23	100	G
Resorcinol	23	100	P
Ricinus oil	23	100	G
Rose oil	23	100	G
Salicylic acid	23	100	G
Silicone oils	23	100	G
Silver nitrate	23	100	G
Soap	23	10	G
Sodium acetate	23	46	G
Sodium acetate	100	46	G
Sodium bichromate	23	5	G
Sodium bisulfate	23	10	G
Sodium bisulphite	23	100	G
Sodium borate	23	100	G
Sodium bromide	23	10	A
Sodium carbonate	100	21	G
Sodium carbonate	23	21	G
Sodium chlorate	23	100	P
Sodium chloride	23	SAT	G
Sodium chlorite	23	5	Q
Sodium chromate	23	100	P
Sodium cyanide	23	100	G
Sodium fluoride	23	100	A
Sodium hydrosulfite	23	100	G
Sodium hypochlorite	23	5	G
Sodium metaphosphate	23	100	G
Sodium monosulphide	23	2	G
Sodium nitrate	23	10	G
Sodium nitrite	23	5	Q

G = Good resistance, no long term effects
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Chemical Resistance of Nylons

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	Temp° C	Conc %	Rating
Sodium perborate	23	100	A
Sodium perborate	23	5	A
Sodium phosphate	23	10	G
Sodium polyphosphate	23	100	G
Sodium silicate	23	100	G
Sodium sulfide	23	10	G
Sodium sulfite	23	10	G
Sodium sulphate	23	10	G
Sodium tetraborate	23	100	G
Sodium thiosulfite	23	SAT	G
Soya oil	23	100	G
Stannic chloride	23	100	A
Stannous chloride	23	100	Q
Starch	23	SAT	G
Stearic acid	23	100	G
Styrene	23	100	G
Sugar	23	SAT	G
Sulfur	23	100	G
Sulfur dioxide	23	5	Q
Sulfurous acid	23	100	P
Sulphuric acid	23	10	P
Tallow	23	100	G
Tartaric acid	23	10	G

Solution	Temp° C	Conc %	Rating
Tea	23	100	G
Tetrachloroethane	23	100	Q
Tetrahydrofluran	23	100	G
Thionyl chloride	23	100	P
Toluene	23	100	G
Transformer oil	23	100	G
Trichloroethane	23	100	Q
Trichloroethylene	23	100	G
Trichloroethylene	87	100	P
Tricresylphosphate	50	100	G
Triethanolamine	23	100	G
Triethylamine	23	100	G
Trisodium phosphate	23	80	G
Turpentine	23	100	G
Urea	23	20	G
Vinyl chloride	23	100	G
VM&P Naphta	23	100	G
Wine	23	100	G
Xylene	23	100	G
Zinc chloride	23	10	Q
Zinc hydrosulfite	23	100	G
Zinc oxide	23	100	G
Zinc sulfate	23	100	Q

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Acetate Solvents Pure	1	2	NR
Acetaldehyde	2	3	NR
Acetamide	*	*	*
Acetic Solvents Crude	*	*	*
Acetic Solvents Pure	1	1	NR
Acetic Acid 10%	1	2	NR
Acetic Acid 20%	1	2	NR
Acetic Acid 50%	1	2	NR
Acetic Acid 80%	1	2	NR
Acetic Acid Glacial	1	2	NR
Acetic Anhydride	1	2	NR
Acetone	1	1	NR
Acetophenone	3	3	*
Acetyl Chloride	*	*	*
Acetylene	*	*	*
Acrylonitrile	*	*	*
Adipic Acid	*	*	*
Alcohol Allyl	1	NR	NR
Alcohol Amyl	1	NR	NR
Alcohol Butyl	1	1	1
Alcohol Ethyl	1	1	1
Alcohol Methyl	*	*	*
Alcohol Propyl	*	*	*
Allyl Chloride	1	3	*
Alum	1	1	*
Alum Ammonium	*	*	*
Alum Chrome	*	*	*
Alum Potassium	*	*	*
Aluminum Chloride	1	1	Boiling NR
Aluminum Fluoride	1	1	*
Aluminum Hydroxide	1	1	*
Aluminum Nitrate	*	*	*
Aluminum Sulfate	1	1	Boiling NR
Ammonia Anhydrous	1	1	*
Aluminum Sulfate	1	1	Boiling NR

Solution	70°F	122°F	170°F
Ammonium Bifluoride	*	*	*
Ammonium Carbonate	1	*	*
Ammonium Chloride	1	1	Boiling NR
Ammonium Fluoride 10%	*	*	*
Ammonium Fluoride 25%	*	*	*
Ammonium Hydroxide	1	1	*
Ammonium Metaphosphate	*	*	*
Ammonium Nitrate	1	1	1
Ammonium Persulfate	1	1	*
Ammonium Phosphate	1	*	*
Ammonium Sulfate	1	1	Boiling NR
Ammonium Sulfide	*	*	*
Amyl Acetate	1	*	*
Amyl Chloride	NR	NR	NR
Aniline	1	2	3
Aniline Hydrochloride	*	*	*
Antimony Trichloride	1	*	*
Aqua Regia	2	3	NR
Arsenic Acid	1	*	*
Barium Carbonate	*	*	*
Barium Chloride	1	*	*
Barium Hydroxide	1	1	*
Barium Sulfate	1	*	*
Barium Sulfide	1	1	*
Beer	1	1	1
Beet Sugar Liquors	*	*	*
Benzaldehyde	1	*	*
Benzene	3	NR	*
Benzene Sulfonic Acid	1	1	*
Benzoic Acid	1	1	*
Benzyl Alcohol	1	1	1
Benzyl Chloride	*	*	*
Bismuth Carbonate	*	*	*
Borax	1	1	*
Bismuth Carbonate	*	*	*

