

Technical Note

TN 4.01 Chemical Resistance of Polyethylene and Elastomers

The results reported herein are of testing performed on HDPE material, compiled from multiple sources. A listing of sources is available at the conclusion of this document. Actual results may vary on the environmental conditions for each particular application. In evaluating the capability of polyethylene pipe, fittings, and manholes to withstand chemical attack, consideration should be given to the following:

1. The effect of an active substance on polyethylene is not as severe when contact is intermittent.
2. Increasing temperature increases chemical activity.
3. Internal pressure may affect the rate of penetration of a substance.
4. Excessive bending and other stresses resulting from improper installation may affect the life of polyethylene products. An example would be circumferential deflection beyond 50% or placing pipe directly on a large, sharp rock.

This listing contains accurate and reliable information to the best of our knowledge. The data contained herein is a compilation of studies conducted by various sources which Advanced Drainage Systems believes to be reliable. However, the information cannot be guaranteed because the conditions of use are beyond our control. The user of this information assumes all risk associated with its use.

Polyethylene

Test Procedure

Polyethylene specimens were placed in the relevant substance for a period of time without the application of mechanical stress. They were then tested for swelling or weight loss and subjected to tensile testing. In critical applications, it is suggested that greater reliance be placed on actual field experience or testing should be performed under similar conditions of stress, exposure, temperature and duration which can be related to the anticipated application. Data regarding resistance to chemicals not listed may be available by contacting an ADS representative.

Table 1: Symbols used in the following table

Symbol	Description
+	Specimen is resistant swelling < 3% or alternatively weight loss < .0.5%, elongation of break not significantly changed
/	Specimen has limited swelling 3 - 8% or alternatively weight resistance only loss 0.5 - 5%, and/or elongation at break decreased by < 50%
-	Specimen is not resistant swelling > 8% or alternatively weight loss > 5%, and/or elongation a break decreased by > 50%
D	Discoloration
*	Or at the boil

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Acetaldehyde + acetic acid	90:10:00	+	
Acetaldehyde, aqueous	all	+	/
Acetamide		+	+
Acetic acid	100%	+	/ D
Acetic acid, aqueous	70%	+	+
Acetic acid ethyl ester		+	+
Acetic anhydride		+	/ D
Acetoacetic acid		+	
Acetone		+	+ *
Acetophenone		+	
Acetylene		+	
Acids, aromatic		+	+
Acronal dispersions		+	/
Acrylic acid emulsions		+	+
Acrylonitrile		+	+
Adipic acid, aqueous	saturated	+	+
Adipic acid ester		+	/
Aktivin (chioramine, aqueous, 1%)		+	+
Alcohol		+	
Alcoholic beverages		+	
Allyl acetate		+	+ to /
Allyl alcohol	96%	+	+
Allyl chloride		/	-
Alum, aqueous	all	+	+
Aluminum chloride, aqueous	all	+	+
Aluminum chloride, solid		+	+
Aluminum fluoride		+	+
Aluminum hydroxide		+	+
Aluminum metaphosphate		+	+
Aluminum sulphate, aqueous	saturated	+	+
Aluminum sulphate, solid		+	+
Amino acids		+	+
Ammonia, gaseous	100%	+	+
Ammonia, liquid		+	
Ammonia solution		+	+
Ammonium acetate, aqueous	All	+	+
Ammonium carbonate	All	+	+
Ammonium chloride, aqueous	All	+	+
Ammonium hydrosulphide, aqueous	All	+	+
Ammonium metaphosphate		+	+
Ammonium nitrate, aqueous	All	+	+
Ammonium phosphate, aqueous	All	+	+
Ammonium sulphate, aqueous	All	+	+
Ammonium sulphide, aqueous	All	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Ammonium thiocyanate		+	+
Amyl acetate		+	+
Amyl alcohol		+	+
Amyl chloride	100%	/	-
Amyl phthalate		+	/
Aniline, aqueous	All	+	+
Aniline hydrochloride, aqueous	All	+	+
Animal oils		+	/
Aniseed oil		/	-
Anisole		/	/ to -
Anone (cyclohexanone)		+	/
Antifreeze agents (vehicles)		+	+
Aqua regia		-	
Anthraquinone sulphonic acid, aqueous (susp.)		+	+
Antimony chloride, anhydrous		+	+
Antimony pentachloride		+	+
Antimony trichloride		+	+
Arsenic acid anhydride		+	+
Arsenic acid, aqueous	all	+	+
Ascorbic acid		+	+
Asphalt		+	/
Aspirin		+	
Barium hydroxide, aqueous	all	+	+
Barium salts, aqueous	all	+	+
Battery acid		+	+
Beater glue		+	+
Beef fat		+	+ to /
Beer		+	+
Beer coloring agent		+	+
Beeswax		+	/ to -
Benzaldehyde, aqueous	all	+	+ to /
Benzaldehyde in isopropyl alcohol	1%	+	+
Benzene	technically pure	/	/
Benzenesulphonic acid		+	+
Benzoic acid, aqueous	all	+	+
Benzoyl chloride		/	/
Benzyl alcohol		+	+
Benzyl chloride		/	-
Bichromate-sulphuric acid		-	-
Bismuth salts		+	+
Bisulphate solution		+	+
Bitumen		+	/
Bleaching liquor containing 12.5% active chlorine		/	-
Bleaching powder (chloride of lime)		+	+
Bone oil		+	+
Borax, aqueous	all	+	+
Boric acid, aqueous	all	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Boron trifluoride		+	+ to /
Brake fluid		+	+
Brandy-wine		+	
Brine (saturated)	saturated	+	+
Bromic acid		-	
Bromine fumes		-	
Bromine, liquid	100%	-	
Bromine water	cold saturated	+	
Bromochloromethane		-	
Butanediol, aqueous	all	+	+
Butane, gaseous		+	
Butanetriol, aqueous	all	+	+
Butanol, aqueous	all	+	+
Butanone		+	/ to -
Butoxyl (methoxybutyl acetate)		+	/
Butter		+	
Butyl acetate	technically pure	+	/
n-Butyl acetate		+	/
Butyl alcohol		+	+
Butyl acrylate		+	/
Butylbenzyl phthalate		+	+
Butylene glycol	technically pure	+	+
Butyric acid, aqueous	All	+	/
Butylphenol	technically pure	+	+
Calcium carbide		+	+
Calcium carbonate		+	+
Calcium chloride, aqueous	All	+	+
Calcium hydroxide		+	+
Calcium hypochlorite, aqueous (susp.)	All	+	+
Calcium nitrate, aqueous	50%	+	+
Calcium oxide (powder)		+	+
Calcium phosphate		+	+
Calcium sulphate		+	+
Camphor		+	/
Camphor oil		-	
Cane sugar		+	+
Carbazole		+	+
Carbolic acid		+	+ D
Carbolineum for fruit trees, aqueous		+ D	/
Carbon dioxide	100%	+	+
Carbon disulphide		/	
Carbonic acid, aqueous	All	+	+
Carbonic acid, dry	100%	+	+
Carbon tetrachloride	technically pure / to -		-
Castor oil		+	+
Caustic potash		+	+
Caustic potash solution	50%	+	+
Caustic soda		+	+
Caustic soda solution	All	+	+
Cetyl alcohol (hexadecanol)		+	+
Chloral hydrate, aqueous	all	+	+ D

