MarineLINE®784

The industry leading cargo tank coating for chemical & product tankers, with superior chemical resistance.

ADVANCED POLYMER COATINGS

What is MarineLine®

Key Coatings Benefits

- MarineLine® 784 from Advanced Polymer Coatings, is the premier cargo tank coating system available for chemical and product carriers, and the only high performance lining that withstands all IMO approved chemical cargoes.
- MarineLine® is generally recognized as safe (GRAS) for food grade cargoes. MarineLine® 784 coating complies with the FDA and all applicable food additive regulations.
- More chemical resistance than stainless steel, phenolic epoxies and zinc silicate coatings.
- Superior resistance to acids, alkalis and solvents; maximum versatility to carry CPPs, PFADs, Bio-Fuels, and Methanol.
- Virtually non-permeable for assurance of product purity.
- Superior bond strength and adhesion.
- Very low VOC - 99 grams/L (0.80 lbs./gal.).
- Excellent flex stressing.
- Resistance to wear, abrasion and impact.
- Thermal shock resistance -40°C to +150°C (-40°F to +302°F).

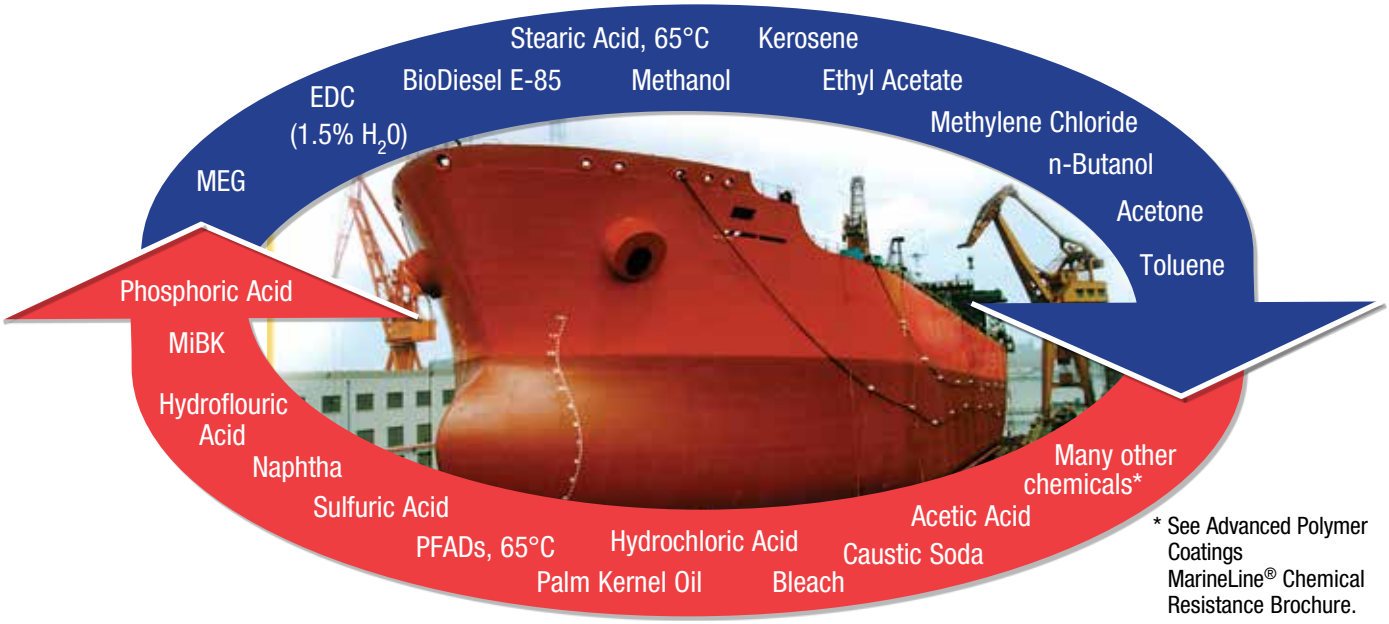
Key Performance Benefits

- Shipowners generate strong Return on Investment (ROI).
- Faster, easier, more efficient cleaning due to non-absorption, low surface energy and smooth surface.
- Inspection of tank coating application and curing by MarineLine professionals.
- Easy tank cleaning with less slops, and fast drying.
- Minor tank touch-up repairs done easily.
- ABS ISO 9001:2008 Certification.
- MarineLine® 784 is ABS Type Approved.