1: <15% loss in property values. Little or no chemical attack.
2: 15-30% loss in property values. Minor chemical attack.
3: 30-50% loss in property values. Moderate chemical attack.
NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Bromine Liquid	*	*	*
Bromine Water	3	*	*
Butadiene	3	NR	NR
Butane	1	*	*
Butyl Acetate	1	*	*
Butyl Alcohol	1	1	1
Butylene	1	*	*
Butyl Phenol	*	*	*
Butyne Diol	*	*	*
Butyric Acid	1	2	*
Butyl Amine	*	*	*
Butyl Ether	*	*	*
Butyl Chloride	*	*	*
Butyl Phthalate	1	*	*
Calcium Bisulfide	*	*	*
Calcium Bisulfite	1	*	*
Calcium Carbonate	*	*	*
Calcium Chlorate	*	*	*
Calcium Chloride	1	1	1
Calcium Hydroxide	1	1	Boiling NR
Calcium Hypochlorite	1	1	Boiling NR
Calcium Nitrate	*	*	*
Calcium Sulfate	1	1	*
Carbolic Acid	1	*	*
Carbon Dioxide	1	1	*
Carbon Disulfide	NR	*	*
Carbon Monoxide	*	*	*
Carbon Tetrachloride	3	*	*
Castor Oil	*	*	*
Caustic Potash	1	1	*
Caustic Soda	1	1	1
Cellosolves	*	*	*
Chloral Hydrate	*	*	*
Chloric Acid	*	*	*
Chlorinated Water	1	1	*

Solution	70°F	122°F	170°F
Chlorine Dry	2	*	*
Chlorine Wet	2	2	*
Chloroacetic Acid	NR	*	*
Chlorobenzene	2	NR	*
Chloroform	2	NR	NR
Chlorosulfonic Acid	NR	*	*
Chrome Alum	*	*	*
Chromic Acid 10%	1	1	Boiling NR
Chromic Acid 30%	1	1	Boiling NR
Chromic Acid 40%	1	1	Boiling NR
Chromic Acid 50%	1	1	Boiling NR
Citric Acid	1	1	3
Coconut Oil	*	*	*
Copper Carbonate	*	*	*
Copper Chloride	1	*	*
Copper Cyanide	1	*	*
Copper Fluoride	*	*	*
Copper Nitrate	1	*	*
Copper Sulfate	1	1	*
Cottonseed Oil	1	2	*
Cresol	*	*	*
Cresylic Acid	1	*	*
Croton Aldehyde	1	1	*
Crude Oil	1	2	*
Cyclohexane	1	1	*
Cyclohexanol	1	1	1
Cyclohexanone	1	*	*
Detergent	1	1	1
Dextrin	*	*	*
Dextrose	1	*	*
Diacetone Alcohol	*	*	*
Diazo Salts	1	1	*
Dibutyl Phthalate	1	1	*
Dichlorobenzene	*	*	*
Dichlorodifluoro Methane	*	*	*

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3: 30-50% loss in property values. Moderate chemical attack.
NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Dichloroethylene	NR	*	*
Dichlorothane	3	*	Boiling NR
Diesel Fuel	1	1	NR
Diethylamine	*	*	*
Diethylene Glycol	*	*	*
Diethyl Cellosolve	*	*	*
Diethyl Ether	1	*	*
Diglycolic Acid	*	*	*
Dimethylamine	*	*	*
Dimethyl Formamide	1	*	*
Dimethyl Sulfoxide	*	*	*
Dioctyl Phthalate	*	*	*
Dioxane 1,4	*	*	*
Diphenyl	*	*	*
Diphenyl Ether	*	*	*
Diphenyl Oxide	*	*	*
Dipropylene Glycol	*	*	*
Distilled Water	1	1	1
Dizynilbenzene	*	*	*
Epichlorohydrin	*	*	*
Ethane	1	*	*
Ethanolamine	*	*	*
Ethers	2	*	*
Ethyl Acetate	1	1	NR@140
Ethyl Acetoacetate	*	*	*
Ethyl Acrylate	*	*	*
Ethyl Alcohol	*	*	*
Ethyl Benzene	1	*	*
Ethyl Benzoate	*	*	*
Ethyl Butyrate	*	*	*
Ethyl Chloride	*	*	*
Ethyl Ether	NR	*	*
Ethyl Sulfate	*	*	*
Ethylene Bromide	*	*	*
Ethylene Chloride	2	NR	*

