



UNIQUE POLYMER COATINGS THAT SOLVE CORROSION PROBLEMS

APC COATINGS RESIST ACIDS – CAUSTICS - SOLVENTS



PowerLINE



ChemLINE



RaiLINE



MarineLINE



ChemLINE



ChemLINE

CHEMICAL MANUFACTURING • TRANSPORTATION •
STORAGE • CONTAINMENT • ENERGY PRODUCTION



CORROSION PROTECTION AT EVERY TURN

Advanced Polymer Coatings, Ltd. (APC) presents a family of unique coatings to protect against the damage from corrosion and to provide safe transport of chemicals whether on land or sea. Based on its development of the patented Siloxirane[®] polymer resin, the company has engineered a range of industry-specific coatings that resist and control the problems encountered by corrosion and chemical attack.

Protection at every turn means that no matter where you manufacture, store, and transport chemicals, APC offers a coating solution.

A History in Aerospace

APC first developed Siloxirane[®], a cross-linked organic-inorganic polymer resin used in composite parts, prepregs and coatings for the aerospace industry for high temperature applications. Siloxirane[®] resin has been specified for a range of stringent parts requirements such as advanced tactical missiles, aircraft parts, space hardware, ordnance, electronics and other high performance applications.

Based on their success with engineered polymers, APC attacked and solved problems in other industries focusing on the corrosion protec-

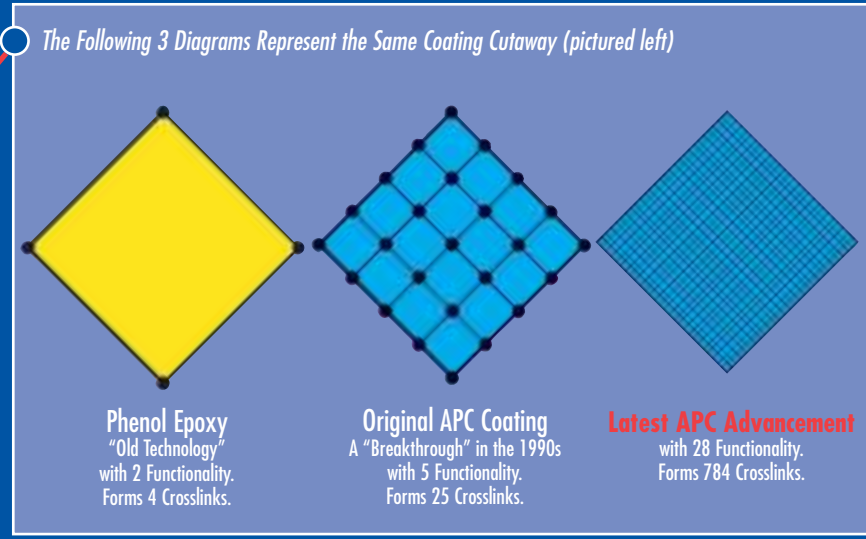
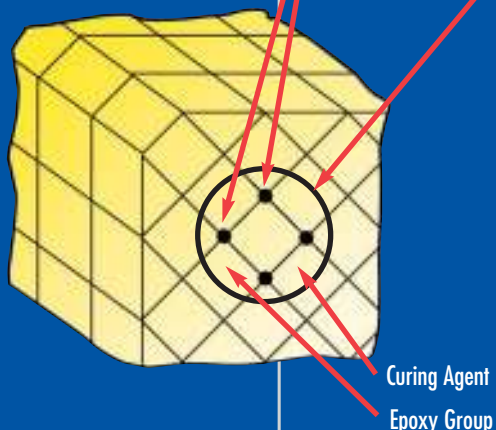


tion deficiencies of conventional protective coatings and linings. Today, from its headquarters in Avon, Ohio, near the heart of the world's leading polymer research centers and testing facilities, APC manufactures coatings formulated with proven Siloxirane[®] technology, that are geared for extreme corrosion-, high temperature- and abrasion-resistance.

