

The

LEADING



An Internal Newsletter

Edge

Environmentally Safe VpCI®/MCI® Technology

May 2003

It's that time again!

Welcome to Cortec's 18th Annual
World Sales Meeting!

Please join us for celebration of our mutual successes, sharing of information and education of the best corrosion protection solutions.

CORTEC'S 2003 TEAM "FIGHTING CHEMISTS"



Laboratory Developments

by Art Ahlbrecht, VP of R&D

Adhesive Technology

New products combining the film technology of Cortec Advanced Films Division, the adhesive coating technology of Cortec Coated Products Division and new biodegradable films are in various stages of development. Mark Hull, an experienced adhesive coatings chemist has this assignment and has developed the new products described in this issue of the Leading Edge.

Bio-Products

Bob Boyle and Bob Berg have an exciting development underway. They have established a cooperative program with

Cargill-Dow. Cargill-Dow is a joint company formed by the two companies to produce, develop and market poly-lactic acid (PLA), - a new resin produced from corn products. We have been able to utilize this resin (PLA) to develop new types of biodegradable films. These new films have properties that will enable the development of stronger Eco and Eco-Corr® products.

Galvanic Coatings

Cortec is a licensee of a concrete coating system developed and tested by NASA. The system utilizes metal powders in a coating, which produces a galvanic effect, when connected to the underlying rebar. Cortec hired a coatings chemist who has been refining the system and we expect to reach the initial field test stage in May. Marlin Hanson, our chemist on this project, has successfully sprayed the coating mixture, which can also be roll coated or brush on as well. This new coating offers an easy to apply alternative to sprayed on zinc metal and 3M's zinc hydro-gel product.

New Products

by Margarita Kharshan, Lab. Director

This year started with some very exciting news: the majority of our products, developed and introduced during last year found customers. Some of the products already moved to the field, some are under long-term evaluation. The feedback we are getting about these products is very encouraging as customers like our products for the combination of their excellent anticorrosion performance and environmentally sound properties! We are happy to see that our research and development and our technical support to our customers is paying off! We are expanding into new markets with existing and new products and creating new applications of Cortec's innovative corrosion protection products every day.

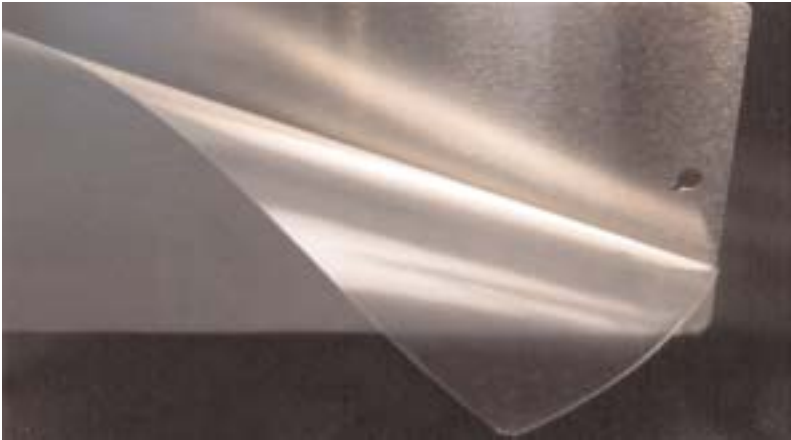
As always, the bottom line for our work on development of new technologies and applications is "What can we do for our customers?"

We are introducing 9 new products in this newsletter, that cover a wide range of applications and means of delivery.

Cor-Pak® VpCI® Masking Film

More and more manufactured items are shipped with removable adhesive masking film lending more protection to finished surfaces.

Examples of masking film are seen everywhere these days. Automobile manufacturers use a white opaque film to protect the paint on cars in transit. The film is removed by the dealer prior to display on the lot. Consumer electronics are sold with masking film in place over both plastic and metal surfaces to prevent scratching during shipping. This film is most often removed by the consumer.



Cor-Pak® VpCI® Masking Film provides surface protection and corrosion inhibition in a removable adhesive film.

Cor-Pak® VpCI® Masking Film, in addition to the protection against marring, contains VpCIs, which will prevent corrosion on the protected surfaces as well.

This first product in what we expect to be a line of masking films is produced with an LLDPE film with excellent clarity and mask protection. The removable pressure sensitive adhesive is formulated with VpCI's to give long-lasting protection against corrosion. Cor-Pak® VpCI® Masking Film sticks firmly to smooth surfaces, yet leaves no adhesive residue upon removal. The film is supplied as a self-wound tape for ease of application. As is expected in this type of masking product, the film is nearly invisible when in place and providing protection.

