

STEEL CONTAINER COATINGS

SHERWIN-WILLIAMS.

CONTENTS

Introduction.	2
Epoxy-Phenolic Liners	3
Phenolic Liners	4
Rust Inhibitors / Size Coats.	5
Exteriors.	5
Regulatory.	6
Product Resistance Data.	6
Product Resistance Tables.	7
Notes.	18

Protective Coatings for Steel Packages

The steel container industry produces steel drums and pails for commercial and industrial products. Many of these products require the use of chemical-resistant linings to protect the integrity of the steel container against the product it packs. This brochure is designed to highlight Sherwin-Williams' coatings system for steel containers, and to present a portion of the extensive product resistance test data amassed during the many years of service within the industry.

The alphabetically arranged product resistance table contains a partial listing of products tested, which are either pure compounds, well-known proprietary products, or representative products for the commercial products from many industries. In addition to the products listed in this brochure, thousands of other product resistance tests have been conducted over the past years which are not included in this listing. Please contact your Sherwin-Williams representative for more information on product resistance data.



Steel Container Coatings from Sherwin-Williams

Sherwin-Williams is a market leader of high performance protective coatings for the drum and pail industry. Our history of development and growth enables Sherwin-Williams to offer the chemical resistant linings and high performance exterior coatings listed in this brochure.

These technologies can be supplied worldwide allowing our global customers to supply equivalent linings to their multinational accounts. To augment our support of the interior market, we offer commodity testing to assist in the selection of the proper lining for a specific commodity.

Additionally, our technical service team delivers onsite support to maximize application efficiencies and provide product support. Our ability to formulate, manufacture, and service a wide product line has made Sherwin-Williams a recognized leader for steel container coatings.

Epoxy-Phenolic Liners

Epoxy-phenolic linings provide excellent product resistance for alkaline products. These liners have been specifically designed to produce outstanding chemical resistance to products in the pH range of 7.0-9.0. The epoxy-phenolic resin blend also provides flexibility in the liner in addition to alkaline product resistance. These liners are manufactured with raw materials which conform to all the requirements of FDA regulations.

Pack Examples: Fatty Acids, Detergents, Emulsions, Foods, General Organic Chemicals, Surfactants, Water-based resins.



Epoxy-Phenolic Products

Recommended curing metal temperature is 450F

EHD002P Buff Chemical Resistant Lining
Spray Application, 3.5 VOC

EHD0022A Buff Chemical Resistant Lining
Roll coat Application, >4.3 VOC

EHB0003 Brown Chemical Resistant Lining
Spray Application, >4.3 VOC

EHD002E Buff Chemical Resistant Lining
Similar to EHD002P, designed for monobake systems,
>4.3 VOC

Liner	pH Range of Packs	Flexibility	FDA Compliance
Epoxy-Phenolic	7.0-9.0	**	Yes
Phenolic	3.0-7.0	*	Yes

* = meets expectations

** = exceeds expectations

Phenolic Liners

Phenolic linings are typically recommended for acidic packs due to their high degree of acid and solvent resistance. These liners are recommended for holding products in the pH range of 3.0-7.0. The cured lining shows excellent adhesion to the metal substrate. These liners are manufactured with raw materials which conform to all the requirements of FDA regulations.

Pack Examples: Agricultural chemicals, insecticides, corrosive chemicals, solvents, nitrocellulose products and inks, food products, essential oils, petroleum products.

Phenolic Products

Recommended curing metal temperature is 425F

HXC005A Clear Chemical Resistant lining
Spray Application, Cures to a Gold Color, >4.3 VOC

HXC0001 Clear Chemical Resistant Lining
Roll Coat Application, >4.3 VOC

HXG008H Olive Chemical Resistant Lining
Spray Application, 4.3 VOC

HXG009C Olive Chemical Resistant Lining
Roll Coat Application, 4.3 VOC

HXR008H Red Chemical Resistant Lining
Spray Application, 4.3 VOC

HXR009B Red Chemical Resistant Lining
Roll Coat Application, 4.3 VOC



Rust Inhibitors and Size Coats

Rust inhibitors and size coats prevent the drum or pail from rusting prior to being filled. They are normally applied at thin films of 0.1-0.2 mils dry. Size Coats are designed to be capable of recoating with linings to improve fabrication without being detrimental to the lining's chemical resistance properties. These coatings are manufactured with raw materials which conform to all the requirements of FDA regulations.