Solution	70°F	122°F	170°F
Ethylene Chlorohydrine	*	*	*
Ethylene Diamine	1	*	*
Ethylene Dibromide	*	*	*
Ethylene Dichloride	3	*	*
Ethylene Glycol	1	1	1
Ethylene Oxide	1	3	*
Fatty Acids	1	1	*
Ferric Chloride (Concentrated)	1	1	Boiling NR
Ferric Nitrate	1	*	*
Ferric Sulfate	1	*	*
Ferrous Chloride	1	*	*
Ferrous Sulfate	1	*	*
Fish Solubles	1	1	1
Fluoboric Acid	1	1	*
Fluorine Gas (Dry)	NR	NR	NR
Fluorine Gas (Wet)	3	*	*
Flousilic Acid	1	*	*
Formaldehyde	1	1	*
Formic Acid	1	1	*
Freon Dry	*	*	*
Freon Wet	*	*	*
Fructose	1	1	1
Fruit Juice	1	1	1
Furfural	1	*	*
Gallic Acid	1	1	*
Gas Manufactured	*	*	*
Gas Natural	NR	*	2
Gasoline (Leaded)	*	*	*
Gasoline (Unleaded)	1	2	*
Gelatin	1	*	*
Glucose	1	*	*
Glue	1	*	*
Glycerine	1	1	1
Glycol	1	1	1
Glycolic Acid	*	*	*

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*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Green Liquor	*	*	*
Helium	*	*	*
Heptane	1	1	*
Hexamine	*	*	*
Hexane	1	*	*
Hexanol Tertiary	*	*	*
Hydrazine	*	*	*
Hydraulic Fluid (Petroleum)	1	*	*
Hydrobromic Acid (37%)	1	1	*
Hydrochloric Acid (>20%)	1	1	Boiling NR
Hydrochloric Acid (50%)	1	1	Boiling NR
Hydrocyanic Acid	1	1	*
Hydrofluoric Acid (>40%)	1	2	*
Hydrofluosilicic Acid	1	*	*
Hydrofluorisilicic Acid	1	*	*
Hydrogen Chloride	1	1	*
Hydrogen Cyanide	1	1	*
Hydrogen Fluoride	1	1	*
Hydrogen Gas	1	*	*
Hydrogen Peroxide	1	2	3
Hydrogen Sulfide (Wet or Dry)	1	*	*
Hydroquinone	1	1	*
Hydroxylamine Sulfate	*	*	*
Hypo Sodium Thiosulfate	*	*	*
Hypochlorous Acid	*	*	*
Iodine	1	*	*
Isobutyl Alcohol	*	*	*
Isooctane	1	*	*
Isopropyl Acetate	*	*	*
Isopropyl Alcohol	1	1	1
Isopropyl Ether	1	*	*
Jet Fuel (JP3,4,5)	*	*	*
Kerosene	1	3	*
Keytones	2	NR	*

Solution	70°F	122°F	170°F
Lactic Acid	1	1	*
Lacquer Solvents	1	*	*
LPG (Propane)	*	*	*
Lard	1	1	*
Lauric Acid	*	*	*
Lauryl Chloride	*	*	*
Lead Acetate	1	*	*
Lead Molten	NR	NR	NR
Lead Nitrate	1	1	*
Lead Sulfamate	*	*	*
Lime	*	*	*
Lime Sulfur	1	*	*
Lineoleic Acid	*	*	*
Linseed Oil	1	1	NR
Lithium Chloride	1	*	*
Lithium Hydroxide	1	*	*
Lubricating Oil	1	*	*
Lye	1	1	1
Machine Oil	*	*	*
Magnesium Bisulfate	*	*	*
Magnesium Carbonate	*	*	*
Magnesium Chloride	1	1	*
Magnesium Hydroxide	1	1	*
Magnesium Nitrate	*	*	*
Magnesium Sulfate	1	*	*
Maleic Acid	1	1	*
Malic Acid	*	*	*
Manganese Chloride	1	*	*
Manganese Sulfate	*	*	*
Mercuric Chloride	1	*	*
Mercuric Cyanide	*	*	*
Mercurous Nitrate	*	*	*
Mercury	1	1	*
Methane	1	*	*

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*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Methyl Acetate	1	*	*
Methyl Acetone	*	*	*
Methyl Amine	*	*	*
Methyl Bromide	*	*	*
Methyl Cellosolve	*	*	*
Methyl Chloraform	2	NR	*
Methyl Chloride Wet	2	*	*
Methyl Chloride Dry	2	*	*
Methyl Ethyl Keytone	1	*	*
Methyl Isobutyl Keytone	NR	*	*
Methyl Salicylate	*	*	*
Methyl Sulfate	*	*	*
Methyl Sulfuric Acid	*	*	*
Methylene Chloride	2	*	*
Milk	1	1	1
Mineral Oil	1	3	NR
Mixed Acids	*	*	*
Molasses	1	*	*
Morpholine	*	*	*
Monochloroacetic Acid	NR	NR	NR
Monochlorobenzene	2	NR	*
Monochlorodifluoromethane	*	*	*
Monoethanolamine	*	*	*
Motor Oil	1	*	*
Mustard	*	*	*
Naptha	1	1	NR
Naphthalene	1	NR	*
Nickel Chloride	1	1	*
Nickel Nitrate	1	*	*
Nickel Sulfate	1	*	*
Nitric Acid (100%)	NR	*	*
Nitric Acid (70%)	NR	*	*
Nitric Acid (50%)	1	*	*
Nitric Acid (30%)	1	1	*

