

Technical Information

Chemical Resistance

Table 3. Specific Chemical Resistance Information Metals, Coated Metals And Fiberglass Materials

CHEMICAL	Aluminum	Fiber Glass Polyester	Steel			Stainless Steel	
			Polyester Powder	Urethane Enamel	Galvanized	Type 304	Type 316
Acetyldehyde	S	U	—	—	—	S	S
Acetic Acid (10%)	L	S	U	U	U	S	U
Acetone	S	L	L	U	L	S	S
Aluminum Chloride (10%)	U	S	U	U	U	U	M
Aluminum Sulfate (10%)	L	S	U	U	U	U	S
Ammonia Gas	L	S	—	—	—	S	S
Ammonium Chloride	U	S	U	U	U	S	S
Ammonium Hydroxide (10%)	S	L	U	U	U	S	S
Ammonium Nitrate (10%)	M	S	U	U	U	S	S
Ammonium Phosphate (10%)	L	M	S	L	U	S	M
Ammonium Sulfate	S	S	—	—	—	S	S
Aniline	L	U	—	—	—	S	S
ASTM #1 Oil	S	S	S	S	S	S	S
ASTM #3 Oil	S	S	S	S	S	S	S
Axle Grease	S	S	S	S	S	S	S
Benzene	S	S	—	—	S	S	S
Boric Acid (10%)	M	S	U	U	U	S	S
Bromine	U	L	U	U	U	U	U
Butyl Acetate	M	L	—	—	—	S	S
Butyric Acid	U	S	—	—	—	S	S
Calcium Chloride (10%)	L	S	U	U	U	L	S
Calcium Hydroxide (10%)	U	S	U	U	U	S	S
Calcium Hypochlorite (10%)	L	M	U	U	U	U	M
Calcium Sulfate	M	S	U	U	U	S	S
Carbolic Acid (25%)	M	L	U	U	U	S	S
Carbon Disulfide	S	L	—	—	—	S	S
Carbon Tetrachloride	S	M	U	S	S	U	S
Chlorine (dry)	S	S	—	—	—	S	S
Chlorine (water) 5-10 ppm	M	L	S	U	U	U	—
Chlorobenzene	S	S	—	—	S	S	S
Chloroform	L	U	—	—	—	S	S
Chrome Plating Solution	U	L	U	U	U	L	L
Chromic Acid	S	S	—	—	—	U	U
Citric Acid (10%)	U	M	U	U	U	S	S
Copper Sulfate	U	S	—	—	—	S	S
Creosote	L	L	—	—	—	S	S
Cutting Fluid (5 Star) 10%	S	S	U	U	U	S	S
Cutting Fluid (Castrol 980 H)	S	S	S	U	U	S	S
Cutting Fluid (Norton 205)	U	S	U	U	U	S	S
Cutting Fluid (Rustlick) 10%	M	S	U	U	U	S	S
Cutting Oil (Dark)	S	S	S	S	S	S	S
Diethyl Ether	S	S	—	—	—	S	S
Ethyl Alcohol	S	S	M	U	S	S	S
Ethylene Dichloride	S	L	—	—	—	—	—
Ethylene Glycol	S	S	S	S	U	S	S
Ferric Chloride	U	S	U	U	U	S	U
Ferric Nitrate	—	S	—	—	—	S	S
Ferric Sulfate	M	S	—	—	—	S	S

KEY :
S = superior resistance / completely unaffected under all conditions
L = limited resistance / some chemical attack may be expected over time, exposure should be limited to fumes or occasional light splashing
— = no data available
M = moderate resistance / superficial (aesthetic) effects only, example: some loss of surface gloss or color change may occur, but mechanical properties (strength) remain unaffected
U = unsatisfactory severe / chemical attack in a relatively short time

