

**FloroEster VE
FloroEster NVE**

**CORROSION RESISTANCE
GUIDE**

How to Use This Corrosion Resistance Guide

This resistance chart gives the limits of our materials in relation to concentration.

The chart is the result of many years of laboratory testing and practical experience.

The information shown below is a guide only. Because recommendations can vary, depending on temperatures other than ambient, temperature swings, field conditions, allowable installation time, combination of chemicals, etc., product recommendations will vary. Always contact Florock for details.

Material description and typical applications are to be seen in the Technical Data Sheets.

Florock® Corrosion Control Products

Rating Description

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	FloroEster VE	FloroEster NVE
Acetaldehyde 100%	NR	SC10
Acetaldehyde 20%	O10	I10
Acetic Acid 0-10%	I12	I13
Acetic Acid 11-50%	I12	I13
Acetic Acid 51-100% (Glacial)	O10	I10
Acetic Anhydride	NR	I10
Acetone 100%	NR	SC10
Acetone - 10%	I10	I13
Acetyl Chloride	NR	T
Acrylic Acid 25%	I10	I10
Acrylic Acid 100%	NR	SC10
Acrylonitrile	NR	SC10
Adipic Acid 23%	I12	I13
Allyl Alcohol	NR	SC10
Allyl Chloride	SC10	SC10
Alum (Saturated Solution)	I12	I13
Aluminum Chloride	I12	I13
Aluminum Fluoride*	O10	SC10
Aluminum Nitrate (Saturated)	I12	I13
Aluminum Sulfate	I12	I13
Ammonia Anhydrous Liquid	NR	NR
Ammonia Aqua - see Ammonium Hydroxide		
Ammonia (Wet Gas)	I12	I13
Ammonium Chloride	I12	I13
Ammonium Fluoride* 10%	I12	I13
Ammonium Hydroxide 20%	I12	I10
Ammonium Lauryl Sulfate 30%	I12	I12
Ammonium Nitrate	I15	I13
Ammonium Persulfate	I15	I13
Ammonium Sulfate	I15	I13
Ammonium Sulfide	I12	I12
Ammonium Sulfite	I14	I13
Amyl Acetate	O10	I12
Amyl Alcohol	I12	I13
Aniline	NR	SC10
Aniline Hydrochloride	I12	I13
Anodizing-Chromic - see 10% Chromic Acid		
Anodizing-Sulfuric - see 20-50% Sulfuric Acid		
Antimony Chloride (tri)	I12	I13

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	FloroEster VE	FloroEster NVE
Aqua Regia	NR	T
Arsenious Acid (Arsenic Trioxide)	I12	I13
Arsenic Acid	I12	I13
Barium Chloride	I12	I13
Barium Hydroxide	I12	I13
Barium Sulfide	I12	I13
Benzal Chloride (Benzyl Dichloride)	NR	I10
Benzaldehyde	NR	SC10
Benzene	NR	I10
Benzene Sulfonic Acid	I12	I13
Benzyl Alcohol	NR	I10
Benzoic Acid	I12	I13
Benzoyl Chloride	T	T
Benzyl Chloride	NR	O10
Black Liquor (Paper)	I12	I13
Bleach 5.5% - see Sodium Hypochlorite		
Boric Acid	I12	I13
Brass Plating - 3% copper, 1% zinc, 5.6% Sodium Cyanides, 3% sodium carbonate	I12	I13
Brine, Salt	I12	I13
Bromine, Wet Gas	I10	I10
Bromine, Dry Gas	I10	I10
Bromine Water 3%	I12	I13
Bronze Plating - 4% copper, 1% zinc, 5.6% sodium cyanides, 3% sodium carbonate	I12	I13
Brown Stock - pH <12	I12	I13
Butadiene	I10	I10
Butanol	I10	I13
Butyl Acetate	NR	SC10
Butyl Acrylate	NR	SC10
Butyl Amine	NR	SC10
Butyl Carbitol (Diethylene Glycol Butyl Ether)	SC10	I10
Butyl Cellosolve	SC10	I10
Butyric Acid - 100%	SC10	I12
Cadmium Plating - Cyanide	I12	I13
Calcium Bisulfite	I12	I13
Calcium Carbonate	I12	I13
Calcium Chloride	I12	I13
Calcium Hydroxide*	I12	I10
Calcium Hypochlorite* 5%	I12	SC10

