no gaps in environmental concern.

RESISTANCE TABLE

according to commodity "elastomers"

Materials:

NR = Natural rubber
Temp. tmax. -30...+ 60° C, Shore -A-hardness 60 ± 5
Temp. Tmax. -22...+ 140° F

NBR = Acrylnitrile Butadiene rubber DRINKING WATER + GAS
Temp. tmax. -25...+ 70° C, Shore-A-hardness 80 ± 5
Temp. tmax. -13...+ 158° F

HNBR = Hydrogenated Acrylonitrile Butadiene rubber
Temp. tmax. -25...+ 150° C, Shore-A-hardness 75 ± 5
Temp. tmax. -13... + 302° F

CR = Chloroprene rubber
Temp. tmax. -25...+ 95° C, Shore-A-hardness 63 ± 5
Temp. tmax. -13...+ 203° F

CSM= Chlorosulphonated Monomer rubber
Temp. tmax. -20...+ 120° C, Shore-A-hardness 70 ± 5
Temp. tmax. -4...+ 248° F

EPDM = Ethylene Propylene Diene Monomer rubber
Temp. tmax. -30...+ 120° C, Shore-A-hardness 70 ± 5
Temp. tmax. -22...+ 248° F

FPM = Fluorinated rubber acid proof
Temp. tmax. -20...+ 200° C, Shore-A-hardness 80 ± 5
Temp. tmax. -4...+ 392° F

IIR = Isobutene Isoprene rubber (Butyle rubber)
Temp. tmax. -25...+ 120° C, Shore-A-hardness 55 ± 5
Temp. tmax. -13...+ 248° F

This is a broad indication of the properties of materials.
Specific applications should be approved and confirmed by technical staff at Kroll & Ziller.
Adviser Service forms (by fax or e-mail) are available for this purpose.

KROLL & ZILLER

The gasket people

KROLL & ZILLER GmbH & Co. KG
Reisholzstrasse 15
D-40721 Hilden/Germany
Telefon: +49 (0)2103-951-500
Fax Inland/domestic: +49 (0)2103-951-508,509
Fax Ausland/Export: +49 (0)2103-951-510
eMail: Kroll-Ziller@t-online.de
http://www.Kroll-Ziller.de

QM-System certified by: TÜV CERT ISO 9002

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Acetaldehyde	+	O	+	+	-	O	O	-
Acetic acid anhydride	O	-	O	+	-	O	O	-
Acetic acid butyl ester	-	-	+	+	-	-	-	-
Acetic acid ethyl ester	-	-	+	+	-	-	-	-
Acetic acid concentrated	O	-	O	+	-	-	-	-
Acetic acid glacial	O	-	O	+	-	-	-	-
Acetone	+	+	+	+	-	O	O	-
Acetophenone	-	-	+	+	-	-	-	-
Acetylchloride	-	-	-	-	-	-	-	+
Acetylene	+	+	+	+	+	+	+	+
Acetylene tetrachloride	-	-	-	-	-	-	-	O
Acronal dispersion	O	O	O	O	O	O	O	-
Acrylic acid ethyl ester	-	-	+	+	-	-	-	-
Acrylonitrile	-	O	O	O	-	O	-	-
Adipic acid solution	+	+	+	+	+	+	+	+
Air	O	O	+	+	O	+	+	+
Air 100°C	-	-	O	+	-	-	O	+
Air 200°C	-	-	-	-	-	-	-	+
Alcohol	+	+	+	+	O	+	+	+
Alum(Aluminium sulphate) solution	+	+	+	+	+	+	+	+
Aluminium acetate solution	+	O	+	+	+	+	O	-
Aluminium chloride solution	+	+	+	+	+	+	+	+
Aluminium fluoride solution	+	+	+	+	+	+	+	+
Aluminium nitrate solution	+	+	+	+	+	+	+	+
Aluminium sulphate solution	+	+	+	+	+	+	+	+
Ammonia gas	O	O	+	+	O	+	+	-
Ammoia solution	O	O	+	+	O	+	+	O
Ammonium carbonate solution	+	+	+	+	(+)	+	+	O
Ammonium chloride solution	+	+	+	+	+	+	+	O
Ammonium fluoride solution	+	+	+	+	+	+	+	O
Ammonium hydroxide solution	O	O	+	+	O	+	+	O
Ammonium nitrate solution	(+)	+	+	+	+	+	+	O
Ammonium nitrite solution	+	+	+	+	+	+	+	O
Amminium per-sulphate solution	-	-	+	+	-	+	+	O
Ammonium phos-phate solution	+	+	+	+	+	+	+	O
Ammonium sulphate solution	+	+	+	+	+	+	+	O
Ammonium sulphide solution	+	+	+	+	+	+	+	O
Amyl acetate	O	-	+	+	-	-	-	-
n-Amyl alcohol	+	+	+	+	O	+	+	+
Aniline	O	O	+	+	-	-	-	+
Anisole	-	-	-	-	-	-	-	+
Antifreeze (glycol based)	+	+	+	+	+	+	+	+

