# Appendix A: Chemical resistance

The chemical resistance of HDPE is depicted per medium at a number of different temperatures. In general we can define the resistance as follows:

For standard soil and waste systems the resistance of HDPE is perfect. In these pipe systems aggressive fluids are rarely drained. When transporting chemical waste waters in laboratories and the chemical industry the following factors have to be taken in account:

- The medium
- The concentration of this medium
- Temperature
- Duration of exposure
- Volume

The chemical resistance list of the electrometric seals is to aid in establishing the suitability of a certain seal. This is only an indication of its suitability. The chemical deterioration of the polymer chain can lead to changes in the mechanical characteristics like tensile strength and elongation at break etc. The data is valid for a temperature of 20°C. At higher temperatures or longer duration of exposure a more aggressive condition can occur which shortens the lifespan of the seal.

**Used symbols**

*HDPE pipe and fittings:*

| | |
|---|---|
| **+** | Resistant, based on the test carried out HDPE is in general. |
| **a** | Suitable material for this application. |
| / | Limited resistance, further research necessary. |
| **-** | No resistance. |
| **Empty field** | No data available. |

*Elastomeric seals:*

| | |
|---|---|
| **1** | Little or no effect, volume change <10%. In heavy conditions this elastomere can show a small increase in volume and /or loss of physical properties. |
| **2** | Possible change of physical properties, volume change 10%-20%, the elastomer can show increase in volume and a change in physical properties but can be suitable for static applications. |
| **3** | Noticeable change of physical properties, large change in volume, and physical properties. |
| **4** | Elastomeric seal is not suitable. Influence too great. |
| **Empty field** | No data available. |

*Abbreviations:*

Comm. Comp. = Commercial composition
HDPE = High Density Polyethylene
NBR = Acryl nitrile-butadiene rubber
EPDM = Ethylene propylene copolymer
FPM = Vinylidene fluoride copolymer
SBR = Styrol butadiene rubber