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Calcium Nitrate	I12	I13
Caprylic Acid (Octanoic Acid)	I12	I13
Carbolic Acid (Phenol) 88%	NR	SC10
Carbon Disulfide (Bi)	NR	O10
Carbon Tetrachloride	I10	I13
Castor Oil (Ricinus Oil)	I12	I13
Cellosolve (Ethylene Glycol Ethyl Ether)	O10	I10
Cellosolve Acetate (Ethylene Glycol Ethyl Ether Acetate)	O10	I10
Chlorinated Brine pH <2.5	I12	I13
Chlorinated Brine pH >9 (Hypochlorite)	I12	I12
Chloroacetic Acid 1-20%	I12	I12
Chloroacetic Acid 21-50%	I10	I10
Chloroacetic Acid 51-100%	NR	SC10
Chlorine Dioxide <1 g/l	I12	I13
Chlorine Gas - Dry	F16	F16
Chlorine Gas - Wet	F16	F16
Chlorine Water - See Chlorinated Brine		
Chlorobenzene	NR	I10
Chlorobutane (Butyl chloride)	NR	SC10
Chloroform	NR	SC10
Chlorophenol	NR	NR
Chlorosulfonic Acid	NR	NR
Chlorotoluene	SC10	I10
Chromic Acid 10%	I12	I13
Chromic Acid 20%	I10	I13
Chromic Acid 40%	NR	SC10
Chromic & Nitric Acid Mix (5% / 10%)	I10	I13
Chromic & Sulfuric Acid Mix max 10%	I11	I13
Chrome Plating 19% Chromic, with Sodium Fluosilicate & Sulfate)	I11	I10
Chromic Chloride (Chromium Chloride)	I12	T
Citric Acid	I12	I13
Copper Plating - Cyanide	I12	I13
Copper Plating - Acid	I12	I13
Corn Oil	I12	I13
Cottonseed Oil	I12	I13
Corn Sugar/Syrup (Glucose)	I12	NF
Cresol (Cresylic Acid)	NR	T
Cyclohexane	I10	I13
Cyclohexanone	O10	O10

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	FloroEster VE	FloroEster NVE
Dextrose - see Glucose		
Dibromopropane	NR	I10
Dibutyl Ether	SC10	I13
Dibutyl Phthalate	I12	I13
Dichloro Acetic Acid 20% - see chloroacetic acid		
Diesel Fuel	I12	I13
Diethanolamine 100% (DEA)	I10	I13
Diethyl ketone 100%	NR	SC10
Dimethylaminopropylamine (DMAPA)	NR	SC10
Dimethyl Aniline	NR	I10
Dimethyl Formamide	NR	O10
Dimethyl Sulfate 20%	I10	I10
Dimethyl Sulfate 100%	NR	SC10
Dimethyl Sulfoxide 20%	I10	I10
Dimethyl Sulfoxide 100%	NR	SC10
Dinitrobenzene	T	T
Dinitrotoluene	T	T
Lauryl Alcohol (Dodecyl Alcohol, N-Dodecanol)	I12	I13
Esters of Fatty Acids	I12	I13
ethyl alcohol - see Ethanol		
Ethoxy Ethanol - see Cellosolve		
Ethoxylated Nonylphenol	NR	I10
Ethyl Acetate	NR	SC10
Ethyl Acrylate	NR	SC10
Ethanol 10%	I12	I13
Ethanol 50%	I10	I13
Ethanol 100%	O10	I10
Ethylamine 20%	I10	I10
Ethyl Bromide	NR	SC10
Ethyl Chloride	NR	SC10
Ethyl Chloroformate	T	SC10
Ethyl Ether	NR	O10
Ethylene Dichloride	NR	SC10
Ethylene Glycol	I12	I13
Ethylene Oxide	NR	NR
Ethyl Sulfate	I10	I10
Ferric Chloride	I12	I13
Ferric Sulfate	I12	I13
Ferrous Chloride	I12	I13

