

Chemical Resistance

The following resistance table is for guidance only. Since the chemical resistance of metals is strongly dependent on the conditions of service, it is always best to contact Klinger Technical to check suitability in a given application. As a general guideline, the metal used to manufacture the windings and inner ring should match the flange material – for carbon steel flanges it is usually okay to select stainless components

- ✓ Suitable
- ✓ Suitability depends on operating conditions
- ✗ Unsuitable

Chemical	Monel	Nickel	Iron & Steel	304	316	Good Others
Acetic acid, crude	✓	✓	✗	-	✓	Ag
Acetic acid, pure	✓	✓	✗	✓	✓	Ag
Acetic acid, vapour	✓	✓	✗	✓	✓	Ag
Acetic anhydride	✓	-	✗	✓	✓	Ag
Acetone	✓	✓	✓	✓	✓	
Acetylene	✓	-	✓	✓	✓	
Air	✓	-	✓	✓	-	
Aluminium chloride	✓	-	✓	✗	✗	
Aluminium fluoride	-	-	-	✗	✗	
Aluminium sulphate	✓	✗	✗	✓	✓	Ag
Alums	✓	✗	✗	✓	✓	Ag
Ammonia gas, cold	✓	-	✓	✓	✓	
Ammonia gas, hot	✗	-	✓	✗	-	
Ammonium chloride	✓	✓	✗	✓	✓	
Ammonium hydroxide	✗	-	✓	✓	✓	
Ammonium nitrate	✗	-	✓	✓	✓	
Ammonium phosphate, monobasic	✗	-	✗	✓	✓	
Ammonium phosphate, dibasic	✓	-	✓	✓	✓	
Ammonium phosphate, tribasic	✓	✓	✓	✓	✓	
Ammonium sulphate	✓	-	✓	✓	✓	
Amyl acetate	✓	-	✗	✓	✓	
Amyl alcohol	✓	-	-	-	-	
Aniline, aniline oil	✓	-	✓	✓	✓	
Aniline dyes	✓	-	-	✓	-	
Asphalt	✓	-	✓	✓	-	
Barium chloride	-	✓	-	✓	✓	
Barium hydroxide	-	✓	-	✓	-	
Barium sulphide	✓	-	-	✓	✓	
Beer	✓	-	✓	✓	✓	
Beet sugar liquors	✓	-	✓	✓	✓	
Benzene, benzol	✓	-	✓	✓	✓	
Benzine, petroleum ether, naphtha	✓	-	✓	✓	✓	
Black sulphate liquor	✓	-	✓	✓	-	
Blast furnace gas	✗	-	✓	✗	-	

	Monel	Nickel	Iron & Steel	304	316	Good Others
Chemical						
Borax	✓	✓	✓	✓	✓	
Boric acid	✓	✓	✗	✓	✓	
Bromine	-	-	✗	✗	✗	Ta, Zr
Butane	✓	-	✓	-	✓	
Butyl acetate	-	-	-	✓	✓	
Butyl alcohol, butanol	✓	-	✓	-	-	
Calcium bisulphite	✗	-	✗	-	✓	
Calcium chloride	✓	-	✓	✗	✗	
Calcium hydroxide	✓	✓	✓	✓	✓	
Calcium bisulphite	✗	-	✗	-	✓	
Calcium hypochlorite	✓	-	✓	✗	✗	Ta, Zr
Caliche liquors	✓	-	✓	✓	-	
Cane sugar liquors	✓	-	✓	✓	✓	
Carbolic acid, phenol	✓	-	✗	✓	✓	
Carbon dioxide, dry	✓	-	✓	✓	✓	
Carbon dioxide, wet	✓	-	✓	✓	✓	
Carbon bisulphite	✓	-	✓	✓	✓	
Carbon monoxide, hot	-	-	✓	✓	✓	
Carbon tetrachloride	✓	-	✗	✗	✗	Ag
Castor oil	✓	-	✓	✓	-	
China wood oil, tung oil	✓	-	✓	✓	-	
Chlorine, dry	✓	-	✓	✓	✓	
Chlorine, wet	✗	-	✗	✗	✗	Ag
Chlorinated solvents, dry	✓	-	✓	✓	-	
Chlorinated solvents, wet	✓	-	✗	✗	-	
Chloroacetic acid	-	✓	✗	✗	✗	Ta, Zr
Chlorosulphonic acid	✓	-	-	✓	-	
Chromic acid	✓	-	-	-	✓	
Citric acid	✓	-	✗	✓	✓	
Coke oven gas	✓	-	✓	-	✓	
Cooper chloride	✓	-	✓	✗	✗	
Cooper sulphate	✓	-	✗	✓	✓	
Corn oil	✓	-	✓	✓	✓	
Cotton seed oil	✓	-	✓	✓	✓	
Creosote, coal tar	✓	-	✓	✓	✓	
Creosote, wood	✓	-	✓	✓	✓	
Cresols, cresylic acid	✓	-	✓	-	✓	
Dowtherm, A	-	-	✓	-	-	
Dowtherm, E	-	-	✓	-	-	
Ethers	✓	-	✓	-	-	
Ethyl acetate	✓	-	✓	✓	✓	
Ethyl cellulose	✓	✓	-	-	-	
Ethyl chloride	✓	✓	✓	✓	✓	
Ethyl glycol	✓	-	✓	✓	✓	
Ferric chloride	✗	✗	✗	✗	✗	
Ferric sulphate	✗	✗	✗	✓	✓	Ta, Zr
Formaldehyde	✓	-	✓	✓	✓	Ag
Formic acid	✗	✗	✗	✓	✓	Ag
Freon	✓	-	✗	✗	✗	
Fuel oil	✓	-	✓	✓	-	

