



aquatherm

state of the pipe

TECHNICAL INFORMATION

The following chemical resistance document can be used as a general guideline, but should not be considered a formal recommendation or approval by aquatherm. The actual behavior of the piping system when exposed to a specific chemical is very dependent on the exposure conditions (temperature, pressure, flow, duration, etc.), the stresses on the piping material and system (mechanical, thermal, cyclic, etc.), and the ancillary materials in the system (o-rings, seals, gaskets, metal components, etc). Due to the comprehensive warranty provided by aquatherm, specific applications must be submitted to aquatherm for review and evaluation using the form in the technical catalog or the online submittal form. A written response will be provided once the review is completed. The attached guidance document should NOT be used as a definitive reference for determining the chemical compatibility of aquatherm piping in a specific application. This can only be determined by submitting the information to aquatherm for review.

Polypropylene (PP) pipes; chemical resistance of pipes and pipe fittings.

The behavior of pipes and pipe fittings towards flow substances depends on the one hand on the particular nature and type of plastic, the design of the pipe fitting and the manufacturing conditions, and, on the other hand, on the nature of the flow substance. In particular, the duration of the action, temperatures and mechanical stresses acting at the same time and other types of influences which additionally have an effect also determine the behavior. The effects of these influences, which frequently are not clearly foreseeable at the outset, are decisive for the suitability for an application. Furthermore, special requirements on the pipe or pipe fitting (e.g. dimensional stability or mechanical strength) shall be taken into consideration, depending on the application.

For these reasons, the suitability of pipes and pipe fittings for a flow substance can be evaluated only from case to case.

The chemical resistance indicates the gradual behavior of the material of the pipe wall towards the action of the flow substance. It depends in each case on the type of interacting substances, their composition, the temperature and the duration of the action.

In an application, the chemical resistance can be influenced by further stresses (e.g. of a mechanical nature).

Note: The chemical resistance does not correspond to the term "chemical stability" hitherto used in everyday language, because this contains an evaluation for the particular application.

Data on chemical resistance

Various processes may occur when the flow substances come into contact with the material of the pipe wall, such as absorption of the liquid (swelling), extraction of soluble constituents of the material (shrinkage) and chemical reactions (hydrolysis, oxidation and the like), which in certain circumstances may cause changes in the properties of the pipes and pipe fittings.

The behavior of the pipes and pipe fittings towards the flow substances is classified into the following groups:

- : **resistant**
The material of the pipe wall is generally evaluated as suitable.
- ◐: **conditionally resistant**
The suitability of the material of the pipe wall for the particular application shall be investigated; if necessary, further experiments shall be carried out.
- : **not resistant**
The material of the pipe wall is generally evaluated as unsuitable.
- : No data on the chemical resistance is available





aquatherm

state of the pipe

TECHNICAL INFORMATION

¹⁾ Table taken from the English translation of DIN 8078 Supplement 1, Feb. 1982, Chemical resistance of (PP-) pipes and pipe fittings. Reproduction with the permission of DIN Deutsches Institut für Normung e. V.. Important: When applying said standard the edition with the most recent release date should be used (can be purchased at Beuth Verlag GmbH, Burggrafenstrasse 6, 10787 Berlin, Germany).

¹⁾ The following designations are used for the composition of the flow substances:

a) If the content data is not followed by "(Vol.)", the data is the weight in % (previously % by weight).

VL: aqueous solution, the weight content of which is $\leq 10\%$.

L: aqueous solution, the weight content of which is greater than 10%.

GL: saturated (at 20 °C) aqueous solution.

TR: flow substance is as least technically pure.

H: commercially available composition.

b) Volume content in % (previously % by volume): this is characterized specially by "(Vol)".

The chemical resistance of pipes and pipe fittings is generally not reduced for weight or volume contents and temperatures lower than those given in the table.

²⁾ These flow substances and/or chemical resistance data are not contained in ISO/TR 7471.

³⁾ The chemical resistance is evaluated as one group lower in ISO/TR 7471.