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | HDPE °C | | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Acetaldehyde** | $CH_3CHO$ | Aqueous solution | 40% | + | + | / | 4 | 2 | 4 | 3 |
| **Acetaldehyde** | $CH_3CHO$ | Technically pure | 100% | + | / | / | 4 | 2 | 4 | 3 |
| **Acetic Acid** | $CH_3COOH$ | Aqueous solution | 10% | + | + | + | 4 | 3/4 | 4 | 4 |
| **Acetic Acid** | $CH_3COOH$ | Aqueous solution | 30% | + | + | + | 4 | 4 | 4 | 4 |
| **Acetic Acid** | $CH_3COOH$ | Aqueous solution | 60% | + | + | + | 4 | 4 | 4 | 4 |
| **Acetic Acid** | $CH_3COOH$ | Aqueous solution | 80% | / | / | - | 4 | 4 | 4 | 4 |
| **Acetic Acid** | $CH_3COOH$ | Technically pure | 100% | + | + | / | 4 | 4 | 4 | 4 |
| **Acetic Acid Anhydride** | $(CH_3CO)_2O$ | Technically pure | 100% | + | / | | 4 | 2 | 4 | 2 |
| **Acetone** | $CH_3COCH_3$ | Aqueous solution | 10% | + | + | + | 4 | 1 | 4 | 2/3 |
| **Acetone** | $CH_3COCH_3$ | Technically pure | 100% | / | / | | 4 | 1 | 4 | 2/4 |
| **Acetophenone** | $CH_3COC_6H_5$ | Technically pure | Indetermined | + | + | + | 4 | 1 | 4 | 4 |
| **Acrylonitrile** | $CH_2$=CH-CN | Technically pure | 100% | + | + | + | 4 | 4 | 4 | 3 |
| **Adipic Acid** | $HOOC(CH_2)_4COOH$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Alcohol** | | | 40% | + | | | | | | |
| **Alcoholic Spirits** | | | Comm. Comp. | + | + | | | | | |
| **Allyl Alcohol** | $CH_2$=CH-$CH_2OH$ | Aqueous solution | 96% | + | + | + | | | | |
| **Alum** | $Al_2(SO_4)_3K_2SO_4{}_4H_2O$ | Aqueous solution | Solution | + | + | + | 2 | 1 | 1 | 1 |
| **Alum** | $Al_2(SO_4)_3K_2SO_4{}_4H_2O$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Aluminium Acetate** | $(CH_3COO)_3Al$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 4 | 4 |
| **Aluminium Bromide** | $AlBr_3$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Aluminium Chloride** | $AlCl_3$ | Aqueous solution | All | + | + | + | 2 | 1 | 1 | 1 |
| **Aluminium Fluoride** | $AlF_3$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Aluminium Nitrate** | $Al(NO_3)_3$ | Aqueous solution | Saturated | + | | | 1 | 1 | 1 | 1 |
| **Aluminium Sulfate** | $Al_2(SO_4)_3$ | Aqueous solution | 10% | + | + | + | 2 | 1 | 1 | 1 |
| **Aluminium Sulfate** | $Al_2(SO_4)_3$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Ammonia** | $NH_3$ | Aqueous solution | Solution | + | + | + | 2 | 1 | 3 | 2 |
| **Ammonia Gas** | $NH_3$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 3 | 2 |
| **Ammonia Gas** | $NH_3$ | Technically pure | 100% | + | + | + | 2 | 1 | 3 | 2 |
| **Ammonium Acetate** | $CH_3COONH_4$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Ammonium Bifluoride** | $NH_4FHF$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Ammonium Carbonate** | $(NH_4)_2CO_3$ | Aqueous solution | 100% | + | + | + | 2 | 1 | 2 | 2 |
| **Ammonium Chloride** | $NH_4Cl$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Ammonium Fluoride** | $NH_4F$ | Aqueous solution | 25% | + | + | + | 1 | 1 | 1 | 1 |
| **Ammonium Fosfate** | $(NH_4)_3PO_4$ X $H_2O$ | | All | + | + | + | 1 | 1 | 1 | 1 |
| **Ammonium Hydroxide** | $NH_4OH$ | Aqueous solution | Solution | + | + | + | 4 | 1 | 2 | 4 |
| **Ammonium Hydroxide** | $NH_4OH$ | Aqueous solution | Saturated | + | + | + | 4 | 1 | 2 | 4 |
| **Ammonium Nitrate** | $NH_4NO_3$ | Aqueous solution | Saturated | + | + | / | 2 | 1 | 1 | 1 |
| **Ammonium Sulfate** | $(NH_4)_2SO_4$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Ammonium Sulfhydrate** | $NH_4OH(NH_4)_2SO_4$ | Aqueous solution | Solution | + | | | | | | |
| **Ammonium Sulfhydrate** | $NH_4OH(NH_4)_2SO_3$ | Aqueous solution | Saturated | + | | | | | | |
| **Ammonium Sulfide** | $(NH_4)_2S$ | Aqueous solution | 10% | + | + | + | 1 | 1 | 1 | 1 |
| **Ammonium Sulfide** | $(NH_4)_2S$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Amyl Acetate** | $CH_3COO(CH_2)_4CH_3$ | Technically pure | 100% | + | + | + | 4 | 2 | 4 | 3 |
| **Amyl Alcohol** | $CH_3(CH_2)_3CH_2OH$ | | 100% | + | + | / | 2 | 2 | 2 | 1 |
| **Amyl Chloride** | $CH_3(CH_2)_4Cl$ | Technically pure | 100% | - | | | 4 | 1 | 4 | 4 |
| **Aniline** | $C_6H_5NH_2$ | Technically pure | 100% | / | | | 4 | 2/3 | 1 | 3 |
| **Aniline Chlorhydrate** | $C_6H_5NH_2HCl$ | Aqueous solution | Saturated | / | / | / | 2 | 2 | 1 | 1 |
| **Anthraquinone Sulfonic Acid** | | | Solution | + | | | | | | |
| **Antimony Trichloride** | $SbCl_3$ | Aqueous solution | 90% | + | + | + | 1 | 1 | 1 | 1 |
| **Aqua Regia** | $_3HCl+_1HNO_3$ | | 100% | - | - | - | 4 | 4 | 2/3 | 4 |
| **Arsenic Acid** | $H_3AsO_4$ | | Saturated | + | + | | | | | |
| **Barium Carbonate** | $BaCO_3$ | Aqueous solution | All | + | + | + | | | | |
| **Barium Chloride** | $BaCl_2$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Barium Hydroxide** | $Ba(OH)_2$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Barium Nitrate** | $Ba(NO_3)_2$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Barium Sulfate** | $BaSO_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Barium Sulfide** | BaS | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 2 |
| **Beer** | | | 100% | + | + | + | 1 | 1 | 1 | 1 |