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Table 3. Continued

CHEMICAL	Aluminum	Fiber Glass Polyester	Steel			Stainless Steel	
			Polyester Powder	Urethane Enamel	Galvanized	Type 304	Type 316
Fluorine	S	U	—	—	—	M	—
Formaldehyde	S	S	—	—	—	L	S
Formic Acid	U	S	U	U	U	M	S
Fuel Oil (#2)	S	S	M	S	S	S	M
Gasoline	S	M	—	—	—	S	S
Glycerine	S	S	—	—	S	S	S
Hydraulic Brake Fluid	S	S	U	U	S	S	S
Hydraulic Oil	S	S	S	S	S	S	S
Hydrochloric Acid (10%)	U	M	U	U	U	U	U
Hydrocyanic Acid	S	U	—	—	—	S	S
Hydrofluoric Acid (20%)	U	U	U	U	U	U	U
Hydrogen Peroxide	S	M	—	—	—	L	S
Hydrogen Sulfide	M	S	—	—	—	L	S
Hypochlorous Acid	U	S	—	—	—	—	—
Isopropyl Alcohol	S	S	M	U	S	S	S
Kerosene	S	S	S	S	S	S	S
Lacquer Thinner	S	S	L	U	S	S	S
Lactic Acid	M	S	—	—	—	L	S
Lime	M	M	—	—	—	—	—
Liquid Dish Soap (10%)	M	S	U	U	U	S	M
Lubricating Oils	S	S	—	—	—	S	S
Magnesium Chloride (10%)	L	S	U	U	U	S	S
Magnesium Hydroxide (10%)	L	S	U	U	U	S	S
Mercuric Chloride (10%)	U	M	U	U	U	S	U
Methyl Ethyl Ketone	S	L	—	—	—	S	S
Methylene Chloride	S	S	U	U	M	S	S
Milk	S	S	—	—	—	S	S
Mineral Oil	S	S	—	—	—	S	S
Mineral Spirits	S	S	S	S	S	S	S
Motor Oil (10 weight)	S	S	S	S	S	S	S
Nickel Salts	L	S	—	—	—	L	S
Nitric Acid (10%)	U	M	U	U	U	S	S
Nitrobenzene	S	L	—	—	—	S	S
Oleic Acid	S	S	—	—	—	L	S
Perchloroethylene	S	S	S	U	S	S	S
Phosphoric Acid (25%)	U	L	U	U	U	S	S
Phosphoric Acid (50%)	U	U	U	U	U	S	S
Pickling Solution	U	M	U	U	U	S	M
Potassium Carbonate (10%)	U	S	S	S	L	S	S
Potassium Chloride (25%)	L	S	U	U	U	S	S
Potassium Hydroxide (25%)	U	U	U	U	U	M	M
Potassium Nitrate (10%)	U	S	U	U	U	S	S
Potassium Sulfate (10%)	L	S	U	U	U	S	S
Soap (Igepal) 10%	L	S	S	U	U	S	S
Sodium Bicarbonate (10%)	L	S	S	S	U	S	S
Sodium Bisulfate (10%)	U	L	U	U	U	S	S
Sodium Chloride (25%)	L	S	U	U	U	S	S
Sodium Hydroxide	U	U	U	U	U	M	M

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Table 3. Continued

CHEMICAL	Aluminum	Fiber Glass Polyester	Steel			Stainless Steel	
			Polyester Powder	Urethane Enamel	Galvanized	Type 304	Type 316
Sodium Hypochlorite	U	M	U	U	U	S	M
Sodium Nitrate (10%)	M	S	U	U	U	S	S
Sodium Phosphate (10%)	L	S	U	U	U	S	S
Sulfuric Acid (25%)	U	S	U	U	U	S	S
Sulfuric Acid (10%)	U	U	U	U	U	S	S
Tannic Acid ((10%)	L	S	U	U	U	M	M
Tetrahydrofuran	M	L	U	U	U	S	S
Toluene	S	S	L	U	S	S	S
Trichloroethylene	S	U	—	—	—	L	S
Trisodium Phosphate	L	M	—	—	—	—	—
Turpentine	S	M	M	U	L	S	S
Vegetable Oils	S	S	—	—	—	S	S
Vinegar	M	S	—	—	—	S	S
Water, Industrial	L	S	L	L	L	S	S
Water, Rain	L	S	S	L	L	S	S
Water, Sea	L	S	U	U	U	S	S
Water, Tap	L	S	S	L	L	S	S
Xylene	S	S	L	U	S	S	S
Zinc Acetate	S	S	—	—	—	S	S
Zinc Chloride	L	S	S	U	U	M	S
Zinc Sulfate	S	S	—	—	—	M	S

