



Corrosive Media	Temperature Degrees F	Fully Resistant	Satisfactorily Resistant	Slightly Resistant	Non Resistant
Acetic Acid 80-100%	Boiling	3,6,8,9	2,7	4,5	1
Alcohol-Ethyl		2,3,4,5,9	1		
Aluminum Chloride	70	7	3,4,5,6,8,9	2*	1
Aluminum Hydroxide Saturated		2,3,4,5	9		
Aluminum Sulphate 10% Saturated	Boiling Boiling	3,6,8 3,6,8	2,4,9 2,4,9	5 5	1 1
Ammonium Hydroxide		2,3,5,6,7,8,9	1		4
Ammonia (All Conc.) Dry	Boiling Boiling	1,2,3,9 2,3,9	5 4,5,7,8		4
Ammonium Sulphate 10% Saturated	Boiling Boiling	3,6,8,9 3,6,8,9	2*,4 2*,4	5 5	1 1
Ammonium Sulphate (Conc.)	Boiling	2*,3,6	4,8,9	5	1,7
Aniline 3% Conc. Crude	70 70	2,3,6,7,8,9 2,3,6,7,8,9	1,5 5		
Asphalt		2,3,4,5,9	1		
Barium Chloride 5% Saturated	70 70	3,6*,8,9 3,6*,7	2*,4,5,7 2,4,5,8,9		1 1
Beer (All Conc. & Temp)		2,3,5,7,8,9	4		1
Benzene	70	2,3,4,5,9	1,7,8		
Borax 5%	Hot	2,3,4,9	1,5,7,8		
Boric Acid (Conc.)	Boiling	2*,3,6,7,8	4,5		1
Calcium Brine Adulterated With Sodium Chloride	70	2*,3,4,5,6*,7,8,9	4,8		1
Calcium Chloride Dilute Conc. Saturated	70 70 212	2*,3,4,5,6*,7,8,9 2*,3,5,6*,7,8,9 2*,3*,6*,7,8	4 4 4,5,9		1 1 1
Calcium Hydroxide 50%	Boiling	2,3,4,5,7,8,9			1
Corrosive Media	Temperature Degrees F	Fully Resistant	Satisfactorily Resistance	Slightly Resistant	Non Resistant
Carbonic Acid Phenol CP Raw	72 Boiling Boiling	2,3,5,9 2,3,5 2,3,5	4 4		1 1
Carbon Dioxide Dry Wet		2,3,4,5,7,8,9 2,3,9	4,5		
Carbonated Water		2,3,4,5,6,7,8,9			
Carbon Disulphide		2,3,9	4,5		
Carbon Tetrachloride Pure (dry)	Boiling	2,3,4,5,6,7,8,9	1		
Aqueous Solution 5-10%	70				
Chlorinated Water Saturated	70	8,9	2,6	3*,4,5	1,7
Chlorine Gas Dry Moist Moist	70 70 212	2,3,4,5,6,7,8 8,9 9	1 8	2	9 1,3,4,5,6,7 2,3,4,5,6,7
Chromic Acid CP 0.5% free of SO CP 10% free of SO CP 50% free of SO CP 50% free of SO Commercial 50% (contains SO)	130 Boiling 70 Boiling 70 Boiling	1,3,8,9 9 3,8,9 3,8,9	2 2 2	6 3,6 6 3,6 6 3,6	4,5,7 1,2,4,5,7,8 1,4,5,7 1,2,4,5,7,8 1,4,5,7 1,2,4,5,7,8
Citric Acid 10% 50%	Boiling Boiling	2,3,6,7,8,9 2,3,6,7,8,9	4,5 4,5		1
Copper Chloride 10%	Boiling	8,9			2,3,4,5