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | HDPE °C | | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Benzaldehyde** | $C_6H_5CHO$ | Aqueous solution | Saturated | + | + | + | 4 | 2 | 4 | 3 |
| **Benzene** | $C_6H_6$ | Technically pure | 100% | / | - | - | 4 | 4 | 3 | 4 |
| **Benzene + Benzine** | | | 20/80% | / | - | - | 2/3 | 4 | 2 | 4 |
| **Benzene Sulfonic Acid** | $C_6H_5SO_3H$ | Aqueous solution | 10% | - | 4 | 4 | 1 | 4 | | |
| **Benzine (Free Of Pb And Aromatic)** | $C_5H_{12}$÷$C_{12}H_{26}$ | | 100% | + | + | / | 4 | 4 | 1 | 4 |
| **Benzoic Acid** | $C_6H_5COOH$ | Aqueous solution | Saturated | + | + | + | 4 | 4 | 1 | 4 |
| **Benzyl Alcohol** | $C_6H_5CH_2OH$ | Technically pure | 100% | + | + | / | 4 | 1 | 1 | 4 |
| **Bleaching Lye** | NaClO+NaCl | 12,5% | Cl | / | / | | 4 | 1 | 1 | 4 |
| **Borax** | $Na2B_4O_7$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Boric Acid** | $H_3BO_3$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Brine** | | | Comm. Comp. | + | | | | | | |
| **Bromic Acid** | $HBrO_3$ | 10% | + | + | + | | 4 | 1 | 1 | 4 |
| **Bromine, Liquid** | $Br_2$ | Technically pure | 100% | - | | | 4 | 3 | 2 | 4 |
| **Bromine, Liquid** | $Br_2$ | | High | - | | | 4 | 4 | 1 | 4 |
| **Butadiene** | $CH_2$=CH-CH=$CH_2$ | Gas | 100% | + | | | 3 | 4 | 2 | 4 |
| **Butane Gas** | $CH_3CH_2CH_2CH_3$ | 100% | + | + | + | | 2 | 4 | 2 | 4 |
| **Butanediol** | $OHCH_2CH_2CH_2CH_2OH$ | Aqueous solution | 10% | + | + | + | | | | |
| **Butanediol** | $OHCH_2CH_2CH_2CH_2OH$ | Aqueous solution | Concentrated | / | - | - | | | | |
| **Butyl Acetate** | $CH_3COOCH_2CH_2CH_2CH_3$ | Technically pure | 100% | / | / | / | 4 | 2 | 4 | 4 |
| **Butyl Alcohol** | $CH_3(CH_2)_3OH$ | Technically pure | 100% | + | + | + | 1 | 2 | 1 | 1 |
| **Butyl Ether** | $(CH_3(CH_2)_3)2O$ | Technically pure | 100% | / | - | - | 4 | 3 | 4 | 4 |
| **Butyl Phenol** | $C_4H_9C_6H_4OH$ | Technically pure | 100% | - | | | 4 | 4 | 2 | 4 |
| **Butyl Phthalate** | $HOOCC_6H_4COOC_4H_9$ | Technically pure | 100% | + | / | / | | | | |
| **Butylene** | $CH_2$=CH-$CH_2CH_4$ | Liquid | 100% | - | | | 2 | 4 | 1 | 4 |
| **Butylene Glycol** | $OHCH_2$-CH=CH-$CH_2OH$ | Technically pure | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Butylene** | $CH_2$=CH-$CH_2CH_3$ | Technically pure | 100% | - | | | 2 | 4 | 1 | 4 |
| **Butyric Acid** | $CH_3CH_2CH_2COOH$ | Aqueous solution | 20% | + | + | / | | | | |
| **Butyric Acid** | $CH_3CH_2CH_2COOH$ | Technically pure | 100% | + | + | / | | | | |
| **Calcium Acetate** | $Ca(CH_3COO)_2$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 4 | 4 |
| **Calcium Bisulfite** | $Ca(HSO_3)_2$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 2 | 2 |
| **Calcium Carbonate** | $CaCO_3$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Calcium Chlorate** | $Ca(ClO_3)_2$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Calcium Chloride** | $CaCl_2$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Calcium Hydroxide** | $Ca(OH)_2$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Calcium Hypochloride** | $Ca(ClO)_2$ | Aqueous solution | Saturated | + | + | + | 4 | 1 | 1 | 4 |
| **Calcium Nitrate** | $Ca(NO_3)_2$ | Aqueous solution | 50% | + | + | + | 1 | 1 | 1 | 1 |
| **Calcium Sulfate** | $CaSO_4$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Calcium Sulfide** | CaS | Aqueous solution | Saturated | / | / | / | 1 | 1 | 1 | 2 |
| **Camphor Oil** | | | Comm. Comp. | - | - | | | | | |
| **Carbon Dioxide** | $CO_2$+$H_2O$ | Aqueous solution | Indetermined | + | + | + | 1 | 1 | 1 | 1 |
| **Carbon Dioxide** | $CO_2$ | Gas | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Carbon Disulfide** | $CS_2$ | Technically pure | 100% | / | - | 4 | 4 | 1 | 4 | |
| **Carbon Monoxid** | CO | Gas | 100% | + | + | + | 2 | 2 | 1 | 2 |
| **Carbon Tetrachloride** | $CCl_4$ | Technically pure | 100% | - | | | | | | |
| **Carbonic Acid** | $H_2CO_3$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Chloramine** | $C_6H_5SO_2NNaCl$ | Aqueous solution | Solution | + | | | | | | |
| **Chloric Acid** | $HClO_3$ | Aqueous solution | 20% | / | | | | | | |
| **Chlorine** | $Cl_2$ | Wet | All | / | - | 4 | 3 | 1 | 4 | |
| **Chlorine** | $Cl_2$ | Gas | 100% | / | / | - | 4 | 2 | 4 | 4 |
| **Chlorine** | $Cl_2$ | Technically pure | 100% | - | | | | | | |
| **Chlorine Water** | $Cl_2$+$H_2O$ | Saturated | / | / | | | | | | |
| **Chloro Benzene** | $C_6H_5Cl$ | Technically pure | 100% | / | - | - | | | | |
| **Chloro Sulfonic Acid** | $HClSO_3$ | Technically pure | 100% | - | - | - | | | | |
| **Chloroform** | $CHCl_3$ | Technically pure | 100% | - | | | 4 | 4 | 2 | 4 |
| **Chrome Alum** | $KCr(SO_4)_2$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Chrome Alum** | $KCr(SO_4)_2$ | Indetermined | + | + | + | | | | | |
| **Chromic Acid** | $CrO_3$+$H_2O$ | Aqueous solution | 10% | / | - | - | 4 | 2/3 | 1 | 4 |
| **Chromic Acid** | $CrO_3$+$H_2O$ | Aqueous solution | 30% | / | - | - | 4 | 2/3 | 1 | 4 |