A FUTURE OF CONTINUING TECHNOLOGY ADVANCES

The Technology; Epoxies, Vinylesters and **ChemLINE**, **MarineLINE**, **RaiLINE** Form 3 Dimensional Screen-Like Structures when Cured

The Greater the Distance Between the Crosslinks, the Greater the Permeation Causing Chemical Attack and Absorption



SUPERIOR CORROSION RESISTANCE PROTECTION

Siloxirane®-based coatings resist 98% of all corrosive acids, alkalis, solvents, gasses and materials at various temperatures. APC has conducted more than 5,000 chemical and physical tests of Siloxirane® resin and coatings. In applications testing versus conventional coatings such as vinylesters,

epoxies, rubbers and high bake phenolics, Siloxirane® has proven to outperform other linings and deliver a better return on investment. Siloxirane® is highly effective against extreme corrosion and erosion, with a temperature resistance capability up to 500°F (260°C).

	MarineLine® 784 RailLine® 784 ChemLine® 784	Phenol Epoxy	Vinylester	Stainless Steel
Acetaldehyde	A	L	N	A
Acetic Acid	A	N	N	A
Acrolein Acid	A	N	—	A
Acrylic Acid	A	N	N	A
Acrylonitrile	A	N	N	A
Ammonium Persulfate	A	A	A	L
Azabenzene	A	N	N	A
Benzene	A	A	N	A
Benzene Carboxylic Acid	A	A	N	A
Benzoyl Chloride	A	N	N	N
B-Methacrylic Acid	A	N	N	A
Bichromate of Soda	A	N	A	A
Bromine	A	N	N	A
Butanoic Acid	A	N	—	A
Butyric Aldehyde	A	N	A	A
Calcium Hydroxide	A	A	A	A
Calcium Hypochlorite	A	A	A	L
Caustic Potash	A	N	N	A
Carbolic Acid	A	N	N	A
Chlorine Water	A	N	A	N
Chlorosulfonic Acid	A	N	N	N
Chlorinated Acetone	A	N	N	L
Chloroacetic Acid	A	N	N	L
Chromic Acid	A	N	A	N
Coal Tar Oil	A	N	A	A
Coconut Fatty Acid	A	A	A	A
Colamine	A	N	N	A
Cresol	A	N	—	A
Dichloromethane	A	N	N	A
Detergents	A	A	A	A
Diethyl Formamide	A	N	N	A
Diethylamine	A	N	N	A
Diethylene Chloride	A	N	N	L
Diethyl Ether	A	N	N	A
Dimethylamide Acetate	A	N	—	A
Disulphuric Acid	A	N	—	A
EDTA	A	N	A	A
Ethanolamine	A	N	N	A
Ethonic Acid Anhydride	A	N	—	A
Ethyl Acrylate	A	A	N	A
Fatty Acids	A	A	A	A
Fatty Acid, Palm	A	A	A	A
Ferric Chloride	A	N	A	N
Flaked Stearic Acid	A	N	A	A