Operational Benefits

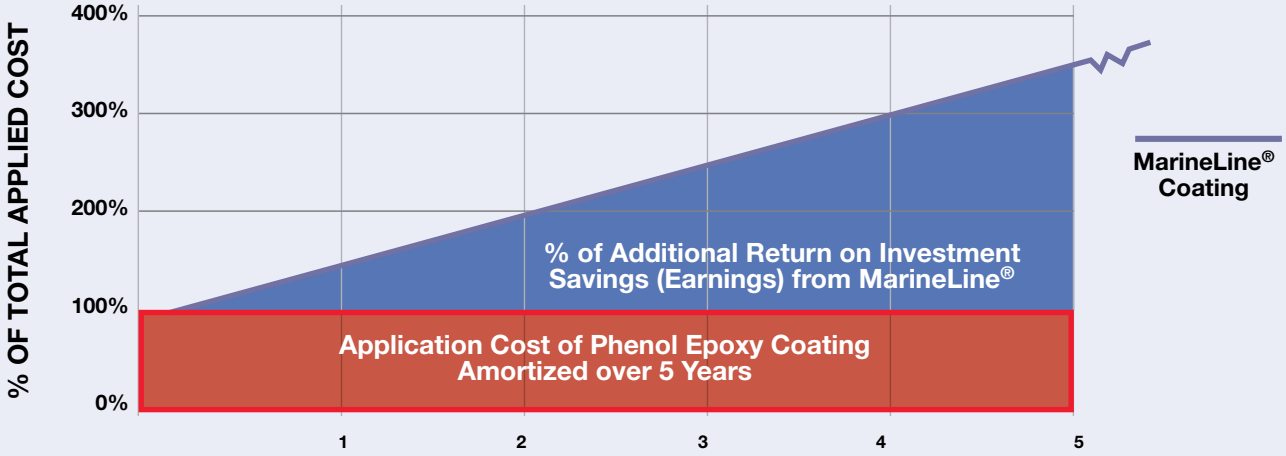
Greater Versatility in Switching Cargoes

Choose the right cargo tank coating — MarineLine® — to take advantage of the greatest sequencing possibilities and the opportunity to carry the most profitable cargoes.



* See Advanced Polymer Coatings MarineLine® Chemical Resistance Brochure.

CARGO TANK COATING
ADDITIONAL RETURN ON INVESTMENT (ROI) COMPARISON



This 5-year comparison of MarineLine® versus Phenol Epoxy coatings shows the tremendous difference in Additional Return On Investment. Chart calculations are based on data accumulated from a number of tanker shipowners.

25,000 DWT Tanker, Nine (9) voyages per year @ $20,000 USD per day

1) Three (3) less cleaning days per voyage than Phenol Epoxy (27 more sailing days)

2) 50% less cleaning chemicals used

3) 50% less slops

4) MarineLine® cargo tank coating is fully cured when leaving the shipyard, so additional income is earned as MarineLine® can immediately carry all cargoes on the MarineLine® resistance list.

A History of Performance

The MarineLine® cargo tank coating has been applied to more than 700 maritime chemical and product tankers, covering over 10 million square meters of surface.

- The majority of ships coated are over 8 years old with some over 15 years old.
- MarineLine® has been applied successfully in major shipyards around the world.
- These tankers have carried thousands of different chemicals, including Acids, Caustics, Solvents, Inorganic Chemicals, and Edible Oils, with some tankers changing their chemical cargoes up to 85 voyages a year.
- APC's MarineLine® coating withstands the stresses of twisting and bending in rough seas while resisting temperature extremes of the cold Baltic winters to the hot Middle East summers.