Whether protecting kickplates for commercial door installations, or the edges of metal treated glass laminations Cor-Pak® VpCI® Masking Film will provide an added measure of protection over other available products.

Future additions to this line of masking films will likely include the use of high-density films for increased physical protection, VpCI® containing films that protect more than just the smooth surface, and biodegradable film for ease of disposal.

Cor-Pak® VpCI® Cold Seal Film

“Cold Seal” is a packaging industry term used to describe a film or paper coated with a cohesive adhesive. This adhesive does not stick to anything except another surface coated with the same adhesive. The term “Cold Seal” comes from the action of forming a bond simply by pressing the two surfaces together without the aid of added heat. This type of packaging is perhaps most commonly seen in candy bar wrappers and medical packaging. The industrial use of Cold Seal, while not as visible, is a very high volume business. Replacement parts of all types are packaged with such films and papers. Cold Seal has the advantage of ease of use, good barrier protection of parts, and the ability to label parts on the packaging materials.



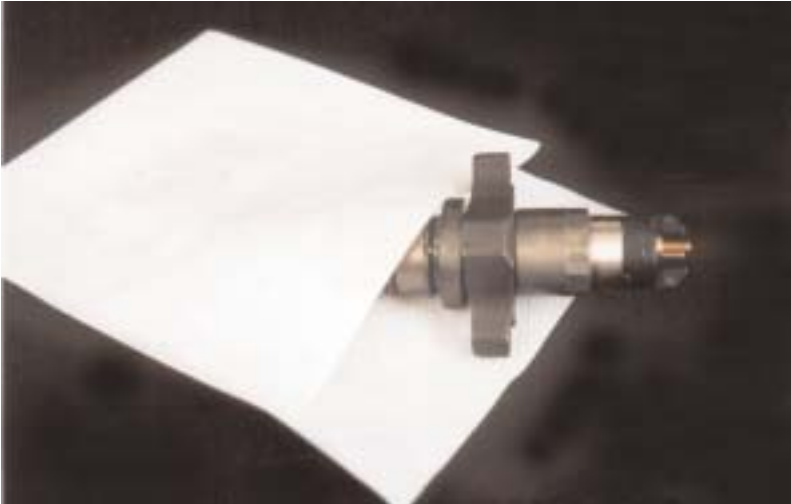
The fit for Cortec in this industry is our ability to upgrade the protective performance of the packaging by adding corrosion inhibitors.

Many of the competitive cohesive materials are aggressive to the metal surface. Introduction of Cortec's VpCI® additive to cohesive latex allows the film to provide a very good corrosion protection to the packaged parts, even in a very humid atmosphere.

Our new construction Cor-Pak® VpCI® Cold Seal film sticks firmly and only to itself, leaving no residue on the packaged items. The film creates a positive pressure seal without heat. Cor-Pak® VpCI® Cold Seal film is produced from the highest quality LLDPE, is translucent and puncture resistant, and is flexible for easy wrapping. Cor-Pak® VpCI® Cold Seal film is available now in different thicknesses.

VpCI® Fabric

VpCI® Fabric is a new, multi-layered fabric for use as protective packaging. This product is an excellent addition to Cortec's existing EcoShield® Fabric and CorShield® Fabric. VpCI® Fabric comprised of a low-density polyethylene film laminated to a soft, polypropylene nonwoven material, treated with VpCI®. While the construction of VpCI® Fabric is somewhat similar to EcoShield® Fabric and CorShield® Fabric, it is very light, much more flexible and conformable, due to VpCI® Fabric's use of 1-mil (25 micron) extruded polyethylene film in place of a woven polyethylene. In the same time, CorShield® Fabric and EcoShield® Fabric are extremely strong materials and could be used in applications when high characteristics of tensile and tear strengths are required.



VpCI® Fabric is a light, flexible multi-layered protective fabric.

Similar to EcoShield® Fabric and CorShield® Fabric, VpCI® Fabric is intended for close contact and surface protection of delicate and expensive equipment and parts. VpCI® Fabric can be wrapped around eccentrically shaped items and held in place with common packing tape. It can easily be formed into an envelope to give superior protection to circuit boards and other electronic parts. Also, VpCI® Fabric can be used as a pallet shroud or a crate liner.

In every use, VpCI® Fabric provides excellent anticorrosion protection while protecting parts from friction and marking.