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Antimony chloride solution	+	+	+	+	+	+	+	+
Aqua Regia solution	-	-	-	-	-	-	-	O
Arsenic acid solution	+	+	+	+	+	+	+	+
ASTM-Fuel A	-	-	-	-	+	O	O	+
ASTM-Fuel B	-	-	-	-	O	-	-	+
ASTM-Fuel C	-	-	-	-	O	-	-	+
ASTM-Fuel D	-	-	-	-	-	-	-	+
ASTM-Oil No. 1, 100°C	-	-	-	-	+	+	+	+
ASTM-Oil No. 1, 70°C	-	-	-	-	+	+	+	+
ASTM-Oil No. 2, 100°C	-	-	-	-	+	-	-	+
ASTM-Oil No. 2, 70°C	-	-	-	-	+	O	O	+
ASTM-Oil No. 3, 100°C	-	-	-	-	+	-	-	+
ASTM-Oil No. 3, 70°C	-	-	-	-	+	-	-	+
Avgas	-	-	-	-	+	O	O	+
Avgas(JP)	-	-	-	-	+	-	-	+
Avgas A (ISO-Fluid A)	-	-	-	-	+	O	O	+
Avgas B (ISO-Fluid B)	-	-	-	-	O	-	-	+
Avgas C (ISO-Fluid C)	-	-	-	-	O	-	-	+
Avgas D (ISO-Fluid D)	-	-	-	-	-	-	-	+
Barium chloride solution	+	+	+	+	+	+	+	+
Barium hydroxide solution	+	+	+	+	+	+	+	+
Battery acid	-	-	+	+	-	-	+	+
Beer	+	+	+	+	+	+	+	+
Benzaldehyde	-	-	+	+	-	-	-	-
Benzene	-	-	-	-	-	-	-	+
Benzoic acid solution	+	+	+	+	+	+	+	+
Benzyl alcohol	(+)	(+)	+	+	-	O	O	+
Benzyl benzoate	-	-	O	O	-	-	-	+
Benzyl chloride	-	-	-	-	-	-	-	+
Bisulphite liquor	O	O	+	+	O	+	+	+
Bleach solution concentrated	-	-	+	+	-	-	+	+
Borax solution	+	+	+	+	+	+	+	+
Boric acid solution	+	+	+	+	+	+	+	+
Brake fluid 100°C (Glycol based)	-	+	+	+	-	-	-	-
Brake fluid 150°C (Glycol based)	-	-	O	+	-	-	-	-
Brake fluid 50°C (Glycol based)	+	+	+	+	-	O	O	-
Brine	+	+	+	+	+	+	+	+
Bromic acid solution	O	-	+	+	-	O	+	+
Bromine gas (vapour)	-	-	-	-	-	-	-	+
Bromine liquid	-	-	-	-	-	-	-	+

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Bromine pentafluoride	-	-	-	-	-	-	-	-
Bromine trifluoride	-	-	-	-	-	-	-	-
Bromine water saturated	-	-	-	O	-	-	-	+
Butadiene	-	-	-	-	O	-	-	+
Butane	-	-	-	-	+	+	O	+
Butanol	+	+	+	+	O	+	+	+
tert-Butanol	O	O	O	O	O	O	O	+
Butter (11.6% water content),70°C	-	-	-	-	+	-	-	+
Butyl Acetate	-	-	+	+	-	-	-	-
Butyl alcohol	+	+	+	+	O	+	+	+
Butyl amine	-	-	-	-	-	-	-	-
Butylene	-	-	-	-	+	-	-	+
Butyraldehyde	-	-	+	+	-	-	-	-
Calcium acetate solution	+	(+)	+	+	+	+	(+)	-
Calcium bisul-phite solution	O	O	+	+	O	+	+	+
Calcium chloride solution	+	+	+	+	+	+	+	+
Calcium hydrox-ide solution	+	+	+	+	+	+	+	+
Calcium hypo-chlorite solution	-	-	+	+	-	-	+	+
Calcium nitrate solution	+	+	+	+	+	+	+	+
Calcium phos-phate solution	+	+	+	+	+	+	+	+
Calcium sulphide solution	+	+	+	+	+	+	+	+
Camphor oil	-	-	-	-	+	-	(-)	+
Carbolic acid	-	-	O	O	-	-	-	+
Carbolineum	-	-	-	-	-	-	-	+
Carbon dioxide, dry	+	+	+	+	+	+	+	+
Carbon dioxide, moist	+	+	+	+	+	+	+	+
Carbon disulphide	-	-	-	-	-	-	-	+
Carbon disulphide solution	-	-	-	-	-	-	-	+
Carbon monoxide, dry	+	+	+	+	+	+	+	+
Carbon tetrachloride	-	-	-	-	-	-	-	+
Carbonic acid	+	+	+	+	+	+	+	+
Castor oil	+	+	+	+	+	+	+	+
Chlophen A 60	-	-	-	-	-	-	-	+
Chlorhydric acid gas	-	-	+	+	-	O	+	+
Chloric acid solution, 20%	-	-	+	+	-	O	+	+
Chloride of lime	-	-	+	+	-	-	+	+
Chlorine dioxide	-	-	-	-	-	-	-	+
Chlorine gas, dry	-	-	O	O	-	-	-	+
Chlorine gas, wet	-	-	O	O	-	-	-	+
Chlorine water, saturated	-	-	O	O	-	-	-	+
Chloro trifluoride	-	-	-	-	-	-	-	-
Chloroacetic acid	-	-	O	O	-	-	-	-
Chloroacetone	-	-	+	+	-	-	-	-
Chlorobenzene	-	-	-	-	-	-	-	+