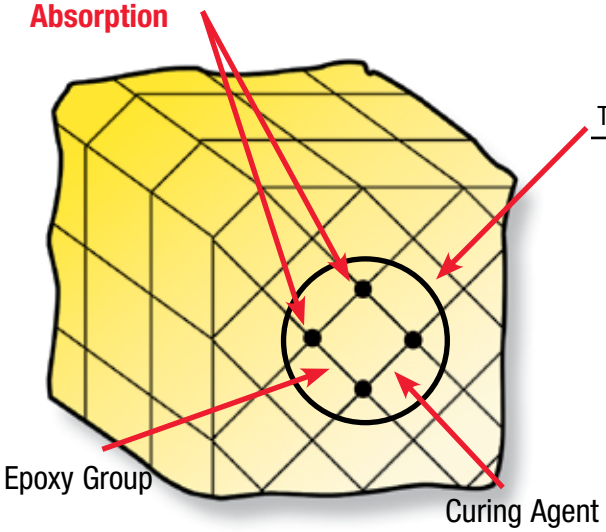
The MarineLine 784® Solution Utilizes Polymer Technology

MarineLine® 784 is formulated with a patented polymer, designed and engineered with high functional groups per molecule. When heat cured, MarineLine® 784 coating forms 3-dimensional, screen-like structures with up to 784 cross-links. This far surpasses Epoxies that only deliver 2 functional groups with only 4 cross-links.

This more densely cross-linked molecular structure delivers:

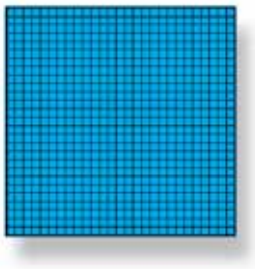
- Higher Chemical Resistance
- Higher Temperature Resistance
- Higher Reactivity at Lower Temperature
- Higher Resistance to Absorption
- Greater Toughness
- Faster Tank Cleaning

► The Greater the Distance Between the Cross-links, the Greater the Permeation Causing Chemical Attack and Absorption



The Following Diagrams Represent the Same Coating Cutaway (pictured left)

Epoxy
2 Functionality
Forms 4 Cross-links



MarineLine® 784
High Functionality
Forms up to 784 Cross-links,
the Highest Cross-link Density

Compare Corrosion Resistance and Product Purity

MarineLine® covers the widest range of chemicals carried by a marine cargo tank coating. See the full Chemical Resistance list at http://www.adv-polymer.com
Corrosion resistance data from published literature.

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

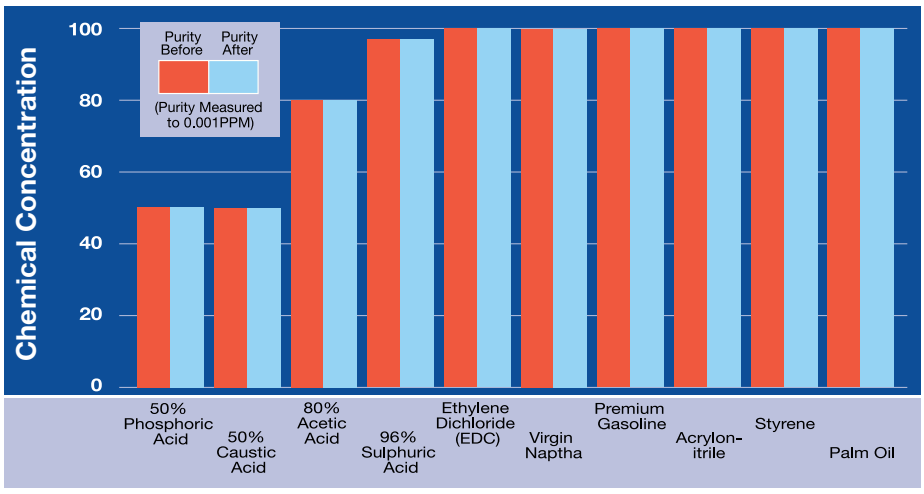
This is Only A Reference Guide. This is an abbreviated listing of MarineLine® capabilities. See the MarineLine® Chemical Resistance Guide for full capabilities. The end user is responsible for determining if MarineLine® is the appropriate coating for the specific application involved.