Solution	70°F	122°F	170°F
Nitric Acid 10%)	1	1	*
Nitrobenzene	1	*	*
Nitrous Oxide	*	*	*
Ocenol	*	*	*
Oils & Fats	1	*	*
Oils, Vegetables	1	*	*
Oleic Acid	1	1	3
Oxalic Acid	1	1	*
Oxygen	1	*	*
Ozone	2	3	*
Palmitic Acid	*	*	*
Paraffin	1	*	*
Pentane	*	*	*
Perchloroethylene	2	*	*
Perchloric Acid (10%)	1	1	*
Petroleum	1	*	*
Petroleum Ether	1	NR	*
Phenol	1	3	*
Phenol Sulfonic Acid	*	*	*
Phenylhydrazine	*	*	*
Phosphoric Acid (10%)	1	1	Boiling NR
Phosphoric Acid (25%)	1	1	Boiling NR
Phosphoric Acid (50-100%)	1	1	Boiling NR
Phosphorus	1	1	*
Phosphorus Trichloride	1	1	*
Phosphorus Pentachloride	*	*	*
Photographic Solutions	1	1	*
Phthalic Acid	1	1	*
Picric Acid	*	*	*
Plating Solutions Brass	*	*	*
Plating Solutions Cadmium	*	*	*
Plating Solutions Chrome	*	*	*
Plating Solutions Copper	*	*	*
Plating Solutions Gold	*	*	*

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NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Plating Solutions Nickel	*	*	*
Plating Solutions Silver	*	*	*
Plating Solutions Tin	*	*	*
Plating Solutions Zinc	*	*	*
Potassium Acetate (50%)	1	*	*
Potassium Aluminum Sulfate	1	1	*
Potassium Bicarbonate (60%)	1	*	*
Potassium Bichromate (5%)	1	*	*
Potassium Bromide (10%)	1	*	*
Potassium Carbonate	1	*	*
Potassium Chlorate	1	1	*
Potassium Chloride	1	*	*
Potassium Chromate	1	*	*
Potassium Cyanide	1	*	*
Potassium Dichromate (5%)	1	*	*
Potassium Ferricyanide	1	*	*
Potassium Ferrocyanide	1	*	*
Potassium Hydrate	1	*	*
Potassium Hydroxide	1	1	1
Potassium Hypochlorite	2	*	*
Potassium Iodide	2	*	*
Potassium Nitrate (10%)	1	*	*
Potassium Permanganate	1	1	*
Potassium Persulfate	1	*	*
Potassium Sulfate	1	*	*
Potassium Sulfide	1	*	*
Potassium Sulfite	1	*	*
Propane	1	*	*
Propyl Alcohol	1	1	1
Propylene Glycol	*	*	*
Propylene Oxide	*	*	*
Pyridine	1	*	*
Pyrogallic Acid	*	*	*
Pyroligneous Acid	1	2	NR@140

Solution	70°F	122°F	170°F
Resorcinol	*	*	*
Rosin	1	*	*
Salicylic Acid	*	*	*
Salicylaldehyde	*	*	*
Salt Brine	1	1	1
Sea Water	1	1	1
Sewage	*	*	*
Silicon Oil	1	*	*
Silver Chloride	*	*	*
Silver Cyanide	1	1	*
Silver Nitrate	1	1	*
Soap Solutions	1	1	*
Sodium Acetate (60%)	1	1	*
Sodium Acid Sulfate	*	*	*
Sodium Benzoate (10%)	1	*	*
Sodium Bicarbonate	1	*	*
Sodium Bichromate	1	1	*
Sodium Bisulfate	1	*	*
Sodium Bisulfite	1	*	*
Sodium Borate	1	1	*
Sodium Bromide	*	*	*
Sodium Carbonate	1	1	1
Sodium Chlorate	1	1	*
Sodium Chromate	*	*	*
Sodium Cyanide	1	*	*
Sodium Dichromate	1	1	*
Sodium Ferricyanide	*	*	*
Sodium Ferrocyanide	*	*	*
Sodium Fluoride	*	*	*
Sodium Hydroxide	1	1	1
Sodium Hypochlorite	1	1	1
Sodium Hyposulfite	1	1	*
Sodium Metaphosphate	1	*	*
Sodium Nitrate	1	*	*

1: <15% loss in property values. Little or no chemical attack.
2: 15-30% loss in property values. Minor chemical attack.
3: 30-50% loss in property values. Moderate chemical attack.
NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Sodium Perborate	1	*	*
Sodium Peroxide	1	1	*
Sodium Phosphates	1	1	1
Sodium Silicate	1	*	*
Sodium Sulfate	1	*	*
Sodium Sulfide	1	*	*
Sodium Sulfite (90%)	1	*	*
Sodium Thiosulfate	1	1	*
Sodium Tetraborate	1	1	1
Soy Bean Oil	*	*	*
Stannic Chloride	*	*	*
Stannous Chloride	*	*	*
Starch	*	*	*
Stearic Acid	1	*	*
Stoddard's Solution	1	3	*
Styrene	*	*	*
Sugar Juice	*	*	*
Sulfate Liquor	1	*	*
Sulfinol	*	*	*
Sulfur	1	1	*
Sulfur (Molten)	NR	NR	NR
Sulfur Chloride	*	*	*
Sulfur Dioxide Gas (Wet)	1	1	*
Sulfur Dioxide Gas (Dry)	1	1	*
Sulfur Trioxide	*	*	*
Sulfuric Acid (10%)	1	1	*
Sulfuric Acid (30%)	1	1	*
Sulfuric Acid (60%)	1	1	*
Sulfuric Acid (80%)	1	3	*
Sulfuric Acid (100%)	1	NR	*
Sulfurous Acid (10%)	1	*	*
Tall Oil	*	*	*
Tannic Acid	1	1	*
Tanning Liquor	1	*	*