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Carbon dioxide	100%	+	+
Carbon disulphide		/	
Carbonic acid, aqueous	All	+	+
Carbonic acid, dry	100%	+	+
Carbon tetrachloride	technically pure / to -		-
Castor oil		+	+
Caustic potash		+	+
Caustic potash solution	50%	+	+
Caustic soda		+	+
Caustic soda solution	All	+	+
Cetyl alcohol (hexadecanol)		+	+
Chloral hydrate, aqueous	all	+	+ D
Chlorine bleach liquor containing 12.5% active chlorine		+	-
Chlorine, gaseous, dry		/	-
Chlorine, gaseous, moist		/	-
Chlorine, liquid		-	
Chlorine water		+	/
Chloroacetic acid (mono), aqueous	all	+	+
Chlorobenzene		/	-
Chlorocarbonic acid		+	/
Chloroethanol	technically pure	+	+ D
Chloroform	technically pure / to -		-
Chloropicrin		+	-
Chlorosulphonic acid		-	
Chrome anode mud		+	+
Chrome salts, aqueous	all	+	+
Chromic acid, aqueous	up to 50%	+	- D
Chrome alum, aqueous	all	+	+
Chromium trioxide, aqueous	up to 50%	+	- D
Chromosulphuric acid		+	-
Cider		+	+
Citric acid, aqueous	saturated	+	+
Citrus juices		+	+
Clophen A 50 and A 60		+	/ to -
Coal-tar oil		+ D	/
Coconut oil		+	/
Coconut oil fatty alcohol	technically pure	+	/
Codliver oil		+	/
Coffee extract		+	+
Cognac		+	
Cola concentrates		+	+
Common salt, aqueous	all	+	+
Copper chloride, aqueous		+	+
Copper fluoride, aqueous		+	+
Copper nitrate, aqueous	30%	+	+
Copper salts, aqueous	cold saturated	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Copper sulphate, aqueous	all	+	+
Corn oil		+	/
Corn syrup		+	+
Coumarone resins		+	+
Creosote		+	+ D
Cresol	100%	+	/
Cresol, aqueous	diluted	+	+ D
Crop protection agents, aqueous		+	+
Crotonaldehyde	technically pure	+	/
Cyclanone (fatty alcohol sulphonate)		+	+
Cyclohexane		+	+
Cyclohexanol		+	+
Cyclohexanone		+	/
Decahydronaphthalene (Decalin)	technically pure	+	/
Defoamers		+	+ to /
Detergents		+	+
Detergents, synthetic		+	+
Developer solutions (photographic)		+ D	+ D
Dextrin, aqueous	18%	+	+
Dextrose		+	+
Dextrose, aqueous	all	+	+
1,2-Dibromoethane		/	-
Dibutyl ether		+ to /	-
Dibutyl phthalate	technically pure	+	/
Dibutyl sebacate		+	/
Dichloroacetic acid	technically pure	+	/
Dichloroacetic acid 50%		+	+
Dichloroacetic acid methyl ester		+	+
Dichlorobenzene		/	-
Dichloroethane		/	/
Dichlorodiphenyltrichloroethane (DDT, powder)		+	+
Dichloroethylene		-	-
Dichloropropane		/	-
Dichloropropene		/	-
Diesel fuel		+	/
Diethylene glycol		+	+
Diethyl ether		+ to /	/*
Di (2-ethylhexyl) phthalate (DOP)		+	/
Diethyl ether		+ to /	/*
Diethyl ketone		+	/
Diglycolic acid, aqueous	30%	+	+
Diisobutyl ketone	technically pure	+	/ to -
Diisopropyl ether		+ to /	-
Dimethylamine		+	/
Dimethyl formamide	technically pure	+	+ to /
Dimethyl sulphoxide		+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Diocetyl phthalate		+	/
Dioxane		+	+
Diphenylamine		+	/
Diphenyl oxide		+	/
Dishwashing liquids		+	+
Disodium phosphate		+	+
Disodium sulphate		+	+
Dispersions, aqueous		+	
Dodecylbenzenesulphonic acid		+	/
Drilling aid		/	/
Drinking water (also chlorinated)		+	+
Dyes		+ D	+ D
Eau de Javelle		+	-
		to /	
Electrolyte baths for the plating industry		+	/
		to /	
Emulsifiers		+	+
Emulsions (photographic)		+	+
Ephetin, aqueous	10%	+	+
Epichlorohydrin		+	+
Epsom salts	all	+	+
Essential oils		-	-
Esters, aliphatic	technically pure	+	+ to /
Ethane		+	+
Ethanol	96%	+	+
Ether		+	/*
		to /	
Ethyl acetate	technically pure	+	/
Ethyl alcohol	96%	+	+
Ethyl alcohol + acetic acid (fermentation mixture)		+	+
Ethylbenzene	technically pure	/	
Ethyl chloride	technically pure	/*	
Ethyl ether	technically pure	+	/*
		to /	
Ethylene		+	/
Ethylenediamine	technically pure	+	+
Ethylenediamine tetraacetic acid		+	+
Ethyl dibromide		/	-
Ethylene dichloride (dichloroethane)		/	-
Ethylene glycol		+	+
Ethylene oxide, gaseous	technically pure	+	+
2-Ethylhexanol		+	/