94X042 Phenoxy-Phenolic

Spray or Roll-Coat Application, Cure at 420F Metal Temperature

31S16AH Alkyd

Spray Application, Cure 380F Metal Temperature

AL1066P Alkyd

Spray or Roll-Coat Application, Cure 380F Metal Temperature

Exteriors

We offer 4 lines of exterior colors for steel containers which offer high-performance and can be matched to a wide range of colors to meet your exact needs. In developing these products, we combined our color and formulation expertise to provide a solution with optimized performance and color. Please contact your local Sherwin-Williams representative for further information.

54Q10 Series

Polyester Water-based drum exterior, Spray Application

27Q41 Series

Acrylic Water-based drum exterior, Spray Application

31S58 Series

Acrylic Solvent-based pail exterior, Roll-Coat Application

13S7 Series

Alkyd Solvent-based pail exterior, Spray Application

Color Options - Black, Grey, White, Clear



Regulatory Approvals

Steel container linings comply with many global regulatory statutes including FDA 175.300. For regulatory compliance information on specific systems, please contact your Sherwin-Williams representative.

Product Resistance Data

The sections below capture a wide range of products we have tested our linings against over the years. Please note, the usage of product resistance tables as a guide for determining lining suitability, and is for reference only. The safe and recommended method is to perform actual field testing. The facilities and personnel of Sherwin William's laboratory are able to perform product pack tests, provide lining test cups or test coupons for the customer's own exposure tests, and for consultation and suggestions on linings. Please contact your local Sherwin representative for liner suggestions and further information.

Testing Parameters

- Exposure to the product for 3 months at 120F
- Test coupons were lined with two coats of spray applied liner
- Substrate is clean cold rolled steel
- Liners were applied at specified film thickness and cure temperatures

Key

✓ = no observed failure X = failure or not acceptable **blank** = no testing performed