Eco Wrap™ Biodegradable and Compostable Tensioning Film

Eco Wrap™ is a unique combination of a certified compostable polyester film and biodegradable cling coating. This biodegrad-



Eco Wrap™ stretch film provides superior strength and performance. This film will biodegrade completely in a couple of months without leaving any harmful residue.

able stretch film has physical properties equal to or exceeding those of currently available stretch films.

Standard stretch film is often sold as a commodity product. One supplier is essentially similar to the others. Cortec has worked in the stretch films area to supply products that give additional advantages. First came Cor-Pak® VpCI® Stretch Film, which provides excellent VpCI® protection. Now, Cortec introduces Biodegradable Stretch Film. As a stretch film, Eco Wrap™ provides superior strength and performance. Stretch applications using 1.6-mil (40 micron) standard stretch film can be performed with 1.0-mil (25 micron) Biodegradable Stretch Film. In fact, this film is strong enough that most applications requiring three wraps of standard film can use two wraps of Eco Wrap™ without sacrificing strength or protection.

Even with superior strength properties, the characteristic that makes Eco Wrap™ special is its biodegradability. Once Biodegradable Stretch Film is discarded (ideally, sent to a compost processor), it biodegrades entirely with no harmful residual. Under standard compost conditions, the film will show a visual change in one to two weeks and will completely biodegrade within a couple of months. The same microorganisms that breakdown yard waste, food and other organisms, ingest Eco Wrap™ and release carbon dioxide and water.

Why is biodegradability important for stretch film? In some parts of the world, polyethylene use is restricted and subject to fines and tariffs. Eco Wrap™ avoids this expense. This makes our film ideally suited for agricultural export shipments. In addition, some companies have adopted programs to increase their use of environmentally friendly products. Replacing non biodegradable plastic materials with a biodegradable product fits this philosophy.

But Eco Wrap™ is more than a stretch film alternative, it can also be used for masking applications and mechanical protection. Eco Wrap™ uses controlled adhesion to stick firmly to smooth surfaces and leaves no residue upon removal.

Announcement

First Comprehensive Testing of Biodegradable Films in US Begins in June!

Cortec has partnered with the City of Hutchinson and CreeksSide Soil to conduct the first customer-designed comprehensive study on biodegradable films in the United States. This study will pick up where certification and laboratory testing leaves off by focusing on the entire life cycle of Eco Film™ compostable bags.

The study involves three key components-biodegradability, toxicity and usability. During the last week of May, Eco Film™ bags will be delivered to households with a survey, instructions and a month's supply of bags. The survey is designed to gain feedback from end-users on the strength, appearance and usability of the bags. Secondly, the instructions state that only Eco Film™ bags should be used, to avoid starch bio-based bags from contaminating the test.

These bags will be collected weekly by Waste Management Inc and delivered to CreekSide where they will be processed right along with the yard and food waste. CreekSide will then chemically and visually monitor the degradation of the Eco Film™ bags.

Eco Film™ is already in compliance with international and domestic certifications and standards. However, these tests do not include the performance and usability of the bags. Many certified bags do not perform their intended function. This test will prove that Eco Film™ is the only biodegradable bag on the market that combines performance with biodegradability. The results will be published by the customer and should be available as early as November 2003.



CorrLam™ VpCI Barrier Laminate

We are excited to unveil the latest advancement in barrier and vacuum packaging technologies - CorrLam™ VpCI® Barrier Laminate! This latest innovation will change the way high value products are protected against the devastating effects of corrosion and environmental degradation.

CorrLam™ VpCI® Barrier Laminate has the following advantages and benefits:

- Combines proven Vapor phase Corrosion Inhibitor technology with the most advanced barrier protection technologies available
- By laminating VpCI®-impregnated film to the metallic barrier layer, VpCI® molecules are trapped inside the package providing corrosion protection unparalleled by any other packaging method
- CorrLam™ is heatsealable and is effective for vacuum-sealed and non-sealed applications
- Excellent mechanical properties: puncture and tear resistance - virtually indestructible!
- Exceptionally low moisture and oxygen transmission rates
- Conforms to MIL PRF 131J
- Ideal replacement for traditional military packs that use desiccants, barrier film and corrosion inhibiting papers
- Applications range from packaging of large industrial equipment to tiny electronic components
- CorrLam™ is available as roll stock, fitted covers, blanked wraps, pouches and other custom forms



VpCI®-145 Static Dissipative Paper protects against static electricity damage and corrosion using a coating derived from soybean oil.