Table 4. Specific Chemical Resistance Information

CHEMICAL	Rigid PVC	Glass Nylon	Gaskets			Windows	
			Neoprene Rubber	Silicone Rubber	Urethane	Acrylic	Poly-carbonate
Acetaldehyde	U	—	S	S	—	—	—
Acetic Acid (10%)	L	U	U	M	L	S	S
Acetone	U	S	U	S	U	U	U
Aluminum Chloride (10%)	S	U	S	S	S	S	S
Aluminum Sulfate (10%)	S	L	U	S	S	S	S
Ammonia Gas	—	S	S	S	—	S	—
Ammonium Chloride	S	U	S	S	S	S	S
Ammonium Hydroxide (10%)	S	—	L	L	S	S	U
Ammonium Nitrate (10%)	S	U	U	S	S	S	U
Ammonium Phosphate (10%)	—	L	U	S	S	S	S
Ammonium Sulfate	S	U	S	S	—	—	—
Aniline	S	L	U	U	—	S	—
ASTM #1 Oil	—	—	M	S	S	S	M
ASTM #3 Oil	—	—	U	L	S	S	M
Axle Grease	—	—	L	S	S	S	M
Benzene	U	S	U	U	—	U	—
Boric Acid (10%)	L	S	S	S	S	S	S
Bromine	U	U	U	U	U	L	U
Butyl Acetate	U	S	U	U	—	U	—
Butyric Acid	U	U	U	—	—	—	—
Calcium Chloride (10%)	S	U	S	S	S	S	S
Calcium Hydroxide (10%)	S	—	U	S	L	S	S

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Chemical Resistance

Table 4. Continued

CHEMICAL	Rigid PVC	Glass Nylon	Gaskets			Windows	
			Neoprene Rubber	Silicone Rubber	Urethane	Acrylic	Poly-carbonate
Calcium Hypochlorite (10%)	S	U	U	S	U	M	S
Calcium Sulfate	S	U	S	S	S	S	S
Carbolic Acid (25%)	—	—	U	U	U	U	U
Carbon Disulfide	U	—	U	—	—	S	—
Carbon Tetrachloride	L	S	U	U	U	S	U
Chlorine (dry)	L	—	—	—	—	—	—
Chlorine (water) 5-10 ppm	L	—	L	S	S	S	S
Chlorobenzene	U	S	U	U	—	L	—
Chloroform	U	U	U	U	—	U	—
Chrome Plating Solution	—	—	U	U	U	S	S
Chromic Acid	L	U	U	M	—	U	—
Citric Acid (10%)	S	L	U	S	U	S	S
Copper Sulfate	S	L	S	S	—	U	—
Creosote	—	U	U	U	—	—	—
Cutting Fluid (5 Star) 10%	—	—	U	S	S	S	M
Cutting Fluid (Castrol 980 H)	—	—	L	S	S	S	L
Cutting Fluid (Norton 205)	—	—	S	S	S	S	S
Cutting Fluid (Rustlick) 10%	—	—	S	S	S	S	S
Cutting Oil (Dark)	—	—	U	S	S	S	S
Diethyl Ether	U	—	—	U	—	U	—
Ethyl Alcohol	S	—	L	S	S	U	M
Ethylene Dichloride	U	—	U	U	—	U	—
Ethylene Glycol	S	—	S	S	S	S	S
Ferric Chloride	S	U	L	S	L	S	S
Ferric Nitrate	S	U	S	M	—	—	—
Ferric Sulfate	S	U	S	M	—	—	—
Fluorine	L	—	—	U	—	—	—
Formaldehyde	L	U	U	M	—	S	—
Formic Acid	L	S	U	L	L	U	S
Fuel Oil (#2)	S	—	U	U	U	S	S
Gasoline	S	S	U	L	—	S	—
Glycerine	S	S	S	S	—	S	—
Hydraulic Brake Fluid	—	—	U	S	U	U	U
Hydraulic Oil	—	—	U	S	S	S	M
Hydrochloric Acid (10%)	S	U	L	L	U	S	S
Hydrocyanic Acid	S	—	S	M	M	—	—
Hydrofluoric Acid (20%)	L	U	U	U	—	S	M
Hydrogen Peroxide	S	U	U	M	—	S	—
Hydrogen Sulfide	S	—	U	M	—	—	—
Hypochlorous Acid	—	—	—	—	—	—	—
Isopropyl Alcohol	—	—	S	S	S	S	S
Kerosene	S	—	U	U	S	S	M
Lacquer Thinner	—	S	U	S	L	U	U
Lactic Acid	S	L	L	—	—	L	—
Lime	—	—	S	M	—	—	—
Liquid Dish Soap (10%)	S	—	L	S	S	S	S
Lubricating Oils	—	—	U	U	—	S	—
Magnesium Chloride (10%)	S	S	S	S	S	S	S