Product Resistance Table

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
AAtrex 4-L (Herbicide)	✓	✓	✓
Acetadol	✓		
Acetic Acid 5%	✓	✓	✓
Acetic Anhydride	✓	✓	✓
Acetone	✓	✓	✓
Acetone/ Isopropanol/ Water 3/3/4 Blend	✓	X	X
Acetone/ Water 1/1 Blend	✓	✓	✓
Acetonitrile	✓		
Acetophenone	✓		
Acrylic Emulsions — General		✓	✓
Adhesives — General Solvent Based	✓	✓	✓
Adhesives — Water Based		✓	✓
Aerosol MA 80%	✓	✓	
Aerosol OT 75%	✓	✓	
Airkem (Cleaners)	X	✓	X
Alkyldiphenyloxide Disulfonate	X	X	X
Alcohols — General	✓	✓	✓
Aldrin EM4 (Insecticide)	✓	✓	
Alpaca (Cleaning Concentrate)		✓	
Alpha-pinene	✓	✓	✓
Ammonia 2%	X	✓	✓
Ammonium Hydroxide (1%)			
Ammonium Lactate 61%	✓	✓	✓
Ammonium Lauryl Sulfate		✓	
Ammonium Thiosulfate 50%	✓	✓	✓
AMP 95 (2 amino-2 methyl-1 propanol)	✓	✓	
Amyl Alcohol	✓		
Antifreeze — General Alcohol Base	✓	✓	✓
Antifreeze — General Glycol Base	✓	✓	✓
Apple Butter	✓	✓	✓
Aquatoc (Cleaner)	✓	✓	✓
Aquinoc (Cleaner)	X	✓	✓
Armeen CD (Primary Aliphatic Amine)	✓	✓	✓
Armeen DMCD (Primary Aliphatic Amine)	✓	✓	✓
Arquad C-50 (Quaternary Ammonium Salt)	✓	✓	
Aseptene 11 (Cleaner)	✓	✓	✓
Asphalt Emulsion	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Barchlor 8S (Alkyl Chloride)	✓	✓	✓
Bardac 22 (Quarternary Ammonium Compound)	✓	✓	✓
Barlene 8S (Tertiary Amine)	✓	✓	✓
Barquat MB -50 (Quaternary Ammonium Compound)	✓	✓	✓
Benzal Chloride	✓	X	✓
Benzaldehyde	✓	✓	✓
Benzoyl Chloride	X	X	✓
Benzyl Chloride	✓	X	✓
Benzyl Trichloride	✓	X	✓
Biosperse 280 (Water Treatment Compound)	X	X	✓
Brake Fluid	✓	✓	✓
Brine (Pickle)		✓	
Butanol	✓	✓	✓
Butter Salt	✓	✓	
Butter Sweet	✓	✓	✓
Butyl Acetate	✓	✓	✓
Butyl Acrylate	✓		
Butyl Benzoate	✓	✓	✓
Butyl Carbitol	✓		
Butyl Cellosolve	✓		
Butyl Cellosolve/ Water 1/ 9 Blend	✓	X	X
Butyl Chloride	✓		
n-Butyldimethylchlorosilane	✓		
Butyl Methacrylate	✓		
Butyraldehyde	✓		
Butyl Stearate	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Calcium Chloride		✓	✓
Calcium Hypochlorite (Dry)	✓	✓	✓
Calnox (Scale Inhibitor) Calnox 213	✓	✓	✓
Calnox 214	✓	✓	✓
Calnox 214A	✓	✓	✓
Capric Acid	✓	✓	✓
Caproic Acid	✓	✓	✓
Caprylic Acid	✓	✓	✓
Carbon Tetrachloride	✓	✓	✓
Carolid (Textile dye carrier) Liquid Carolid CEG-105	✓	✓	✓
Liquid Carolid ELF-1-111	✓	✓	✓
Liquid Carolid NCS-115	✓	✓	✓
Liquid Carolid 100% 2335	✓	✓	✓
Liquid Carolid 50% 125	✓	X	✓
Castor Oil	✓	✓	✓
Caustic Flakes	X	X	X
Caustic Materials — General	X	✓	✓
Chain Lubricant	X	X	✓
Cherry Flavor		✓	
Cheese		✓	
Cheese Whiz		✓	
Chlordane, Emulsifiable Concentrate	✓	✓	✓
Chlorinated Hydrocarbons	✓		
Chloroform	✓	✓	✓
Chocolate Concentrate	✓	✓	✓
Cinnamic Aldehyde	✓	X	✓
Citral	✓	✓	✓
Clean-O-Lite (Cleaner)	✓	✓	✓
Clean Quick (Liquid Cleaner)	X	✓	✓
Coconut Oil Fatty Acids	✓	✓	✓
Cold Cream	✓	✓	✓
Colloidal Silica (General)		✓	
Corexit (Oil Field Chemical) Corexit #7652	✓	✓	
Corn Syrup	✓	✓	✓
Crisco	✓	✓	✓
Cyclohexanone	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Dad's Old Fashioned Root Beer Concentrate	✓	X	✓
Detergents — General		✓	✓
Diamine Epoxy Resins - General	✓		
Dibutyl Phthalate	✓		
Dichloro-difluoro-methane	✓		
Dichromate Solution - Inorganic	✓	✓	
Diethylene Glycol	✓	✓	✓
Diethanolamine	✓	✓	✓
Diethylenetriamine	✓	X	
Dimethylacetamide	✓		
Dimethylformamide (DMF)	✓		
Dimethyloctadecylchlorosilane	✓		
Dioxolanone	✓		
Ditertiary Butyl Peroxide	✓	X	✓
D'Limonene	✓	✓	
Dodecenylsuccinic Anhydride	✓	✓	✓
Dodecyl Mercaptan	✓		
Dreft(1% Solution)	✓	✓	✓
Dyanap (Herbicide)	✓	✓	✓
Dyeweld (Textile dyeing assistant) Dyeweld D-101	✓	✓	✓
Edible Oils — General — 100% Phenolic Preferred	✓	✓	✓
Emulsifiers — General	✓	✓	✓
Emulsions — Water Based		✓	✓
Essential Oils — General	✓		
Ethanenitrile	✓		
Ethanol	✓	✓	✓
Ethoxylated Stearic Acid (Hot filled)	✓	X	X
Ethylene Diamine	✓	✓	✓
Ethyl Acrylate	✓		
Ethylenediamine	X	X	X
Ethylenediaminetetraacetic Acid (EDTA)	X	X	X
Ethylene Dibromide	✓	X	
Ethylene Dichloride	✓	✓	✓
Ethylene Glycol	✓	✓	✓
Ethyl Lactate	✓	✓	✓
Ethyl Silicate	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Fatty Acids — General	✓	✓	✓
Floor Polish (Emulsion)		✓	✓
Floor Polish (Solvent Based)	✓	✓	✓
Folex (Defolient)	✓	✓	✓
Formaldehyde (37% Water-Alcohol Solution)	✓	✓	✓
Freon TMC	✓	✓	✓
Freshtex (Sugar Product)	✓	✓	✓
Fryol #6 (Flameproofing Agent)	✓	✓	✓
Fungicides - General	✓		
Furfuryl Alcohol	✓		
Gasoline — General	✓	✓	✓
Geranyl Formate	✓	✓	
Gluconic Acid	✓	✓	✓
Glucose	✓	✓	✓
Glycerin	✓	✓	✓
Glycol Ethers - General	✓		
Grease — General	✓	✓	✓
Guaiacol	✓	✓	✓
Gum Arabic	✓	✓	✓
Hamp-ene 100 (Chelating Agent)	X	✓	✓
Hand Cream	✓	✓	✓
Herbicides — General	✓		
Heptane	✓	✓	✓
Hexadecyl Stearate	✓	✓	✓
Hexahydro Phthalic Anhydride	✓	✓	✓
Hexamethylene Diisocyanate	✓	✓	
Hexane	✓	✓	✓
Hexanoic Acid	✓	✓	✓
Honey	✓	✓	✓
Hydraulic Fluid	✓	✓	✓
Hydrocarbon Solvents Aliphatic	✓	✓	✓
Hydrocarbon Solvents Aromatic	✓	✓	✓
Hydrochloric Acid (1%)	✓	✓	✓
Hydrogenated Edible Oils	✓	✓	✓
Hydroxy Acetic Acid (70%)	✓		