	MarineLine® 784 RailLine® 784 ChemLine® 784	Phenol Epoxy	Vinylester	Stainless Steel
Fluoroboric Acid	A	N	—	N
Formaldehyde	A	A	A	A
Formamide	A	N	—	A
Formic Acid 10%	A	N	A	A
Green Liquor	A	N	A	L
Glycerol	A	N	N	A
Grape Juice	A	A	A	A
Grapefruit Juice	A	A	A	A
Grease Oil	A	A	A	A
Heptanoic Acid	A	A	—	A
Herring Oil	A	A	A	A
Hexahydroaniline	A	N	—	A
HMDA	A	N	—	A
Hydrazine	A	N	N	A
Hydrobromic Acid	A	N	A	N
Hydrochloric Acid	A	N	A	N
10% Hydrofluoric Acid	A	N	A	N
5-20% Hydrogen Chloride	A	N	—	N
35% Hydrogen Peroxide	A	N	A	A
10%-30% Hydrogen Sulfate	A	N	A	A
5%-17% Hypochlorite Bleach	A	N	A	N
Isobutanol	A	N	A	A
Isobutyric Acid	A	N	—	A
Isopropyl Amine	A	N	A	A
Javelle Water	A	N	A	N
Juices, Fruit	A	A	A	A
Lactic Acid	A	A	A	A
Lactonitrile	A	N	—	A
Latex	A	A	A	A
Liquid Ammonia	A	N	N	A
Liquid Pitch Oil	A	N	A	A
M-Phosphoric Acid	A	N	A	L
Maleic Anhydride	A	N	A	A
MCA	A	N	—	A
Methacrylonitrile	A	N	N	A
Methanamide	A	N	—	A
Methanol	A	N	N	A
MEK	A	L	N	A
Methylene Chloride	A	N	N	N
Monochloroacetic Acid	A	N	N	N
Monochloro Benzene	A	N	N	N
Naphtalene	A	N	A	A
Nitric Acid 1-20%	A	N	A	A
Nitro Benzene	A	A	N	A

	MarineLine® 784 RailLine® 784 ChemLine® 784	Phenol Epoxy	Vinylester	Stainless Steel
Nitrogen Fertilizers	A	A	—	A
Norval Amine	A	N	N	A
Octanoic Acid	A	A	—	A
Ortho Nitro Benzene	A	N	N	N
Oleum	A	N	N	A
Olive Oil Fatty Acid	A	A	A	A
Palm Oil Fatty Acid	A	A	A	A
Perchloroethylene	A	N	N	A
Perchloric Acid	A	N	N	N
Phenol	A	N	N	A
Phosphoric Acid	A	N	A	N
Phthalic Anhydride	A	N	A	A
Piperzine	A	N	—	A
Polyethylene Polyamines	A	N	—	A
Potassium Hydroxide	A	A	L	L
Potassium Permanganate	A	A	A	L
Propionic Acid	A	N	N	A
Pyridine	A	N	N	A
Rubber Extender Oils	A	A	A	A
Rum	A	A	A	A
Sodium Carbonate	A	N	A	N
Sodium Dichromate	A	N	A	A
Sodium Hydroxide	A	A	A	L
Sodium Hypochlorite	A	N	A	N
Sodium Sulfide	A	A	N	N
Stannic Chloride	A	A	A	N
Stearic Acid	A	A	A	A
Spent Sulfuric Acid	A	N	N	A
Sulfur	A	N	N	A
Sulfuric Acid 1-70%	A	A	A	N
Sulfuric Acid 70-99%	A	N	N	L
Sulphurous Acid	A	N	N	A
Tall Oil	A	A	A	A
Tallow Acid	A	A	N	A
Tar Acid	A	N	A	A
Tetra Chloroacetic Acid	A	N	N	N
Tetra Hydrofurfuryl Alcohol	A	N	N	A
Toluene Diamine	A	N	N	A
Toluol	A	L	L	A
Valeraldehyde	A	N	—	A
Vinegar	A	N	A	A
Vitriol Oil 65%	A	N	A	A
Water, Acid	A	N	N	A
Xylenol	A	N	N	A

A = Good at ambient temperatures L = Limited Service N = Not recommended

Corrosion resistance data for Epoxy, Vinylester and Stainless Steel from published literature.

APC and its affiliate company, ChemLine Europe Ltd., have provided ChemLine® coating for hundreds of ISO tank containers, over-the-road tankers and portable tanks. These vessels are in service throughout the world safely carrying even the most aggressive chemicals such

as 98% Sulfuric Acid, 37% Hydrochloric Acid, 50% Sodium Hydroxide, Methanol, Methylene Chloride, Acetic Acid and others, while delivering an increased return on investment for owners and operators.

TRANSPORT VIA ROAD & RAIL

RaiLINE® ChemLINE®

RaiLine® is the protection standard for vessels traveling via rail. RaiLine® is

referred to as the 'Universal Tank Lining System' as it resists thousands of chemicals, offering far greater benefits than stainless steel or lining materials such as high bake phenolics and rubber used on rail tanker cars. RaiLine® also offers excellent wear and abrasion resistance when carrying pellets, crystals and other coarse media in rail hopper cars.