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Chlorobromo methane	-	-	O	O	-	-	-	-
Chlorobutadiene	-	-	-	-	-	-	-	+
Chloroform	-	-	-	-	-	-	-	+
1- Chloro naphthalene	-	-	-	-	-	-	-	+
Chloroprene	-	-	-	-	-	-	-	+
Chlorosulphonic acid	-	-	-	-	-	-	-	-
Chlorotoluene	-	-	-	-	-	-	-	+
Chromic acid solution	-	-	O	O	-	-	O	+
Cinnamaldehyde	O	-	+	+	-	-	-	+
Citric acid solution	+	+	+	+	+	+	+	+
City gas, benzene free	-	-	-	-	+	O	O	+
Cobalt chloride solution	+	+	+	+	+	+	+	+
Cocoa butter	-	-	-	-	-	-	-	+
Cocoa fat	-	-	-	-	+	O	O	+
Coconut oil	-	-	-	-	+	-	-	+
Cod liver oil	(-)	(-)	(-)	(-)	+	(+)	(+)	+
Cooking salt solution	+	+	+	+	+	+	+	+
Copper acetate solution	O	-	+	+	O	O	O	-
Copper chloride solution	+	+	+	+	+	+	+	+
Copper cyanide solution	+	+	+	+	+	+	-	+
Copper nitrate solution	+	+	+	+	+	+	+	+
Copper sulphate solution	+	+	+	+	+	+	+	+
Copper vitriol solution	+	+	+	+	+	+	+	+
Corn oil	-	-	-	-	+	O	O	+
Cottonseed oil	-	-	-	-	+	O	O	+
Creosote (wood based)	-	-	-	-	+	-	-	+
Cresol solution	-	-	-	-	-	-	-	+
Crude oil	-	-	-	-	+	O	-	+
Cumol	-	-	-	-	-	-	-	+
Cyclohexane	-	-	-	-	+	-	-	+
Cyclohexanol	-	-	-	-	+	O	O	+
Cyclohexanone	-	-	O	O	-	-	-	-
p-Cymene	-	-	-	-	-	-	-	+
Decalin	-	-	-	-	O	-	-	+
Decane	-	-	-	-	+	-	-	+
Desmodur 44	-	-	-	-	-	-	-	+
Dextrin solution	+	+	+	+	+	+	+	+
Diacetone alcohol	-	-	+	+	-	-	-	-
Dibenzylether	-	-	O	O	-	-	-	+
Dibenzylsebacate (Sebacic acid, dibenzyl ester)	-	-	+	+	-	-	-	+
Dibutylamine	-	-	-	-	-	-	-	-
Dibutylether	-	-	-	-	O	-	-	+
Dibutylphthalate	-	-	O	+	-	-	-	O
Dibutylsebacate (Sebacic acid, dibutyl ester)	-	-	+	+	-	-	-	+
Dibutyric acid (Bernstein / amber acid)	+	+	+	+	+	+	+	+

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Dibutyric acid diethyl ester	O	-	+	+	-	-	-	-
Dichloroacetic acid methyl ester	-	-	+	+	-	-	+	-
Dichlorobenzene	-	-	-	-	-	-	-	+
Dichloroethane	-	-	-	-	-	-	-	+
Dichloroiso-propylether	-	-	-	-	-	-	-	-
Dichlorolmethane	-	-	-	-	-	-	-	O
Dicylohexy-lamine	-	-	-	-	-	-	-	-
Diesel oil	-	-	-	-	+	-	-	+
Diethylamine	O	O	O	O	-	-	-	-
Diethyleneglycol	+	+	+	+	+	+	+	+
Diethylether	-	-	-	-	-	-	-	-
Diethylsebacate (Sebacic acid, diethyl ester)	-	-	+	+	-	-	-	+
Diglycolic acid solution	+	+	+	+	O	+	+	+
Diisobutylene	-	-	-	-	+	-	-	+
Diisobutylketone	O	O	+	+	-	-	-	-
Diisopropylketone	-	-	+	+	-	-	-	-
Dimethylamine	-	-	O	O	-	-	O	-
Dimethylaniline	-	-	-	O	(-)	-	(-)	-
Dimethylether	O	(-)	+	+	(-)	(-)	(-)	(-)
Dimethylforma-mide	-	-	+	+	-	-	-	-
Dimethylphtha-late	-	-	+	+	-	-	-	+
Dioctylphthalate (DOP)	-	-	+	+	-	-	-	+
Dioctylsebacate (Sebacic acid, dioctyl ester)	-	-	+	+	-	-	-	+
Dioxane	-	-	O	O	-	-	-	-
Dipentene	-	-	-	-	O	-	-	+
Diphenylether	-	-	-	-	-	-	-	+
Diphyl	-	-	-	-	-	-	-	+
Dipropylketone	-	-	O	O	-	-	-	-
Dodecylalcohol	+	+	+	+	+	+	+	+
Elaol FR, 80°C	-	-	O	+	-	-	-	+
Epichlorohydrin	-	-	O	O	-	-	-	-
Ethane	-	-	-	-	+	O	O	+
Ethanol	+	+	+	+	O	+	+	+
Ethanolamine	O	+	+	+	O	O	-	-
Ether	-	-	-	-	-	-	-	-
Ethereal oils	-	-	-	-	-	-	-	O
Ethyl acetate	-	+	+	-	-	-	-	-
Ethyl acrylate	-	+	+	-	-	-	-	-
Ethyl alcohol	+	+	+	+	O	+	+	+
Ethyl benzol	-	-	-	-	-	-	-	+
Ethyl chloride	O	O	+	+	+	O	-	+
Ethyl ether	-	-	-	-	-	-	-	-
Ethyl formate	-	-	O	O	-	O	O	+
Ethyl hexanol	+	+	+	+	+	+	+	+
Ethyl mercaptan	-	-	-	-	-	-	-	+
Ethyl silicate	O	O	+	+	+	+	O	+
Ethylene	(-)	(-)	(-)	(-)	+	(-)	(-)	+
Ethylene chloride	-	-	-	-	-	-	-	+
Ethylene chlorohydrin	O	O	O	O	-	O	O	+
Ethylene diamine	+	O	+	+	+	+	O	-
Ethylene dibromide	-	-	-	-	-	-	-	+

