



Technical

Suggested Sheath Materials

The following table of recommendations should only be used as a guide. The proper choice should be based upon your knowledge of the conditions which exist in each application.

Compound	Copper	Lead	Aluminum	Nickel	Iron and Steel	Cast Iron NI Resist	300 Series Stainless	Monel	Inconel Incoloy
Acetic Acid,									
Crude	2	x	2	2	x	3	2	2	3
Pure	2	2	1	2	—	x	—	1	3
Vapors	2	x	3	2	—	x	—	2	3
150 PSI; 400°F	2	x	3	2	—	—	—	2	3
Acetone	—	—	—	—	3	2	1	—	—
Alboloy Process	—	—	—	—	1	—	—	—	—
Aluminum Sulphate	2	1	3	3	x	3	2	2	—
Ammonia Gas									
Cold	3	1	1	—	1	1	1	1	—
Hot	x	x	—	—	3	3	3	3	—
Ammonia and Oil	—	—	—	—	1	—	—	—	—
Ammonium Chloride	x	1	x	2	3	1	2	2	—
Ammonium Hydroxide	x	1	2	—	1	1	1	3	1
Ammonium Nitrate	x	x	2	—	1	3	1	3	—
Ammonium Sulphate	2	1	—	—	1	1	1	1	—
Amyl Alcohol	1	—	—	—	—	—	—	1	—
Anhydrous Ammonia	x	—	—	—	1	—	—	—	—
Aniline, Aniline Oil	x	—	x	—	1	—	1	1	—
Aniline Dyes	—	—	—	—	—	—	1	1	—
Anodizing Solutions 10%	—	—	—	—	3	—	1	—	—
Chromic Acid 96°F	—	—	—	—	3	—	1	—	—
Sulphuric Acid 70°F	—	1	—	—	—	—	—	—	—
Sodium Hydroxide Alkaline	—	—	—	—	1	—	—	—	—
Nigrosine Black Dye	—	—	—	2	—	—	—	1	—
Nickel Acetate	—	3	—	2	—	—	—	1	—
Barium Hydroxide	x	x	x	1	—	—	1	—	—
Barium Sulphide	x	1	—	—	—	—	1	1	—
Bleaching Solution	—	—	—	2	—	—	—	1	—
1½lb. Oxalic Acid per									
Gallon of H ₂ O at 212°F	—	—	—	—	—	—	—	—	—
Bonderizing	—	—	—	—	3	2	1	—	—
Cadmium Plating	—	—	—	—	—	—	—	—	1
Carbolic Acid, Phenol	x	1	1	—	3	3	1	1	1
Carbon Dioxide									
Dry	1	1	1	—	1	1	1	1	1
Wet	2	x	2	—	2	3	1	1	1
Carbon Tetrachloride	3	2	3	—	3	3	3	1	1
Castor Oil	—	—	1	—	1	—	1	1	1
Chloroacetic Acid	x	x	x	2	x	—	x	—	—
Chlorine									
Dry	1	1	1	—	1	1	1	1	—
Wet	x	2	x	—	x	x	x	x	—
Chromic Acid	x	1	x	—	3	3	1	2	3
Chrome Plating	—	1	—	—	—	—	—	—	—
Citric Acid	1	1	1	—	x	3	1	1	1
Cobalt Acetate 130°F	—	—	—	—	—	—	—	1	1
Coconut Oil	—	—	—	1	—	—	—	2	—
Copper Chloride	3	1	x	—	2	—	x	2	—
Copper Cyanide	—	—	—	—	1	—	—	—	—
Copper Plating	—	—	—	—	1	—	—	—	—
Copper Sulphate	3	1	x	—	x	3	1	1	1
Creosote	1	—	1	—	1	1	1	1	—

Resistance Ratings: 1 = Good 2 = Fair 3 = Depends on Conditions x = Unsuitable



Technical

Suggested Sheath Materials (con't)