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Inks - Solvent Based	✓	✓	✓
Inks - Water Based		✓	✓
Insecticides — General	✓		
Irganox L 138	✓	✓	✓
Isobutyraldehyde	✓		
Isocyanates - General	✓		
Isooctyl Acrylate	✓	✓	✓
Isopentanoic Acid	✓		
Isophorone	✓		
Isopropanol	✓	✓	✓
Jams and Jellies - General	✓	✓	✓
Jefferson Fuel Additive — 4	✓	✓	✓
Jet Oil - Synthetic		✓	
Jojoba Oil Colorless	✓	✓	✓
Karathane (Fungicide)	✓	✓	✓
Kara Syrup	✓	✓	✓
Kerosene	✓	✓	✓
Lactic Acid 85%	✓	✓	✓
Lactic Acid 1 %	✓	✓	✓
Lacquers — General	✓		X
Lard	✓	✓	✓
Latex Products — General		✓	✓
Lauric Acid	✓	✓	✓
Lemon Pie Filling	✓	✓	✓
Linear Alkylbenzene Sulfonate	✓	X	X
Linseed Oil	✓	✓	✓
Lubit (Textile Wet Processing Lubricants)	✓	✓	✓
Ludox (Colloidal Silica)		✓	✓
3,4 Lutidine	✓		

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Malathion (Insecticide)	✓		
Maltose	✓	✓	✓
p-Menthadiene	✓	✓	
Merphos (Defoliant)	✓	✓	✓
Merse 7F (Textile Surfactant)	✓	✓	✓
Methacrylic Acid	✓		
Methyl Alcohol	✓	✓	✓
Methyl Bisthiocynate	✓		
Methyl Cresotinate	✓	✓	
Methyl Ethyl Ketone	✓	X	✓
Methylene Chloride	✓		
Methyl Cyanide	✓		
Methyl Methacrylate	✓		
Methyl Naphthalene	✓	✓	✓
1-Methyl-2-Pyrrolidone	✓	X	X
Methyl Salicylate	✓	✓	
Migrassist (Textile Leveling Agent) Migrassist-tAC 1821	✓	✓	✓
Migrassist NYL 102	✓	✓	✓
Mineral Spirits	✓	✓	✓
Mocap (Insecticide)	✓		
Modown (Herbicide)	✓	✓	✓
Molasses	✓	✓	✓
Morpholine	✓	✓	✓
Mustard Oil	✓	✓	✓
Myrj 45 (Surfactant)	✓	✓	✓
Naphthenic Acid	✓	✓	✓
Neodol (Surfactants) Neodol 23-3	✓	✓	✓
Neodol 25	✓	✓	✓
Neodol 25-9	✓	✓	✓
Neo-Fat 8 (Caprylic Acid)	✓	✓	✓
Nitrocellulose Lacquer	✓		