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CHEMICAL	Rigid PVC	Glass Nylon	Gaskets			Windows	
			Neoprene Rubber	Silicone Rubber	Urethane	Acrylic	Poly-carbonate
Magnesium Hydroxide (10%)	S	—	S	S	S	S	S
Mercuric Chloride (10%)	L	—	U	L	U	S	S
Methyl Ethyl Ketone	U	S	S	U	—	L	—
Methylene Chloride	—	U	U	S	U	U	U
Milk	S	—	S	S	—	S	—
Mineral Oil	S	—	L	M	—	S	—
Mineral Spirits	—	—	U	U	S	S	M
Motor Oil (10 weight)	—	—	U	U	S	S	S
Nickel Salts	S	—	U	S	—	—	—
Nitric Acid (10%)	S	U	U	U	U	S	L
Nitrobenzene	U	S	U	—	—	—	—
Oleic Acid	S	U	—	U	—	—	—
Perchloroethylene	—	—	U	S	U	U	U
Phosphoric Acid (25%)	S	U	S	S	U	S	S
Phosphoric Acid (50%)	S	U	S	S	U	S	S
Pickling Solution	—	—	L	M	M	S	S
Potassium Carbonate (10%)	L	S	S	S	S	S	S
Potassium Chloride (25%)	S	L	S	S	S	S	S
Potassium Hydroxide (25%)	S	S	U	L	M	U	U
Potassium Nitrate (10%)	S	L	S	S	S	S	S
Potassium Sulfate (10%)	SL	S	S	S	S	S	S
Soap (Igepal) 10%	S	—	U	S	S	S	S
Sodium Bicarbonate (10%)	S	S	S	S	S	S	S
Sodium Bisulfate (10%)	S	L	S	S	L	S	S
Sodium Chloride (25%)	S	S	S	S	S	S	S
Sodium Hydroxide	S	S	U	U	M	S	U
Sodium Hypochlorite	S	U	U	S	U	S	S
Sodium Nitrate (10%)	S	S	S	S	S	S	S
Sodium Phosphate (10%)	S	—	U	S	S	S	S
Sulfuric Acid (25%)	S	U	S	S	U	S	S
Sulfuric Acid (10%)	S	—	U	U	L	S	S
Tannic Acid (10%)	S	U	U	L	U	S	S
Tetrahydrofuran	—	S	U	U	U	U	U
Toluene	U	S	U	U	U	U	U
Trichloroethylene	U	U	U	U	—	U	—
Trisodium Phosphate	S	—	—	—	—	—	—
Turpentine	—	S	U	L	U	S	S
Vegetable Oils	S	—	L	S	—	S	—
Vinegar	—	S	L	S	—	S	—
Water, Industrial	S	—	S	S	S	S	S
Water, Rain	S	—	S	S	S	S	S
Water, Sea	S	—	S	S	S	S	S
Water, Tap	S	—	S	S	S	S	S
Xylene	—	S	U	M	U	S	U
Zinc Acetate	—	—	—	U	—	—	—
Zinc Chloride	S	U	M	S	U	S	M
Zinc Sulfate	S	L	S	S	—	—	—

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Technical Information

Enclosure Paint Finishes

The primary function of the enclosure's paint is to provide corrosion protection, but benefits such as improved appearance and added distinction should also be considered. The corrosive severity of the application conditions is the first consideration in selecting the finish. Once a paint has been chosen for its corrosion protection, other factors such as color, gloss, texture, ease of cleaning, retention of properties and maintenance can be evaluated to complete the selection.

Table 5 rates different paint types on a continuum of use from "Recommended" to "Unacceptable" in three broad categories of chemical corrosives. The table also provides moisture, heat and chip resistance information. Table 6 provides a relative cost comparison of the available paint categories and the enclosure materials to which they may be applied.

Table 5. Broad Categories Of Paint Type Characteristics

CONTINUUM OF USE	CHEMICAL RESISTANCE				CHIP RESISTANCE	HEAT RESISTANCE
	Acid	Alkalines	Solvents	Water		
Recommended			Polyester Powder, Urethane		Epoxy, Polyester Powder, Urethane	Epoxy
	Urethane, Polyester Powder	Urethane, Polyester Powder, Epoxy		Urethane, Polyester Powder		
			Epoxy			
Acceptable	Alkyds, Epoxy		Epoxy	Alkyds, Epoxy	Alkyds	Alkyds, Polyester Powder, Urethane
			Epoxy			
Limited or Unacceptable		Alkyds	Alkyds			

Table 6. Relative Cost Comparison Of Paint Types

PAINT TYPES	COST	MATERIAL APPLICATION
Alkyd	Medium	Mild Steel
Epoxy	Medium-High	Mild Steel
Polyester Powder	Low-Medium	Mild Steel, Aluminum
Urethane	Medium-High	Mild Steel, Aluminum