Compound	Copper	Lead	Aluminum	Nickel	Iron and Steel	Cast Iron NI Resist	300 Series Stainless	Monel	Inconel Incoloy
Deoxidine	—	—	—	—	—	—	1	—	—
Deoxylle	—	—	—	—	—	—	1	—	—
Dipenyl 300° - 350°F	—	—	—	—	1	—	—	—	—
Di Sodium Phosphate									
25% 180°F	—	—	—	—	1	—	—	—	—
Diversey No. 99	—	—	—	—	1	—	—	—	—
Downtherm	—	—	—	—	1	—	—	—	—
Ethers	1	1	1	—	1	—	—	1	1
Ethyl Chloride	1	—	—	1	1	—	1	1	—
Ethylene Glycol 300°F	—	—	—	—	—	—	1	1	—
Ferric Chloride	x	x	x	x	x	x	x	x	x
Ferric Sulphate	x	1	x	x	x	x	2-304 1-316	x	3
Formaldehyde	2	x	2	—	2	2	1	1	1
Formic Acid	2	x	x	3	x	—	2	3	3
Freon	1	1	1	—	3	1	3	1	—
Fuel Oil	1	1	—	—	1	—	1	1	—
Fuel Oil, Acid	3	1	—	—	3	—	3	1	—
Gasoline, Sour	3	1	3	—	3	3	1	1	1
Gasoline, Refined	1	1	1	—	1	1	1	1	1
Glycerin, Glycerol	2	1	1	—	1	1	1	1	—
Holdens 310A Tempering Bath	—	—	—	1	—	—	—	—	—
Houghtons Mar Tempering Salt	—	—	—	3	3	—	—	—	—
Hydrochloric Acid									
< 150°F	x	2	x	3	x	x	x	3	—
> 150°F	x	x	x	3	x	—	x	3	—
Hydrofluoric Acid									
Cold < 65%	3	2	x	x	x	x	x	2	—
> 65%	2	3	x	—	2	—	x	1	—
Hot < 65%	x	x	x	x	x	—	x	3	—
> 65%	2	x	x	—	3	—	x	1	—
Hydrogen Peroxide	x	2	1	2	x	x	1	2	1
Irdite 1-part and 5-parts									
water 200°F	—	1	—	—	—	—	—	—	—
Isoproponel	2	—	—	—	3	—	—	1	—
Kerosene	1	1	—	—	1	—	1	1	1
Kolene	—	—	—	1	—	—	—	—	—
Lacquer solvents	3	—	1	—	3	1	1	1	—
Lard	—	—	—	—	2	—	—	—	—
Linseed oil	1	1	1	—	1	—	1	1	1
Magnesium chloride	2	x	x	2	2	2	2	2	—
Magnesium hydroxide	x	—	x	1	1	1	1	1	—
Magnesium sulphate	1	—	2	—	1	1	1	1	—
Mercuric chloride	x	—	x	x	3	3	x	x	x
Mercury	x	—	x	—	1	1	1	1	1
Methyl alcohol, methanol	1	1	1	—	1	—	1	1	—
Methyl chloride	1	1	—	1	1	—	—	1	—
Mineral oils	1	1	1	—	1	—	1	1	1
Naphthalene	—	—	—	—	1	—	—	—	—
Nickel chloride	x	—	x	—	—	—	2	3	—
Nickel plating, bright	—	1	—	—	—	—	—	—	—
Nickel plating, dull	—	1	—	—	—	—	—	—	—
Nickel sulphate	x	—	x	—	—	—	1	3	x
Nitric acid,									
Crude	x	x	3	x	x	—	3	x	x
Concentrated	x	x	1	x	x	—	2	x	x
Diluted	x	x	x	x	x	—	1	x	x

Resistance Ratings: 1 = Good 2 = Fair 3 = Depends on Conditions x = Unsuitable



Technical

Suggested Sheath Materials (con't)

Compound	Copper	Lead	Aluminum	Nickel	Iron and Steel	Cast Iron NI Resist	300 Series Stainless	Monel	Inconel Incoloy
Nitrobenzene	2	—	—	—	1	—	1	—	—
Oakite No. 20	—	—	—	—	1	—	—	—	—
Oakite No. 23	—	—	—	—	1	—	—	—	—
Oakite No. 24	—	—	—	—	1	—	—	—	—
Oakite No. 30	—	—	—	—	1	—	—	—	—
Oakite No. 32	—	—	—	—	—	—	—	—	—
Oakite No. 33	—	—	—	—	—	1-347	—	—	—
Oakite No. 36	—	—	—	—	—	—	—	—	—
Oakite No. 51	—	—	—	—	1	—	—	—	—
Oakite No. 90 @ 180°F	—	—	—	—	1	—	—	—	—
Oleic acid	x	x	1	1	3	3	1	1	1
Oxalic acid	3	x	1	—	3	3	3	1	—
Paraffin	—	—	—	—	1	—	—	—	—
Parkerizing	—	—	—	—	3	2	1	—	—
Perchloroethylene	—	—	—	—	—	—	1	—	—
Permachlor	—	—	—	—	—	—	1	—	—
Petroleum oils, crude									
<500°F	3	3	1	3	1	1	1	3	—
>500°F	x	x	1	x	1	1	1	x	—
<1000°F	x	x	x	x	x	—	3	x	—
	—	—	—	—	—	—	1-347	—	—
Phenol 85%, 120°F	—	—	—	1	3	—	1	—	—
Phosphoric acid									
Crude	x	3	x	x	3	—	3	x	—
Pure <45%	2	1	3	3	x	—	1	2	—
>45% Cold	2	1	x	3	x	—	1	2	—
>45% Hot	3	x	x	—	x	—	x-304	3	—
	—	—	—	—	—	—	3-316	—	—
Photo fixing bath	—	—	—	—	—	—	1	3	—
Picric acid water solution	x	x	x	x	3	—	1	3	—
Potassium chloride	1	1	3	1	1	1	1	1	—
Potassium cyanide	x	x	x	—	1	—	1	1	—
Potassium dichromate 208°F	—	—	—	—	—	—	1-347	—	—
Potassium hydroxide	x	x	x	1	3	1	2	1	—
Potassium sulphate	1	1	1	1	1	1	2	1	—
Prestone 350°F	—	—	—	—	1	—	—	1	—
R5 Bright Dip for copper polish @ 180°F	—	—	—	—	—	—	1-316	—	—
Soap solutions	3	1	—	—	1	1	1	1	—
Sodium carbonate <20%	—	—	—	—	1	—	—	—	—
Sodium chloride	2	1	x	1	1	1	2-304	1	1
	—	—	—	—	—	—	1-316	—	—
Sodium cyanide	x	x	x	—	1	3	1-316	2	—
Sodium hydroxide	x	2	x	1	1	1	2	1	1
Sodium hypochlorite	3	x	x	3	x	3	x	3	—
Sodium nitrate	2	1	1	1	1	1	2-304	1	1
	—	—	—	—	—	—	1-316	—	—
Sodium peroxide	—	—	1	1	3	1	1	1	—
Sodium silicate	3	x	x	1	1	1	1-316	1	—
Sodium sulphate	1	1	3	1	1	1	1	1	1
Sodium sulphide	x	1	x	2	1	1	1	2	1
Soybean oil	—	—	—	—	—	—	1	—	—
Steam									
<500°F	1	3	1	1	1	—	1	1	1
500-1000°F	3	x	3	3	3	—	1	3	1
>1000°F	x	—	x	x	x	—	1	x	1
Stearic acid	3	1	3	1	3	3	1	1	1