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
2-Ethylhexanol		+	/
Euron B		/	/
Euron G		+	+
Fatty acid amides		+	/
Fatty acids (>C6)		+	+ to /
Fatty alcohols		+	/
Ferric chloride, aqueous	all	+	+
Ferrous sulphate, aqueous	all	+	+
Fertilizer salts, aqueous	all	+	+
Fir wood oil		+	/
Fluoboric acid, aqueous		+	/ 25%
Fluorine, gaseous		-	
Fluosilicic acid	all	+	+
Formic acid, aqueous	10%	+	+
Formic acid, aqueous	85%	+	+
Formaldehyde, aqueous	up to 40%	+	+
Formamide		+	+
Frigen 12 (Freon 12)	100%	/	-
Fruit juices, fermented	all	+	+
Fruit juices, unfermented		+	+
Fruit pulp		+	+
Fuel oil		+	/
Furfural		+	/
Furfuryl alcohol		+	+ D
Gases from roasting, dry	all	+	+
Gases liquor (ammoniacal)		+	+
Gelatin		+	+
Genantin		+	+
Gin		+	
Glacial acetic acid	technically pure	+	/ D
Glauber's salt, aqueous	all	+	+
Glucose, aqueous	all	+	+
Glue		+	+
Glycerine, aqueous	up to 100%	+	+
Glycerol chlorohydrin		+	+
Glycine		+	+
Glycol, aqueous		+	+
Glycolic acid, aqueous	up to 70%	+	+
Glycolic acid butyl ester		+	+
Glystantin		+	+
Grisiron 8302		/	/
Grisiron 8702		+	+
Halothane		/	/ to -
Heptane		+	/
Hexane		+	/
Hexanetriol		+	+
Honey		+	+
Hydraulic fluid		+	/
Hydrazine hydrate		+	+
Hydrobromic acid, aqueous	50%	+	+
Hydrochloric acid, aqueous	all	+	+
Hydrogen chloride gas, dry and moist		+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Hydrocyanic acid		+	+
Hydrofluoric acid, aqueous	40%...85%	+	/
Hydrofluosilicic acid, aqueous	all	+	+
Hydrogen	100%	+	+
Hydrogen peroxide, aqueous	10%	/	/
Hydrogen peroxide, aqueous	30%	/	/
Hydrogen peroxide, aqueous	90%	/	-
Hydrogen sulphide, aqueous	saturated	+	+
Hydrogen sulphide, dry	100%	+	+
Hydroquinone		+ D	+ D
Hydrosulphite, aqueous		+	+
Hydroxylamine sulphate, aqueous	up to 10%	+	+
Hypochlorous acid	12%	+	/
Ink		to /	+
Iodine - potassium iodide	3% iodine	+	+
Iron (III) chloride, aqueous	all	+	+
Isobutyl alcohol		+	+
Isooctane		+	/
Isopropanol (isopropyl alcohol)	technically pure	+	+
Isopropyl acetate	100%	+	/
Isopropyl ether	technically pure	+	-
Jam		to /	
Kerosene		+	+
Ketones		+	/ to -
Labarraque's solution		to /	
Lactic acid, aqueous	10%...96%	+	+
Lactose		+	+
Lanolin (wool fat)		+	+
Latex		+	+
Lead acetate, aqueous	all	+	+
Lead tetraethyl		+	
Lime		+	+
Limewater		+	+
Linseed oil	technically pure	+	+
Liquer		+	-
Liquid manure		to /	
Liquid paraffin		+	+
Liquid soaps		+	+
Lithium bromide		+	+
Lubricating oils	technically pure	+	+ to /
Lysol		+	/

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Machine oil		+	/
Magnesium carbonate		+	+
Magnesium chloride, aqueous	all	+	+
Magnesium fluosilicate		+	+
Magnesium hydroxide		+	+
Magnesium iodide		+	+
Magnesium salts, aqueous	all	+	+
Magnesium sulphate, aqueous	all	+	+
Maleic acid, aqueous	up to 100%	+	+
Malic acid, aqueous	50%	+	+
Manganese sulphate		+	+
Margarine		+	+
Mash		+	+
Mayonnaise		+	
Menthol		+	/
Mercuric chloride (corrosive sublimate)		+	+
Mercury		+	+
Mercury salts		+	+
Metallic mordants		+	+
Metal soaps		+	+
Methacrylate		+	+
Methacrylic acid		+	+
Methanol	technically pure	+	+
Methoxy butanol		+	/
Methoxybutyl acetate (Butoxyl)		+	/
Methyl alcohol		+	+
Methylbenzene		/	-
Methyl bromide, gaseous	technically pure	-	
Methyl chloride		/	
Methyl chloride, gaseous	technically pure	/	
Methylcyclohexane		/	/ to -
Methylene chloride		/	/*
Methyl ethyl ketone	technically pure	+	/ to -
Methyl glycol		+	+
Methyl isobutyl ketone		+	/ to -
Methyl methacrylate		+	+
4-Methyl pentanol-2		+	+ to / D
Methyl propyl ketone		+	/
n-Methyl pyrrolidone		+	+
Methyl salicylate (salicylic acid methyl ester)		+	/
Methyl sulphuric acid	50%	+	+
Milk		+	+
Mineral oil	without additives	+	+ to /
Mineral spirits, see White spirit			
Mineral water		+	+
Molasses		+	+
Molasses wort		+	+
Monochloroacetic acid		+	/

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Monochloroacetic acid ethyl ester		+	+
Monochloroacetic acid methyl ester		+	+
Monochlorobenzene		/	-
Morpholine		+	+
Motor oil (HD oil)		+	+ to /
Mould-release agents		+	+
Mowilith polymer emulsions		+	+
Mustard		+	+
Nail polish remover		+	/
Naphtha		+	/
Naphthalene		+	-
Nickel chloride		+	+
Nickel nitrate		+	+
Nickel salts, aqueous		+	+
Nickel sulphate, aqueous	all	+	+
Nicotine		+	+
Nitric acid	25%	+	+
Nitric acid	50%	/	- (100%)
Nitrobenzene		+	/
Nitrocellulose		+	
o-Nitrotolunene		+	/
Nonyl alcohol (nonanol)		+	+
Octyl cresol	technically pure	/	-
Oils, animal and vegetable		+	+ to /
Oils, essential		/	-
Oleic acid		+	/
Oleum	all	-	-
Olive oil		+	+
Optical brighteners		+	+
Orange juice		+	+
Oxalic acid, aqueous	all	+	+
Oxygen	all	+	+
Ozone	50 ppm	/	-
Palmitic acid	70%	+	+
Palmityl alcohol		+	+
PaIm-kernal oil		+	+
Paraformaldehyde		+	+
Pentanol		+	
Peppermint oil		+	
Perchloric acid, aqueous	20%	+	+
Perchloric acid, aqueous	50%	+	/
Perchloric acid, aqueous	70%	+	-
Perchloroethylene		/	-
Perfume oils		/	/ to -
Petrol	technically pure	+	+ to /
Petrol/benzene mixture	80/20	+	/
Petroleum		+	/
Petroleum ether		+	/
Phenol		+	+ D

