

**CORROSION GUIDE — SUGGESTED METAL SHEATHS**

**\*USE THIS SECTION ONLY AS A GUIDE - FACTORS SUCH AS SOLUTION CONCENTRATION, SOLUTION TEMPERATURE, FLOW RATE, HEATER WATT DENSITY, AND CONTAMINATION OF THE SOLUTION MAY GREATLY IMPACT SHEATH MATERIAL CORROSION RESISTANCE. SHEATH MATERIAL SUITABILITY SHOULD BE RESEARCHED PRIOR TO UTILIZATION.**

COMPOUND	COPPER	LEAD	ALUMINUM	NICKEL	IRON AND STEEL	CAST IRON IN RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY
Acetic Acid, Crude	F	X	F	F	X	C	F	F	C
Pure	F	F	A	F		X		A	C
Vapors	F	X	C	F		X		F	C
150 PSI; 400° F	F	X	C	F				F	C
Acetone					C	F	A		
Alboloy Process					A				
Alodine 200° F							A-347 A-316		
Aluminum Sulphate	F	A	C	C	X	C	F	F	
Ammonia Gas, Cold		C	A	A		A	A	A	A
Hot	X	X			C	C	C	C	
Ammonia and Oil					A				
Ammonium Chloride	X	A	X	F	C	A	F	F	
Ammonium Hydroxide	X	A	F		A	A	A	C	A
Ammonium Nitrate	X	X	F		A	C	A	C	
Ammonium Sulphate	F	A			A	A	A	A	
Amyl Alcohol	A							A	
Anhydrous Ammonia	X				A				
Aniline, Aniline Oil	X		X		A		A	A	
Aniline, Dyes							A	A	
Anodizing Solutions 10% Chromic Acid 96° F					C		A		
Sulphuric Acid 70° F		A							
Sodium Hydroxide Alkaline					A				
Nigrosine Black Dye				F				A	
Nickel Acetate		C		F				A	
Barium Chloride			X	A			F-304 X-316		
Barium Hydroxide	X	X	X	A			A		
Barium Sulphide	X	A					A	A	
Bleaching Solution 1 1/2 lb. Oxalic Acid per Gallon of H2O at 212 F				F				A	
Bonderizing					C	F	A		
Cadmium Plating								A	
Carbolic Acid, Phenol	X	A	A		C	C	A	A	A
Carbon Dioxide, Dry	A	A	A		A	A	A	A	A
Wet	F	X	F		F	C	A	A	A
Carbon Tetrachloride	C	F	C		C	C	C	A	A
Castor Oil			A		A		A	A	A
Chloroacetic Acid	X	X	X	F	X		X		
Chlorine, Dry	A	A	A		A	A	A	A	
Wet	X	F	X		X	X	X	X	
Chromic Acid	X	A	X		C	C	A	F	C
Chrome Plating		A							
Citric Acid	A	A	A		X	C	A	A	A
Cobalt Acetate 130° F								A	A
Coconut Oil				A				F	
Copper Chloride	C	A	X		F			X	F
Copper Cyanide					A				
Copper Plating					A				
Copper Sulphate	C	A	X		X	C	A	A	A
Creosote	A		A		A	A	A	A	

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COMPOUND	COPPER	LEAD	ALUMINUM	NICKEL	IRON AND STEEL	CAST IRON IN RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY
Deoxidine									A
Deoxylyle							A		
Diphenyl 300° - 350° F					A				
Di Sodium Phosphate 25% 180° F					A				
Diversey No. 99					A				
Dowtherm					A				
Ethers	A	A	A		A			A	A
Ethyl Chloride	A			A	A		A	A	
Ethylene Glycol 300° F							A	A	
Ferric Chloride	X	X	X	X	X	X	X	X	X
Ferric Sulphate	X	A	X	X	X	X	F-304 A-316	X	C
Formaldehyde	F	X	F		F	F	A	A	A
Formic Acid	F	X	X	C	X		F	C	C
Freon	A	A	A		C	A	C	A	
Fuel Oil	A	A			A		A	A	
Fuel Oil, Acid	C	A			C		C	A	
Gasoline, Sour	C	A	C		C	C	A	A	A
Gasoline, Refined	A	A	A		A	A	A	A	A
Glycerin, Glycerol	F	A	A		A	A	A	A	
Holdens 310A Tempering bath					A				
Houghton Mar Tempering Salt					C	C			
Hydrochloric Acid <150° F		X	F	X	C	X	X	X	C
>150° F		X	X	X	C	X		X	C
Hydrofluoric Acid, Cold <65%		C	F	X	X	X	X	X	F
>65%		F	C	X		F		X	A
Hot <65%		X	X	X	X	X		X	C
>65%		F	X	X		C		X	A
Hydrogen Peroxide	X	F	A	F	X	X	A	F	A
Indite 1-Part and 5-Parts Water 200° F	A								
Isoproponel	F				C			A	
Kerosene	A	A			A		A	A	A
Kolene				A					
Lacquer Solvents	C		A		C	A	A	A	
Lard					F				
Linseed Oil	A	A	A		A		A	A	A
Magnesium Chloride	F	X	X	F	F		F	F	
Magnesium Hydroxide	X		X	A	A	F	A	A	
Magnesium Sulphate	A		C		A	A	A	A	
Mercuric Chloride	X		X	X	C	A	X	X	X
Mercury	X		X		A	C	A	A	A
Methyl Alcohol, Methanol	A	A	A		A	A	A	A	
Methyl Chloride	A	A		A	A			A	
Mineral Oils	A	A	A		A		A	A	A
Naphthalene					A				
Nickel Chloride	X		X				F	C	
Nickel Plating, Bright		A							
Nickel Plating, Dull		A							
Nickel Sulphate	X		X				A	C	X
Nitric Acid, Crude	X	X	C	X	X		C	X	X
Concentrated	X	X	A	X	X		F	X	X
Diluted	X	X	X	X	X		A	X	X