⁴⁾ The chemical resistance is evaluated as one group higher in ISO/TR 7471.





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Waste gases ²⁾ or air/gas mixtures				
- containing hydrogen fluoride	traces	●	●	-
- containing carbon dioxide	any	●	●	-
- containing carbon monoxide	any	●	●	-
- containing nitroses (nitrogen oxide)	traces	●	●	-
- containing hydrochloric acid	any	●	●	-
- containing sulphur dioxide	any	●	●	-
- containing sulphuric acid	any	●	●	-
- containing sulphur: trioxide (oleum)	traces	○	○	○
Acetaldehyde ²⁾	TR	◐	-	-
Acetaldehyde, aqueous ²⁾	40%	●	●	-
Acetic anhydric (acetic acid anhydride)	TR	●	-	-
Acetone	TR	●	●	-
Acetophenone	TR	●	◐	-
Acrylonitrile	TR	●	● ²⁾	-
Adipic acid ²⁾	GL	●	●	-
Malic acid	L	●	●	-
Caustic soda see sodium hydroxide solution	up to 60%	●	●	●
Battery acid ²⁾	H	●	●	-
Alums (Me(I)-Me(III)-sulphates) ²⁾	GL	●	●	-
Allyl alcohol (prop-2-en-1-ol), aqueous ²⁾	96%	●	●	-
Aluminium chloride ²⁾	GL	●	●	-
Aluminium sulphate ²⁾	GL	●	●	-
Formic acid, aqueous	10%	●	●	◐
Formic acid, aqueous	85%	●	◐ ³⁾	○
2 - Aminoethanol (ethanolamine)	TR	●	-	-
Ammonia, liquid	TR	●	-	-
Ammonia, gaseous	TR	●	● ²⁾	-
Aqueous ammonia (ammonia solution)	GL	●	● ²⁾	-
Ammonium acetate	GL	●	●	-
Ammonium carbonate ²⁾ and bicarbonate	GL	●	●	-
Ammonium chloride	GL	●	● ²⁾	-
Ammonium fluoride	L	●	●	-
Ammonium nitrate	GL	●	●	●
Ammonium phosphate ²⁾	GL	●	●	●
Ammonium sulphate	GL	●	●	●