Solution	70°F	122°F	170°F
Taritar Oil	*	*	*
Tartaric Acid (10%)	1	*	*
Tetrachloroacetic Acid	*	*	*
Terachloroethane	*	*	*
Tetrachloroethylene	2	*	*
Tetraethyl Lead	*	*	*
Tetrahydrofuran	2	*	*
Tetrahydronaphthalene	1	*	*
Tetraphosphoric Acid	*	*	*
Thionyl Chloride	3	*	*
Tin Tetrachloride	1	*	*
Titanium Tetrachloride	*	*	*
Toluene	1	3	NR
Tomato Juice	1	*	*
Tributyl Citrate	*	*	*
Tributyl Phosphate	*	*	*
Transformer Oil	1	1	*
Trichloroacetic Acid	*	*	*
Trichloroethane	3	NR	*
Trichloroethylene	NR	*	*
Trichlorotrifluoroethane	*	*	*
Tricresyl Phosphate	1	*	*
Triethanolamine	1	*	*
Triethylamine	*	*	*
Triethylene Glycol	*	*	*
Trisodium Phosphate	1	1	*
Tripopylene Glycol	*	*	*
Trisodium Phosphate	1	1	*
Tung Oil	*	*	*
Turpentine	1	3	NR
Undecanol	*	*	*
Urea	1	*	*
Urine	1	1	*
Varnish	1	*	*

1: <15% loss in property values. Little or no chemical attack.
2: 15-30% loss in property values. Minor chemical attack.
3: 30-50% loss in property values. Moderate chemical attack.
NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of TIVAR®

The information in this chart should only be used as a general rule to the selection of a suitable material.

Solution	70°F	122°F	170°F
Vinyl Acetate	*	*	*
Vinyl Chloride	1	NR	*
Vinylidene Chloride	*	*	*
Water, Fresh	1	1	1
Water, Acid Mine	1	1	*
Water, Distilled	1	1	*
Water, Deionized	*	*	*
Water, Demineralized	*	*	*
Water, Salt	1	1	*
Whiskey	1	*	*

Solution	70°F	122°F	170°F
White Liquor	NR	*	*
White Spirit	1	3	*
Wine	1	1	1 to 160
Xylene	3	NR	*
Zinc Chloride	1	1	*
Zinc Cyanide	*	*	*
Zinc Molten	NR	NR	NR
Zinc Nitrate	*	*	*
Zinc Stearate	*	*	*
Zinc Sulfate	1	*	*

1: <15% loss in property values. Little or no chemical attack.
2: 15-30% loss in property values. Minor chemical attack.
3: 30-50% loss in property values. Moderate chemical attack.
NR: Not recommended. >50% loss in property values.
*: No data available.

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Chemical Resistance of Rubber Products

Solution	Nitrile	EPDM	Natural	Neoprene	Urethane	SBR	Silicone	Viton®	Hypalon
Acetic Acid, dilute	X	G	X	X	X	X	G	G	G
Concentrate	X	G	X	X	-	X	X	X	G
Glacial	X	G	X	X	-	X	X	X	L
Acetic Anhydhide	L	G	L	G	-	G	L	X	G
Acetone	X	G	L	L	X	G	L	X	G
Acetylene	G	G	G	G	-	G	L	G	G
Acrylonitrile	-	-	G	-	-	-	G	-	L
Alum	G	G	G	G	-	G	G	G	G
Aluminum Chloride	G	G	G	G	L	G	G	G	G
Aluminum Sulfate	G	G	G	G	-	G	G	G	G
Ammonia, anhydrous	X	G	G	G	-	G	L	X	G
Ammonium Chloride	G	G	G	G	G	G	G	G	G
Ammonium Hydroxide	L	G	X	G	G	X	G	G	G
Ammonium Nitrate	G	G	G	G	X	G	G	G	G
Ammonium Sulfate	G	G	G	G	G	G	G	G	G
Amyl Acetate	X	G	L	X	X	X	-	X	X
Amyl Alcohol	G	G	G	G	-	G	-	G	G
Aniline	X	L	X	X	-	X	-	G	L
Animal Fats	G	G	X	G	G	X	G	G	L
Arsenic Acid	X	G	G	G	L	L	G	G	G
Asphalt	G	X	X	G	-	X	G	G	G
ASTM Oil #1	G	L	X	G	G	X	G	G	G
ASTM Oil #2	G	X	X	G	G	X	-	G	-
ASTM Oil #3	G	X	X	G	L	X	L	G	L
Benzene	X	X	X	X	X	X	-	G	X
Bunker Oil	G	X	X	G	G	X	G	G	X
Butyl Acetate	X	L	X	X	X	X	-	X	X

G = Good; L = Limited; – = unknown; x = not recommended

Factors Affecting Chemical Resistance
Concentration: Chemical resistance is often lower as acids, bases and active chemical concentrations increase.
Temperature: These reference tables are based on room temperature exposure. Higher temperatures frequently increase chemical effect.
Exposure: The extent of extreme temperature and chemical exposure is critical. Intermittent exposure permits cost-effective performance from many standard grade materials.
Other factors: Material thickness, reinforcements, mechanical wear and oxygen atmosphere can all contribute to the success or failure of an application.