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | HDPE °C | | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Chromic Acid** | $CrO_3+H_2O$ | Aqueous solution | 50% | / | - | - | 4 | 2/3 | 1 | 4 |
| **Citric Acid** | $C_3H_4(OH)(COOH)_3$ | Aqueous solution | 50% | + | + | + | 2 | 1 | 1 | 2 |
| **Compressed Air with Oil** | | | 100% | + | + | | | | | |
| **Copper Acetate** | $Cu(COOCH_3)_2$ | | Saturated | + | | | 2 | 1 | 4 | 4 |
| **Copper Chloride** | $CuCl_2$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Copper Fluoride** | $CuF_2$ | Aqueous solution | All | + | + | + | 2 | 1 | 1 | 1 |
| **Copper Nitrate** | $Cu(NO_3)_2$ | Aqueous solution | Indetermined | + | + | + | 2 | 1 | 1 | 1 |
| **Copper Sulfate** | $CuSO_4$ | Aqueous solution | Solution | + | + | + | 1 | 1 | 1 | 1 |
| **Copper Sulfate** | $CuSO_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Cresol** | $CH_3C_6H_4OH$ | Aqueous solution | >=90% | + | + | / | | | | |
| **Cresol** | $CH_3C_6H_4OH$ | Aqueous solution | Solution | + | + | / | | | | |
| **Croton Aldehyde** | $CH_3$-CH=CH-CHO | Technically pure | 100% | / | | | | | | |
| **Cryolite** | $Na_3AlF_6$ | Aqueous solution | Saturated | / | / | - | | | | |
| **Cyclohexane** | $C_6H12$ | Technically pure | 100% | + | + | + | 2 | 4 | 1 | 4 |
| **Cyclohexanol** | $C_6H11OH$ | Technically pure | 100% | + | / | / | 2 | 4 | 2 | 3 |
| **Cyclohexanone** | $C_6H_{10}O$ | Technically pure | 100% | + | / | / | 4 | 3 | 4 | 4 |
| **Decalin (Decahydronaftalene)** | $C_{10}H_{18}$ | Technically pure | 100% | + | / | / | | | | |
| **Detergents** | | Aqueous solution | Comm. Comp. | + | + | + | | | | |
| **Dextrine** | | | Comm. Comp. | + | + | + | | | | |
| **Dextrose** | $C_6H_{12}O_6$ | Aqueous solution | All | + | + | + | | | | |
| **Dextrose** | $C_6H_{12}O_6$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Dextrose** | $C_6H_{12}O_6$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Dibutyl Phthalate** | $C_6H_4(COOC_4H_9)_2$ | Technically pure | 100% | - | | | 4 | 2 | 2 | 4 |
| **Dibutyl Sebacate** | $C_8H_{16}(COOC_4H_9)_2$ | Technically pure | 100% | + | | | 4 | 2 | 2 | 4 |
| **Dichloro Benzene** | $C_6H_4Cl_2$ | Technically pure | 100% | / | | | 4 | 4 | 2 | 4 |
| **Dichloroacetic Acid** | $Cl_2CHCOOH$ | Aqueous solution | 50% | + | + | + | 2 | 2 | 2 | 2 |
| **Dichloroacetic Acid** | $Cl_2CHCOOH$ | Technically pure | 100% | + | + | / | 3 | 2 | 3 | 3 |
| **Dichloroacetic Acid Methyl Ester** | $Cl_2CHCOOH_3$ | Technically pure | 100% | + | + | + | | | | |
| **Dichloroethylene** | CHCl=CHCl | Technically pure | 100% | - | | | | 2 | 2 | 4 |
| **Diesel Oil** | | | 100% | + | / | / | 1 | 4 | 1 | 4 |
| **Diethylether** | $C_2H_5OC_2H_5$ | Technically pure | 100% | - | - | | 4 | 4 | 4 | 4 |
| **Diglycolic Acid** | $HOOCCH_2OCH_2COOH$ | Aqueous solution | Saturated | + | | | | | | |
| **Di-Isobutyl Ketone** | $(CH_3)_2CHCH_2COCH_2CH(CH_3)_2$ | Technically pure | 100% | + | / | - | 4 | 2 | 4 | 2/3 |
| **Dimethyl Amine** | $(CH_3)_2NH$ | Technically pure | 100% | / | - | | | | | |
| **Dimethyl Formamide** | $HCON(CH_3)_2$ | Technically pure | 100% | + | + | / | 4 | 2 | 4 | 3 |
| **Dioctyl Phthalate** | $C_6H_4(COOC_8H_{17})_2$ | Technically pure | 100% | + | / | / | 4 | 2 | 2 | 4 |
| **Dioxane** | $(CH_2)_4O2$ | Technically pure | 100% | + | + | + | 4 | 2/3 | 4 | 4 |
| **Ethyl Acetate** | $CH_3COOCH_2CH_3$ | Technically pure | 100% | + | / | - | 4 | 2/3 | 4 | 4 |
| **Ethyl Alcohol** | $CH_3CH_2OH$ | Aqueous solution | 96% | + | + | / | 2 | 1 | 2 | 1 |
| **Ethyl Benzene** | $C_6H_5C_2H_5$ | Technically pure | 100% | / | / | / | 4 | 4 | 2 | 4 |
| **Ethyl Chloride** | $CH_3CH_2Cl$ | Technically pure | 100% | / | - | 2/3 | 4 | 2 | 4 | |
| **Ethyl Ether** | $CH_3CH_2OCH_2CH_3$ | Technically pure | 100% | / | 3 | 3 | 4 | 4 | | |
| **Ethylene Chlorohydrin** | $ClCH_2CH_2OH$ | Technically pure | 100% | + | + | / | 4 | 2 | 2 | 2 |
| **Ethylene Diamina** | $NH_2CH_2CH_2NH_2$ | Technically pure | 100% | - | - | - | 2 | 1 | 4 | 2 |
| **Ethylene Dichloride** | $CH_2ClCH_2Cl$ | Technically pure | 100% | / | / | 4 | 4 | 2/3 | 4 | |
| **Ethylene Glycol** | $HOCH_2$-$CH_2OH$ | Technically pure | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Ethylene Oxide** | $C_2H_4O$ | Technically pure | 100% | - | | | 3 | 3 | 4 | 4 |
| **Exhaust fumes** | | | Traces | + | + | + | | | | |
| **Fatty Acids** | $R>C_6$ | Technically pure | 100% | + | + | / | | | | |
| **Ferric Chloride** | $FeCl_3$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 2 |
| **Ferric Nitrate** | $Fe(NO_3)_3$ | Indetermined | + | + | + | | | | | |
| **Ferric Sulfate** | $Fe_2(SO_4)_3$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Ferrous Chloride** | $FeCl_2$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 2 |
| **Ferrous Nitrate** | $Fe(NO_3)_2$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Ferrous Sulfate** | $FeSO_4$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 2 |
| **Fertilizer Salts** | | Aqueous solution | 10% | + | + | + | | | | |
| **Fertilizer Salts** | | Aqueous solution | Saturated | + | + | + | | | | |