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Ethylene dichloride	-	-	-	-	-	-	-	+
Ethylene glycol	+	+	+	+	+	+	+	+
Ethylene oxide	-	-	O	O	-	-	-	-
Ethylene trichloride	-	-	-	-	-	-	-	+
Ferric chloride solution	+	+	+	+	+	+	+	+
Ferric nitrate solution	+	+	+	+	+	+	+	+
Ferric sulphate solution	+	+	+	+	+	+	+	+
Fish liver oil	-	-	-	-	+	+	+	+
Fluid 101, 100°C	-	-	-	-	O	-	-	+
Fluisil S 25, 80°C	-	O	O	O	+	+	+	+
Fluorine, dry	-	-	O	O	-	(-)	(-)	+
Fluorobenzene	-	-	-	-	-	-	-	+
Fluosilicic acid	-	-	-	+	-	-	-	+
Formalin,30 %	+	+	+	+	+	+	+	O
Formamide	+	(+)	+	+	-	O	+	O
Formic acid	O	O	+	+	-	+	+	-
Freon 11	-	-	-	-	+	O	+	+
Freon 112	-	-	-	-	O	O	O	+
Freon 113	-	O	-	-	+	+	+	O
Freon 114	+	+	+	+	+	+	+	O
Freon 114 B 2	-	-	-	-	O	+	+	O
Freon 115	+	+	+	+	+	+	+	+
Freon 12	O	+	O	O	+	+	+	O
Freon 13	+	+	+	+	+	+	+	+
Freon 13 B 1	+	+	+	+	+	+	+	+
Freon 14	+	+	+	+	+	+	+	+
Freon 142b	+	+	+	+	+	+	+	-
Freon 152a	+	+	+	+	+	+	-	-
Freon 21	-	-	-	-	-	O	-	-
Freon 218	+	+	+	(+)	+	+	+	+
Freon 22	O	+	+	+	-	+	+	-
Freon 31	-	O	+	+	-	+	O	-
Freon 32	+	+	+	+	+	+	+	-
Freon C 316	+	+	+	(+)	+	+	+	(+)
Freon C 318	+	+	+	+	+	+	+	+
Fruit juice	+	+	+	+	+	+	+	+
Furan (Furfurane)	-	-	-	-	-	-	-	(-)
Furfural (a-Furaldehyde)	-	-	+	+	-	-	-	-
Furfuryl alcohol	-	-	+	+	-	-	-	(-)
Gas,natural	-	-	-	-	+	O	O	+
Gasoline	-	-	-	-	O	-	-	+
Gear oil, EP (Hypoid),110°C	-	-	-	-	-	-	-	+
Gelatine solution	+	+	+	+	+	+	+	+
Glucose solution	+	+	+	+	+	+	+	+
Glucose solution (Grape sugar)	+	+	+	+	+	+	+	+
Glue (Bone glue)	+	+	+	+	+	+	+	+
Glycerine	+	+	+	+	+	+	+	+
Glycol	+	+	+	+	+	+	+	+
Glycolic acid solution	+	+	+	+	+	+	+	+
Grease and oil, animal	-	-	-	-	+	O	O	+
Grease and oil, mineral	-	-	-	-	+	O	O	+

Medium
Grease ar vegetable
Heating o (Coal oil b
Heating o (Petroleur based)
Helium
Henkel-P solution
n-Heptane
Heptanon
Hexachlo diene
Hexachlo hexane
n-Hexalde
n-Hexane
Heaxanet
n-Hexene
Hexyl alco
Hydraulic HFA,50°C
Hydraulic HFB,50°C
Hydraulic HFC,60°C
Hydraulic HFD-R, 1
Hydraulic HFD-S, 1
Hydraulic (Mineral c 100°C
Hydrazine
Hydrochlo solution, 1
Hydrochlo fuming
Hydrofluo acid, 65%
Hydrofluo acid, anhy
Hydrogen
Hydrogen chloride g
Hydrogen peroxide,
Hydrogen peroxide,
Hydrogen sulphide
Hydroxyla sulphate s
Iodinepen fluoride
Iso-octane
Isobutyl a
Isopropar
Isopropyla
Isopropyla
Isopropylc
Isopropyle
Kerosene
Lactam