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Oxide (Detergent Disinfectant)	✓	X	✓
Oleic Acid	✓	✓	✓
Oleo margarine	✓	✓	✓
Orange Oil	✓	✓	
Orho cresol	✓	✓	✓
Paint and Varnish Remover	✓		
Pentachlorophenol (4% in solvent)	✓	✓	
2,4, Pentanedione	✓	X	X
Perchlorethylene	✓		
Perchloroethylene	✓		
Perf-A-Tape Compound	✓	✓	
Pesticide —.General	✓		
Phenol	✓	X	
Phenyl Mercury Acetate	✓	✓	
Phosphoric Acid (8% in solvent)	✓		
Phosphoric Anhydride	✓		
Phosphorous Oxychloride	X	X	X
Phosphorus Trichloride	✓		
Pine Oil	✓	✓	✓
Polyacrylamide - Nonionic	✓	✓	✓
Polyalkylene glycol	✓	✓	✓
Polyester Resin (Styrene Type)	✓	✓	✓
1,2,3-Propanetriol Triacetate	✓		
n-Propyl Bromide	✓		
Propylene Carbonate	✓		
PVA Paints and Resins — General		✓	✓
Quaternary Ammonium Compounds — General	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Racing Fuels - General	✓	✓	✓
Refrigerants - General	✓		
Resin — Solvent Based	✓		✓
Resin — Water Based		✓	✓
Salad Dressing	✓	✓	✓
Salad Oil		✓	
Sea Breeze (Antiseptic)	✓	✓	✓
Sesame Seed Oil	✓		
Selcol (Disinfectant)	✓	✓	✓
Shortening	✓	✓	✓
Silicone Emulsions — General	✓	✓	✓
Siloxane Fluid	✓	✓	✓
Sodium Alkyl Sulfate		✓	
Sodium Chloride (5%)	X	X	X
Sodium Chlorite		X	
Sodium Hydroxide (1%)	X	✓	✓
Sodium Hydroxide (3%)		X	X
Sodium Lauryl Sulphate	✓	✓	
Sodium Trichloroacetate	✓		
Soft Drink Concentrate — General	✓		✓
Spot Remover	✓	✓	✓
Sorbitol		✓	
Spearmint Oil	✓	✓	
Staple Cement	✓	X	✓
Stearic Acid	✓	✓	✓
Styrenated Dyphenylamines	✓	✓	
Styrene	✓		
Sulfonated Oil	✓	✓	✓
Sure Stick (Tile Adhesive)	✓	✓	✓
Surfactants - Anionic - General	X	X	X
Surfonic N (Surface Active Agent)	✓	✓	✓

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Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Tanadel (Textile Dyeing Assistant) Tanadel IM— 384	✓	✓	✓
Tanalene (Textile Dyeing Assistant) Tanalene 200-354	✓	✓	✓
Tanalid (Textile Printing Center) Tanalid 004SP-496	✓	✓	✓
Tanalon (Textile Dye Carrier) Tanalon Jet-127	✓	✓	✓
Tanalube (Textile Lubricant) Tanalube RF-248	✓	✓	✓
Tanalube M-33-317	✓	✓	✓
Tanapal (Textile Leveling Agent) Tanapal CD-200	X	X	✓
Tanapon (Textile Surfactant) Tanapon LCE-100	✓	✓	✓
Tanapon X-70-504	X	✓	✓
Tanaterge (Surfactant) Tanaterge BDS-200-103	✓	✓	✓
Tetrachloroethylene	✓		
Texaphor (Paint Additive)	✓	✓	✓
Textile Chemicals — General	X	X	✓
Toluene	✓	✓	✓
Toluene Sulfonic Acid	✓	✓	
Tomato Paste	✓	✓	✓
Treflan (Herbicide)	✓		
Triacetin	✓		
Trichlorobenzene	✓	✓	✓
Trichloromethane	✓	✓	✓
Triethanolamine	✓	✓	✓
Triethylene Diamine	✓		
Trydet (Polyoxyethylene Fatty Esters) Trydet 20	✓	✓	✓
Trydet SA-50	X	✓	✓
Tryfac (Phosphate Esters) Tryfac 610A	✓	✓	✓
Tryfac 61 OK	✓	✓	✓
Trymeen CAM-10 (Polyoxyethylene) Fatty Amines	✓	✓	✓