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Ammonium sulphide ²⁾	GL	●	●	–
Amyl acetate (acetate (acetic acid isoamyl ester))	TR	◐	–	–
Amyl alcohol (fermentation amyl alcohol)	TR	●	●	●
Aniline	TR	◐ ⁴⁾	◐ ⁴⁾	–
Anilium chloride (aniline hydrochloride)	GL	●	●	–
Anisole ²⁾	TR	◐	◐	–
Anone see cyclohexanone	TR	◐	○	○
Antimony(III) chloride, aqueous ²⁾	90%	●	●	–
Apple juice	H	●	● ²⁾	● ²⁾
Malic acid	L	●	●	–
Apple wine ²⁾	H	●	●	–
Arsenic acid, ortho, aqueous ²⁾	10%	●	●	–
Arsenic acid, ortho, aqueous ²⁾	80%	●	●	◐
Barium hydroxide	GL	●	●	●
Barium salts ²⁾	GL	●	●	●
Cottonseed oil	TR	●	●	–
Benzaldehyde ²⁾	GL	●	●	–
Benzaldehyde ²⁾	L	●	–	–
Benzine (aliphatic hydrocarbons)	H	◐ ³⁾	○	○
Benzine/benzene mixture ²⁾	80%/20% (Vol.)	◐	○	○
Benzoic acid	GL	●	● ²⁾	–
Benzene	TR	◐	○	○
Benzoyl chloride ²⁾	TR	◐	–	–
Benzyl alcohol	TR	●	◐	–
Succini acid	GL	●	●	–
Beeswax ²⁾	H	●	◐	–
Beer ²⁾	H	●	●	●
Caramel ²⁾	VL	●	●	–
Hydrocyanic acid ²⁾ (hydrogen cyanide)	TR	●	●	–
Lead acetate ²⁾	GL	●	●	◐
Bleaching liquor (sodium hypochlorite)	20%	◐ ⁴⁾	◐	○ ²⁾
Lead tetraethyl (tetraethyl-lead) ²⁾	TR	●	–	–
Borax (sodium tetraborate)	L	●	●	–
Boric acid	GL	●	● ²⁾	● ²⁾
All types of spirits ²⁾	H	●	●	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Bromine (bromine water) ²⁾	GL	◐	○	○
Bromine, gaseous	any	◐	○	○
Bromine, liquid	TR	○	○	○
Bromomethyl see methyl bromide	TR	○	○	○
Hydrobromic acid, aqueous	48%	●	◐	○
Butane, gaseous	TR	●	● ²⁾	-
Butadiene, gaseous ²⁾	TR	◐	○	○
Butanols (butyl alcohols)	TR	●	◐	◐
Butane-1,2,4-triol ²⁾	TR	●	●	-
But-2-ene-1,4-diol ²⁾	TR	●	●	-
But-2-ine-1,4-diol ²⁾	TR	●	-	-
Butyric acids, aqueous	20%	●	-	-
Butyl acetates(acetic acid butyl esters)	TR	◐	○	○
Butylenes, liquid ²⁾ (butenes)	TR	◐	-	-
Butylene glycols (butanediols) aqueous ²⁾	10%(Vol.)	●	◐	-
Butylene glycols (butanediols) ²⁾	TR	●	●	-
Butylglycol (ethylene glycol monobutyl ether)	TR	●	-	-
Butylphenols	GL	●	-	-
Butylphenone ²⁾	TR	○	-	-
Butyl phthalate (dibutyl phthalate)	TR	●	◐	◐
Calcium carbonate	GL	●	●	●
Calcium chloride	GL	●	●	●
Calcium hydroxide	GL	●	●	-
Calcium hypochlorite	L	●	-	-
Calcium nitrate	GL	●	●	-
Camphor oil	TR	○	○	○
Carbolineum ²⁾	H	●	-	-
Chlorine, gaseous, dry	TR	○	○	○
Chlorine, gaseous, moist ²⁾	0.50%	◐	-	-
Chlorine, gaseous, moist ²⁾	1%	○	○	○
Chlorine, liquid	TR	○	○	○
Chlorine (chlorine water)	GL	◐ ⁴⁾	○	○
Chloral ²⁾ (trichloroacetaldehyde)	TR	●	●	-
Chloral hydrate ²⁾	TR	◐	○	○
Chloramine ²⁾	L	●	-	-
Chlorobenzene ²⁾	TR	◐	-	-





