



Methanol Transport via the High Seas Safeguarded by MarineLine® Coating

The MarineLine® cargo tank coating system is well known in the chemical and product tanker market for its versatility and ability to carry a very wide range of chemicals. This technical report focuses on Methanol.

Because of the great geographical distances between major Methanol manufacturing centers and key users, up to 80% of Methanol is transported between continents via the oceans.

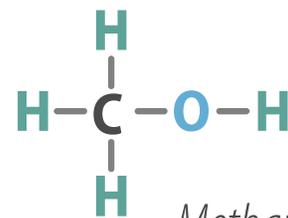
After transport by chemical tanker, Methanol is off-loaded to marine terminals and then shipped via truck, rail, and barge to chemical production facilities, bulk distributors and eventually to end users.

Methanol has many uses as a fuel or fuel additive, chemical feed stock, solvent, refrigerant, or as a component or intermediate in many consumer goods.

Methanol is considered a hazardous chemical that needs to be properly handled and stored, especially during transport.



This cargo tank from a chemical tanker, coated with MarineLine®, has successfully carried many loads of Methanol during its 5 years of service. This photo was taken during a recent on-board inspection of the coating. Only minor touch-up tank coating repairs were needed and the ship was quickly put back in service. The ship owner was very pleased with the ongoing performance of MarineLine®.



Methanol

TECHNICAL REPORT



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WHY MARINELINE® WORKS FOR METHANOL CARRIAGE

The MarineLine® cargo tank coating system has carried Methanol on thousands of voyages for a number of different shipping companies. MarineLine® is selected for a number of reasons:

- 1 Virtually Impermeable Coating** - Air-absorbed moisture in the presence of inorganic salts causes Methanol to be very corrosive to carbon steel cargo tanks, which is why tanks need to be properly protected. Yet, the very small molecule size of Methanol can still permeate traditional phenolic epoxy coatings. MarineLine® however is formulated with a unique, patented polymer technology that creates a virtually impermeable, cross-linked and tightly knit structure to resist this type of attack.
- 2 Ease of Cleaning** - After carrying Methanol in a MarineLine® tank, a forced air dry for 24 hours is usually all that is needed for the cargo tank cleaning, so it can then be loaded with many other types of chemical and veg oil cargoes for its next voyages. APC provides these recommendations during MarineLine® cleaning procedures for Methanol:
 - After carrying Methanol in MarineLine® cargo tanks, DO NOT STEAM. Force air dry for 24 hours.
 - Before carrying Methanol in MarineLine® cargo tanks, if tanks have been steamed, tanks must be allowed to cool to 30-40°C before loading.
- 3 Versatility** - Typically, other types of standard cargo tank coatings have many restrictions either before loading Methanol or after un-loading. Not adhering to these restrictions can cause tank coating failures. In fact, most epoxy-coated tanks are not even recommended to carry Methanol. And in the case of zinc coated cargo tanks, these are typically used only as dedicated Methanol carriage, thus returning empty to the home port after delivery. MarineLine® however, can handle a wide range of chemicals for return voyages, thus greatly enhancing ROI and profitability of the ship's operation.
- 4 Heat Curing Experts** - APC has determined poor or incomplete heat curing of a cargo tank coating after application can lead to coating problems. That is a key reason why APC employs its own heat curing experts, who use specialized equipment to ensure that heat curing is completed to demanding specifications, in order to obtain high crosslinking of the MarineLine® coating.
- 5 Purity** - From port to port, customers demand consistent, high purity Methanol. Carriage in MarineLine® coated tanks meets this specification, time after time.