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Phenolic resin moulding materials		+	+
Phenylethyl alcohol		+	+
Phenylhydrazine	technically pure	/	/ to -
Phenylhydrazine hydrochloride		+	-
Phenylsulphonate (sodium dodecylbenzenesulphonate)		+	+
Phosgene, gaseous	100%	-	
Phosgene, liquid	100%	-	
Phosphorus oxichloride		+	/
Phosphates, aqueous	all	+	+
Phosphoric acid, aqueous	50%	+	+
Phosphoric acid, aqueous	80%.. .95%	+	/ D
Phosphorus pentoxide	100%	+	+
Phosphorus trichloride		-	-
Photographic developers		+ D	+ D
Phthalic acid, aqueous	50%	+	+
Phthalic acid ester		+	+ to /
Picric acid, aqueous	1%	+	
Pineapple juice		+	+
Pine-needle oil		+	
Plasticizers		+	/
Polyester plasticizers		+	+ to /
Polyester resins		/	-
Polyglycols		+	+
Polysolvan 0 (glycolic acid n-butyl ester)		+	+
Potash alum, aqueous	all	+	+
Potassium bicarbonate, aqueous	all	+	+
Potassium bisulphate, aqueous	all	+	+
Potassium borate, aqueous	1%	+	+
Potassium bromate, aqueous	up to 10%	+	+
Potassium bromide, aqueous	all	+	+
Potassium carbonate, aqueous	all	+	+
Potassium chlorate, aqueous	all	+	+
Potassium chloride, aqueous	all	+	+
Potassium chromate, aqueous	40%	+	+
Potassium cyanide, aqueous	all	+	+
Potassium dichromate, aqueous	all	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Potassium ferricyanide and ferrocyanide, aqueous	all	+	+
Potassium fluoride, aqueous	all	+	+
Potassium hydroxide, aqueous	30%	+	+
Potassium iodide, aqueous	all	+	+
Potassium nitrate, aqueous	all	+	+
Potassium perborate		+	+
Potassium perchlorate, aqueous	1%	+	
Potassium perchlorate, aqueous	up to 10%	+	/
Potassium permanganate	20%	+	+ D
Potassium permanganate, aqueous	up to 6%	+	+ D
Potassium persulphate, aqueous	all	+	+
Potassium sulphate, aqueous	all	+	+
Potassium sulphide		+	+
Potassium sulphite		+	+
Potassium tetracyanocuprate		+	+
Potassium thiosulphate		+	+
Propanol		+	+
i-Propanol (i-propyl alcohol)	technically pure	+	+
n-Propanol (n-propyl alcohol)		+	+
Propargyl alcohol, aqueous	7%	+	+
Propionic acid, aqueous	all	+	+
Propylene dichloride	100%	-	
Propylene glycol		+	+
Propylene oxide		+	+
Pseudocumene		/	/
Pyridine		+	/
Quinine		+	+
Rubber dispersions (Latex)		+	+
Sagrotan		+	/
Salicylic acid		+	+
Saturated steam condensate		+	+
Sauerkraut		+	+
Seawater		+	+
Silicic acid, aqueous	all	+	+
Silicone oil	technically pure	+	+
Silver nitrate		+	+
Silver nitrate, aqueous	all	+	+
Silver salts, aqueous	cold saturated	+	+
Soap solution, aqueous	all	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Soda, aqueous	all	+	+
Sodium acetate, aqueous	all	+	+
Sodium aluminum sulphate		+	+
Sodium benzoate		+	+
Sodium benzoate, aqueous	any	+	+
Sodium bicarbonate		+	+
Sodium bisulphate		+	+
Sodium bisulphite, aqueous	all	+	+
Sodium borate		+	+
Sodium bromide		+	+
Sodium carbonate, aqueous	all	+	+
Sodium chlorate, aqueous	saturated	+	+
Sodium chloride, aqueous	all	+	+
Sodium chlorite, aqueous	50%	+	
Sodium chromate		+	+
Sodium cyanide		+	+
Sodium dichromate		+	+
Sodium dodecylbenzenesulphonate		+	+
Sodium ferrocyanide		+	+
Sodium fluoride		+	+
Sodium hexacyanoferrate		+	+
Sodium hydroxide, aqueous	all	+	+
Sodium hydroxide, solid		+	+
Sodium hypochlorite, aqueous with 12.5% active chlorine		/	-
Sodium hypochlorite, dry		+	
Sodium nitrate, aqueous	all	+	+
Sodium nitrite, aqueous	all	+	+
Sodium perborate, aqueous	all	+	/
Sodium perchlorate, aqueous		+	+
Sodium peroxide, aqueous	10%	+	+
Sodium peroxide, aqueous	saturated	/	
Sodium phosphate, aqueous	saturated	+	+
Sodium silicate		+	+
Sodium silicate, aqueous	all	+	+

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Sodium sulphate, aqueous	cold saturated	+	+
Sodium sulphide, aqueous	saturated	+	+
Sodium thiosulphate, aqueous (fixing salt)	all	+	+
Sodium thiosulphate, aqueous	saturated	+	+
Sodium thiosulphate, solid (fixing salt)		+	+
Soft soap		+	+
Soyabean oil		+	+
Spermaceti		+	
Spindle oil		+	/
Spirits		to /	/
Stain removers		+	
Standard mineral spirit (DIN 51635)		to /	/
Starch, aqueous	up to 100%	+	/
Stearic acid		+	+
Styrene		/	-
Succinic acid, aqueous	50%	+	+
Sulphates, aqueous solutions	all	+	+
Sulphur		+	+
Sulphuric acid, aqueous	up to 50%	+	+
Sulphuric acid, aqueous	70%	+	0...70% /
Sulphuric acid, aqueous	80%	+	70..90% /
Sulphuric acid, aqueous	98%	+	90..100% /
Sulphuric acid, aqueous	98%	/	-
Sulphuric ether		+	/*
Sulphur dioxide, aqueous	all	to /	/*
Sulphur dioxide, dry and moist	all	+	+
Sulphurous acid		+	+
Sulphur trioxide		-	wet, gas, dry
Sulphuryl chloride		-	
Syrup		+	+
Tallow	technically pure	+	+
Tannic acid	10%	+	+
Tartaric acid, aqueous	all	+	+
Tetrabromoethane		/ to -	-
Tetrachloroethane		/ to -	-
Tetrachloroethylene		/ to -	-
Tetrahydrofuran	technically pure	+	-
		to -	-

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Tetrahydronaphthalene (Tetralin)	technically pure	+	-
Thioglycolic acid		+	+
Thionyl chloride		-	
Thiophene		/	-
Tin (II) chloride, aqueous	all	+	+
Tincture of iodine, DAB 6 (German pharmacopoeia)		+	/
Toluene	technically pure	/	-
Tomato juice		+	+
Transformer oil	technically pure	+	/
Tributyl phosphate		+	+
Trichloroacetic acid	technically pure	+	/ to -
Trichloroacetic acid, aqueous	50%	+	+
Trichloroethylene	technically pure	+	-
Trichlorobenzene		-	-
Tricresyl phosphate		+	+
Triethanolamine		+	+ D
Triethylene glycol		+	+
Trilon		+	+
Trimethyl borate		+	/ to -
Trimethylpropane, aqueous		+	+
Tri-B-chloroethyl phosphate		+	+
Trioctyl phosphate		+	/
Trisodium phosphate		+	+
Turpentine oil	technically pure	+	-
Tutogen U		+	+
Tween 20 and 80		+	-
Two-stroke engine oil		+	/
Urea, aqueous	up to 33%	+	+
Uric acid		+	+
Urine		+	+
Vaseline	technically pure	+	/
Vaseline oil	technically pure	+	/
Vinegar (white vinegar)		+	+
Vinyl acetate		+	+
Viscose spinning solutions		+	+
Vitamin C		+	
Vitamin preparations, dry (powders)		+	

Substance	POLYETHYLENE		
	Concentration	68°F	140°F
Walnut oil		+	/
Waste gases, containing carbonic acid	all	+	+
Waste gases, containing carbon monoxide		+	+
Waste gases, containing hydrochloric acid	all	+	+
Waste gases, containing hydrogen fluoride	traces	+	+
Waste gases, containing nitrosyl sulphuric acid	traces	+	+
Waste gases, containing SO2	low	+	+
Waste gases, containing sulphuric acid (moist)	all	+	+
Water, distilled		+	+
Wax alcohols	technically pure	/	/
Waxes		+	+ to /
Whey		+	+
Whiskey		+	
White spirit	technically pure	+	/
Wine		+	
Wine vinegar		+	+
Wood stains		+	+ to /
Xylene		/	-
Yeast		+	+
Zinc carbonate		+	+
Zinc chloride, aqueous	all	+	+
Zinc oxide		+	+
Zinc salts, aqueous	all	+	+
Zinc sludge		+	+
Zinc stearate		+	+
Zinc sulphate, aqueous	all	+	+

Elastomers

Test Procedure

The criteria for the ratings of various elastomers presented here (Natural Rubber, SBR, and EPDM) were primarily volume swell resistance, compression set resistance, and aging resistance. The ratings were developed from specific data or general agreement of the sources identified in the corresponding table enclosed. Several important factors must be considered in the use of rubber parts in service, including:

1. The Temperature of Service: Greater temperatures increase the effect of all chemicals on polymers. The affect of the temperature varies with the polymer and the chemical.
2. Conditions of Service: A compound that swells badly might still function well as a static seal yet fail in dynamic applications.