	Monel	Nickel	Iron & Steel	304	316	Good Others
Chemical						
Fuel oil, acid	✓	-	✗	✗	-	
Furfural	✓	-	✓	✓	✓	
Gasoline, sour	✓	-	✗	✗	✓	
Gasoline, refined	✓	-	✓	✓	✓	
Gelatine	✓	-	-	✓	✓	
Glucose	✓	-	✓	✓	✓	
Glue	✓	-	✓	✓	✓	
Glycerine, glycerol	✓	-	✓	✓	✓	
Green sulphate liquor	✓	-	✓	-	-	
Hydrochloric acid	✗	✗	✗	✗	✗	
Hydrochloric acid, <70 deg. C	✗	✗	✗	✗	✗	Ag
Hydrochloric acid, >70 deg. C	✗	✗	✗	✗	✗	H - B. Ta
Hydrocyanic acid	✓	-	✗	✓	✓	
Hydrofluoric acid, cold, <65%	✓	✗	✗	✗	✗	Cu - Ni
Hydrofluoric acid, cold, >65%	✓	-	✓	✗	✗	Ag
Hydrofluoric hot, <65%	✗	✗	✗	✗	✗	
Hydrofluoric hot, >65%	✓	-	✗	✗	✗	Ag
Hydrocyanic acid	✗	-	✗	✗	✗	
Hydrogen gas, cold	✓	-	✓	✓	✓	
Hydrogen gas, hot	✓	-	✓	✓	✓	
Hydrogen peroxide	✓	✓	✗	✓	✓	
Hydrogen sulphide, dry, cold	✓	✓	✗	✓	✓	
Hydrogen sulphide, dry, hot	✗	✗	✗	✗	✗	502
Hydrogen sulphide, wet, cold	✓	✓	✓	✓	✓	
Hydrogen sulphide, wet, hot	✗	✗	✗	✗	✗	
Kerosene	✓	-	✓	✓	✓	
Lacquers	✓	-	✗	✓	✓	
Lacquer solvents	✓	-	✗	✓	✓	
Lactic acid, cold	✓	✓	✗	✗	✓	Sn
Lactic acid, hot	✗	✗	✗	✗	✗	Ag (Bair)
Linseed oil	✓	-	✓	✓	✓	
Lubricating oils, sour	✓	-	✗	✗	-	
Lubricating oils, refined	✓	-	✓	✓	-	
Magnesium chloride	✓	✓	✓	✓	✓	Ag
Magnesium hydroxide	✓	✓	✓	✓	✓	
Magnesium sulphate	✓	-	✓	✓	✓	
Mercuric chloride	✗	✗	✗	✗	✗	
Mercury	✓	-	✓	✓	✓	
Methyl alcohol, methanol	✓	-	✓	✓	✓	
Methyl chloride	✓	-	✓	-	-	
Milk	✓	✓	✓	-	✓	
Mineral oils	✓	-	✓	✓	✓	
Natural gas	✓	-	✓	✓	✓	
Nickel chloride	✗	-	-	✓	✓	
Nickel sulphate	✗	-	-	✓	✓	
Nitric acid, crude	✗	✗	✗	✗	✗	
Nitric acid, Diluted	✗	✗	✗	✓	✓	
Concentrated	✗	✗	✗	✓	✓	
Nitrobenzene	-	-	✓	-	✓	
Oleic acid	✓	✓	-	✓	✓	