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Suggested Sheath Materials (con't)

Compound	Copper	Lead	Aluminum	Nickel	Iron and Steel	Cast Iron NI Resist	300 Series Stainless	Monel	Inconel Incoloy
Sulphur	x	—	1	x	1	3	2	x	1
Sulphuric acid<10%									
Cold	3	1	3	3	x	—	2	3	—
Hot	x	1	3	x	x	—	2-316	3	—
	—	—	—	—	—	—	x-304	—	—
10-75% Cold	x	1	3	3	x	—	x-304	3	—
	—	—	—	—	—	—	2-316	—	—
Hot	x	1	x	x	x	—	x	3	—
75-95% Cold	x	1	3	3	3	—	1	3	—
Hot	x	1	x	x	2	—	x	3	—
Fuming	x	1	3	x	3	2	3-304	x	—
	—	—	—	—	—	—	2-316	—	—
Sulphurous acid	3	1	3	x	1	—	3-316	x	—
	—	—	—	—	—	—	x-304	—	—
Tannic acid	1	x	x	1	—	—	2	1	—
Tar	—	—	1	—	1	—	1	—	1
Tartaric acid	—	1	1	3	—	—	3-304	3	—
	—	—	—	—	—	—	1-316	—	—
Tetrachlorethylene	—	—	—	—	1	—	—	—	—
Thermoil Granodine™	—	—	—	—	2	—	—	—	—
Therminol™	—	—	—	—	—	—	—	—	—
Fr. 1-8-12W/Sq.In.640°F	—	—	—	—	1	—	—	—	—
Tin plating	—	—	—	1	—	—	—	—	—
Toluene	—	1	1	—	1	—	1	1	—
Triad solvent	—	—	—	—	3	—	—	—	—
Trichloroethylene	3	2	3	—	3	3	3	1	—
Turco No. 2623	—	—	—	—	1	—	—	—	—
Turpentine	3	1	1	—	3	1	1	1	—
Urea ammonia liquor 48°F	—	—	—	—	1	—	—	—	—
Vegetable oil	—	—	—	—	—	—	1	—	—
Vinegar	—	—	3	—	3	—	2-304	1	—
	—	—	—	—	—	—	1-316	—	—
Water, acid mine									
containing oxidizing salts	3	3	3	3	x	3	1	x	—
no oxidizing salts	—	—	1	—	3	1	x	1	—
Water, fresh	1	1	1	—	3	1	1	1	1
Distilled, Lab grade	x	x	1	1	x	x	1	3	1
Return condensate	1	1	1	—	1	1	1	1	1
Water, sea water	3	1	x	—	3	1	2	1	2
Whiskey and wines	1	—	—	—	x	3	2-304	1	1
	—	—	—	—	—	—	1-316	—	—
X-ray solution	—	—	—	—	—	—	1	—	—
Zinc chloride	x	1	x	—	3	3	x	1	—
Zinc plating	—	—	—	—	1	—	—	—	—
Zinc sulphate	x	—	3	—	3	1	1	1	1

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Because so many Factors are beyond our Power to control we cannot be responsible for any electric immersion heater failure that can be attributed to corrosion. This is in view of any warranties, written or verbal, relative to heater performance in a corrosive environment.