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Ferrous Nitrate	I12	I13
Ferrous Sulfate	I12	I13
Fertilizer Dry	I12	I13
Fertilizer Liquid N-P-K 8-8-8	I12	I13
Flue Gas Dry	F18	F30
Flue Gas Wet	I12	I13
Fluoboric Acid*	O12	O10
Fluosilicic Acid* 10%	O12	O10
Fluosilicic Acid* 35%	O10	O10
Fluosilicic Acid* Fumes	F14	NR
Fly Ash Slurry	I12	I13
Formaldehyde	I12	I13
Formamide 20%	I10	I13
Formic Acid 10%	I12	I13
Formic Acid 50%	I12	I10
Furfural to 10%	I10	I10
Furfuryl Alcohol	NR	SC10
Gasoline		
Aviation	I12	I13
Regular (E10 Ethanol)	I10	I10
Glucose	I12	NF
Glycerine	I12	I13
Glycolic Acid to 70% (Hydroxyacetic Acid)	I10	I10
Gold Plating (Cyanide)	I12	I13
Green Liquor (Paper Ind)	I12	I13
Gypsum Slurry (Calcium Sulfate Slurry)	I12	I13
Heptane	I12	I13
Hexane	I12	I13
Hydrazine 10%	T	SC10
Hydriodic Acid 40%	I12	I13
Hydrobromic Acid 20%	I12	I13
Hydrobromic Acid 48%	I12	I12
Hydrochloric Acid 10%	I12	I13
Hydrochloric Acid 20%	I12	I13
Hydrochloric Acid 30%	I12	I13
Hydrochloric Acid 32%	I10	I13
Hydrochloric Acid 37%	SC10	SC10
Hydrofluoric Acid 1%	O12	O12
Hydrofluoric Acid* 10%	O12	O12

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	FloroEster VE	FloroEster NVE
Hydrofluoric Acid* 20%	O10	O10
Hydrofluoric Acid* 21 - 48%	NR	NR
Hydrofluosilicic Acid see Fluosilicic Acid		
Hydrogen Peroxide 5%	I12	I13
Hydrogen Peroxide 30%	I10	I13
Hydrogen Peroxide 50%	NR	SC10
Hydrogen Sulfide Gas	F14	F16
Hydrogen Sulfide - Wet	I12	I13
Hypochlorous Acid 10%	I10	SC10
Iodine, Crystals & Vapor sulfate)	I12	I13
Isopropyl Alcohol	I12	I12
Jet Fuel	I12	I13
Kerosene	I12	I13
Lactic Acid	I12	I13
Lead Acetate	I12	I13
Levulinic Acid (Saturated)	I12	I13
Lime Slurry (Calcium Hydroxide)	I12	I13
Limestone Slurry (Calcium Carbonate)	I12	I13
Linseed Oil	I12	I13
Lithium Hydroxide* Saturated	I12	I10
Magnesium Chloride	I12	I13
Magnesium Phosphate	I12	I13
Magnesium Sulfate	I12	I13
Maleic Acid	I12	I13
Malic Acid 10%	I12	I13
Mercury and Salts	I12	I13
Metal Pickling Solutions (Sulfuric, HCL & or Phosphoric .5-15%)	I12	I13
Methanol 5% (Methyl Alcohol)	I10	I12
Methanol 20% (Methyl Alcohol)	NR	I10
Methanol 40-100% (Methyl Alcohol)	NR	SC10
Methyl Acetate	NR	SC10
Methyl Butyl Ketone (MBK)	SC10	I10
Methylene Chloride	NR	SC10
Methyl Chloride Gas	NR	F12
Methyl Ethyl Ketone (MEK)	O10	SC10
Methyl Sulfate (see Dimethyl Sulfate)		
Methyl Isobutyl Ketone (MIBK)	SC10	I10
Methyl Tertiary Butyl Ether (MTBE)	NR	SC10