Table 2: Numbers used in the following table

Number	Description
1	Minor effect
2	Moderate effect
3	Static only
4	Not recommended
-	Insufficient data

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Acetaldehyde	2	3	1
Acetamide	4	4	1
Acetic acid, glacial	2	2	1
Acetic acid 30%	2	2	1
Acetic anhydride	2	2	2
Acetone	3	3	1
Acetophenone	4	4	1
Acetyl chloride	4	4	4
Acetylene	2	2	1
Acrylonitrile	4	4	4
Adipic acid	1	1	1
Alkazene (Dibromoethylbenzene)	4	4	4
Alum-NH3-Cr-K (aq)	1	1	1
Aluminum acetate (aq)	1	2	1
Aluminum chloride (aq)	1	1	1
Aluminum fluoride (aq)	2	1	1
Aluminum nitrate (aq)	1	1	1
Aluminum phosphate (aq)	1	1	1
Aluminum sulfate (aq)	1	1	1
Ammonia anhydrous	4	4	1
Ammonia gas (cold)	1	1	1
Ammonia gas (hot)	4	4	2
Ammonium carbonate (aq)	1	1	-
Ammonium chloride (aq)	1	1	1
Ammonium hydroxide (conc.)	4	4	1
Ammonium nitrate (aq)	3	2	1
Ammonium nitrite (aq)	1	1	1
Ammonium persulfate (aq)	1	4	1
Ammonium phosphate (aq)	1	1	1
Ammonium sulfate (aq)	1	1	1
Amyl acetate (banana oil)	4	4	3
Amyl alcohol	2	2	1
Amyl borate	4	4	4
Amyl chloronaphthalene	4	4	4
Amyl naphthalene	4	4	4
Aniline	4	4	1
Aniline dyes	2	2	1
Aniline hydrochloride	2	4	2
Animal fats	4	4	2
Ansul ether (anesthetics)	4	4	3

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Aqua regia	4	4	3
Aroclor, 1248	4	4	3
Aroclor, 1254	4	4	3
Aroclor, 1260	1	1	1
Arsenic acid	2	1	1
Arsenic trichloride (aq)	4	4	3
Askarel	4	4	4
Asphalt	4	4	4
Banana oil (amyl acetate)	4	4	3
Barium chloride (aq)	1	1	1
Barium hydroxide (aq)	1	1	1
Barium sulfate (aq)	1	1	1
Barium sulfide (aq)	1	2	1
Beer	1	1	1
Beet sugar liquors	1	1	1
Benzaldehyde	4	4	1
Benzene	4	4	4
Bezene sulfonic acid	4	4	3
Benzine (Ligroin) (Nitrobenzine) (pet ether)	4	4	4
Benzoic acid	4	4	3
Benzoyl chloride	4	4	4
Benzyl alcohol	4	4	1
Benzyl benzoate	4	4	2
Benzyl chloride	4	4	4
Biphenyl (Diphenyl) (Phenylbenzene)	4	4	4
Blast furnace gas	4	4	4
Bleach solutions	4	4	1
Borax	2	2	1
Bordeaux mixture	2	2	1
Boric acid	1	1	1
Brine	1	1	1
Bromine-anhydrous	4	4	4
Bromine trifluoride	4	4	4
Bromine water	4	4	2
Bromobenzene	4	4	4
Binker oil	4	4	4
Butadiene	4	4	3
Butane	4	4	4
Butter (animal fat)	4	4	1
Butyl acetate	4	4	3
Butyl acetyl ricinoleate	4	4	1
Butyl acrylate	4	4	4
Butyl alcohol	1	1	2
Butyl amine	4	4	2
Butyl benzoate	3	2	2
Butyl carbitol	4	4	1
Butyl cellusolve	4	4	1
Butyl oleate	4	4	2
Butyl stearate	4	4	3
Butylene	4	4	4
Butyraldehyde	4	4	2

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Calcium acetate (aq)	1	4	1
Calcium bisulfite (aq)	4	4	4
Calcium chloride (aq)	1	1	1
Calcium hydroxide (aq)	1	1	1
Calcium hypochlorite (aq)	3	3	1
Calcium nitrate (aq)	1	1	1
Calcium sulfide (aq)	2	2	1
Cane sugar liquors	1	1	1
Carbamate	4	4	2
Carbitol	2	2	2
Carbolic acid (phenol)	4	4	2
Carbon bisulfide	4	4	4
Carbon dioxide	2	2	2
Carbonic acid	1	2	1
Carbon monoxide	2	2	1
Carbon tetrachloride	4	4	4
Castor oil	1	1	2
Cellosolve	4	4	2
Cellosolve acetate	4	4	2
Cellulube (Fryquel)	4	4	1
China wood oil (Tung oil)	4	4	3
Chlorine (dry)	4	4	4
Chlorine (wet)	4	4	3
Chlorine dioxide	4	4	3
Chlorine trifluoride	4	4	4
Chloroacetic acid	4	4	1
Chloroacetone	4	4	1
Chlorobenzene	4	4	4
Chlorobromomethane	4	4	2
Chlorobutadiene	4	4	4
Chlorododecane	4	4	4
Chloroform	4	4	4
O-Chloronaphthalene	4	4	4
1-Chloro-1-Nitro ethane	4	4	4
Chlorosulfonic acid	4	4	4
Chlorotoluene	4	4	4
Chlorox (sodium hypochlorite NaOCI)	4	4	2
Chrome plating solutions	4	4	2
Chromic acid	4	4	3
Citric acid	1	1	1
Coal tar (creosote)	4	4	4
Cobalt chloride (aq)	1	1	1
Coconut oil	4	4	3
Cod liver oil	4	4	1
Coke oven gas	4	4	4
Copper acetate (aq)	1	4	1
Copper chloride (aq)	1	1	1
Copper cyanide (aq)	1	1	1
Copper sulfate (aq)	2	2	1
Cornoil	4	4	3