	MarineLine®	Phenolic Epoxy	Stainless Steel	Inorganic Zinc
Acetic Acid	A	N	A	N
Acrolein Acid	A	N	A	N
Acrylic Acid	A	N	A	N
Acrylonitrile, 35°C	A	N	A	A
Ammonium Persulfate	A	A	L	N
Azabenzene	A	N	A	N
Benzene	A	A	A	A
Benzene Carboxylic Acid	A	A	A	N
B-Methacrylic Acid	A	N	A	N
Bichromate of Soda	A	N	A	N
Bio Fuels	A	L	A	A
Butanoic Acid	A	N	A	N
Butyric Aldehyde	A	N	A	N
Calcium Hydroxide	A	A	A	N
Caustic Potash	A	N	A	N
Carbolic Acid	A	N	A	L
Coal Tar Oil	A	N	A	L
Colamine	A	N	A	—
Cresol	A	N	A	A
Detergents	A	A	A	N
Diethylamine	A	N	A	A
Diethyl Ether	A	N	A	A
Dimethylamide Acetate	A	N	A	N
Disulphuric Acid	A	N	A	N
Ethylene Dichloride (EDC)	A	L	N	N
EDTA	A	N	A	N
Ethanol	A	A	A	A

	MarineLine®	Phenolic Epoxy	Stainless Steel	Inorganic Zinc
Ethanolamine	A	N	A	N
Ethonic Acid Anhydride	A	N	A	N
Ethyl Acrylate	A	A	A	N
Fatty Acids	A	A	A	N
Formic Acid 10%	A	N	A	N
Glycerol	A	N	A	N
Heptanoic Acid	A	A	A	N
Hexahydroanaline	A	N	A	L
HMDA	A	N	A	L
Isobutanol	A	N	A	N
Isobutyric Acid	A	N	A	N
Isopropyl Amine	A	N	A	N
Juices, Fruit	A	A	A	N
Liquid Pitch Oil	A	N	A	L
Maleic Anhydride	A	N	A	N
MCA	A	N	A	N
Methacrylonitrile, 35°C	A	N	A	N
Methanol	A	N	A	A
MEK	A	L	A	A
Methylene Chloride	A	N	N	N
Mono Ethylene Glycol (MEG)	A	A	A	N
Nitrogen Fertilizers	A	A	A	N
Norval Amine	A	N	A	N
Octanoic Acid	A	A	A	N
Orthonitro Benzene	A	N	N	N
Palm Fatty Acid (PFAD)	A	A	A	N
Perchloroethylene	A	N	A	N

	MarineLine®	Phenolic Epoxy	Stainless Steel	Inorganic Zinc
Phenol	A	N	A	A
Phosphoric Acid	A	N	L	N
Phthalic Anhydride	A	N	A	N
Piperzine	A	N	A	A
Polyethylene Polyamines	A	N	A	N
Potassium Hydroxide	A	A	L	N
Potassium Permanganate	A	A	L	N
Propionic Acid	A	N	A	N
Pyridine	A	N	A	N
Sodium Carbonate	A	N	N	N
Sodium Hydroxide	A	A	L	N
Sodium Sulfide	A	A	N	N
Stearic Acid	A	A	A	N
Styrene Monomer	A	L	A	A
Spent Sulfuric Acid	A	N	A	N
Sulfur	A	N	A	N
Sulfuric Acid 1-70%	A	A	N	N
Sulfuric Acid 70-99%	A	N	L	N
Sulphurous Acid	A	N	A	N
Tall Oil	A	A	A	N
Tallow	A	A	A	N
Tar Acid	A	N	A	N
Toluene	A	N	A	A
Valeraldehyde	A	N	A	N
Vinegar	A	N	A	N
Vitriol Oil 65%	A	N	A	N
Xylenol	A	N	A	A

Over the past 10 years of voyages of MarineLine® coated vessels, the tanks have never had a contamination claim. As this chart illustrates, the cross-linked structure of MarineLine® coating does not absorb the cargo, thus ensuring product purity, from port to port. Visit www.adv-polymer.com to view testing that has been performed.



Coating Inspection & Heat Curing by APC

To ensure the performance of MarineLine®, it is imperative that APC provides inspection services throughout the entire application process. APC focuses on the importance of good surface preparation, correct application and proper heat cure, in a 6-Step approach. MarineLine® has set the benchmark regarding heat curing, and spark testing the entire tank surface.