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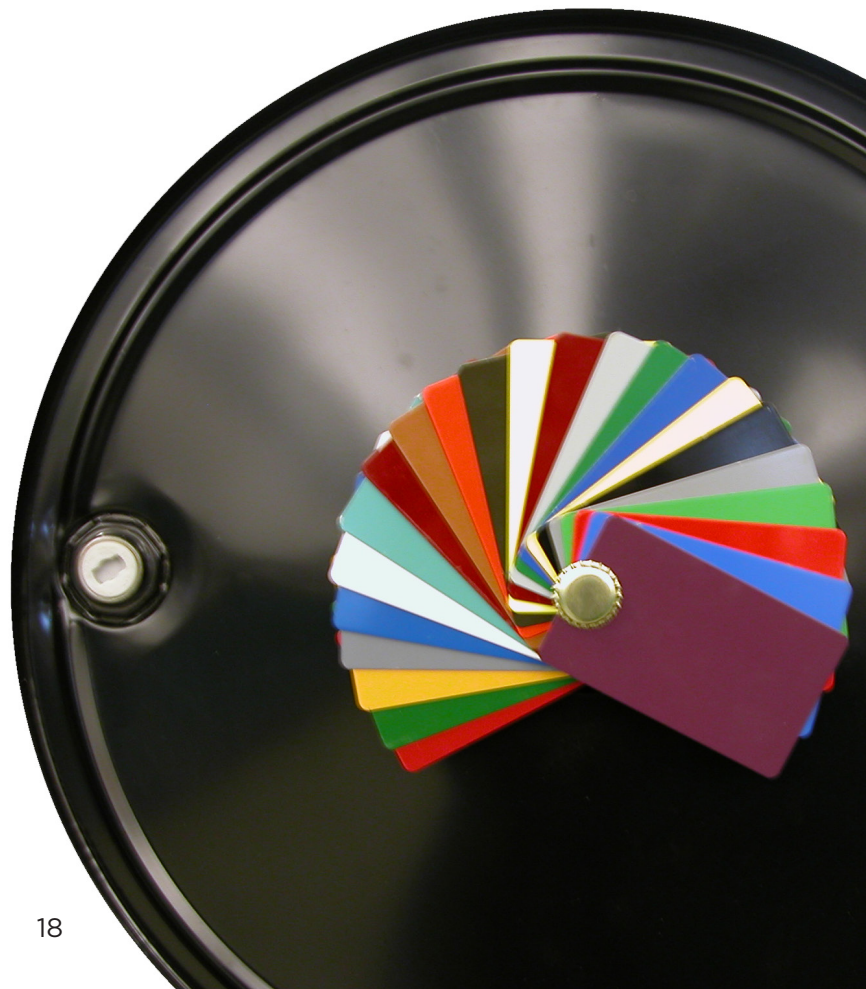
Product Resistance Table (continued)

Linings	Phenolic	Epoxy-Phenolic	Modified Phenolic
Urea Formaldehyde — Resin Solution	✓	✓	✓
Varnish — Solvent Based	✓	✓	✓
Vegetable Oils	✓		
Water — Distilled		✓	✓
Water — Tap		✓	✓
Water Based Products — General		✓	✓
Xyol	✓	✓	✓
Zinc Chloride 50%	✓		

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The information and suggestions for use and application presented in this brochure and in this table represent the best information available to us and are believed to be reliable. They should not, however, be construed as controlling suggestions, and there is no warranty of performance of our materials either expressed or implied. End users of our materials should conduct confirmatory tests to determine final suitability for their specific end uses.

Notes





STEEL CONTAINER COATINGS

At Sherwin-Williams, our packaging coatings protect and advance the design and heritage of many of the world's best known brands. Whether your goal is to create a new package design for food, beverage or household products, meet ever-changing regulatory challenges or enhance the sustainability of a package, you can count on us to develop and deliver innovative custom coating solutions and provide the technical expertise and support you need. We are Sherwin-Williams Packaging Coatings, and we are passionate about enabling the success of your package and brand.

Contact us at PackagingCoatings@sherwin.com or visit us at packaging.sherwin.com