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Cottonseed oil	4	4	2
Creosote (Coal tar)	4	4	4
Cresol	4	4	4
Cresylic acid	4	4	4
Cumene	4	4	4
Cyclohexane	4	4	4
Cyclohexanol	4	4	3
Cyclohexanone	4	4	2
P-Cymene	4	4	4
Decalin	4	4	4
Decane	4	4	4
Denatured alcohol	1	1	1
Detergent solutions	2	2	1
Developing fluids	1	2	2
Diacetone	4	4	1
Diacetone alcohol	4	4	1
Dibenzyl ether	4	4	2
Dibenzyl sebacate	4	4	2
Dibromoethylbenzene (Alkazene)	4	4	4
Dibutyl amine	4	4	3
Dibutyl ether	4	4	3
Dibutyl phthalate	4	4	2
Dibutyl sebacate	4	4	2
O-Dichlorobenzene	4	4	4
Dichloro-isopropyl ether	4	4	3
Dicyclohexylamine	4	4	4
Diesel oil	4	4	4
Diethylamine	2	2	2
Diethyl benzene	4	4	4
Diethyl ether	4	4	4
Diethylene glycol	1	1	1
Diethyl sebacate	4	4	2
Diisobutylene	4	4	4
Diisopropyl benzene	4	4	4
Diisopropyl ketone	4	4	1
Diisopropylidene acetone (Phorone)	4	4	3
Dimethyl formamide	4	4	2
Dimethyl phthalate	4	4	2
Dinitrotoluene	4	4	4
Diocetyl Phthalate	4	4	2
Diocetyl Sebacate	4	4	2
Dioxane	4	4	2
Dioxolane	4	4	2
Dipentene	4	4	4
Diphenyl (Biphenyl) (Phenylbenzene)	4	4	4
Diphenyl oxides	4	4	4
Dowtherm oil	4	4	4
Dry cleaning fluids	4	4	4
Epichlorohydrin	4	4	2
Ethane	4	4	4
Ethanolamine	2	2	2
Ethyl acetate	4	4	2
Ethyl acetoacetate	3	3	2
Ethyl acrylate	4	4	2

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Ethyl alcohol	1	1	1
Ethyl benzene	4	4	4
Ethyl benzoate	1	1	1
Ethyl cellosolve	4	4	4
Ethyl cellulose	2	2	2
Ethyl chloride	4	4	3
Ethyl chlorocarbonate	4	4	2
Ethyl chloroformate	4	4	2
Ethyl ether	4	4	3
Ethyl formate	4	4	2
Ethyl mercaptan	4	4	3
Ethyl oxalate	1	1	1
Ethyl pentachlorobenzene	4	4	4
Ethyl silicate	2	2	1
Ethylene	3	3	2
Ethylene chloride	4	4	3
Ethylene chlorohydrin	2	2	2
Ethylene diamine	1	2	1
Ethylene dichloride	4	4	3
Ethylene glycol	1	1	1
Ethylene oxide	4	4	3
Ethylene trichloride	4	4	3
Fatty acids	4	4	3
Ferric chloride (aq)	1	1	1
Ferric nitrate (aq)	1	1	1
Ferric sulfate (aq)	1	1	1
Fishoil	4	4	4
Fluorinated cyclic ethers	4	4	1
Fluorine (liquid)	4	4	4
Fluorobenzene	4	4	4
Fluoroboric acid	1	1	1
Fluorocarbon oils	2	2	1
Fluorolube	2	3	1
Fluorosilicic acid (hydrofluosilicic acid)	2	3	2
Formaldehyde (RT)	2	2	1
Formic acid	2	1	1
Freon 11	4	4	4
Freon 12	2	1	2
Freon 13	1	1	1
Freon 21	4	4	4
Freon 22	2	1	1
Freon 31	2	2	1
Freon 32	1	1	1
Freon 112	4	3	4
Freon 113	3	2	3
Freon 114	1	1	1
Freon 115	1	1	1
Freon 142b	2	2	2
Freon 152a	1	1	1
Freon 218	1	1	1
Freon C316	1	1	1
Freon C318	1	1	1
Freon 13B1	1	1	1

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Freon 114B2	4	3	4
Freon 502	1	1	1
Freon TF	4	3	4
Freon T-WD602	4	3	2
Freon TMC	4	4	3
Freon T-P35	1	1	1
Freon TA	3	3	2
Freon TC	4	3	2
Freon MF	4	4	4
Freon BF	4	4	4
Fueloil	4	4	4
Fumaric acid	3	3	2
Furan, furfuran	4	4	3
Furfural	4	4	2
Fyrquel (cellulube)	4	4	1
Gallic acid	1	2	2
Gasoline	4	4	4
Gelatin	1	1	1
Glouber's salt (aq)	2	4	2
Glucose	1	1	1
Glue	2	2	1
Glycerin	1	1	1
Glycols	1	1	1
Green sulfate liquor	2	2	1
Hollowax oil	4	4	4
N-Hexaldehyde	4	4	1
Hexane	4	4	4
N-Hexene-1	4	4	4
Hexyl alcohol	2	2	3
Hydrazine	1	1	1
Hydraulic oil (petroleum)	4	4	4
Hydrobromic acid	1	4	1
Hydrobromic acid 40%	1	4	1
Hydrochloric acid (cold) 37%	2	2	1
Hydrochloric acid (hot) 37%	4	4	3
Hydrocyanic acid	2	2	1
Hydrofluoric acid (conc.) cold	4	4	3
Hydrofluoric acid (conc.) hot	4	4	4
Hydrofluoric acid - anhydrous	4	4	3
Hydrofluosilicic acid (fluosilicic acid)	2	3	2
Hydrogen gas	2	1	1
Hydrogen peroxide (90%)	4	4	2
Hydrogen sulfide (wet) cold	4	4	1
Hydrogen sulfide (wet) hot	4	4	1
Hydroquinone	2	4	2
Hypochlorous acid	2	4	2
Iodine pentafluoride	4	4	4

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Iodoform	4	4	4
Isobutyl alcohol	1	2	1
Isooctane	4	4	4
Isophorone	4	4	3
Isopropyl acetate	4	4	2
Isopropyl alcohol	1	2	1
Isopropyl chloride	4	4	4
Isopropyl ether	4	4	4
Kerosene	4	4	4
Lacquers	4	4	4
Lacquer solvents	4	4	4
Lactic acid (cold)	1	1	1
Lactic acid (hot)	4	4	4
Lard	4	4	2
Lavender oil	4	4	4
Lead acetate (aq)	1	4	1
Lead nitrate (aq)	1	1	1
Lead sulfamate (aq)	2	2	1
Ligroin (Benzene) (Nitrobenzene) (pet ether)	4	4	4
Lime bleach	1	2	1
Lime sulfur	4	4	1
Lindol (hydraulic fluid)	4	4	1
Linoleic acid	4	4	4
Linseed oil	4	4	3
Liquefied petroleum gas	4	4	4
Lubricating oils (petroleum)	4	4	4
Lye2	2	1	-
Magnesium chloride (aq)	1	1	1
Magnesium hydroxide (aq)	2	2	1
Magnesium sulfate (aq)	2	2	1
Maleic acid	3	3	2
Maleic anhydride	3	3	2
Malic acid	3	3	2
Mercury chloride (aq)	1	1	1
Mercury	1	1	1
Mesityl oxide	4	4	2
Methane	4	4	4
Methyl acetate	3	3	1
Methyl acrylate	4	4	2
Methylacrylic acid	4	4	2
Methyl alcohol	1	1	1
Methyl bromide	4	4	4
Methyl butyl ketone (propyl acetone)	4	4	1
Methyl cellosolve	4	4	2
Methyl chloride	4	4	3
Methyl cyclopentane	4	4	4
Methylene chloride	4	4	3