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Chloroacetic acid, mono, aqueous	L	●	● ²⁾	–
Chloroacetic, mono, aqueous	85% ²⁾	●	●	–
Chloroethane (ethyl chloride)	TR	○	○	○
2-Chloroethanol (ethylene chlorohydrin)	TR	●	● ²⁾	–
Bleaching powder suspension in water ²⁾	any	●	●	–
Chloroform (trichloromethane)	TR	◐	○	○
Chloric acid, aqueous ²⁾	1%	●	◐	○
Chloric acid, aqueous ²⁾	10%	●	◐	○
Chloric acid, aqueous	20%	●	○	○
Chlorosulphonic acid (chlorosulphuric acid)	TR	○	○	○
Chlorine water (chlorine)	GL	◐ ⁴⁾	○	○
Hydrogen chloride, dry gas	TR	●	●	–
Hydrogen chloride, moist gas ²⁾ (hydrochloric acid)	TR	●	●	–
Chrome alum (alums)	GL	●	●	–
Chromic acid, aqueous	40%	◐ ⁴⁾	◐	○
Chromic acid/sulphuric acid/water ²⁾ (chromic/sulphuric acid)	15/35/50%	○	○	○
Citric acid	VL	●	●	●
Crotonaldehyde ²⁾ (2-butenal)	TR	●	–	–
Potassium cyanide	L	●	● ²⁾	–
Cyclohexane	TR	●	–	–
Cyclohexanol	TR	●	◐	–
Cyclohexanone	TR	◐	○	○
Dekalin (decahydronaphthalene)	TR	◐ ³⁾	○	○
Dextrin (starch gum)	L	●	●	–
Dextrose (glucose)	20%	●	●	●
1,2-Diaminoethane (ethylenediamine) ²⁾	TR	●	●	–
Di-n-butyl ether ²⁾	TR	◐	○	○
Dibutyl phthalate (phehalic acid dibutyl ester)	TR	●	◐	○
Dichloroethylene (1,1- and 1, 2-)	TR	◐	–	–
Dichlorobenzenes ²⁾	TR	◐	–	–
Dichloroacetic acid	TR	◐	–	–
Dichloroacetic acid, aqueous ²⁾	50%	●	●	–
Dichloroacetic acid methyl ester ²⁾	TR	●	●	–
Diesel fuel ²⁾	H	●	◐	–
Diethanolamine	TR	●	–	–
Diethyl ether (ether)	TR	●	◐	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Diglycollic acid	GL	●	● ²⁾	–
Dihexyl phthalate ²⁾	TR	●	◐	–
Diisobutyl ketone ²⁾ (2,6-dimethylheptan-4-one)	TR	●	○	○
Diisopropyl ether	TR	◐	○ ²⁾	–
Diisooctyl phthalate	TR	●	◐	–
Dimethylamine, gaseous	100%	●	–	–
N, N-Dimethylformamide	TR	●	●	–
Dinonyl phthalate ²⁾ (DNP)	TR	●	◐	–
Dioctyl phthalate (DOP)	TR	● ³⁾	◐	–
1,4-dioxane (diethylene dioxide)	TR	◐	◐	–
Fertilizer salts ²⁾	GL	●	●	–
Iron (II) and (III) chloride ²⁾	GL	●	●	–
Natural gas	TR	●	–	–
Peanut oil	TR	●	●	–
Vinegar (wine vinegar)	H	●	●	●
Acetic acid, aqueous (glacial acetic acid)	TR	●	◐	○
Acetic acid, aqueous and vinegar essence	50%	●	●	◐
Acetic acid, aqueous	up to 40%	●	●	–
Acetic acid anhydride	TR	●	–	–
Acetic acid ethyl ester (ethyl acetate)	TR	● ³⁾	◐ ³⁾	○
Acetic acid methyl ester (methyl acetate)	TR	●	●	–
Ethanol (ethyl alcohol)	TR	●	●	●
Ethanol, denatured with 2% of toluene ²⁾	96%(Vol.)	●	–	–
Ethylbenzene ²⁾	TR	◐	○	○
Ethyl chloride, gaseous (chloroethane)	TR	○	○	○
Ethylene chlorohydrin (chloroethanol)	TR	●	● ²⁾	–
Ethylenediamine (1,2-diaminoethane)	TR	●	●	–
Ethylene glycol	TR	●	●	●