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	FloroEster VE	FloroEster NVE
Milk - Fresh & Sour	I12	NF
Mineral Oils, aliphatic	I12	I13
Molasses	I12	NF
Motor Oil	I12	I13
Muriatic Acid see Hydrochloric Acid		
Naphtha - Aliphatic	I12	I13
Naptha, Aromatic (Coal Tar)	NR	I12
Naphthalene (moth balls)	I12	I13
Naphthenic Acids	SC10	I12
Nickel Plating (4% Nickel Sulfate, 4% ammonium Chloride, 4% Boric Acid)	I12	I13
Nickel Sulfate	I12	I13
Nitric Acid - 5%	I12	I13
Nitric Acid - 10%	I12	I13
Nitric Acid - 20%	I12	I12
Nitric Acid - 30%	SC10	I10
Nitric Acid - 40%	NR	I10
Nitric Acid 50%	NR	SC10
Nitric Acid 60-70%	NR	NR
Nitrobenzene	NR	SC10
Nitromethane	NR	SC10
Nitrous Acid 10%	NR	T
Octanoic Acid - see Caprylic Acid		
Oils		
Fuel (#1 see Kerosene, #2 see Diesel)		
Sweet & Sour Crude Petroleum	I12	I13
Animal	I12	I13
Mineral	I12	I13
Vegetable	I12	I13
Oleic Acid	I12	I13
Oleum (Fuming Sulfuric)	NR	NR
Oxalic Acid (Saturated)	I12	I12
Paraxylene - see Xylene		
Perchloric Acid 10%	I12	I13
Perchloric Acid 30%	I10	I10
Perchloroethylene	SC10	I12
Petroleum, Sour Crude - see oils		
Phenol 2%	SC10	I12
Phenol 5%	NR	I12
Phenol 10%	NR	I12

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	FloroEster VE	FloroEster NVE
Phenol 15%	NR	SC10
Phenol 85%	NR	SC10
Phenol Sulfonic Acid	SC10	SC10
Phosphoric Acid 20%	I12	I13
Phosphoric Acid 85%	I12	I13
Phosphorous Oxychloride	NR	O10
Phosphorous Trichloride	NR	O10
Picric Acid in Alcohol 10%	NR	I10
Polyacrylic Acid - 50%	I12	I13
Potassium Aluminum Sulfate	I12	I13
Potassium Dichromate	I12	I13
Potassium Bromide	I12	I13
Potassium Carbonate	I12	I13
Potassium Chloride	I12	I13
Potassium Cyanide (KCN)	I12	I13
Potassium Fluoride*	I12	SC10
Potassium Hydroxide* 10%	I10	SC10
Potassium Hydroxide* 50%	I10	SC10
Potassium Nitrate	I12	I13
Potassium Permanganate	I12	I13
Potassium Persulfate	I12	I13
Potassium Sulfate	I12	I13
Propanediol - see Propylene Glycol		
Propionic Acid 20%	I12	I13
Propionic Acid 50%	I12	I13
Propionic Acid 100%	NR	I10
Propyl Acetate	NR	SC10
Propylene Glycol	I12	I13
Pyridine 20%	I10	I10
Pyridine 100%	NR	O10
Rayon Spin Liquor	I12	I13
Red Liquor	I12	I13
Salicylic Acid	I12	NF
Salt Brine - see Brine, Salt		
Sea Water	I12	I13
Silver Nitrate	I12	I13
Silver Plating Solution 4% silver,7%potassium,5%sodium cyanides,2% potassium carbonate	I12	I13
Skydrol (Phosphate Ester)	SC10	I12
Sodium Acetate	I12	I13