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Methyl ether (dimethyl ether) (monomethyl ether)	4	4	4
Methyl ethyl ketone	4	4	1
Methyl formate	4	4	2
Methyl isobutyl ketone	4	4	2
Methyl methacrylate	4	4	3
Methyl oleate	4	4	2
Methyl salicylate	3	3	2
Milk	1	1	1
Mineral oil	4	4	3
Monochlorobenzene	4	4	4
Monomethyl aniline	4	4	2
Monoethanol amine	2	2	1
Monomethyl ether (methyl ether) (dimethyl ether)	4	4	4
Monovinyl acetylene	2	2	2
Mustard gas	1	2	1
Naphtha	4	4	4
Naphthalene	4	4	4
Naphthalenic acid	4	4	4
Natural gas	2	2	4
Neats foot oil	4	4	2
Neville acid	4	4	2
Nickel acetate (aq)	1	4	1
Nickel chloride (aq)	1	1	1
Nickel sulfate (aq)	2	2	1
Niter cake	1	1	1
Nitric acid (conc.)	4	4	4
Nitric acid (dilute)	4	4	2
Nitric acid - red fuming	4	4	4
Nitrobenzene	4	4	1
Nitrobenzene (petroleum ether)	4	4	4
Nitroethane	2	2	2
Nitrogen	1	1	1
Nitrogen tetroxide	4	4	3
Nitromethane	2	2	2
Octachlorotoluene	4	4	4
Octadecane	4	4	4
N-Octane	4	4	4
Octyl alcohol	2	2	3
Oleic acid	4	4	4
Oleum spirits	4	4	4
Olive oil	4	4	2
O-Dichlorobenzene	4	4	4
Oxalic acid	2	2	1
Oxygen - cold	2	2	1
Oxygen - (200°-400°F)	4	4	3
Ozone	4	4	1
Paint thinner, duco	4	4	4
Palmitic acid	2	2	2
Peanut oil	4	4	3

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Perchloric acid	4	4	2
Perchloroethylene	4	4	4
Petroleum - below 250°F	4	4	4
Petroleum - above 250°F	4	4	4
Phenol (carbolic acid)	4	-	2
Phenylbenzene (biphenyl) (diphenyl)	4	4	4
Phenyl ethyl ether	4	4	4
Phenyl hydrazine	1	2	2
Phorane (diisopropylidene acetone)	4	4	3
Phosphoric acid - 20%	2	2	1
Phosphoric acid - 45%	3	3	1
Phosphorus trichloride	4	4	1
Pickling solution	4	4	3
Picric acid	2	2	2
Pinene	4	4	4
Pineoil	4	4	4
Piperidine	4	4	4
Plating solution - chrome	4	4	1
Polyvinyl acetate emulsion	2	4	1
Potassium acetate (aq)	1	4	1
Potassium chloride (aq)	1	1	1
Potassium cupro cyanide (aq)	1	1	1
Potassium cyanide (aq)	1	1	1
Potassium dichromate (aq)	2	2	1
Potassium hydroxide (aq)	2	2	1
Potassium nitrate (aq)	1	1	1
Potassium sulfate (aq)	2	1	1
Producer gas	4	4	4
Propane	4	4	4
i-Propyl acetate	4	4	2
n-Propyl acetate	4	4	2
Propyl acetone (methyl butyl ketone)	4	4	1
Propyl alcohol	1	1	1
Propyl nitrate	4	4	2

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Propylene	4	4	4
Propylene oxide	4	4	2
Pydraul, 10E, 29 ELT	4	4	1
Pydraul, 30E, 50E, 65E, 90E	4	4	1
Pydraul, 115E	4	4	1
Pydraul, 230E, 312C, 540C	4	4	4
Pyranol, transformer oil	4	4	4
Pyridine	4	4	2
Pyroligneous acid	4	4	2
Pyrrole	3	3	3
Radiation	3	3	2
Rapeseed oil	4	4	1
Red oil (MIL-H-5606)	4	4	4
RJ-1 (MIL-F-25558 B)	4	4	4
RP-1 (MIL-F-25576 C)	4	4	4
Sal ammoniac	1	1	1
Salicylic acid	1	2	1
Salt water	1	1	1
Sewage	2	2	2
Silicate esters	4	4	4
Silicone greases	1	1	1
Silicone oils	1	1	1
Silver nitrate	1	1	1
Skydrol 55	4	4	1
Skydrol 7000	4	4	1
Soap solutions	2	1	1
Soda ash	1	1	1
Sodium acetate (aq)	1	4	1
Sodium bicarbonate (aq) (baking soda)	1	1	1
Sodium bisulfite (aq)	1	2	1
Sodium borate (aq)	1	1	1
Sodium chloride (aq)	1	1	1
Sodium cyanide (aq)	1	1	1
Sodium hydroxide (aq)	1	1	1
Sodium hypochlorite (aq) (Clorox)	4	4	2
Sodium metaphosphate (aq)	1	1	1
Sodium nitrate (aq)	2	1	1
Sodium perborate (aq)	2	2	1
Sodium peroxide (aq)	2	2	1
Sodium phosphate (aq)	1	1	1
Sodium silicate (aq)	1	1	1
Sodium sulfate (aq)	2	2	1
Sodium thiosulfate (aq)	2	2	1
Soybean oil	4	4	3
Stannic chloride (aq)	1	1	1

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Stannous chloride (aq)	1	1	1
Steam under 300°F	4	4	1
Steam over 300°F	4	4	3
Stearic acid	2	2	2
Stoddard solvent	4	4	4
Styrene	4	4	4
Sucrose solution	1	1	1
Sulfite liquors	2	2	2
Sulfur	4	4	1
Sulfur chloride (aq)	4	4	4
Sulfur dioxide (dry)	2	2	1
Sulfur dioxide (wet)	4	4	1
Sulfur dioxide (liquified under pressure)	4	4	1
Sulfur hexafluoride	4	4	1
Sulfur trioxide	2	2	2
Sulfuric acid (dilute)	3	3	2
Sulfuric acid (conc.)	4	4	3
Sulfuric acid (20% oleum)	4	4	4
Sulfurous acid	2	2	2
Tannic acid	1	2	1
Tar, bituminous	4	4	3
Tartaric acid	3	4	2
Terpineol	4	4	3
Tertiary butyl alcohol	2	2	2
Tertiary butyl catechol	4	2	2
Tertiary butyl mercaptan	4	4	4
Tetrabromoethane	4	4	4
Tetrabromomethane	4	4	4
Tetrabutyl titanate	2	2	1
Tetrachloroethylene	4	4	4
Tetraethyl lead	4	4	4
Tetrahydrofuran	4	4	3
Tetralin	4	4	4
Thionyl chloride	4	4	3
Titanium tetrachloride	4	4	4
Toluene	4	4	4
Toluene diisocyanate	4	4	2
Transformer oil	4	4	4
Transmission fluid type A	4	4	4
Triacetin	2	2	1
Triaryl phosphate	4	4	1
Tributoxy ethyl phosphate	2	2	1
Tributyl mercaptan	4	4	4
Tributyl phosphate	2	4	2
Trichloroacetic acid	3	2	2
Trichloroethane	4	4	4
Trichlorethylene	4	4	4
Tricresyl phosphate	4	1	4
Triethanol amine	2	2	1