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | HDPE °C | | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Fluoboric Acid** | $HBF_4$ | Technically pure | 100% | + | + | + | | 1 | 1 | 1 |
| **Fluorine Gas Dry** | $F_2$ | | 100% | - | | | | 4 | 1 | 4 |
| **Fluosilicic Acid** | $H_2SiF_6$ | Aqueous solution | 32% | + | + | + | | | | |
| **Formaldehyde** | $CH_2O$ | Aqueous solution | 37% | + | + | + | 1 | 1 | 1 | 1 |
| **Formamide** | $HCONH_2$ | Technically pure | 100% | + | + | + | 2 | 2 | 1 | 1 |
| **Formic Acid** | HCOOH | Aqueous solution | 50% | + | + | + | 4 | 2 | 4 | 2 |
| **Formic Acid** | HCOOH | Technically pure | 100% | + | + | + | 4 | 2 | 4 | 2 |
| **Freon F-12** | $CCl_2F_2$ | Technically pure | 100% | - | | | 2 | 2/3 | 2 | 4 |
| **Fruit pulp and juice** | | | Comm. Comp. | + | | | | | | |
| **Furfuryl Alcohol** | $C_5H_6O_2$ | Technically pure | 100% | + | + | / | 4 | 2 | | 4 |
| **Gelatine** | | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Glycerine** | $C_3H_5(OH)_3$ | Aqueous solution | All | + | + | + | 1 | 1 | 2 | 1 |
| **Glycocoll** | $NH_2CH_2COOH$ | Aqueous solution | 10% | + | + | | | | | |
| **Glycolic Acid** | $HOCH_2COOH$ | Aqueous solution | 37% | + | + | + | | | | |
| **Gas containing:** | | | | | | | | | | |
| **- Carbon Dioxide** | $CO_2$ | Gas | All | + | + | + | | | | |
| **- Carbon Monoxid** | CO | Gas | All | + | + | + | | | | |
| **- Hydrochloric Acid** | HCL | Gas | All | + | + | + | | | | |
| **- Hydrochloric Acid** | HCL | Gas | All | + | + | + | | | | |
| **- Hydrofluoric Acid** | HF | Gas | < 0,1% | + | + | + | | | | |
| **- Nitrous Vapours** | NO, $NO_2$, $N2O_3$, NOx | Gas | < 0,1% | + | + | + | | | | |
| **- Nitrous Vapours** | NO, $NO_2$, $N2O_3$, NOx | Gas | 5% | + | + | + | | | | |
| **- Oleum** | $H_2SO_4 + SO_3$ | Gas | < 0,1% | - | - | - | | | | |
| **- Oleum** | $H_2SO_4 + SO_3$ | Gas | 5% | - | - | - | | | | |
| **- Sulphur Dioxide Liquid** | $SO_2$ | Gas | All | + | + | + | | | | |
| **- Sulphur Trioxide** | $SO_3$ | Gas | < 0,1% | - | - | - | | | | |
| **- Sulphuric Acid** | $H_2SO_4$ | Gas | All | + | + | + | | | | |
| **Heptane** | $C_7H_{16}$ | Technically pure | 100% | + | / | - | 1 | 4 | 1 | 4 |
| **Hexane** | $C_6H_{14}$ | Technically pure | 100% | + | / | / | 1 | 4 | 1 | 4 |
| **Hydrazine Hydrate** | $NH_2$-$NH_2$ $H_2O$ | Aqueous solution | Solution | + | + | + | | 2 | 1 | 1 |