TRANSPORT VIA THE SEA

MarineLINE®



For maritime chemical tankers, MarineLine® is the only high performance lining that withstands all IMO approved chemical cargoes. MarineLine®'s unique cross-linked polymer structure does not allow a chemical cargo to permeate the tank lining. This answers the critical needs to assure product purity, resist corrosion, and ensure tank cleaning is fast and easy.

Tanks coated with MarineLine® are today safely carrying a range of CPP and chemicals including Benzene, MTBE, Palm oils, Vegetable Oils, Phenol, Acrylonitrile, Methanol, Ethylene Dichloride, Toluene, Acetic Acid, and many others. Chemical-carrying tanks coated with MarineLine® over 10 years ago are still in service today. MarineLine® is now the coating of choice for the maritime chemical tanker industry.

5



Many years of studying the operations of MarineLine® ship owners has produced a computer program that allows you to analyze your operating cost! Fill in the blanks with your itemized cost and **see how much YOU can add to YOUR Bottom Line Profit.**

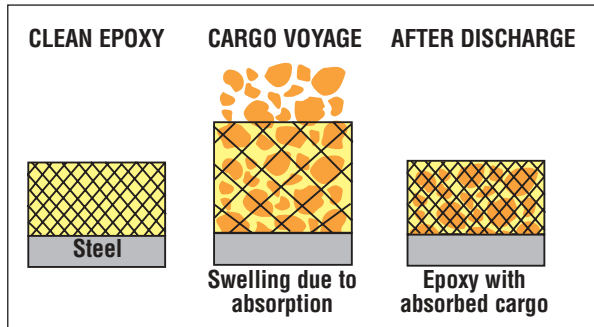


Use our **free Cost Analysis Tool** located at www.adv-polymer.com, or ask for the **MarineLine® Story CD**, available from APC.

HIGH PERFORMANCE COATINGS ELIMINATE PROBLEMS

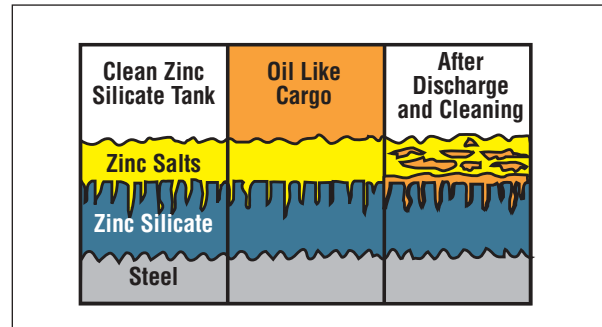
Problems with Phenolic Epoxy Coating

- Absorbs cargoes to high levels (depending on cargo)
- Absorbs cargo relatively slowly
- Releases absorbed cargo very slowly
- Small traces may be retained
- Subsequent cargo contamination