The data presented here should be used only as a guide to selecting rubber for a particular application. Since factors affecting chemical resistance vary, Robco recommends that materials for critical applications should be thoroughly tested before use. No guarantee of satisfactory performance is either expressed or implied.

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Chemical Resistance of Rubber Products

Solution	Nitrile	EPDM	Natural	Neoprene	Urethane	SBR	Silicone	Viton®	Hypalon
Butyl Alcohol	G	G	G	G	-	G	G	G	G
Butyl Carbitol	G	G	X	G	-	X	G	G	G
Butyl Cellosolve	G	G	X	L	-	X	-	-	G
Calcium Chloride	G	G	G	G	G	G	G	G	G
Carbonic Acid	X	X	X	X	G	X	-	G	L
Carbon Tetrachloride	L	X	X	X	X	X	X	G	X
Carbonic Acid	G	G	X	-	G	X	G	G	G
Castor Oil	G	G	G	G	G	G	G	G	G
Cellosolve	-	G	X	X	-	X	-	G	G
Chlorinated Solvents	X	L	X	X	X	X	X	G	X
Chlorine	X	L	X	X	X	X	X	G	X
Chromic Acid	X	L	X	X	X	X	L	G	G
Coal Oil	G	X	X	G	G	X	X	G	L
Copper Hydroxide	G	-	L	-	-	G	-	L	G
Corn Syrup	G	G	-	G	G	-	G	G	G
Crude Oil	G	X	X	G	L	X	G	G	X
Diacetone Alcohol	X	L	G	G	G	G	G	-	G
Diesel Oil	G	X	X	G	G	X	-	G	L
Diisobutyl Ketone	X	G	X	X	-	X	-	G	X
Diisobutyl Ether	G	X	X	X	-	X	-	-	L
Ethanol	G	G	G	G	-	G	G	G	G
Ethyl Acetate	G	G	X	X	X	X	G	X	X
Ethyl Chloride	G	G	G	G	G	G	-	G	G
Ethyl Gylcol	G	G	G	G	G	G	G	G	G
Flourine	X	X	X	X	-	X	X	G	X
Formaldehyde	G	G	G	G	X	G	G	G	-
Formic Acid	L	G	G	G	X	G	G	-	G

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Factors Affecting Chemical Resistance
Concentration: Chemical resistance is often lower as acids, bases and active chemical concentrations increase.
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Chemical Resistance of Rubber Products

Solution	Nitrile	EPDM	Natural	Neoprene	Urethane	SBR	Silicone	Viton®	Hypalon
Freon 12	G	-	X	G	G	X	X	G	L
Freon 22	X	X	X	G	X	X	-	-	G
Fuel Oil	G	G	X	G	G	X	-	G	G
Fuel A (ASTM)	G	X	X	G	G	G	-	G	X
Fuel B (ASTM)	G	X	X	L	G	X	-	G	X
Gallic Acid	X	X	G	L	X	-	-	G	G
Gasoline	G	X	X	G	G	X	-	G	X
Glycerine	G	G	G	G	G	G	G	G	G
Grease	G	X	X	G	-	X	-	G	L
Hexane	G	X	X	G	G	X	-	G	G
Hexylene Glycol	G	-	G	G	-	G	-	G	G
Hydrochloric Acid, 20%	L	G	L	-	G	L	-	G	G
Isophorone	X	-	X	X	-	X	-	X	-
Jet Fuels	G	X	X	G	-	X	-	-	L
Kerosene	G	X	X	G	G	X	X	G	L
Linseed Oil	G	G	X	G	G	X	G	G	G
Lubricating Oils	G	X	X	G	G	X	G	G	L
Methyl (wood) Alcohol	G	G	G	G	-	G	-	-	G
Methyl Chloride	-	L	X	X	X	X	X	G	X
Methyl Ethyl Ketone (MEK)	X	G	X	X	X	X	X	-	X
Methyl Isobutyl Carbitol	G	G	G	G	-	G	-	G	G
Methyl Isobutyl Ketone	X	G	X	X	-	X	-	X	X
Mineral Oil	G	X	X	G	G	X	G	G	G
Mineral Spirits	G	X	X	L	-	X	-	G	G
Monochlorobenzene	X	X	X	X	-	X	-	G	X
Muriatic Acid	X	X	X	X	-	X	-	G	G

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Factors Affecting Chemical Resistance
Concentration: Chemical resistance is often lower as acids, bases and active chemical concentrations increase.
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Chemical Resistance of Rubber Products