Copper Cyanide 5% Saturated	Boiling	9 2,3,6,7,8,9	1 4,5		
Copper Nitrate 50%	Hot	2,3,6,9			1,4,5,7
Copper Sulphate (Sat.) (Blue Vitrol)	Boiling	2,3,6,8,9		4	1,5
Creosote (coal tar)	Hot	2,3,9	1,5	4	
Cuprit Chloride		9	2*,8		1,3,4,5 ,6,7
Dowtherm	Hot	2,3,4,5	1		
Dyes	190	2	4,5		
Esters		2,3,4,5,7,8,9	1		
Ether	70	2,3,4,5,7,8,9	1		
Ethylene Glycol Conc.	70	2,3,4,5,7,8,9	1		
Fats	to 500	2,3,6,9	4,5		1
Ferric Chloride 1% 1% 5%	70 Boiling 70	9 9 8,9	2*	3*,5,8 2,8 2,3*	1,4,6,7 1,3,4,5 ,6,7 1,4,5,6 ,7
Ferric Nitrate to 5% Aerated	70	2,3,8,9			1,4,5,7
Ferrous Chloride Saturated	70	7,8,9	3,4,5	2	
Fluorine	70	5 dry only	3,4 dry only, 7,8		1,2,9
Fluoborate Plating Sol.			3,6	2,5	
Formaldehyde 40%	70 Boiling	2*,3,5,6,7,8,9 2*,3,6,9	1,4 1,4,5,7,8		
Freon		2,3,4,5,9	1		
Fruit Juices	Hot	2,3,5,9	4		1
Fuel Oil	Hot	2,3,4,5,7,8,9	1		
Glue	Hot	2,3,4,5,7,8,9			1
Glucose	70	3,5,9	4		
Hydrochloric Acid 1:85 Diluted 1:10 Diluted 1:10 Vapors Vapors	70 Boiling 70 Boiling 70 212	7*,8*,9 7*	2,4(a),5 8 to 122,9(b) 4(a),5 8 to 122*	4(a),5 2 9(b) 2	1,3,6 1,2,3,6 1,3,6 1,2,3,4 (a)5,6 1,3,6 1,2,3,6
Hydrofluoric Acid Vapors	70 212		3,4,5 4	2,6,7,8 3,5	1 1,2,6,7 ,8,9
Hydrogen		2,3,4,5,7,8,9(d)			
Hydrogen Peroxide	70 Boiling	2,3,6,8 8	5,7 2,3,5,6,7	4,9 9	1 1
Hydrogen Sulphide Dry Wet	70 70	2,3,6,9 3,6,9	1,4,5,7,8 2,4,5,7,8		1 1
Iodine Dry Moist	70 70	2,3,5,6	8 8		1 1,2,3,4 ,5,6
Lacquers & Lacquer Solvents		3,4,5,9			1
Magnesium Chloride 1&5% 1& 5%	70 Hot	2*,3,6*,7,8 to 122*,9 7,8 to 122*,9	4,5 3*,4,6*(c)	 2(c)5	1 1
Magnesium Chloride 10-50%	Boiling	6*(c),7,8 to 122*,9	2*(c),3*	4,5*	
Magnesium Sulphate	70 Hot	2,3,6,7,8,9 2,3,6,7,8,9	1,4,5 4	5	1
Mercury (liquid)	70 & 125	2,3,9	5,7,8	4	
Methyl Alcohol (Methanol)	70 Hot	2,3,4,5,7,8,9 2,4,5,7,8,9	1		1
Milk (Fresh or Sour) (Hot or Cold)		3,7,8,9 2,3,7,8,9		4,5 4,5	1 1
Molasses		2,3,4,5,7,8,9	1		
Mixed Acids% by wt 50% Sulphuric+50Nitric	140	2,3,9			1,4,5



