NEWS ALERT

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Cortec® Releases White Paper on NASA Seawater Rinsedown Testing of EcoShield® 386!

Cortec® has released a white paper explaining the advantages of Nano VpCI® coatings and describing the seawater rinsedown testing of EcoShield® 386 at the NASA Corrosion Technology Laboratory.

The white paper describes how formulating Nano VpCI® into coatings provides more complete coverage and protection of metal substrates, offering safety and environmental advantages over traditional inhibitors.

In order to investigate the effectiveness of Nano VpCIs added to waterborne acrylic coatings, two types of extreme testing were performed at the NASA Corrosion Technology Laboratory Beachside Corrosion Test Site.

Several metal panels were coated with less than 2.0 mils DFT of either Cortec® EcoShield® 386 or VpCI®-386 Acrylic Primer/Topcoat. These panels were subjected to 1,000 hours of intense testing--either in a salt spray chamber (per ASTM B117) or in a seawater rinsedown system where seawater pumped from the Atlantic Ocean was sprayed on the panels 10 minutes each hour. The tests continued for 41.6 days.

The NASA testing confirmed Cortec's own test conclusions that there is an improvement in salt fog performance through the use of nano-sized inhibitor particles in the coatings.

The paper concludes by saying that Nano VpCIs and non-toxic metal complex inhibitors form a synergistic effect that allows water based acrylics to reach new levels of performance at low DFT. The economic cost of corrosion is high, but through the development of a unique micronizing process, Cortec® Corporation has been able to create high-performance water based VpCIs.

Please continue to read the full white paper!

Seawater Rinsedown Testing of EcoShield® 386

Background

The performance of a coating, under corrosive conditions, requires that the coating provide reliable and sustainable protection of the substrate during the lifetime of the coating. In today's markets the industry is challenged to be more cognizant of the impact corrosion inhibitors and coating types have on human health and on the ecosystem.

The use of single-component water based coatings for protection of metal substrates continues to grow due to their low odor, health and safety advantages, easy cleanup, and environmental friendliness. Nevertheless, the challenge of finding alternatives to the traditional chromate, zinc, or similar heavy metal type corrosion inhibitors (which tend to rely on passivation or sacrificial cathodic protection) continues. Additionally, ongoing regulatory developments, which require lower VOCs and elimination of carcinogenic materials, continue to tighten the usage of products containing these heavy metals, thus forcing the need for alternative technologies. The use of Nano Vapor phase Corrosion Inhibitors (VpCIs) provide an attractive alternative by adsorbing onto the metal substrate and filling the voids or micro-crevices of the substrate, preventing corrosion from starting or growing once the surface of the coating has been damaged. This technology has been proven effective in single component water based coatings at dry film thicknesses (DFTs) of 1 mil (25 microns).

Introduction to VpCI® Coatings

VpCIs are formulated into a coating thru a complex development process which involves determining chemical compatibility of the VpCIs with the other components of the coating such as the resin, solvents, pigments and other additives used for a variety of reasons. VpCIs work by adsorbing onto the metal surface in a non-reactive attractive capacity. In other words, they are attracted to the metal thru the particle charge.

VpCIs compare with traditional inhibitor systems by using smaller particles as well as relying not only on contact inhibition but also vapor phase inhibition, providing more complete coverage and protection of the surface.

VpCIs can be used with most coating systems. There are many variations of VpCIs and the key is to choose the correct VpCI® for the corresponding coating system by checking compatibility, effectiveness, and processability.

Traditional inhibitors containing heavy metals are becoming increasingly more regulated and often are no longer allowed to be used due to the negative impact they have on the environment and (as carcinogens) on workers exposed to them. The environmental advantages

of using VpCIs are that they are non-toxic, do not contain heavy metals, and have no adverse effect due to their low usage concentrations. VpCIs have long been used in other products such as PE films, foams, powders, and liquids to provide a vapor phase of corrosion protection without impacting the environment.

Testing / Experiment

The purpose of testing[1] at the NASA Corrosion Technology Laboratory Beachside Corrosion Test Site (BCTS) was to investigate the effectiveness of Nano VpCIs when added to waterborne acrylic coatings. The ultimate goal was to achieve 1,000 hours in a salt fog chamber (ASTM B117) on Cold Rolled Steel (CRS), with a high gloss clearcoat of less than 2.0 mils DFT to corroborate test results of Cortec® Laboratories. Normally this kind of performance can only be achieved with highly pigmented coatings using corrosion inhibitors that are toxic, or at the very least not environmentally friendly.

During the NASA test, a total of six 4 inch x 6 inch (10.16 cm x 15.24 cm) 1010 coated steel panels were set up in the BCTS seawater rinsedown system. Ten minutes out of every hour, they were exposed to spray from natural seawater pumped from the Atlantic Ocean. This was followed by 50 minutes of drying per cycle. The one-hour cycle was continued 24 hours per day for 1,000 hours, or 41.6 days. All panels were mounted at a 30° angle facing south for maximum solar load.

Six 4 inch x 6 inch (10.16 cm x 15.24 cm) 1010 coated steel panels were also placed in a salt spray chamber run according to ASTM B117 specifications. The ASTM B117 test utilized a continuous salt fog 24 hours per day for 1,000 hours using a 5% NaCl solution.

Three panels of each six panel set were coated with approximately 1 mil DFT of either Cortec's VpCI® - 386 Acrylic Primer/Topcoat or Cortec's EcoShield® 386 Water Based Coating Powered by Nano VpCI®. Each panel was scribed horizontally. Periodic evaluations were conducted to check for blisters, creep from scribe, and degree of rusting to ascertain differences in corrosion performance.

The NASA testing confirmed Cortec's own test conclusions that there is an improvement in salt fog performance through the use of nano-sized inhibitor particles in the coatings.

Summary

The combination of Nano VpCIs and non-toxic metal complex inhibitors forms a synergistic effect that now allows for water based acrylics to reach 1,000 hours of salt fog testing at less than 1.5 mils per ASTM B117.

The DTM (direct to metal) aspects of these coatings results in direct cost savings by reducing the amount of material needed, reducing the application time and labor due to fewer coats,

and finally reducing the time and expense of equipment cleanup due to the environmentally friendly nature of the waterborne systems. Applications range widely from equipment to vehicles to infrastructure.

The economic cost of corrosion throughout the world is estimated to be well over two hundred billion dollars. This cost of corrosion comes in the form of product failure and replacement, or repair of damaged equipment.

Founded in 1977, by Boris Miksic, Cortec® has been a global leader in Vapor phase Corrosion Inhibitors (VpCIs). As a global leader in mitigating corrosion, Cortec® has developed a manufacturing process to micronize the VpCI® pigments, giving them unique properties that create high-performance water based VpCIs.

References:

1. Kolady, Mark and Jerry Curran. *Cortec – ASTM B117 Salt Spray and Seawater Rinsedown Testing of Coated Panels*. Kennedy Space Center, FL: Corrosion Technology Laboratory, November 9, 2016.