Medium	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Grease and oil, vegetable	-	-	-	-	+	O	O	+
Heating oil (Coal oil based)	-	-	-	-	+	-	-	+
Heating oil (Petroleum oil based)	-	-	-	-	+	O	-	+
Helium	+	+	+	+	+	+	+	+
Henkel-P3-solution	O	+	+	+	+	+	+	+
n-Heptane	-	-	-	-	+	O	-	+
Heptanone	-	-	O	O	-	-	-	-
Hexachlorobuta. diene	-	-	(-)	(-)	-	-	(-)	+
Hexachlorocyclo. hexane	-	-	(-)	(-)	(-)	(-)	(-)	+
n-Hexaldehyde	-	-	O	+	-	+	-	-
n-Hexane	-	-	-	-	+	O	-	+
Heaxanetriol	(+)	(+)	+	+	+	+	+	+
n-Hexene-1	-	-	-	-	O	O	O	+
Hexyl alcohol	+	+	O	O	+	O	O	+
Hydraulic fluid, HFA,50°C	-	-	-	-	+	O	-	+
Hydraulic fluid, HFB,50°C	-	-	-	-	+	O	-	+
Hydraulic fluid, HFC,60°C	+	+	+	+	+	+	+	-
Hydraulic fluid, HFD-R, 100°C	-	-	O	+	-	-	-	+
Hydraulic fluid, HFD-S, 100°C	-	-	-	-	-	-	-	+
Hydraulic oil (Mineral oil based) 100°C	-	-	-	-	+	O	-	+
Hydrazine	(-)	O	+	+	O	O	O	(-)
Hydrochloric acid solution, 10%	O	O	+	+	O	+	+	+
Hydrochloric acid, fuming	-	-	+	+	-	-	-	O
Hydrofluoric acid, 65%	-	-	+	+	-	O	+	+
Hydrofluoric acid, anhydrous	-	-	O	O	-	-	+	-
Hydrogen	+	+	+	+	+	+	+	+
Hydrogen chloride gas	-	-	+	+	-	O	+	+
Hydrogen peroxide, 3%	O	O	+	+	O	+	+	+
Hydrogen peroxide, 90%	-	-	-	-	-	-	-	+
Hydrogen sulphide	-	-	+	+	-	+	-	-
Hydroxylamine sulphate solution	+	+	+	+	+	O	+	+
Iodinepenta-fluoride	-	-	-	-	-	-	-	-
Iso-octane	-	-	-	-	+	O	O	+
Isobutyl alcohol	O	O	+	+	O	+	+	+
Isopropanol	+	O	+	+	O	O	+	+
Isopropylacetate	-	-	+	+	-	-	-	-
Isopropylalcohol	+	O	+	+	O	O	+	+
Isopropylchloride	-	-	-	-	-	-	-	+
Isopropylether	-	-	-	-	O	-	-	-
Kerosene	-	-	-	-	+	-	-	+
Lactam	-	-	+	+	-	O	O	-

Medium	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Lactic acid solution	+	+	+	+	+	+	+	+
Lard	-	-	-	-	+	O	O	+
Laughing gas	+	+	+	+	+	+	+	+
Lauryl alcohol	+	+	+	+	+	+	+	+
Lavender oil	-	-	-	-	O	-	-	+
Lead acetate	+	-	+	+	O	O	-	-
Lead nitrate solution	+	+	+	+	+	+	+	(+)
Linseed oil	-	-	-	-	+	-	-	+
Liquor	+	+	+	+	+	+	+	+
Lithium bromide solution	+	+	+	+	+	+	+	+
Lithium chloride solution	+	+	+	+	+	+	+	+
Lubricating oil (mineral based)	-	-	-	-	+	O	O	+
Machine oil mineral	-	-	-	-	+	O	-	+
Magnesium chloride solution	+	+	+	+	+	+	+	+
Magnesium hydroxide solution	+	+	+	+	+	+	+	+
Magnesium sulphate solution	+	+	+	+	+	+	+	+
Maleic acid solution	+	+	+	+	+	+	+	+
Margarine	-	-	-	-	+	O	-	+
Mercuric chloride solution	+	+	+	+	+	+	+	+
Mercury	+	+	+	+	+	+	+	+
Methacrylic acid methyl ester	-	-	-	-	-	-	-	-
Methane	-	-	-	-	+	O	O	+
Methanol	+	+	+	+	O	O	+	-
Methyl acetate	-	-	O	O	-	O	-	-
Methyl acrylate	-	-	O	O	-	O	-	-
Methyl alcohol	+	+	+	+	O	O	+	-
Methyl amine solution	+	O	+	+	-	+	+	-
Methyl bromide	-	-	(-)	(-)	-	-	-	+
Methyl butyl ketone	-	-	+	+	-	-	-	-
Methyl chloride	-	-	-	-	-	-	-	+
Methyl cyclo pentane	-	-	-	-	-	-	-	+
Methyl ether	O	(-)	+	+	(-)	(-)	(-)	(-)
Methyl ethyl keto-ne (Butanone)	-	-	+	+	-	-	-	-
Metyhl formate (Formic acid methyl ester)	-	-	O	O	-	O	O	(-)
Methyl glycol acetate	-	O	+	+	-	-	O	-
Methyl isobutyl ketone	-	-	O	O	-	-	-	-
Methyl isopropyl ketone	-	-	O	O	-	-	-	-
Methyl methacrylate	-	-	-	-	-	-	-	-
Methyl oleate	-	-	O	O	-	-	-	+
Methyl sulphuric acid	(-)	(-)	+	+	-	+	+	+
Methylene chloride	-	-	-	-	-	-	-	+
Methylene chloride	-	-	-	-	-	-	-	O

