# MarineLINE®784

***The industry leading cargo tank coating for chemical and product tankers.***

ADVANCED POLYMER COATINGS

*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.*

## Key Coatings Benefits

- 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
- 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
- Support offices in Korea, China, Turkey, Singapore, UK, Japan, and the USA
- ABS ISO 9001:2008 Certification
- MarineLine® 784 is ABS Type Approved

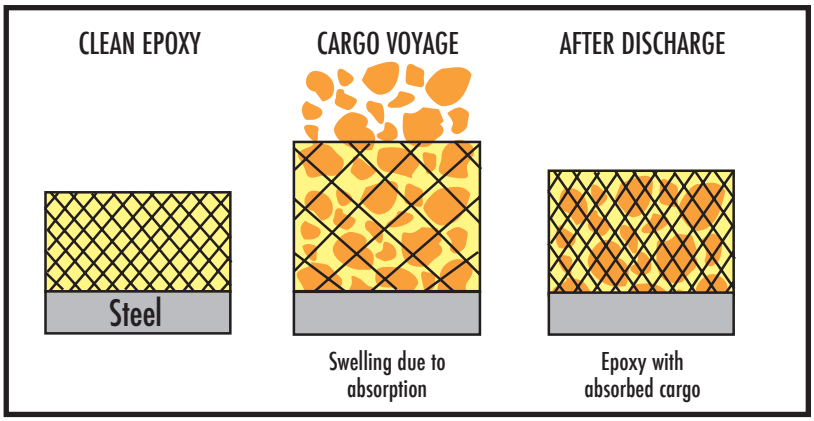
# Why MarineLine® 784 is a Better Coating

## Potential Problems with Conventional Coatings

As shown here, both phenolic epoxy and zinc silicate coatings have problems with various cargoes, leading to potential cargo contamination issues, and corrosion.

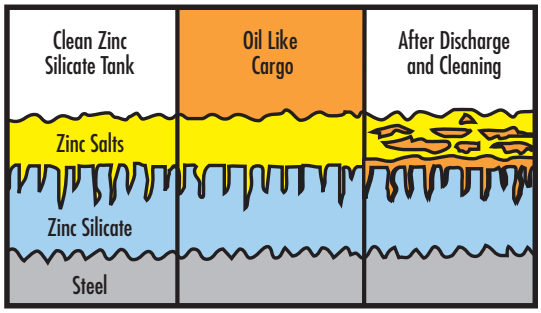
### ▸ Limitations of Phenolic Epoxy Coatings

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




### ▸ Limitations of Zinc Silicate Coatings

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



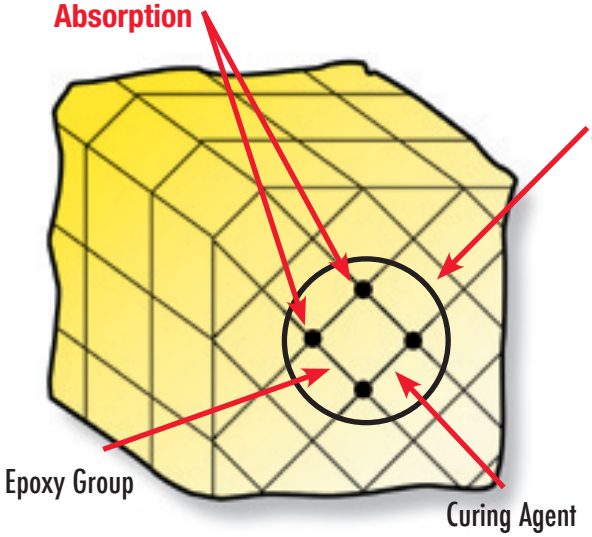

## The MarineLine 784® Solution Utilizes Polymer Technology

MarineLine® 784 is formulated with a polymer designed and engineered with 28 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 Phenolic Epoxies that only deliver 2 functional groups with only 4 cross-links.