Solution	Nitrile	EPDM	Natural	Neoprene	Urethane	SBR	Silicone	Viton®	Hypalon
Naptha	G	X	X	L	-	X	X	G	L
Natural Gas	G	-	X	G	G	X	G	G	G
Nitric Acid, 30 to 70%	X	X	X	X	X	X	X	G	G
Nitrogen Gas	G	G	G	G	G	G	G	G	G
Octane	G	X	X	-	-	X	-	G	X
Oil, petroleum	G	X	X	G	G	X	-	G	X
Oleic Acid	G	G	X	L	G	X	X	G	G
Oxygen	G	G	G	G	G	G	G	G	G
Ozone	X	G	X	G	G	X	G	G	G
Palmitic Acid	G	G	X	G	G	X	-	G	G
Papermakers Alum	G	G	G	G	-	G	-	G	G
Perchloroethylene	X	X	X	X	L	X	-	G	X
Petroleum Oils	G	X	X	G	G	X	-	G	X
Phenol	X	X	X	X	-	X	-	G	L
Phosphoric Acid, 10 to 85%	X	G	X	L	G	X	X	G	G
Propane Gas, liquid	G	X	X	G	-	X	-	G	G
Propyl Alcohol	G	G	G	G	-	G	G	G	G
Sea Water	G	G	G	G	G	G	G	G	G
Sewage	G	G	G	G	-	G	G	G	G
Soda Lime	G	G	G	L	L	G	L	G	G
Sodium Hydroxide	L	G	G	G	L	G	G	G	G
Sodium Silicate	G	G	G	G	L	G	G	G	G
Soybean Oil	G	L	X	G	G	X	-	G	L
Stearic Acid	G	G	X	G	G	X	G	G	L
Styrene	X	X	X	X	L	X	X	G	X
Sulfur	X	L	X	X	G	X	G	G	G

G = Good; L = Limited; – = unknown; x = not recommended

Factors Affecting Chemical Resistance
Concentration: Chemical resistance is often lower as acids, bases and active chemical concentrations increase.
Temperature: These reference tables are based on room temperature exposure. Higher temperatures frequently increase chemical effect.
Exposure: The extent of extreme temperature and chemical exposure is critical. Intermittent exposure permits cost-effective performance from many standard grade materials.
Other factors: Material thickness, reinforcements, mechanical wear and oxygen atmosphere can all contribute to the success or failure of an application.

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Chemical Resistance of Rubber Products

Solution	Nitrile	EPDM	Natural	Neoprene	Urethane	SBR	Silicone	Viton®	Hypalon
Sulfuric Acid 25%	X	G	X	L	-	X	X	G	G
25 - 50%	X	G	X	X	-	X	X	G	G
50 - 96%	X	X	X	X	X	X	X	G	G
fuming	X	X	X	X	X	X	X	G	L
Tall Oil	G	X	X	G	-	X	-	G	L
Tallow	G	L	X	G	G	X	G	G	L
Tar	G	X	X	G	-	X	-	G	L
Toulene	X	X	X	X	L	X	X	G	X
Toluol	X	X	X	X	L	X	X	G	X
Transmission Oil A	G	X	X	G	G	X	-	G	L
Trichloroethane	X	X	X	X	X	X	-	G	X
Trichlorethylene	X	X	X	X	X	X	-	G	X
Turpentine	G	X	X	L	X	X	-	G	X
Urea	G	-	G	G	-	G	-	-	G
Vegetable Oils	G	L	X	G	G	X	G	G	G
Vinegar	L	L	G	G	L	G	G	G	G
Water	G	G	G	G	G	G	G	G	G
Whiskey	G	G	G	G	-	G	G	G	G
Wines	G	G	G	G	-	G	G	G	G
Xylene	X	X	X	X	X	X	-	G	X

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Factors Affecting Chemical Resistance
Concentration: Chemical resistance is often lower as acids, bases and active chemical concentrations increase.
Temperature: These reference tables are based on room temperature exposure. Higher temperatures frequently increase chemical effect.
Exposure: The extent of extreme temperature and chemical exposure is critical. Intermittent exposure permits cost-effective performance from many standard grade materials.
Other factors: Material thickness, reinforcements, mechanical wear and oxygen atmosphere can all contribute to the success or failure of an application.

The data presented here should be used only as a guide to selecting rubber for a particular application. Since factors affecting chemical resistance vary, Robco recommends that materials for critical applications should be thoroughly tested before use. No guarantee of satisfactory performance is either expressed or implied.

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The effects of various gases and fluids on packing materials