	Monel	Nickel	Iron & Steel	304	316	Good Others
Chemical						
Oleum spirits	✓	-	✓	-	-	
Oxalic acid	✓	-	✗	✗	✗	
Oxygen, cold	✓	-	✓	✓	✓	
Oxygen <260 deg. C	✓	-	✓	✓	✓	
Oxygen 260 - 540 deg. C	✓	-	✓	✓	✓	
Oxygen >540 deg. C	✗	✓	✗	✗	✗	
Ozone	-	-	-	-	-	
Palmitic acid	✓	-	✓	✓	✓	
Petroleum oils, crude, <260 deg. C	✗	✗	✓	✓	✓	
Petroleum oils, crude >260 deg. C	✗	✗	✓	✓	✓	
Petroleum oils, crude <540 deg. C	✗	✗	✗	✗	✗	
Phosphoric acid, crude	✗	✗	✗	✗	✗	
Phosphoric acid, pure, <45%	✓	✗	✗	✓	✓	
Phosphoric acid >45%, cold	✓	✗	✗	✓	✓	
Phosphoric acid, hot	✗	-	✗	✗	✗	
Picric acid	✗	✗	✓	✓	✓	
Potassium chloride	✓	✓	✓	✓	✓	
Potassium cyanide	✓	-	✓	✓	✓	
Potassium hydroxide	✓	✓	✗	✓	✓	
Potassium sulphate	✓	✓	✓	✓	✓	
Producer gas	✓	-	✓	-	-	
Propane	✓	-	✓	✓	✓	
Sewage	✓	-	✓	✓	✓	
Soap solutions	✓	-	✓	✓	-	
Soda ash, sodium carbonate	✓	-	✓	✓	✓	
Sodium bicarbonate, baking soda	✓	✓	✗	✓	✓	
Sodium bisulphate	✓	✓	✗	✗	✗	
Sodium chloride	✓	✓	✓	✓	✓	
Sodium cyanide	✓	-	✓	-	✓	
Sodium hydroxide	✓	✓	✓	✓	✓	
Sodium hypochlorite	✗	✗	✗	✗	✗	Pt
Sodium metaphosphate	✓	✓	-	✓	-	
Sodium nitrate	✓	✓	✓	✓	✓	
Sodium perborate	✓	✓	✗	✓	✓	
Sodium peroxide	✓	✓	✗	✓	✓	
Sodium phosphate, monobasic	✓	✓	✗	-	✓	
Sodium phosphate, Dibasic	✓	✓	✗	-	✓	
Sodium phosphate, Tribasic	✓	✓	✓	-	✓	
Sodium silicate	✓	✓	✓	-	✓	
Sodium sulphate	✓	✓	✓	✓	✓	
Sodium sulphide	✓	✓	✓	✓	✓	
"Sodium thiosulphate, ""hypo"""	✗	-	✗	✓	✓	
Soybean oil	-	-	-	✓	✓	
Stannic chloride	✗	✗	-	✗	✗	Ta, Zr
Steam, <260 deg. C	✓	✓	✓	✓	✓	
Steam 260 - 540 deg. C	✗	✗	✓	✓	✓	500
Steam >540 deg. C	✗	✗	✗	✓	✓	Inc., 502
Stearic acid	✓	✓	✗	✓	✓	Ag
Sulphur	✗	✗	✓	✓	✓	
Sulphur chloride	✗	-	✗	-	✗	

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Chemical						
Sulphur dioxide, dry	✓	✓	✓	✓	✓	
Sulphur trioxide, dry	✓	-	✓	✓	-	
Sulphuric acid, <10%, cold	✗	✗	✗	✓	✓	Pt
Sulphuric acid, <10%, hot	✗	✗	✗	✗	✓	Pt
Sulphuric acid, 10 - 75%, cold	✗	✗	✗	✗	✓	Pt
Sulphuric acid, 10 - 75%, hot	✗	✗	✗	✗	✗	Pt
Sulphuric acid, 75 - 95%, cold	✗	✗	✗	✓	✓	Pt
Sulphuric acid, 75 - 95%, hot	✗	✗	✓	✗	✗	Pt
Sulphuric acid, fuming	✗	✗	✗	✗	✓	Pt
Sulphurous acid	✗	✗	✓	✗	✗	Pt
Tannic acid	✓	✓	-	✓	✓	
Tar	-	-	✓	✓	-	
Tartaric acid	✗	✗	✗	✗	✓	
Toluene	✓	-	✓	-	-	
Trichloroethylene	✓	-	✗	✗	✗	
Turpentine	✓	-	-	✓	✓	
Vinegar	✓	-	✗	✓	✓	
Water, acid mine, with oxidizing salts	✗	✗	✗	✓	✓	
Water, acid mine, no oxidizing salts	✓	-	✗	-	✗	
Water, fresh	✓	-	✗	✓	✓	
Water distilled, lab. Grade	✗	✓	✗	✓	✓	
Water return condensate	✓	-	✓	✓	✓	
Water, seawater	✓	-	✗	✓	✓	
Whiskey and wines	✓	-	✗	✓	✓	
Zinc chloride	✓	-	✗	✗	✗	
Zinc sulphate	✓	-	✗	✓	✓	

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