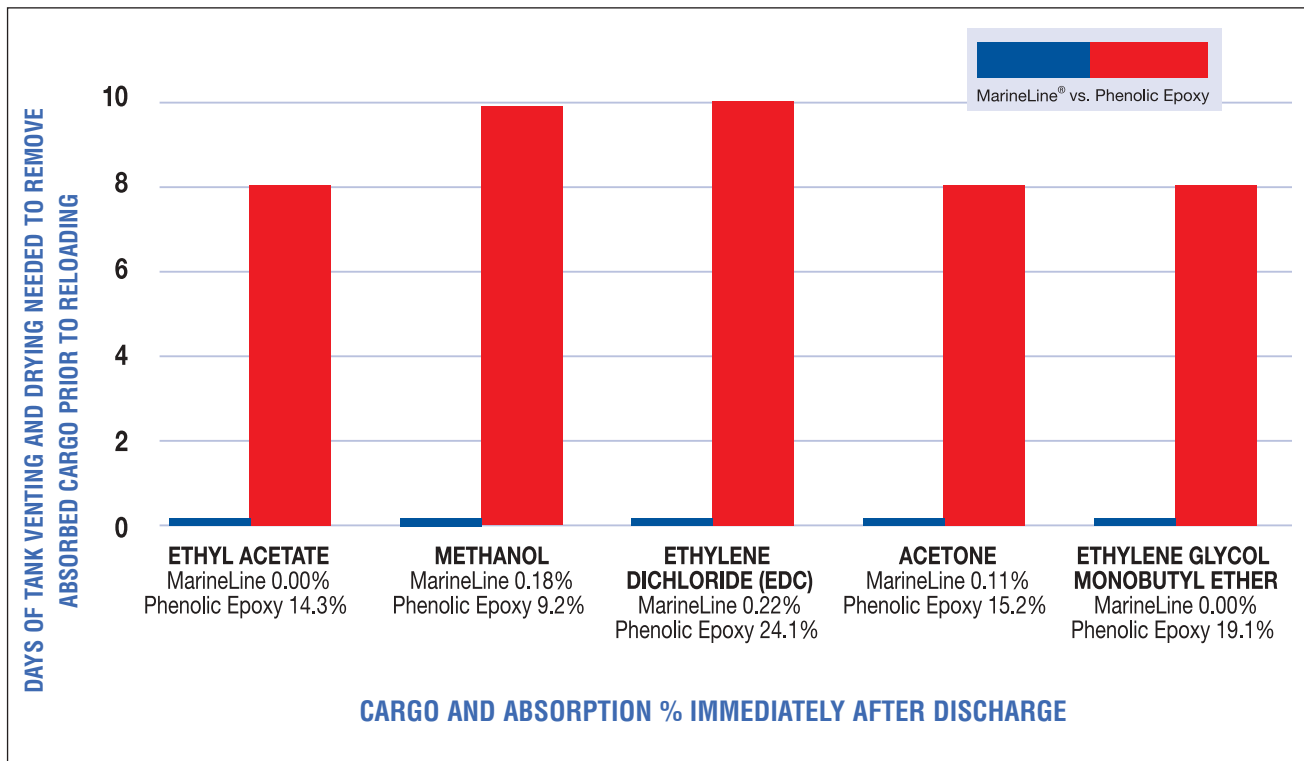
Problems with Zinc Silicate Coatings

- Absorbs cargo quickly
- Retains oil like cargoes
- Subsequent cargo contamination
- Limit back hauling capability
- Not resistant to acids, caustics, and acid containing oils and urea



Absorption/Desorption

MarineLine® vs Phenolic Epoxy comparisons after 45 days immersion with various cargoes, showing days recovery (desorption) with ventilation @ 30° C.



Tests performed by independent testing laboratory

SAFE PROCESSING & STORAGE

ChemLINE®

At chemical, petrochemical, industrial processing and storage facilities, ChemLine® offers optimal corrosion protection against acids, caustics and solvents. ChemLine® is virtually impermeable so wherever hazardous chemicals pose problems – tanks, pipes, stacks, digesters, and in or around processing equipment – ChemLine® delivers superior long-term performance.

ChemLine® is also versatile, providing superior resistance to more than 98% of all types of chemicals. The coating offers superior bonding qualities and can even be applied to pitted and corroded steel. It is the ideal choice for safely protecting investments at processing and storage facilities.