| **Hydrobromic Acid** | HBr | | 10% | + | + | + | 3 | 2 | 1 | 3 |
| **Hydrobromic Acid** | HBr | | 48% | + | + | + | 4 | 1 | 1 | 4 |
| **Hydrochloric Acid** | HCl | Aqueous solution | 10% | + | + | + | | | | |
| **Hydrochloric Acid** | HCl | Aqueous solution | 30% | + | + | + | 2/3 | 1 | 2 | 2/3 |
| **Hydrochloric Acid** | HCl | Aqueous solution | 5% | + | + | + | | | | |
| **Hydrochloric Acid** | HCl | Aqueous solution | Saturated | + | + | + | | | | |
| **Hydrocyanic Acid** | HCN | Aqueous solution | Solution | + | + | + | 2 | 2 | 1 | 2 |
| **Hydrocyanic Acid** | HCN | Technically pure | | + | + | + | 2 | 2 | 1 | 2 |
| **Hydrofluoric Acid** | HF | Aqueous solution | 10% | + | + | / | 4 | 3 | 2/3 | 3 |
| **Hydrofluoric Acid** | HF | Aqueous solution | 40% | + | / | / | 4 | 3 | 2/3 | 3 |
| **Hydrofluoric Acid** | HF | Aqueous solution | 70% | + | / | / | 4 | 3 | 2/3 | 3 |
| **Hydrogen Gas** | $H_2$ | | 100% | + | + | + | 2 | 1 | 1 | 4 |
| **Hydrogen Peroxide** | $H_2O_2$ | Aqueous solution | 10% | + | + | + | 2 | 1 | 1 | 2 |
| **Hydrogen Peroxide** | $H_2O_2$ | Aqueous solution | 50% | + | + | / | 2 | 1 | 1 | 2 |
| **Hydrogen Peroxide** | $H_2O_2$ | Aqueous solution | 90% | + | - | - | 2 | 1 | 1 | 2 |
| **Hydrogen Sulfide** | $H_2S$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Hydrogen Sulfide** | $H_2S$ | | 100% | + | + | / | | | | |
| **Hydroquinone** | $C_6H_4O_2$ | Aqueous solution | Saturated | + | + | + | 3 | 4 | 2 | 4 |
| **Hydroxylamine Sulphate** | $(NH_2OH)_2$-$H_2SO_4$ | Aqueous solution | All | + | + | + | | | | |
| **Iodine Dry And Wet** | I2 | | 3% | / | - | | 1 | 2 | 1 | 1 |
| **Iso-Octane** | $C_8H_{18}$ | | 100% | / | / | - | 1 | 4 | 1 | 4 |
| **Isopropyl Alcohol** | $(CH_3)_2CHOH$ | Technically pure | 100% | + | + | + | 2 | 1 | 1 | 2 |
| **Isopropyl Ether** | $(CH_3)_2CHOCH(CH_3)_2$ | Technically pure | 100% | / | - | - | 2/3 | 3 | 4 | 4 |
| **Lactic Acid** | $CH_3CHOHCOOH$ | Aqueous solution | <=28% | + | + | + | 2 | 1 | 1 | 3 |
| **Lanoline** | | | Comm. Comp. | + | + | + | 1 | 4 | 1 | 4 |
| **Lard Oil** | | | Comm. Comp. | + | | | | | | |
| **Lead Acetate** | $Pb(CH_3COO)_2$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 4 | 4 |
| **Lead Chloride** | $PbCl_2$ | Aqueous solution | Saturated | + | + | | | | | |
| **Lead Nitrate** | $Pb(NO_3)_2$ | Aqueous solution | Saturated | + | | | 1 | 1 | 1 | 1 |