Medium	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Methylene dichloride	-	-	-	-	-	-	-	O
Milk	+	+	+	+	+	+	+	+
Mine gas (Firedamp)	-	-	-	-	+	O	O	+
Mineral oil	-	-	-	-	+	O	O	+
Mineral water	+	+	+	+	+	+	+	+
Molasses,treacle	+	+	+	+	+	+	+	+
Monobromoben-zene	-	-	-	-	-	-	-	+
Monochloro-actetic acid ethyl ester	-	-	+	+	-	-	-	-
Monochloro-actetic acid methyl ester	-	-	+	+	-	-	-	-
Monochloro-benzene	-	-	-	-	-	-	-	+
Monoethanol-amine	O	+	+	+	O	O	-	-
Morpholine	-	-	+	+	-	+	+	-
Motor oil	-	-	-	-	+	O	O	+
Natural gas	-	-	-	-	+	O	O	+
Neatsfoot oil	-	-	-	-	+	-	-	+
Neon	+	+	+	+	+	+	+	+
Nickel acetate solution	+	-	+	+	O	O	-	-
Nickel chloride solution	+	+	+	+	+	+	+	+
Nickel sulphate solution	+	+	+	+	+	+	+	+
Nitric acid, solution, 10%	-	-	+	+	-	-	+	+
Nitric acid, concentrated, 65%	-	-	-	-	-	-	-	+
Nitric acid fuming	-	-	-	-	-	-	-	O
Nitrobenzene	-	-	O	O	-	-	-	+
Nitroethane	O	O	O	O	-	O	O	-
Nitrogen	+	+	+	+	+	+	+	+
Nitrogen tetroxide	-	-	-	-	-	-	-	-
Nitromethane	O	-	O	O	-	-	-	-
Nitropropane	-	-	O	O	-	-	-	-
Nitrous gases (Mixture-NO^2, NO,N^2O,etc)	-	-	O	O	-	-	-	-
Nitrous oxide	+	+	+	+	+	+	+	+
n-Octane	-	-	-	-	O	-	-	+
Octyl alcohol	O	O	+	+	O	O	O	+
Octyl cresol	-	-	-	-	O	-	-	O
Oleic acid	-	-	-	-	O	-	-	+
Olive oil	-	-	-	-	+	O	O	+
Oxalic acid solution	O	O	+	+	O	O	O	+
Ozone-air mixture	-	-	O	+	-	O	+	+
Palmitic acid	O	O	O	O	+	O	O	+
Paraffin oil	-	-	-	-	+	+	+	+
Paraffin wax, molten	-	-	-	-	+	+	O	+
Peanut oil	-	-	-	-	+	O	O	+
Pentachloro diphenyl	-	-	-	-	-	-	-	+
Pentane	-	-	-	-	+	O	O	+
Perchloric acid	-	-	O	O	-	O	O	+
Perchloroethylene	-	-	-	-	-	-	-	+

Media Resistance

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Toluene	-	-	-	-	-	-	-	+
Tolyl chloride	-	-	-	-	-	-	-	+
Town gas, benzene free	-	-	-	-	+	O	O	+
Transformer oil (Petroleum oil based)	-	-	-	-	+	O	-	+
Triacetin (Glycerine triacetate)	O	O	+	+	O	O	O	-
Tributylphosphate	O	-	+	+	-	-	-	-
Trichloroacetic-acid	O	-	O	O	-	-	-	-
Trichloroethane	-	-	-	-	-	-	-	-
Trichlorolethylene	-	-	-	-	-	-	-	+
Tricresyl-phosphate	-	-	+	+	-	-	-	+
Triethanolamine	O	O	O	O	-	O	O	-
Triethylamine	-	-	-	-	O	-	-	O
Triisopropyl-benzene	-	-	-	-	+	-	(-)	+
Trioctyl phosphate	-	-	+	+	-	-	-	O
Tritan(Triphenyl methane)	-	-	-	-	-	-	-	+
Trisodium-phosphate	+	+	+	+	+	+	+	+
Turbine oil (Petroleum oil based)	-	-	-	-	+	O	-	+
Turpentine oil	-	-	-	-	O	-	-	+
Urea solution	+	+	+	+	+	+	+	+
Vaseline	-	-	-	-	+	O	O	+
Vegetable oil	-	-	-	-	+	O	O	+
Vinegar, wine	+	O	+	+	O	O	O	-
Water glass	+	+	+	+	+	+	+	+
Water, cold	+	+	+	+	+	+	+	+
Water, hot, 100°C	-	O	+	+	O	-	-	O
Whisky	+	+	+	+	+	+	+	+
Wine	+	+	+	+	+	+	+	+
Wood oil	-	-	-	-	+	O	-	+
Xenon	+	+	+	+	+	+	+	+
Xylene	-	-	-	-	-	-	-	+
Yeast solution	+	+	+	+	+	+	+	+
Zinc acetate solution	+	-	+	+	O	O	-	-
Zinc chloride solution	+	+	+	+	+	+	+	+
Zinc sulphate solution	+	+	+	+	+	+	+	+

The tables give us a summary of the resistance of various elastomer groups to individual media.

The abbreviations for elastomers comply with ISO Standard R 1629. Note that these names and abbreviations represent generic types. A particular designation includes a multiplicity of qualities which may display similar general properties but which differ in terms of specific properties such as hardness, rebound resilience, strength and elasticity, heat and cold resistance, etc. The ISO designation merely covers the elastomer basis of the material. It is thus necessary in cases involving questions about or orders for materials that quality requirements such as hardness, mechanical strength properties, application temperature range and the like must be specified in addition to the designation of the basic material, e.g., NBR, FPM or EPDM. Any rubber materials that come into contact with foodstuffs must comply with the relevant national law concerning foodstuffs.