8



ChemLine® is the coatings answer to protect concrete-based containment structures, waste water tanks, clarifiers, flocculation basins, neutralization chambers, chemical plant floors and clean room floors. Wherever spills occur

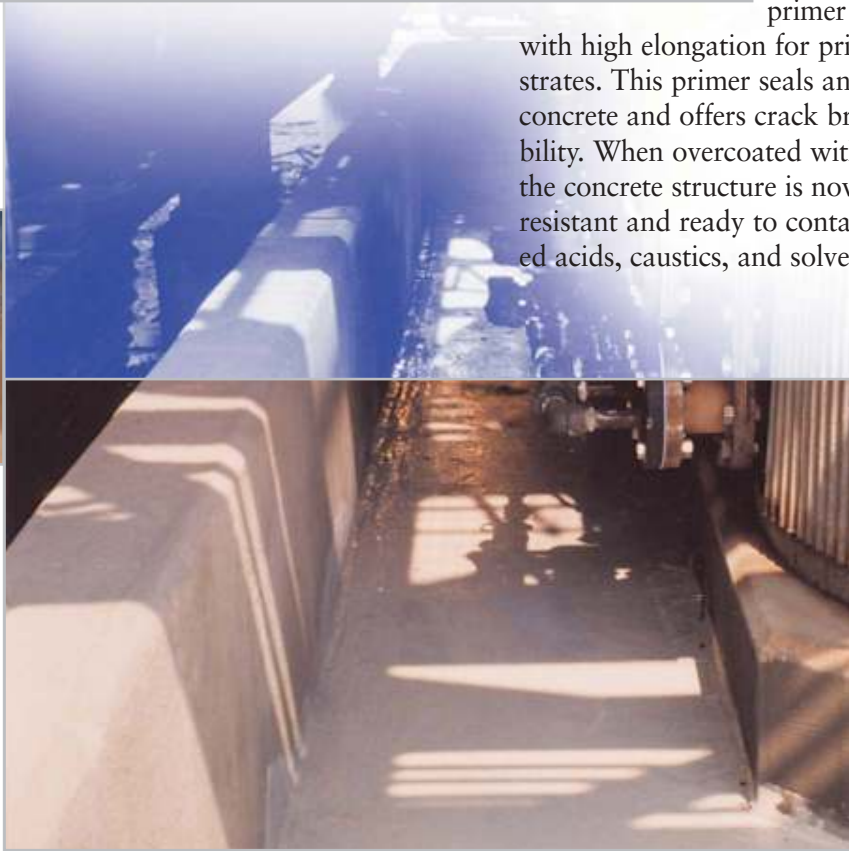
and/or protective chemical containment is needed, ChemLine® is the answer. Due to ChemLine®'s unique cross-linked polymer structure, chemicals are not able to permeate the lining, ensuring containment, even against the most aggressive chemicals.

SECURE CONTAINMENT & PROTECTION

ChemLINE®

APC also provides ChemPrime® as a surface-tolerant primer and sealer

with high elongation for priming substrates. This primer seals and strengthens concrete and offers crack bridging capability. When overcoated with ChemLine®, the concrete structure is now chemically resistant and ready to contain concentrated acids, caustics, and solvents.



RELIABLE POWER GENERATION PROTECTION

PowerLINE®

PowerLine® coating is specially formulated to handle the high temperature and abrasion requirements of the power industry. The coating has proven to be very effective at preventing corrosion in a number of key areas including flue gas desulfurization systems, stacks, chimneys, ducts, FGD scrubbers, chemical scrubbers, pre-scrubbers, spray towers and fans.

PowerLine® offers very high bond strength of 5200 PSI on grit blasted steel and can be applied to pitted and corroded steel. It resists fly ash abrasion and the coating's smooth, low surface energy reduces fly ash buildup in ducts and stacks. PowerLine® delivers superior corrosion and high temperature resistance up to 500°F (260°C), with exceptional flexibility and toughness.

It is the coating of choice for your most demanding power protection requirements.

CASE STUDY SOLUTIONS

MarineLine® Offers Versatile Solutions for Clearwater Group Tanker Fleet

MarineLine-coated tanks enable this fleet of ships to carry sulfuric, phosphoric, and acetic acids in its cargo tanks, as well as a wide range of other aggressive acids, caustics & solvents all covered in the IBC Code. The tankers have made up to 80 cargo changes in a year. Cleaning is easily achieved with hot salt water, followed by a fresh water rinse. This versatility gives Clearwater Group an exceptional edge in the market.