Step 1 Pre-Blast

- Weld & Grind Inspection
- Staging • Dehumidification
- Ventilation • Rain Protection
- Surface Contamination Testing
- Surface Protection

Step 2 Blasting

- Surface Profile
- Surface Cleanliness
- Environmental Conditions
- Cleaning • Blasting
- Visual Blast Inspection
- Rejection of Blast Quality

Step 3 Spray Application

- Environmental Conditions
- Mixing Thinners
- Base Coat (shown here)
- Stripe Coat
- Top Coat

Step 4 Inspection

- Dry Film Thickness Test
- Spark Test

Step 5 Heat Cure

- Equipment
- Set-up
- Charting
- Curing

Step 6 Final Inspection

- Hardness Test
- Solvent Wipe Test
- Inspection Report Prepared

Insurance Warranty through Helvetia Insurance

helvetia

APC has joined forces with Helvetia Group, the Swiss-based insurer, to offer a specialized insurance program to warranty the application and performance of MarineLine® cargo tank coatings.

This insurance program covers shipowners and operators on the MarineLine® tank coating for a specified warranty period up to 5 years. With the Helvetia program, APC offers customers a true 'turn-key' solution for their cargo tank coating.

Operational Efficiencies of MarineLine®

Long Service Life Potential

Taking care of your MarineLine® cargo tank coating with proper cleaning and regular maintenance can provide years of profitable service. Well maintained MarineLine® tanks have been in service 10+ years, and are still performing well.

The following UNRETOUCHED photographs of tankers at various inspection intervals provide some insight into the performance of MarineLine®. For some tanks, minor coating repairs have been made using the MarineMend Repair system (see below).


3 Years


4 Years


5 Years


6 Years


11 Years

Easy Cleaning

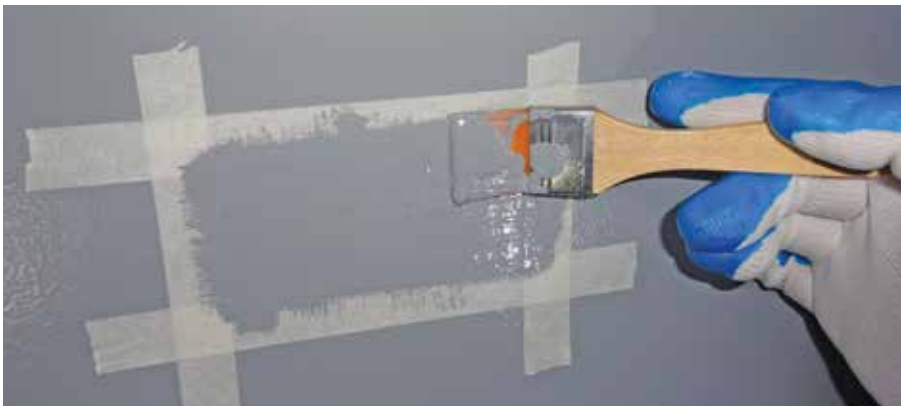
MarineLine® 784 has an ultra-smooth, glossy, low energy surface that reduces venting time, uses less cleaning chemicals and less fuel/energy for cleaning equipment, and leads to faster turnaround.

A wide range of approved cleaning detergents and chemicals can be used to clean and prepare the coating for next cargoes allowing the shipowner/operator to maintain the coating with minimal effort.

A number of shipowners have provided examples of their MarineLine® cleaning practices which APC readily shares with others upon request. A properly cleaned and maintained MarineLine® cargo tank coating should provide excellent service for many years.

Simple Coating Repair for Small Areas

The MarineMend Repair System Kit is designed for minor repairs of MarineLine® coated cargo tanks. The repair procedure can be used when the coating has minor mechanical damage.



(Top) MarineMend coating repair in progress. (Below) Finished repair.

Call on APC

For all your MarineLine® needs contact APC. We can assist in all aspects including coating application and heat curing, to after-sales service including coating inspections and coating maintenance.

We want to stay in contact with shipyards, shipowners and vessel operators to ensure many years of profitable tanker service and to keep your MarineLine® cargo tank coating in peak operating efficiency.

ADVANCED POLYMER COATINGS

www.adv-polymer.com

Advanced Polymer Coatings

Avon, Ohio 44011 U.S.A.

+1 440-937-6218 Phone

+1 440-937-5046 Fax

800-334-7193 Toll-Free in USA & Canada

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