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | | HDPE °C | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Lead Sulfate** | $PbSO_4$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Linseed Oil** | | | Comm. Comp. | / | | | 1 | 3 | 1 | 4 |
| **Lubricating Oils** | | | Comm. Comp. | - | | | 2 | 4 | 1 | 4 |
| **Lubricating Oils, Free Of Aromatic** | | | Comm. Comp. | + | + | / | 1 | 4 | 1 | 4 |
| **Magnesium Carbonate** | $MgCO_3$ | Aqueous solution | All | + | + | + | 1 | 1 | 1 | 1 |
| **Magnesium Chloride** | $MgCl_2$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Magnesium Nitrate** | $Mg(NO_3)_2$ | Aqueous solution | Indetermined | + | + | + | | | | |
| **Magnesium Sulfate** | $MgSO_4$ | | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Maize Oil** | | | Comm. Comp. | + | + | / | 1 | 1 | 1 | 4 |
| **Maleic Acid** | HOOC-CH=CH-COOH | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Malic Acid** | $HOOCCH_2CHOHCOOH$ | Aqueous solution | Saturated | + | | | 1 | 4 | 1 | 2 |
| **Sodium Bisulfite** | $NaHSO_3$ | Aqueous solution | 100% | + | + | + | 1 | 1 | 1 | 2 |
| **Sodium Bromate** | $NaBrO_3$ | Aqueous solution | All | + | / | | | | | |
| **Sodium Bromide** | NaBr | Aqueous solution | Saturated | + | + | + | | | | |
| **Sodium Carbonate (Soda)** | $Na_2CO_3$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 1 |
| **Sodium Chlorate** | $NaClO_3$ | Aqueous solution | All | + | + | + | 2/3 | 2 | 1 | 4 |
| **Sodium Chloride** | NaCl | Aqueous solution | Solution | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Chloride** | NaCl | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Chromate** | $Na_2CrO_4$ | Aqueous solution | Solution | + | | | | | | |
| **Sodium Cyanide** | NaCN | Aqueous solution | All | + | + | + | 2 | 1 | 1 | 1 |
| **Sodium Disulphite** | $Na_2S_2O_5$ | Aqueous solution | All | + | | | 1 | 1 | 1 | 2 |
| **Sodium Ferrocyanide** | $Na_4FeCN_6$ | Aqueous solution | Saturated | + | + | | | | | |
| **Sodium Fluoride** | NaF | Aqueous solution | Saturated | + | | | | | | |
| **Sodium Hydroxide** | NaOH | Aqueous solution | 10% | + | + | + | 3 | 1 | 2 | 2 |
| **Sodium Hydroxide** | NaOH | Aqueous solution | 30% | + | + | + | 4 | 1 | 3 | 2 |
| **Sodium Hydroxide** | NaOH | Aqueous solution | 50% | + | + | + | 1 | 1 | 3 | 2 |
| **Sodium Hypochlorite** | NaClO | Aqueous solution | 12,50% | / | - | | 4 | 1 | 1 | 4 |
| **Sodium Hypochlorite** | NaClO | Aqueous solution | 3% | + | / | / | 4 | 1 | 1 | 4 |
| **Sodium Iodide NaI** | Aqueous solution | | All | + | | | | | | |
| **Sodium Metasilicate** | $Na_2SiO_3$ | Aqueous solution | <5% | + | + | + | | | | |
| **Sodium Metasilicate** | $Na_2SiO_3$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Nitrate** | $NaNO_3$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Nitrite** | $NaNO_2$ | Aqueous solution | Saturated | + | | | | | | |
| **Sodium Oxalate** | $Na_2C_2O_4$ | Aqueous solution | Saturated | + | | | | | | |
| **Sodium Perborate** | $NaBO_3$ | Aqueous solution | All | + | | | 2 | 1 | 1 | 2 |
| **Sodium Perchlorate** | $NaClO_4$ | Aqueous solution | Indetermined | + | | | | | | |
| **Sodium Peroxide** | $Na_2O_2$ | | Solution | + | | | 2 | 1 | 1 | 2 |
| **Sodium Persulphate** | $Na_2S_2O_8$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Sodium Phosphate** | $Na_3PO_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Phosphate Monoacid** | $Na_2HPO_4$ | Aqueous solution | Saturated | + | + | 1 | 1 | 1 | | |
| **Sodium Sulfate** | $Na_2SO_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sodium Sulfide** | $Na_2S$ | Aqueous solution | Solution | + | + | + | 2 | 1 | 1 | 3 |
| **Sodium Sulfide** | $Na_2S$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 3 |
| **Sodium Sulfite** | $Na_2SO_3$ | Aqueous solution | Saturated | + | + | + | | | | |
| **Sodium Thiocyanate** | NaSCN | Aqueous solution | Indetermined | + | + | + | | | | |
| **Sodium Thiosulphate** | $Na_2S_2O_3$ | Aqueous solution | Saturated | + | + | + | 3 | 1 | 1 | 2 |
| **Stannic Chloride** | $SnCl_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 2 |
| **Stannous Chloride** | $SnCl_2$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Stearic Acid** | $C_{17}H_{35}COOH$ | Technically pure | 100% | + | / | | 1 | 1 | 1 | 1 |
| **Styrene** | $C_6H_5CH=CH_2$ | | 100% | / | - | - | 4 | 4 | 1 | 4 |
| **Sugar Syrup** | | | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Sulfamic Acid** | $HSO_3NH_2$ | Aqueous solution | 20% | - | | | | | | |
| **Sulphur** | S | | 100% | + | + | + | | | | |
| **Sulphur Dioxide Liquid** | $SO_2$ | Aqueous solution | Saturated | + | + | + | + | | | |
| **Sulphur Dioxide Liquid** | $SO_2$ | Technically pure | 100% | - | | | | | | |
| **Sulphur Dioxide Liquid** | $SO_2$ | Technically pure | 100% | + | + | + | + | | | |
| **Sulphur Trioxide** | $SO_3$ | | 100% | - | | | | | | |