ChemLine® Coating Protects Stainless Steel Tanks at Chemical Plant

A chemical company's stainless steel tanks were being eaten away by a bacteria known as MIC. This micro organism was introduced through the tanks' waste water system. The bacteria created small cracks in the tanks' stainless steel walls which were then also attacked by other chemicals, and the unfiltered waste water at a 160°F temperature. The tanks were lined with an APC Siloxirane®-based coating, now branded as ChemLine®, which successfully solved this problem.



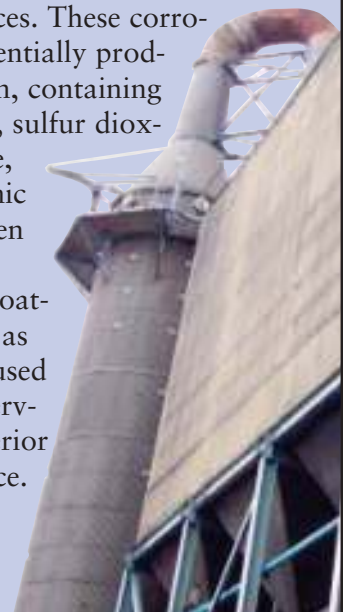
RaiLine® Shows NO Deterioration after 10 Years of Service

Leading chemical producers have relied on RaiLine® for over 10 years to protect their railcars and hopper cars from corrosion and product contamination. The cars have been used to carry products such as 98% sulfuric acid, waste acids, MEA, fertilizers and hundreds of other products. In a recent inspection of several of these cars after 10 years of service there is no sign of deterioration of the RaiLine® coating and the rail cars are still in service.



PowerLine® Provides Corrosion Resistance for Scrubber in Australia

A smelting services company in Australia needed to line two large scrubbers used to treat exhaust gasses from furnaces. These corrosive gasses are essentially products of combustion, containing hydrogen fluoride, sulfur dioxide, sulfur trioxide, condensable organic vapors and nitrogen oxide. APC's Siloxirane-based coating, now branded as PowerLine®, was used and has been in service delivering superior corrosion resistance.



CLIENT LIST

Leading-edge companies throughout the world have relied on Advanced Polymer Coatings to solve their corrosion-control needs.

3M Corp	Dow Chemical	Mead Westvaco
Alcoa	Duke Energy	Merck Chemical
Asarco	DuPont Chemical	Monsanto
B.P. Chemicals	Eli Lilly	Chemical
BASF	Formosa Plastics	Nepco
Bayer Chemical	Corp.	Occidental
Betz Labs	GE Plastics	Chemical
Boeing Corp.	Georgia Pacific	PPG Industries
Bristol Myers	Great Lakes	Rhodia
Squibb	Chemical	Rolls Royce
Cargill	Huntsman	Shell Chemical
Celanese	Chemical	Company
Chemicals	Corporation	Stolthaven
Chevron Phillips	IMC/Aurora	Terminals
CIBA Specialty	Tankers	Vopak Terminals
Chemicals	International Paper	Vought Aircraft
Clearwater Group	Latvian Shipping	Weyerhaeuser
Shipping	Lockheed Martin	
Coors Brewery	Maersk - A.P.	
Clipper Group	Moeller Shipping	

A WEBSITE DESIGNED WITH OUR CUSTOMERS IN MIND

To learn more about Advanced Polymer Coatings polymer-based high performance coatings – MarineLine®, RaiLine®, ChemLine® and PowerLine®, visit our website. Learn about the various markets APC serves with product-specific coatings. The site offers downloadable PDFs of all product brochures and a complete chemical resistance guide. Other subjects include a 'Cost Analysis Tool' which shows cost savings and profit potential in coating tanks with MarineLine® on chemical tankers. A brief movie presents the story of



www.adv-polymer.com

MarineLine® coatings on-board chemical tankers. The website also contains case studies, listings of coated and contracted ships, article reprints, news updates, product MSDS, and application specifications.

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