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
Triethyl aluminum	4	4	3
Triethyl borane	4	4	3
Trinitrotoluene	4	4	4
Trioctyl phosphate	4	4	1
Tung oil (China wood oil)	4	4	3
Turbine oil	4	4	4
Turpentine	4	4	4
Unsymmetrical dimethyl hydrazine (UDMH)	1	1	1
Varnish	4	4	4
Vegetable oils	4	4	3
Versilube F-50	1	1	1
Vinegar	2	2	1
Vinyl chloride	4	4	4
Wagner 21B brake fluid	2	1	1
Water	1	1	1
Whiskey, wines	1	1	1
White pine oil	4	4	4
White oil	4	4	4
Woodoil	4	4	4
Xylene	4	4	4
Xylidine (Di-methyl aniline)	3	3	2
Zeolites	1	1	1
Zinc acetate (aq)	1	4	1
Zinc chloride (aq)	1	1	1
Zinc sulfate (aq)	2	2	1
TT-T-656b	4	4	1
VV-B-680	2	1	1
VV-G-632	4	4	4
VV-G-671c	4	4	4
VV-H-910	2	1	1
VV-I-530a	4	4	4
VV-K-211d	4	4	4
VV-K-220a	4	4	4
VV-L-751b	4	4	4
VV-L-800	4	4	4
VV-L-820b	4	4	4
VV-L-825a type I	4	4	4
VV-L-825a type II	4	4	4
VV-L-825a type III	4	4	4
VV-O-526	4	4	4
VV-P-216a	4	4	4
VV-P-236	4	4	4
51-F-23	4	4	4
ASTM Method D-471			
1	4	4	4
2	4	4	4
3	4	4	4
MIL-L-644 B	3	3	3
MIL-L-2104 B	4	4	4
MIL-L-2105 B	4	4	4
MIL-G-2108	4	4	4
MIL-S-3136 B type I	4	4	4
MIL-S-3136 B type II	4	4	4

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
MIL-S-3136 B type III	4	4	4
MIL-S-3136 B type IV	4	4	4
MIL-S-3136 B type V	4	4	4
MIL-S-3136 B type VI	4	4	4
MIL-S-3136 B type VII	4	4	4
MIL-L-3150 A	4	4	4
MIL-L-3503	4	4	4
MIL-L-3545 B	4	4	4
MIL-C-4339 C	4	4	4
MIL-G-4343 B	4	4	3
MIL-L-5020 A	4	4	4
MIL-J-5161 F	4	4	4
MIL-C-5545 A	4	4	4
MIL-H-5559 A	2	1	1
MIL-F-5566	1	1	1
MIL-F-5602	4	4	4
MIL-H-5606 B (red oil)	4	4	4
MIL-J-5624 G JP-3, JP-4, JP-5	4	4	4
MIL-O-6081 C	4	4	4
MIL-L-6082 C	4	4	4
MIL-H-6083 C	4	4	4
MIL-L-6085 A	4	4	4
MIL-L-6086 B	4	4	4
MIL-L-6387 A	4	4	4
MIL-C-6529 C	4	4	4
MIL-F-7024 A	4	4	4
MIL-H-7083 A	2	1	1
MIL-G-7118 A	4	4	4
MIL-G-7187	4	4	4
MIL-G-7421 A	4	4	4
MIL-H-7644	2	1	1
MIL-L-7645	4	4	4
MIL-G-7711 A	4	4	4
MIL-L-7808 F	4	4	4
MIL-L-7870 A	4	4	4
MIL-C-8188 C	4	4	4
MIL-A-8243 B	2	1	1
MIL-L-8383 B	4	4	4
MIL-H-8446 B (MLO-8515)	4	4	4
MIL-L-8660 B	1	1	1
MIL-L-9000 F	4	4	4
MIL-T-9188 B	4	4	1
MIL-L-9236 B	3	3	3
MIL-L-10295 A	4	4	4
MIL-L-10324 A	4	4	4
MIL-G-10294 B	4	4	4
MIL-L-11734 B	4	4	4
MIL-O-11773	4	4	4
MIL-P-12098	2	1	1
MIL-H-13862	4	4	4
MIL-H-13866 A	4	4	4
MIL-H-13910 B	2	1	1
MIL-H-13919 A	4	4	4
MIL-L-14107 B	4	4	4

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
MIL-L-15017	4	4	4
MIL-L-15015 B	4	4	4
MIL-L-15019 C	4	4	4
MIL-L-15719 A	3	2	2
MIL-G-15793	4	4	4
MIL-F-16929 A	4	4	4
MIL-L-16958 A	4	4	4
MIL-F-17111	4	4	4
MIL-L-17331 D	4	4	4
MIL-L-17353 A	4	4	4
MIL-L-17672 B	4	4	4
MIL-L-18486 A	4	4	4
MIL-G-18709 A	4	4	4
MIL-H-19457 B	4	4	1
MIL-F-19605	4	4	4
MIL-L-19701	4	4	4
MIL-21260	4	4	4
MIL-S-21568 A	2	1	1
MIL-H-22072	2	1	1
MIL-L-22396	4	4	4
MIL-L-23699 A	4	4	4
MIL-G-23827 A	4	4	4
MIL-G-25013 D	2	1	1
MIL-F-25172	4	4	4
MIL-L-25336 B	4	4	4
MIL-F-25524 A	4	4	4
MIL-G-25537 A	4	4	4
MIL-F-25558 B (RJ-1)	4	4	4
MIL-F-25576 C (RP-1)	4	4	4
MIL-H-25598	4	4	4
MIL-F-25656 B	4	4	4
MIL-L-25681 C	2	1	1
MIL-G-25760 A	3	3	4
MIL-L-25968	4	4	4
MIL-L-26087 A	4	4	4
MIL-G-27343	1	1	1
MIL-H-27601 A	4	4	4
MIL-G-27617	-	2	1
MIL-I-27686 D	2	1	1
MIL-L-27694 A	1	1	1
MIL-L-46000 A	4	4	4
MIL-H-46001 A	4	4	4
MIL-L-46002	4	4	4
MIL-H-46004	4	4	4
MIL-P-46046 A	2	1	1
MIL-H-81019 B	4	4	4
MIL-S-81087	1	1	1
O-A-548 a	2	1	1
O-T-634 b	4	4	4
P-S-661 b	4	4	4
P-D-680	4	4	4
TT-N-95 a	4	4	4
TT-N-97 b	4	4	4
TT-I-735 b	1	1	1
TT-S-735 type I	4	4	4
TT-S-735 type II	4	4	4
TT-S-735 type III	4	4	4

Substance	Natural Rubber (NR, IR)	Styrene Butadiene (SBR, BR)	Ethylene Propylene (EPM, EPDM)
TT-S-735 type IV	4	4	4
TT-S-735 type V	4	4	4
TT-S-735 type VI	4	4	4
TT-S-735 type VI	4	4	4

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