75% Sulphuric+25%Nitric	200		2,9	3	1,4,5	
	140 200 Boiling 315	2,3,9	2,3,9 9	2,3,9	1,4,5 1,4,5 1,4,5	
70% Sulphuric+10% Nitric + 20%Water	140	2,3,9				
	200 Boiling		2,3,9 9	3,9	1,4,5 1,4,5	
	335				1,4,5	
Naphta	70	2,3,4,5,7,8,9	1			
Nickel Chloride Solutions	70	2*,3,7,8,9		5	1,4	
Nickel Sulphate Solution Diluted	70	2*,3,9	4,5,8		1	
	70					
Nitric Acid	70	2,3,6,9	8		1,4,5,7	
	Boiling	2,3,6,9	8 to 150*		1,4,5,7	
	Diluted 1:10	70	2,3,6,9	8	1,4,5,7	
	Diluted 10%	Boiling	2,3,6,9	8 to 150*	1,4,5,7	
Conc.	70	2,3,6,9			1,4,5,7	
	Boiling	9	2,3,6		1,4,5,7	
Fuming	70	2,3,6,9		5	1,4	
	Boiling	9(e)	6	2,3	1,4,5	
Nitrous Acid 5%	70	2,3,9	7		1,4,5,7	
Oil Crude, Asphalt Base Paraffin Base	Hot	2,3,4,5,9	1,5	1		
	70	2,3,4,5,9	1	1		
Oil Lubricating, Lt. Or Hvy		2,3,4,5,9	1			
Oil Mineral,Hot or Cold		1,2,3,4,5,9				
Corrosive Media	Temperatu re Degrees F	Fully Resistant	Satisfactorily Resistant	Slightly Resistant	Non Resi stant	
Oil Vegetable, Hot or Cold		2,3,4,5,9	1		1	
Oxalic Acid	70	2,3,4,6	5,7,8		1	
	Boiling		3,4,7,8	2,5,6	1,9	
	Boiling		3,4,7,8	2,5,6	1,9	
25%	Boiling		3,6,7,8	2,4,5	1,9	
50%	Boiling					
Paraffin, Hot or Cold		2,3,4,5,7,8,9	1			
Petroleum		2,3,4,5,7,8,9		1		
Phosphoric Acid 1%	70	2,3,6,7,8,9	4,5		1	
	Boiling	2,3,6,7,8		4,5,8	1	
	10%	Boiling	2,3,6,7,8	9	4,5	1
	45%	Boiling	2,3,6,7,8		4,9	1,5
	80%	140	2,3,6,7,8		9	1,4,5
80%	230	3,6,7,8		2,9	1,4,5	
Photographic Developers all have reducing properties,hydroquinone, amidol,ferrous, potassium,oxalate	70	2*,3,7,8,9	5	4		
	Boiling	2*,3,7,8,9	5	4		
Potassium Chloride 1%	70	2*,3,5,6*,7,8,9	4		1	
	Boiling	2*,3,6*,8,9	4,5,7		1	
	70	2*,3,5,6*,7,8,9	4		1	
5%	Boiling	2*,3*,6*,8,9	4,5,7		1	
Potassium Dichromate 25%	Boiling	2*,3,6,9	8	5	1,4	
Potassium Hydroxide (Caustic Potash)	Boiling	2,3,4,5,6	7,8,9		1	
	Boiling	3,4,5,6	2,7,8,9		1	
	Melting 675	4,5,6	3,7,8		1,2	
Potassium Nitrate (Salt Peter) 50%	70	2,3,6	4,5,8			
	Boiling	2,3,6	4,5,8			
Potassium Sulphate 1%	70	2,3,6,7,8	1,4,5			
	5%	70	2,3,6,7,8	1,4,5		
Rosin (molten)		2,3,4,5,7,8,9			1	
Salt Brine 3%	70	2*,3,6*,7,8,9	4,5		1	