RESISTANCE RATINGS: A=GOOD F=FAIR C=DEPENDS ON CONDITIONS X=UNSUITABLE

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COMPOUND	COPPER	LEAD	ALUMINUM	NICKEL	IRON AND STEEL	CAST IRON IN RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY
Nitrobenzene	F				A		A		
Oakite No. 20					A				
Oakite No. 23					A				
Oakite No. 24					A				
Oakite No. 30					A				
Oakite No. 32									
Oakite No. 33							A-347		
Oakite No. 3									
Oakite No. 51					A				
Oakite No. 90 @ 180 F					A				
Oleic Acid	X	X	A	A	C	C	A	A	A
Oxalic Acid	C	X	A		C	C	C	A	
Paraffin					A				
Parkerizing					C	F	A		
Perchlorethylene							A		
Permachlor							A		
Petroleum Oils, Crude <500 F	C	C	A	C	A	A	A	C	
>500 F		X	X	A	X	A	A	A	X
>1000 F		X	X	X	X	X		C	X
								A-347	
Phenol 85%, 120 F				A	C		A		
Phosphoric Acid, Crude	X	C	X	X	C		C	X	
Pure <45%		F	A	C	C	X		A	F
>45% Cold	F		A	X	C	X		A	F
Hot		C	X	X		X		X-304 C-316	C
Photo Fixing Bath							A	C	
Picric Acid Water Solution	X	X	X	X	C		A	C	
Potassium Chloride	A	A	C	A	A	A	A	A	
Potassium Cyanide	X	X	X		A		A	A	
Potassium Dichromate 208 F							A-347		
Potassium Hydroxide	X	X	X	A	C	A	F	A	
Potassium Sulphate	A	A	A	A	A	A	F	A	
Prestone 305° F					A			A	
R5 Bright Dip for Copper Polish @ 180° F							A-316		
Soap Solutions	C	A			A	A	A	A	
Sodium Carbonate <20%					A				
Sodium Chloride	F	A	X	A	A	A	F-304 A-316	A	A
Sodium Cyanide	X	X	X		A	C	A-316	F	
Sodium Hydroxide	X	F	X	A	A	A	F	A	A
Sodium Hypochlorite	C	X	X	C	X	C	X	C	
Sodium Nitrate	F	A	A	A	A	A	F-304 A-316	A	A
Sodium Peroxide			A	A	C	A	A	A	
Sodium Silicate	C	X	X	A	A	A	A-316	A	
Sodium Sulphate	A	A	C	A	A	A	A	A	A
Sodium Sulphide	X	A	X	F	A	A	A	F	A
Soybean Oil							A		
Steam <500° F	A	C	A	A	A		A	A	A
500°-1000° F	C	X	C	C	C		A	C	A
>1000° F	X		X	X	X		A	X	A
Stearic Acid	C	A	C	A	C	C	A	A	A

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Sulphur	X		A	X	A	C	F	X	A
Sulphuric Acid <10% Cold	C	A	C	C	X		F	C	
Hot	X	A	C	X	X		F-316 X-304	C	
10-75% Cold	X	A	C	C	X		X-304 F-316	C	
Hot	X	A	X	X	X		X	C	
75-95% Cold	X	A	C	C	C		A	C	
Hot	X	A	X	X	F		X	C	
Fuming	X	A	C	X	C	F	C-304 F-316	X	
Sulphurous Acid	C	A	C	X	A		C-316 X-304	X	
Tannic Acid	A	X	X	A			F	A	
Tar			A		A		A		A
Tartaric Acid		A	A	C			C-304 A-316	C	
Tetrachlorethylene					A				
Thermail Granodine					F				
Therminall Fr. 1-8-12W/Sq. In. 640 F					A				
Tin Plating				A					
Toluene		A	A		A		A	A	
Triad Solvent					C				
Trichloroethylene	C	F	C		C	C	C	A	
Turco No. 2623					A				
Turpentine	C	A	A		C	A	A	A	
Urea Ammonia Liquor 48° F					A				
Vegetable Oil							A		
Vinegar			C		C		F-304 A-316	A	
Water, Acid Mine Containing Oxidizing Salts	C	C	C	C	X	C	A	X	
No Oxidizing Salts			A		C	A	X	A	
Water, Fresh	A	A	A		C	A	A	A	
Distilled, Lab. Grade	X	X	A	A	X	X	A	C	A
Return Condensate	A	A	A		A	A	A	A	A
Water, Sea Water	C	A	X		C	A	F	A	F
Whiskey and Wines	A				X	C	F-304 A-316	A	A
X-Ray Solution							A		
Zinc Chloride	X	A	X		C	C	X	A	
Zinc Plating					A				
Zinc Sulphate	X		C		C	A	A	A	A

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