Ethylene oxide, liquid ²⁾ (oxirane)	TR	○	–	–
Fatty acids (from C ₄) ²⁾	TR	●	◐	–
Pine-needle oil ²⁾	H	●	◐	–
Fluorine, dry ²⁾	TR	◐	–	–
Fluorosilicic acid ²⁾ , aqueous	32%	●	●	–
Hydrofluoric acid, aqueous ²⁾	40%	●	●	–
Hydrofluoric acid, aqueous ²⁾	70%	●	◐	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Formaldehyde, aqueous	40%	●	● ²⁾	–
Photo emulsions ²⁾	H	●	●	–
Photo developer baths ²⁾	H	●	●	–
Photo fixing baths ²⁾	H	●	●	–
Antifreeze (automobiles) ²⁾	H	●	●	●
Fruit drinks and fruit juices	H	●	●	●
Fructose (fruit sugar)	L	●	●	●
Furfuryl alcohol ²⁾	TR	●	◐	–
Fermentation mash ²⁾	H	●	●	–
Gelatine	L	●	●	● ²⁾
Tannin extract, vegetable ²⁾	H	●	○	–
Tannic acid (tannin), aqueous ²⁾	10%	●	○	–
Glucose, aqueous	20%	●	●	●
Glycerol	TR	●	●	●
Glycollic acid, aqueous	30%	●	◐ ²⁾	–
Urea	GL	●	● ²⁾	–
Yeast ²⁾	any	●	–	–
Heating Oil ²⁾	H	●	◐	–
Heptanes	TR	● ³⁾	◐ ³⁾	○
Hexanes	TR	●	◐	–
Hexane-1,2,6-triol ²⁾	TR	●	●	–
Hydrazine hydrate ²⁾	TR	●	–	–
Hydroquinone ²⁾	L	●	–	–
Hydroxylammonium sulphate ²⁾	12%	●	●	–
Isooctane	TR	● ³⁾	◐ ³⁾	○
Isopropanol (propan-2-01)	TR	●	●	●
Tincture of iodine	H	●	◐ ²⁾	–
Potassium hydroxide solution, aqueous	50%	●	●	●
Potassium bromate, aqueous	10%	●	●	–
Potassium bromide	GL	●	●	–
Potassium carbonate (potash)	GL	●	● ²⁾	–
Potassium chlorate	GL	●	●	–
Potassium chloride	GL	●	● ²⁾	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Potassium chromate	GL	●	●	–
Potassium cyanide	L	●	● ²⁾	–
Potassium dichromate ²⁾	GL	●	●	–
Potassium fluoride	GL	●	●	–
Potassium hexacyanoferrate-(II) and -(III) ²⁾ (yellow and red potassium ferro- and ferricyanide)	GL	●	●	–
Potassium bicarbonate	GL	●	●	–
Potassium iodide	GL	●	● ²⁾	–
Potassium nitrate	GL	●	●	–
Potassium perchlorate, aqueous	10%	●	●	–
Potassium permanganate	GL	●	○ ²⁾	–
Potassium peroxodisulphate (potassium persulphate)	GL	●	● ²⁾	–
Potassium sulphate	GL	●	● ²⁾	–
Fluoro silicic acid	32%	●	●	–
Silicic acid, aqueous ²⁾	any	●	●	–
Common salt (sodium chloride)	VL	●	●	●
Aqua regia (HCl/HNO ₃)	75%/25%	○	○	○
Carbon dioxide, gaseous	any	●	●	–
Carbon dioxide (carbonic acid), aqueous ²⁾	any	●	●	–
Coconut fat alcohol ²⁾	TR	●	◐	–
Coconut oil (coconut fat, copra)	TR	●	–	–
Cresols	90% ²⁾	●	●	–
Cresols	>90%	●	–	–
Copper(II) chloride	GL	●	●	–
Copper(I) cyanide ²⁾	GL	●	●	–
Copper(II) nitrate, aqueous	30%	●	●	●
Copper(II) sulphate	GL	●	●	–
Lanolin (wool fat)	H	●	◐	–
Linseed oil	H	●	●	●
Illuminating gas ²⁾	H	●	–	–
Air	TR	●	●	●
Magnesium chloride	GL	●	●	● ²⁾
Magnesium hydroxide carbonate	GL	●	●	●
Magnesium salts ²⁾	GL	●	●	–
Magnesium sulphate	GL	●	●	● ²⁾