This more densely cross-linked molecular structure delivers:

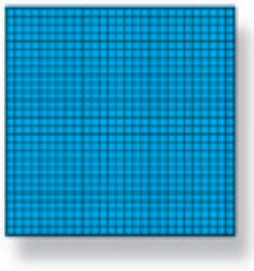
- Higher Chemical Resistance
- Higher Temperature Resistance
- Higher Reactivity at Lower Temperature
- Higher Resistance to Absorption
- Greater Toughness
- Faster Tank Cleaning

### ▸ 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**
28 Functionality
Forms up to 784 Cross-links, the Highest Cross-link Density

# Compare Corrosion Resistance and Product Purity

MarineLine® 784 covers the widest range of chemicals carried by a marine cargo tank coating. This abbreviated list shows some of the corrosion resistance performance offered. Visit www.adv-polymer for the full Chemical Resistance list.

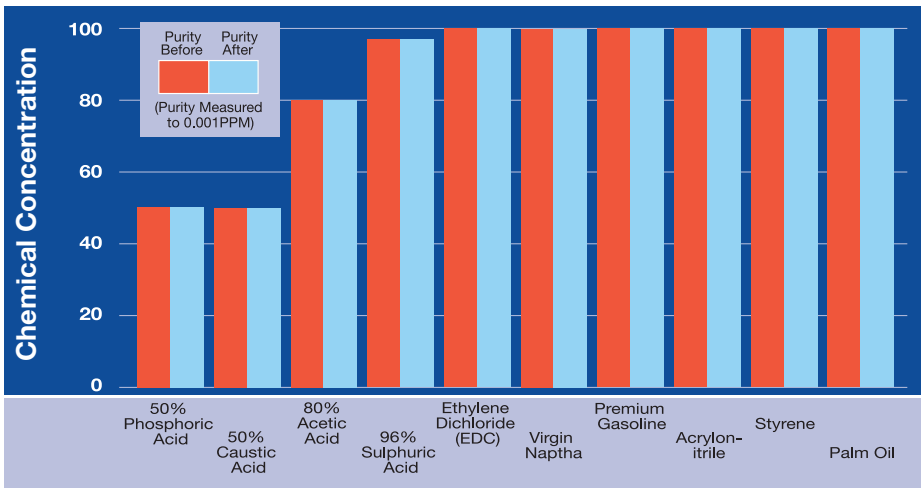
A = Good at ambient temperatures
L = Limited Service
N = Not recommended

| | MarineLine® 784 | 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 | 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 |
| Ethenal | A | A | A | A |

| | MarineLine® 784 | 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 | 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® 784 | 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.



# Careful Coating Inspection & Monitoring by APC

To ensure the performance of MarineLine® 784, 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® 784 has set the benchmark regarding heat curing, and spark testing the entire tank surface.

## Step 1 Pre-Blast

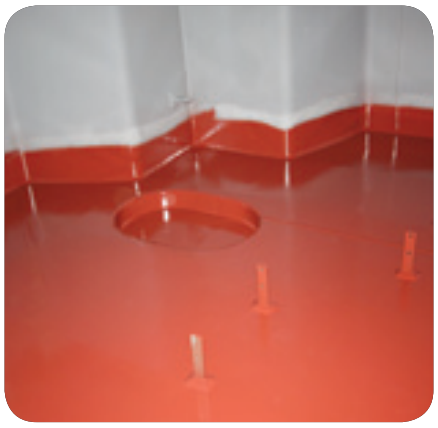
- Weld & Grind Inspection
- Staging
- Dehumidification
- Ventilation
- Rain Protection
- Surface Contamination Testing
- Surface Protection


## 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 below)
- 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

## A History of Performance

**MarineLine® coatings and linings have been proven worldwide under the most arduous operating conditions. From resisting the most aggressive cargoes to handling hot cargoes in the sub-freezing arctic. MarineLine®-coated ships have withstood the tremendous stresses and extremes of changing cargoes almost on a weekly basis. Based on this experience, the development of MarineLine® represents a quantum leap in tank lining technology.**

## Add to Your Profits — Specify MarineLine®

**For the full story on MarineLine®, contact APC or visit our website at www.adv-polymer.com for the most versatile, technologically advanced and cost effective protection available.**

ADVANCED POLYMER COATINGS

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