	Media	174 1140 Sequel 1121/1123	1342 1200 1220 1250	809 160 317 362	380 4040	267	4029 4025	3000 3400 3425	5019 5050 5059
Gases	Air	Satisfactory to 290°C (554°F)	Satisfactory to 345°C (653°F)	Satisfactory	Satisfactory to 96°C (23°F)	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	Oxygen	Satisfactory to 290°C (554°F)	Not recommended	Satisfactory	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended
	Halogens (chlorine, bromine, etc.)	Satisfactory	Not recommended	Satisfactory	Not recommended	Limited resistance	Satisfactory if dry (only)	Satisfactory	Not recommended
	Other hot gases or dry steam	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 96°C (23°F)	Not recommended	Saturated steam only	Satisfactory	Not recommended
Liquids	Water	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 96°C (23°F)	Satisfactory	Satisfactory	May cause contamination	Satisfactory to 71°C (180°F)
	Mild acids pH 3 to 6	Satisfactory	Satisfactory	Satisfactory	Not recommended	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	Strong Acids Ph 0 to 2	Satisfactory	Satisfactory	Not recommended	Not recommended	Not recommended	Not recommended	Satisfactory	Satisfactory to 30°C (86°F)
	Mild Alkalies PH 7 to 11	Satisfactory	Satisfactory	Satisfactory	Not recommended	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	Strong Alkalies PH 12 to 14	Satisfactory	Satisfactory	Not recommended	Not recommended	Not recommended	Not recommended	Satisfactory	Satisfactory to 30°C (86°F)
	Aqua Ammonia	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 96°C (23°F)	Limited resistance	Satisfactory	Satisfactory	Satisfactory
	Anhydrous Ammonia	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 96°C (23°F)	Not recommended	Satisfactory	Satisfactory	Limited resistance
	Halogens (liquid, chlorine, bromine etc.)	Satisfactory	Not recommended	Satisfactory	Not recommended	Not recommended	Not recommended	Limited resistance	Not recommended
Solvents	Aliphalic hydrocarbons (gasoline, kerosene, etc.)	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 30°C (86°F)
	Aromatic hydrocarbons (benzene, toluene, etc.)	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 30°C (86°F)
	Acetone	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 30°C (86°F)
	Alcohol	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Oils	Oils, petroleum	Satisfactory	Satisfactory	Satisfactory	Satisfactory to 96°C (23°F)	Satisfactory	Satisfactory	Satisfactory	Satisfactory

The information listed above indicates the general suitability of basic mechanical packing materials against various media. It is intended only as a guide, not as a rule. Packings are rarely fully exposed to the gases or liquids and will not necessarily react in the same degree as indicated here.
Also most packings are impregnated with lubricants and other compounds which modify the effects of gases and liquids have on the packing in use. The chemical recommendations noted are based on performance of compression packings.

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Packing Recommendations

	Service Conditions							Motion			Acid		Alkali		Gases								Oils		Solvent	
	Temperature		Pressure (Stuufing box)		Shaft Speed		pH Range	Rotary	Reciprocating	Valve stem	Corrosive	Mild	Corrosive	Mild	Air & Dry industrial	Br/Cl	Ammonia	Oxygen	Steam	Water	Salt water		Petroleum	Synthetic	Aliphatic	Aromatic
	°F	°C	PSI	BAR	FPM	m/s																				
Vegetable Fiber																										
Lubricated (380)	194	90	150	10	1885	9.5	6-8	X	X	X										X	X					
PTFE Coated (4040)	275	135	300	20	2250	11.4	6-8	X	X	X										X	X	X	X			
Asbestos																										
Lubricated (317/362)	392	200	300	20	2500	12.7	4-10	X	X	X		X		X	X		X			X	X	X	X			
PTFE Coated (160)	500	260	500	34	3600	18.3	2-12	X	X	X		X		X	X		X		X	X	X	X	X	X	X	X
Valve packing w/wire (809)	1247	675	500	34			4-10			X		X		X	X		X		X	X	X	X	X	X	X	X
Acrylic																										
Lubricated (5019)	500	260	300	20	2000	10	2-12	X	X	X		X		X	X		X			X	X	X	X			
PTFE Coated (5050/5059)	500	260	500	34	2250	11	2-12	X	X	X		X		X	X		X		X	X	X	X	X	X	X	X
Aramid																										
PTFE Coated (4025/4029)	500	260	500	34	2500	12.7	2-12	X	X	X		X		X	X		X		X	X	X	X	X	X	X	X
Carbon/Graphite																										
Carbon pumps (3000/3400/3425)	500	260	500	34	3000	15.2	1-14	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X
Graphite pumps (1342)	1200	650	500	34	5000	25.4	1-14	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X
Valve application (3400/1342)	1200	650	4000	272			1-14			X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Graphite (1220)	1200	650	4000	272	4000	27.6	1-14	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Braided Flax/Graphite (1200/1250)	1200	650	3000	204	4000	27.6	1-14	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Copolyimide																										
PTFE Coated (4259)	500	260	500	34	3000	15.2	2-12	X	X	X		X		X	X		X		X	X	X	X	X	X	X	X
PTFE/ Graphite (174/1140)	500	260	500	34	3500	17.7	0-14	X	X	X		X		X	X		X		X	X	X	X	X	X	X	X

The above listed recommendations are for reference only.

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Packing Recommendations

	Service Conditions							Motion			Acid		Alkali		Gases							Oils		Solvent	
	Temperature		Pressure (Stuufing box)		Shaft Speed		pH Range	Rotary	Reciprocating	Valve stem	Corrosive	Mild	Corrosive	Mild	Air & Dry industrial	Br/Cl	Ammonia	Oxygen	Steam	Water	Salt water	Petroleum	Synthetic	Aliphatic	Aromatic
	°F	°C	PSI	BAR	FPM	m/s																			
Glass																									
Dry (267)	1000	538					2-12				X	X	X	X	X				X	X	X	X	X	X	X
PTFE Coated (267 PTFE)	500	260	300	20	1800	9	2-12	X		X	X	X	X	X	X				X	X	X	X	X	X	X
PTFE																									
Lubricated (1123)	500	260	300	20	1500	7.6	0-14	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Dry (1120/1121)	500	260	300	20	1000	5	0-14	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X

The above listed recommendations are for reference only.

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