Due to the multiplicity of rubber compounds available and the many different conditions for application in practice, it is only possible to give in the details very general information to serve for a first overview. This should however simplify the selection of a suitable material for use. In any case we recommend a preliminary test before actual use under test conditions that are as close as possible to the actual ones. For special applications and conditions of use it is advantageous to consult with the rubber manufacturer before deciding on a particular grade so as to allow special research to be carried out if necessary. It is only possible to select the optimum material on the basis of adequate knowledge of the conditions of use.

Although the behavior of a vulcanised product with respect to contact media is primarily determined by the base rubber, a very significant role is also played by the types and quantities of additives, such as softeners, fillers, vulcanising agents and metal oxides. Thus, for example, larger amounts of softeners that are easily leached out thus change the swelling behavior (of the rubber) in mineral oils and solvents to the extent that the vulcanised materials swells significantly less or even shrinks. Mixtures with a high filler content generally display less swelling, due to the reduction in the proportion of rubber. The amount of swelling is further influenced by the degree of cross-linkage of the macro-molecules of the rubber, which are produced during vulcanisation and depend in turn on the type and amount of vulcanising agent. A strongly cross-linked rubber-compounds less swelling, as a rule, than a less strongly cross-linked one. Resistance to water, aqueous solutions and acids, above all in the case of CR, CSM and FPM elastomers, depends greatly on the types of metal oxides and fillers used.

There are even a number of different grades within a particular type of rubber, which can be distinguished primarily by the different monomer relationships in the polymerising mix and through different arrangements of the repeating blocks. This also includes oil-extended rubbers, which contain upto 500% parts by weight mineral oil. This necessarily implies that the swelling behavior differs within a particular elastomer group.

For these reasons it is obvious that the details in this resistance table are only intended as a broad outline. If no special details are given about temperature, then the notes refer to normal temperatures.

+ Practically no attack or very little; elastomers of this group are generally used.

O Moderate degree of attack; elastomers of this group can only be used with caution. It is recommended that you discuss the matter with the rubber manufacturer.

- Elastomers of this group are not recommended, since they are strongly attacked or even destroyed.

(+) No data available, but probably suitable: test before using.

(-) No data available, but probably not suitable.

The ratings +, O and - are based on laboratory research and actual use. The estimated values given in brackets are based on experience, by analogy with and experience of chemical compounds that are very similar to the ones in question. The details are given to the best of our knowledge, but cannot be regarded as definitive and binding statements.

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Petrol + 20% Ethanol	-	-	-	-	O	-	-	+
Petrol + 20% Methanol	-	-	-	-	-	-	-	O
Petrol, neat	-	-	-	-	+	O	O	+
Petrol, regular	-	-	-	-	O	-	-	+
Petrol, super	-	-	-	-	O	-	-	+
Petroleum	-	-	-	-	+	O	O	+
Petroleum (Crude oil)	-	-	-	-	+	O	O	+
Petroleum ether	-	-	-	-	+	O	O	+
Phenol	-	-	O	O	-	-	-	+
Phenylethyl ether	-	-	-	O	-	-	-	-
Phenylhydrazine	O	O	-	-	-	-	-	+
Phosgene, gaseous	-	(-)	+	+	+	+	(+)	+
Phosgene, liquid	-	(-)	O	O	O	+	+	+
Phosphoric acid, 20% solution	O	O	+	+	O	O	+	+
Phosphoric acid, concentrated	-	-	O	O	-	-	-	+
Phosphorous oxychloride	O	O	+	+	-	O	+	+
Phosphorous trichloride	-	-	+	+	-	-	-	+
Photographic developer	+	+	+	+	+	+	+	+
Photographic fixation agent	+	+	+	+	+	+	+	+
Picric acid solution	O	O	+	+	O	+	+	+
Pine needle oil	-	-	-	-	O	-	-	+
Piperadine	-	-	-	-	-	-	-	-
Polyran M 25 N, 80°C	O	+	+	+	O	O	+	+
Polyran M 400, 80°C	+	+	+	+	+	+	+	+
Potash lye solution	O	O	+	+	O	O	+	-
Potash, solution	O	O	+	+	O	O	+	-
Potassium acetate solution	+	-	+	+	O	O	-	-
Potassium bi - sulphate solution	+	+	+	+	+	+	+	+
Potassium borate solution	+	+	+	+	+	+	+	+
Potassium bromate solution	+	+	+	+	+	+	+	+
Potassium bromide solution	+	+	+	+	+	+	+	+
Potassium carbonate solution	+	+	+	+	+	+	+	+
Potassium lchlorate solution	O	O	+	+	-	+	+	+
Potassium chloride solution	+	+	+	+	+	+	+	+
Potassium chromate solution	O	O	+	+	O	+	+	+
Potassium cyanide solution	+	+	+	+	+	+	+	+
Potassium dich-romate solution	O	O	+	+	O	+	+	+
Potassium hydroxide solution	O	O	+	+	O	O	+	-