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Maize germ oil	TR	●	◐	–
Machine oil ²⁾	TR	●	◐	○
Sea-water	H	●	●	●
Molasses ²⁾	H	●	●	●
Menthol ²⁾	TR	●	◐	–
Methanol (methyl alcohol)	TR	●	●	–
Methanol (methyl alcohol)	5%	●	● ³⁾	◐
Methanesulphonic acid, aqueous ²⁾ (methylsulphuric acid)	50%	◐	◐	○
Methanesulphonic acid, aqueous ²⁾ (methylsulphuric acid)	50 bis 100%	◐	○	○
Methoxybutanol ²⁾	TR	●	◐	–
Methyl acetate see (acetic acid methyl ester)	TR	●	●	–
Methylamine, aqueous	32%	●	–	–
Methyl bromide (bromomethyl)	TR	○	○	○
Methyl chloride, gaseous ²⁾ (chloromethyl)	TR	○	○	○
Methylene chloride (dichloromethane)	TR	◐	○	○
Methyl ethyl ketone ²⁾	TR	●	◐	–
Milk	H	●	●	●
Lactic acid	90%	●	●	–
Mineral water	H	●	●	●
Engine lubrication oils ²⁾	TR	●	◐	–
Naphtha	H	●	○	○
Sodium acetate	GL	●	●	●
Sodium benzoate, aqueous	35%	●	● ²⁾	–
Sodium borate-hydrogen peroxide (sodium perbarate)	GL	●	–	–
sodium carbonate, aqueous	50%	●	●	◐
Sodium chlorate	GL	●	● ²⁾	–
Sodium chloride	VL	●	●	●
Sodium chlorite, aqueous	2 to 20%	●	◐	○
Sodium dichromate	GL	●	●	●
Sodium hexametaphosphate	L	●	● ²⁾	–
Sodium bicarbonate	GL	●	●	●
Sodium bisulphate	GL	●	●	–
Sodium bisulphite	L	●	–	–
Sodium hypochlorite, aqueous	10%	●	–	–
Sodium hypochlorite, aqueous	20%	◐ ⁴⁾	◐	○ ²⁾
Sodium nitrate	GL	●	●	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Sodium nitrite ²⁾	G	●	●	–
Sodium phosphate, tri	GL	●	●	●
Sodium silicate, (water-glass)	L	●	●	–
Sodium sulphate	GL	●	●	–
Sodium sulphide	GL	●	● ²⁾	–
Sodium sulphite, aqueous	40%	●	●	●
Sodium tetraborate	L	●	●	–
Sodium thiosulphate	GL	●	● ²⁾	–
Sodium hydroxide solution, aqueous	up to 60%	●	●	●
Nickel salts ²⁾	GL	●	●	–
Nitrobenzene	TR	●	◐	–
2-Nitrotoluene ²⁾	TR	●	◐	○
Fruit pulps ²⁾	H	●	–	–
Octylcresol ²⁾	TR	◐	○	○
Oils and fats (animal and vegetable)	TR	●	◐	–
Oleic acid	TR	●	◐	–
Oleum (H ₂ SO ₄ + SO ₃)	TR	○	○	○
Olive oil	TR	●	●	◐
Oxalic acid	GL	●	● ³⁾	○
Ozone ²⁾	0.5ppm	●	◐	–
Paraffin emulsions ²⁾	H	●	●	–
Paraffin oil	TR	●	◐	○
Perchloroethylene (tetrachloroethylene) ²⁾	TR	◐	◐	–
Perchloric acid, aqueous	20%	●	● ²⁾	–
Petroleum ether	TR	● ³⁾	◐	–
Petroleum	TR	●	◐	–
Peppermint oil	TR	●	–	–
Phenol, aqueous	5%	●	●	–
Phenol, aqueous	90%	●	–	–
Phenylhydrazine ²⁾	TR	◐	◐	–
Phenylhydrazinium chloride ²⁾	TR	●	◐	–
Phosgene, gaseous ²⁾ (carbonyl chloride)	TR	◐	◐	–
Phosphates ²⁾ (inorganic)	GL	●	●	–
Phosphorus(III) chloride ²⁾	TR	◐	–	–
Phosphorus oxychloride	TR	◐	–	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Phosphoric acid, ortho	85%	●	●	●
Phthalic acid ²⁾	GL	●	●	–
Picric acid (2, 4, 6 - trinitrophenol)	GL	●	–	–
Propane, gaseous	TR	●	–	–
Propan-1-ol ²⁾ (propyl alcohol)	TR	●	●	–
Propargyl alcohol, aqueous ²⁾	7%	●	●	–
Propionic acid, aqueous	>50%	●	● ²⁾	–
Propylene glycols ²⁾	TR	●	●	–
Pyridine	TR	◐	◐ ²⁾	–
Mercury	TR	●	●	–
Mercury salts ²⁾	GL	●	●	–
Castor oil	TR	●	●	–
Aqueous ammonia (ammonia water)	GL	●	● ²⁾	–
Nitric acid, aqueous	10%	●	◐ ³⁾	○
Nitric acid, aqueous	10-50%	◐	○ ²⁾	○ ²⁾
Nitric acid, aqueous	>50%	○	○	○
Hydrochloric acid, aqueous	up to 20%	●	●	–
Hydrochloric acid, aqueous	>20 to 36%	●	◐ ²⁾	◐ ²⁾
Oxygen	TR	●	–	–
Lubricating oils ²⁾	H	◐	–	–
Sulphur dioxide, gaseous	TR	●	● ²⁾	–
Sulphur dioxide, gaseous (sulphurous acid)	any	●	● ²⁾	–
Carbon disulphide	TR	○	○	○
Sulphuric acid, aqueous	10%	●	●	●
Sulphuric acid, aqueous	>10 to 80%	●	●	–
Sulphuric acid, aqueous	>80 to TR	◐	○	–
Sulphuric acid, fuming (oleum)		○	○	○
Hydrogen sulphide, gaseous	TR	●	●	–
Sea-water	H	●	●	●
Silver nitrate	GL	●	●	◐
Silver salts ²⁾	GL	●	●	–
Silicone oil	TR	●	●	●
Silicone emulsion ²⁾	H	●	●	–
Soda (sodium carbonate)	50%	●	●	◐