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Sodium Bicarbonate	I12	I13
Sodium Bisulfate	I12	I13
Sodium Bisulfite	I12	I13
Sodium Bromate	I12	I13
Sodium Carbonate	I12	I13
Sodium Chloride	I12	I13
Sodium Chlorite	I12	I13
Sodium Chromate	I12	I13
Sodium Chlorate	I12	I13
Sodium Cyanide	I12	I13
Sodium Dichromate	I12	I13
Sodium Fluoride*	I12	I13
Sodium Hydrosulfide 45% (Sodium Bisulfide)	I12	I13
Sodium Hydroxide* 1-5%	I12	I10
Sodium Hydroxide* 10-25%	I10	I10
Sodium Hydroxide* 50%	I10	I10
Sodium Hypochlorite* 5%	I10	I10
Sodium Hypochlorite* 18%	SC10	NR
Sodium Hypochlorite* 25%	O10	NR
Sodium Lauryl Sulfate	I12	I13
Sodium Oxalate Solution	I12	I13
Trisodium Phosphate		
Sodium Polyacrylate	I12	I13
Sodium Sulfate	I12	I13
Sodium Sulfide*	I12	I13
Sodium Sulfite	I12	I13
Sodium Tartrate	I12	I13
Sodium Thiosulfate	I12	I13
Soybean Oil (Soya)	I12	I13
Starch	I12	I13
Stearic Acid	I12	I13
Styrene	NR	I10
Sugar (Sucrose)	I12	NF
Sugar Beet Liquor	I12	NF
Sugar Cane Liquor	I12	NF
Sulfamic Acid 10%	I12	I13
Sulfamic Acid 25%	I12	I13
Sulfite Liquor (Paper)	I12	I13
Sulfur Dioxide (Wet)	I12	I13

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	FloroEster VE	FloroEster NVE
Sulfur Dioxide (Dry)	F180	F35
Sulfur Trioxide (Wet) - see Sulfuric Acid		
Sulfuric Acid 0-25%	I12	I13
Sulfuric Acid 26-50%	I12	I13
Sulfuric Acid 51-70%	I12	I13
Sulfuric Acid 71-75%	I10	I13
Sulfuric Acid 76-80%	SC10	I10
Sulfuric Acid 81-98%	NR	O10
Sulfurous Acid 10%	I10	I10
Tall Oil	I12	I13
Tannic Acid	I12	I13
Tartaric Acid	I12	I13
Tetrachloroethane	I10	I12
Tetrachloroethylene - see Perchloroethylene		
Tetrahydrofuran 5%	I10	I10
Tetrahydrofuran 100%	NR	O10
Tetrahydrofurfuryl Alcohol - see Furfuryl Alcohol		
Thionyl Chloride	NR	O10
Tin Plating (Fluoborate) - 18% Stannous Fluoborate, 7% tin, 9% Fluoboric Acid, 2% Boric Acid	I12	I13
Titanium Tetrachloride	I12	I13
Toluene	SC10	I10
Toluene Sulfonic Acid (solution)	I12	I13
Toluidine see Aniline		
Transformer Oil (esters)	I12	I13
Transformer Oils (silicone & mineral)	I12	I13
Triethanolamine	I12	I13
Triethylamine	I12	I11
Triethylenetetramine	T	I10
Trichloroacetic Acid 20%	I12	I12
Trichloroethane	I10	I10
Trichloroethylene	NR	SC10
Tricresyl Phosphate 100%	I12	I13
Trisodium Phosphate*	I12	I13
Turpentine	I12	I13
Urea Solutions	I12	I13
Vinegar	I12	I13
Vinyl Acetate (Monomer)	NR	O10
Vinyl Chloride	NR	O10

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Water, Distilled & Demineralized	I12	I13
White Liquor (Paper)	I12	I10
Xylene (Xylol)	SC10	I12
Ammonium Fluoborate	I12	I13
Zinc Plating - Cyanide - 9% Zinc, 4% Sodium Cyanides, 9% Sodium Hydroxide	I12	I10
Zinc Nitrate	I12	I13
Zinc Phosphate	I12	I13
Zinc Sulfate	I12	I13