Sea Water	70	2*,3,4*,5*,6*,7,8,9			1
Silver chloride		8,9			1,2,7
Shellac		2,3,4,5,9		1	
Silver Nitrate 10%		2,3,9	7,8	4,5	1
Soap	70	2,3,4,5,7,8,9	1		
Sodium Bicarbonate					
Baking soda all Conc.	70	2,3,5,6,7,8,9	4	1	
5%	150	2,3,5,6,7,8,9	4	1	
Sodium Carbonate (Sat.) Cold	70	2*,3,4,5,9	6,7,8		1
At 212	Boiling	2*,9	3,4,5,6,7,8		1
	Hot	9	2*,3,4,5,6,7,8		1
Sodium Cyanide	70	2,3,9	1,4,5		
Sodium Hydroxide 1-5%	130	1,2,3,4,5,6,7,9	1,8		
20%	230	2,3,4,5,6,9	7,8		1
34%	212	2,3,4,5,6	7,8,9		1
34%	Boiling	4,5,6	2,7,8,9		1
Sodium Sulphate(Gauber's Salt)					
All Conc.	Hot	2,3,6,7,8,9	4,5		1
Starch Solution		2,3,5,9	1,4		
Stearich Acid	70	2,3,5,6	4	1	
	350	3,5,6,7,8,9	2,4		1
Sugar Solution	Hot	2,3,5,9	4		1
Sulpher,Molten	265	1(h),9	4,5		
Sulphur Dioxide Gas Moist	70	2,3,6,8,to 158,9			1,4,5
Sulphuric Acid Diluted 1:20	70	2,3,6,7,8	4,5,9(g)		1
	Boiling		3,7	2,4,6(f),8,9 (g)	1,5
1:10	70	2,3,6,7*,8*	4	5,9 (g)	1
	180		3(f),6(f),7*	4,8*,9(g)	1,2,5
	Boiling		7*	3(f),4,8*,9 (g),6(f)	1,2,5
Conc. (93-98%)	70	2,3,6,7*,8*	1,5	4,9(g)	
	212			2,3(f),5,6(f) 9(g)	1,4, 7*,8*
	300			9(g)	1,2,3(f) ,4,5,6 (f),7*,8 *
Fuming (11% free SO3)	212		2		1,4,8*
(60% free SO3)	70	2,8*		1	4
(60% free SO3)	160	2	8*	1	4
Sulphurous Acid Saturated	70	2,3,6,8		5	1,4,7
Sweet Water	Hot	2,3,5			
Tartaric Acid 10%	70	2,3,6,7,8,9	4,5		1
Toluene or Toluol	70	2,3,4,5		1	
Trichlorethylene Dry	70	2,3,4,5,6,8,9	7		
	Boiling	2,3,4,5,6,8,9	1,7		
Tri Sodium Phosphate 35%	70	2,3,7,8,9	4,5	1	
Turpentine Oil	95	2,3,4,5,7,8	1		
Vamish	70	2,3,4,5,7,8			
	Hot	2,3,4,5,7,8			1
Vegetable Juices		2,3,5,6,7,8,9	4		
Vinegar	Hot	2,3,6,9	4,5		1
Water	Hot	2,3,5,7,8,9	1,4		
	Oily	2,3,5,9	1,4		
	Salt	3,5,7,8,9	2*,4		
Whiskey		2,3,5,9		4	1
White Liquor		2,3,6	5	1	
Wood Pulp		2,3,9	8-105 degress	1	
Wort		2,3,5			1
Yeast		2,3,5			
Zinc Chloride Solution	100				
Sp. Grav. 2.05	100	6*,7,9	2*,3,4,5,8	5	1
1.09	Boiling	6*,7,9	2*,3*,4,8		1



78 Degree Be	95	6*,7,9	2*,3*,4,5,8		1
Zinc Cyanide Solution	70	2,3	1,5		
Zinc Sulphate(White Vitriol) to 50%		2,3,6	4,7,8	5	1

Key to Metals

- 1. Carbon Steel**
- 2. 316L Stainless Steel**
- 3. Alloy 825**
- 4. Monel**
- 5. Nickel**
- 6. Alloy 20 Cb-3**
- 7. Alloy B-2**
- 8. Alloy C-276**
- 9. Titanium**

NOTE: Pitting may occur particularly if scale is allowed to build up.

CP= Chemically Pure

Fully Resistant is less than 0044 inches per year

* Coupon testing important to check for possible presence of ferric or cupric ions.

- (a) Aeration will have very detrimental effect on Monel.
- (b) May be fully resistant when oxidizing inhibitors are present.
- (c) Both 316L SS and Alloy 20 Cb-3 may be subject to stress corrosion cracking.
- (d) Titanium may be subject to Hydrogen embrittlement under certain conditions while it may react violently with others. Consult Manufacturer and USE CAUTION IN TESTING.
- (f) Small traces of chlorides, particularly in sulphuric acid steel pickling solutions may cause excessive pitting.
- (g) Titanium may be fully resistant when traces of oxidizing inhibitors are present.
- (h) Provided no moisture is present.

In no instance should the ratings be considered as the basis for a guarantee of TEMPCO EXCHANGERS life.