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Soybean oil	TR	●	◐	–
Spindle oil ²⁾	TR	●	◐	○
Starch	any	●	●	–
Starch gum (dextrin)	L	●	●	–
Startch syrup ²⁾	any	●	●	–
Sulphuryl chloride ²⁾	TR	○	○	○
Terpentine oil	TR	○	○	○
White spirit ²⁾	TR	●	◐	○
Tetrachloroethane ²⁾	TR	◐	○	○
Tetrachloroethylene (perchloroethylene)	TR	◐	◐	–
Carbon tetrachloride (tetrachloromethane)	TR	○	○	○
Tetrahydrofuran	TR	◐	○	○
Tetrahydronaphthalene (tetralin)	TR	○	○	○
Thionyl chloride ²⁾	TR	◐	○	○
Thiophene	TR	●	◐	–
Toluene	TR	◐	○	○
Transformer oil (insulating oil) ²⁾	TR	◐	○	–
Grape sugar (glucose)	20%	●	●	●
Triethanolamine	L	●	–	–
Trichloroethylene	TR	○	○	○
Trichloroacetic acid, aqueous	50%	●	●	–
Tricresyl phosphate ²⁾ (phosphoric acid tritoyl ester)	TR	●	◐	–
Drinking water, chlorinated ²⁾	TR	●	●	●
Triocyl phosphate ²⁾	TR	●	–	–
Vaseline oil ²⁾	TR	●	◐	–
Vinyl acetate ²⁾	TR	●	◐	–
Vinylidene chloride (1,1-dichloroethylene)	TR	◐	–	–
Detergents ²⁾	VL	●	●	–
Water, pure	H	●	●	●
Hydrogen	TR	●	● ²⁾	–
Hydrogen peroxide, aqueous	30%	●	◐	–
Wines	H	●	● ²⁾	–
Wine vinegar, table vinegar	H	●	●	●
Tartaric acid, aqueous	10%	●	●	–





aquatherm

state of the pipe

Flow Substance	Content ¹⁾ %	Behavior at		
		20°C / 68 °F	60°C / 140 °F	100°C / 212 °F
Xdylene (all isomers)	TR	◐ ³⁾	○	○
Zinc salts ²⁾	GL	●	●	-
Tin(II) chloride	GL	●	●	-
Tin(IV) chloride	GL	●	●	-
Citric acid	VL	●	●	●
Sugar syrup ²⁾	H	●	●	-

aquatherm GmbH
Biggen 5
57439 Attendorn, Germany

18th of September 2013