| Component | | | Concentration | Pipe and fittings | | | Elastomeric seals | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Formula | Remark | | | HDPE °C | | NBR °C | EPDM °C | FPM °C | SBR °C |
| | | | | 20 | 40 | 60 | 20 | 20 | 20 | 20 |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution | 10% | + | + | + | 2 | 1 | 2 | 2 |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution | 50% | + | + | + | 4 | 1 | 2 | 4 |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution | 80% | + | + | / | 4 | 2 | 2 | 4 |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution | 90% | / | / | - | | | | |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution | 96% | - | - | - | 4 | 4 | 2 | 4 |
| **Sulphuric Acid** | $H2SO_4$ | Aqueous solution indetermined | 98% | - | - | - | | | | |
| **Sulphuric Acid** | $H2SO_4$ | Technically pure | 100% | - | - | - | | | | |
| **Sulphurous Acid** | $H2SO_3$ | Aqueous solution | Saturated | + | + | + | 2 | 2 | 1 | 2 |
| **Tallow Emulsion** | | | Comm. Comp. | + | / | / | 2 | 2 | 1 | 4 |
| **Tannic Acid** | $C_{76}H_{52}O_{46}$ | Aqueous solution | All | + | + | + | 2 | 2 | 2 | 2 |
| **Tartaric Acid** | $COOH(CHOH)_2COOH$ | Aqueous solution | All | + | + | + | | | | |
| **Tetrachloroethane** | $CHCl_2CHCl_2$ | 100% | / | - | | | 4 | 4 | 1 | 4 |
| **Tetrachloroethylene** | $Cl_2C=CCl_2$ | 100% | / | - | | | 4 | 4 | 2 | 4 |
| **Tetraethyl Lead** | $Pb(C_2H_5)_4$ | Technically pure | 100% | + | | | 2 | 4 | 1 | 4 |
| **Tetrahydrofurane** | $(CH_2)4_O$ | | 100% | / | - | | 4 | 4 | 4 | 4 |
| **Tetrahydronaphthalene** | $C_{10}H_{12}$ | | 100% | / | | | | | | |
| **Thionyl Chloride** | $SOCl_2$ | Technically pure | 100% | - | | | 2/3 | 1 | 1 | 2/3 |
| **Thiophene** | $C_4H_8S$ | 100% | / | / | / | | 4 | 4 | 4 | 4 |
| **Toluene** | $C_6H_5CH_3$ | Technically pure | 100% | / | - | - | 4 | 4 | 2 | 4 |
| **Toluic Acid** | $CH_3C_6H_4COOH$ | | 50% | / | | | | | | |
| **Transformer Oil** | | | Comm. Comp. | + | / | / | | 4 | 2 | 4 |
| **Tributylphosphate** | $(C_4H_9)_3PO_4$ | Technically pure | 100% | + | + | + | 4 | 2 | 3 | 4 |
| **Trichlorethylene** | $ClCH=CCl_2$ | Technically pure | 100% | - | - | - | 4 | 4 | 2 | 4 |
| **Trichloroacetic Acid** | $CCl_3COOH$ | Aqueous solution | 50% | + | / | / | 2 | 2 | 4 | 4 |
| **Trichloroacetic Acid** | $CCl_3COOH$ | Technically pure | 100% | + | / | - | 2 | 2 | 4 | 4 |
| **Trichloroethane** | $CH_3CCl_3$ | Technically pure | 100% | / | | | 4 | 4 | 1 | 4 |
| **Tricresylphosphate** | $(CH_3C_6H_4O)_3PO_4$ | Technically pure | 100% | + | + | + | 4 | 2 | 2 | 4 |
| **Triethanolamine** | $N(CH_2CH_2OH)_3$ | Technically pure | 100% | + | + | / | 3 | 1 | 4 | 2 |
| **Trioctylphosphate** | $(C_8H_{17})_3PO_4$ | Technically pure | 100% | / | | | 4 | 1 | 2 | 4 |
| **Turpentine Oil** | | Technically pure | 100% | / | - | - | 2 | 4 | 1 | 4 |
| **Urea** | $NH_2CONH_2$ | Aqueous solution | <=10% | + | + | + | 1 | 1 | 1 | 1 |
| **Urea** | $NH_2CONH_2$ | Aqueous solution | 33% | + | + | + | 1 | 1 | 1 | 1 |
| **Urine Indetermined** | | | | + | + | + | | | | |
| **Vaseline Oil** | | | Comm. Comp. | + | + | / | | 1 | 1 | 4 |
| **Vegetable Oils and fats** | | | Comm. Comp. | + | / | | 1 | 4 | 1 | 3 |
| **Water** | $H_2O$ | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Water** | $H_2O$ | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Water** | $H_2O$ | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Water** | $H_2O$ | | 100% | + | + | + | 2 | 1 | 2 | 2 |
| **Water** | $H_2O$ | | 100% | + | + | + | 2 | 1 | 2 | 2 |
| **Water, Rain** | $H_2O$ | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Water, Salt** | $H_2O$+NaCl | | Saturated | + | + | + | 1 | 1 | 1 | 1 |
| **Water, Sea** | | | 100% | + | + | + | 1 | 1 | 1 | 1 |
| **Wine** | | | Comm. Comp. | + | + | + | 1 | 1 | 1 | 1 |
| **Wine Vinegar** | | Technically pure | Comm. Comp. | + | + | + | | | | |
| **Xylene** | $C_6H_4(CH_3)_2$ | | 100% | - | 4 | 4 | 2 | 4 | | |
| **Zinc Acetate** | $Zn(CH_3COO)_2$ | | Indetermined | + | + | + | 2 | 1 | 4 | 4 |
| **Zinc Chloride** | $ZnCl_2$ | Aqueous solution | Solution | + | + | + | 2 | 1 | 1 | 2 |
| **Zinc Chloride** | $ZnCl_2$ | Aqueous solution | Saturated | + | + | + | 2 | 1 | 1 | 2 |
| **Zinc Chromate** | $ZnCrO_4$ | Aqueous solution | Indetermined | + | + | + | | | | |
| **Zinc Cyanide** | $Zn(CN)_2$ | Aqueous solution | All | + | + | + | | | | |
| **Zinc Nitrate** | $Zn(NO_3)_2$ | Aqueous solution | Indetermined | + | + | + | | | | |
| **Zinc Sulfate** | $ZnSO_4$ | Aqueous solution | Solution | + | + | + | 1 | 1 | 1 | 1 |
| **Zinc Sulfate** | $ZnSO_4$ | Aqueous solution | Saturated | + | + | + | 1 | 1 | 1 | 1 |

*The data is based on the latest knowledge. When in doubt please contact our Technical Support department.*