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Potassium iodide solution	+	+	+	+	+	+	+	+
Potassium nitrate solution	+	+	+	+	+	+	+	+
Potassium Per-chlorate solution	-	-	+	+	-	+	+	+
Potassium Permanganate solution	-	-	+	+	-	+	+	+
Potassium Per sulphate solution	-	-	+	+	-	+	+	+
Potassium sulphate solution	O	O	+	+	+	+	+	+
Potassium hy-droxide solution	O	O	+	+	O	O	+	-
Propane, gaseous	-	-	-	-	+	O	O	+
Propanol	+	+	+	+	+	+	+	+
Propyl acetate	-	-	O	O	-	-	-	-
Propyl alcohol	+	+	+	+	+	+	+	+
Propyl nitrate	-	-	O	O	-	-	-	-
Propyl amine	-	-	-	-	-	-	-	-
Propylene	-	-	-	-	-	-	-	+
Propylene glycol	+	+	+	+	+	+	+	+
Propylene oxide	-	-	O	O	-	-	-	-
Prussic acid	+	O	+	+	O	O	+	+
Pydraul C (312, 540)	-	-	-	-	-	-	-	+
Pydraul E (29, 30, 50, 65, 90, 115)	-	-	+	+	-	-	-	+
Pyridine	-	-	O	O	-	-	-	-
Pyrrole	O	O	-	-	-	-	-	-
Rapeseed oil	-	-	O	O	+	O	O	+
Salt water	+	+	+	+	+	+	+	(+)
Sea water	+	+	+	+	+	+	+	+
Silicone grease	+	+	+	+	+	+	+	+
Silicone oil	+	+	+	+	+	+	+	+
Silver nitrate solution	+	+	+	+	O	+	+	+
Skydrol 500	-	-	O	+	-	-	-	-
Skydrol 7000	-	-	+	+	-	-	-	O
Soap solution	O	O	+	+	+	O	+	+
Soda solution	+	+	+	+	+	+	+	+
Sodium acetate solution	+	-	+	+	O	O	O	-
Sodium benzoate solution	+	+	+	+	+	+	+	+
Sodium bicar-bonate solution	+	+	+	+	+	+	+	+
sodium bisulphite solution	O	O	+	+	+	+	+	+
Sodium borate solution	+	+	+	+	+	+	+	+
Sodium carbonate solution	+	+	+	+	+	+	+	+
Sodium chlorate solution	-	O	+	+	O	+	+	+
Sodium chloride solution	+	+	+	+	+	+	+	+
Sodium cyanide solution	+	+	+	+	+	+	+	+
Sodium dichro-mate solution	+	+	+	+	+	+	+	+
Sodium hydroxide solution	O	O	+	+	O	O	+	-

Medium	Elastomer Type							
	NR/IR	SBR/BR	IIR	EPDM	NBR	CR	CSM	FPM
Sodium hypo-chlorite solution	-	-	O	O	-	O	O	+
Sodium lye solution	O	O	+	+	O	O	+	-
Sodium nitrate solution	+	+	+	+	+	+	+	+
Sodium perborate solution	O	O	+	+	O	O	O	+
Sodium phosphate solution	+	+	+	+	+	+	+	+
Sodium silicate solution	+	+	+	+	+	+	+	+
Sodium stearate solution	O	O	+	+	+	O	+	+
Sodium sulphate solution	+	+	+	+	+	+	+	+
Sodium sulphide solution	O	O	+	+	+	+	+	+
Sodium thiosul-phate solution	+	+	+	+	+	+	+	+
Soya oil	-	-	-	-	+	O	O	+
Spindle oil (mineral oil based)	-	-	-	-	+	O	-	+
Spirits	+	+	+	+	O	+	+	+
Stannous chloride solution	+	+	+	+	+	+	+	+
Starch solution	+	+	+	+	+	+	+	+
Steam at 150°C	-	-	+	+	-	-	-	-
Stearic acid, 100°C	-	-	-	-	-	O	O	+
Styrene	-	-	-	-	-	-	-	O
Sugar-beet juice	+	+	+	+	+	+	+	+
Sulphur chloride	-	-	-	-	-	-	-	+
Sulphur dioxide	-	-	O	+	-	-	-	+
Sulphur hex-afluoride	(+)	+	+	+	+	+	+	+
Sulphur trioxide, Anhydrous	-	-	O	O	-	-	-	+
Sulphur molten	-	-	-	-	-	-	-	+
Sulphuric acid solution, 20%	-	-	+	+	-	O	+	+
Sulphuric acid, concentrated, 96%	-	-	-	-	-	-	-	+
Sulphurous acid	O	O	+	+	O	O	+	+
Sulphuryl chloride	-	-	O	O	-	-	O	+
Tannic acid	+	+	+	+	+	+	+	+
Tannin	+	O	+	+	+	O	O	+
Tar	-	-	-	-	-	-	-	+
Tar oil	-	-	-	-	-	-	-	+
Tartaric acid	+	+	+	+	+	+	+	+
Tetrabromo methane	-	-	-	-	-	-	-	+
Tetrachloro ethane	-	-	-	-	-	-	-	O
Tetrachloro ethylene	-	-	-	-	-	-	-	+
Tetraethyle lead	-	-	-	-	O	-	-	+
Tetrahydro furane	-	-	O	O	-	-	-	-
Tetralin	-	-	-	-	-	-	-	+
Thinners (eg ketones, esters,benzene, alcohols)	-	-	-	-	-	-	-	-
Thionyl chloride	-	-	O	O	-	-	O	+
Titanium tetrachloride	-	-	-	-	-	-	-	+