VpCI®-145 Static Dissipative Paper

Static electricity damage to sensitive electronic components during handling is a problem that can be eliminated through the use of Cortec VpCI®-145. This new product from Cortec Corporation eliminates static electricity buildup through the use of a coating made from soybean oil that is coated onto the surface of the paper. This environmentally friendly coating on the surface of the paper will adhere to the strict anti-stat requirements of Performance Specification MIL-PRF-81705D for static decay rate and surface resistivity. In addition, Cortec VpCI®-145 performs better on the static half-life test (a test with an environment consisting of little or no humidity) than papers with anti-stat coatings consisting of Alkyl Ammonium Chlorides, typical ethoxyylated amines, typical imidazolines, phosphated esters and nonionic-based antistat coatings.

The antistat protection from Cortec VpCI®-145 is thermally stable in excess of 392°F (200°C), pH stable between 2 and 11 at temperatures in excess of 100°F (38°C), for several days. In addition to adhering to the anti-stat requirements of Performance Specification MIL-PRF-81705D, Cortec VpCI®-145 will provide very dependable contact, vapor and barrier phase corrosion inhibition for ferrous and nonferrous metals. VpCI®-145 also conforms to the performance requirements of specification MIL-PRF-3420G. Simply wrap your sensitive electronic metal items in Cortec VpCI®-145, and rest assured, knowing that your valuable items will be protected from static electricity buildup and corrosion.

Cortec VpCI®-145 paper is fully recyclable / repulpable, biodegradable, non-toxic and does not contain any nitrites, phosphates, silicates or other hazardous compounds. This paper is made from the highest quality neutral natural kraft paper, without the use of chlorine or other bleaching. Cortec VpCI®-145 applications include wrapping single items, interleaving parts, end closures for shipping tubes, insert strips for recessed areas in large packages, and as sheet liners or separators between products.

MCI® Products in the News

MCI® on the Pentagon!!!

We are proud to announce that Cortec's MCI®-2020 V/O has been specified as part of the rehabilitation project going on at the Pentagon. This project started in April 2003 with initial order of 360 gallons (1350 Liters) of the product and will be ongoing for the next 8-10 years, covering over a million square feet of surface area. After proper surface cleaning and preparation, MCI®-2020 V/O will be applied to all exterior walls, followed with Keim's silicate based coating. Watch for future updates on this prestigious project!

MCI®-2026 Flooring System

MCI®-2026 HPCS - High Performance Coating System for concrete is the newest addition to Cortec's MCI® product line. This system is designed for environments that require a high degree of mechanical, chemical, and temperature resistance and is especially useful for concrete floors.

MCI®-2026 is a combination of the very effective migrating corrosion inhibitor MCI®-2020 and two high quality epoxies: MCI®-2026 Concrete Primer and MCI®-2026 Floor Coating. These products can be used separately but they are most effective when used in combination.

The first product MCI®-2020, will migrate through the concrete, attach itself to the surface of reinforcing steel, and significantly prolong the time before steel rebars would corrode and cause cracks in the concrete. The second product - MCI®-2026 Concrete Primer, is a two component water-based epoxy primer. It retains excellent adhesion even to damp concrete, good abra-



MCI®-2026 Flooring System combines the strength of our concrete primer and floor coating.

sion and chemical resistance. MCI®-2026 Floor Coating prevents the penetration of the organic and inorganic acids and salts, oils, solvents and other destructive chemicals. Additionally MCI®-2026 HPCS possesses remarkably high level of mechanical properties, resistant to UV light and heat. It is available either as clear or in extensive range of colors, and has a glossy finish.

The components of MCI®-2026 HPCS meet all USDA guidelines for use in federally inspected poultry and meat plants. In short, MCI®-2026 HPCS is cost effective, extends the lifetime of concrete, has an excellent appearance, is environmentally safe and easy to apply.

The first successful application was already carried out at Ridgeview Hospital in Waconia, Minnesota, where the maintenance room floor was primed and coated.

GpC-777

Galvanic Coating for Concrete

This product is introduced as an addition to Cortec's MCI® line of anticorrosion products for existing concrete (to prevent or slow down the corrosion on the rebars). GpC-777 is a galvanic coating for concrete that uses metallic zinc to provide cathodic protection to the steel rebar. Being electrically connected to the rebar, GpC-777 stops the corrosion.

Slightly modified, this coating utilizes the technology developed at the NASA Kennedy Space Center, and all laboratory test results have shown excellent cathodic protection, better than the identical conventional system used in industry.

The GpC-777 system uses aluminum screensand wires to connect directly to the rebar. Junction boxes can be installed, but



GpC-777 is based on the technology developed at the NASA Kennedy Space Center.

are not required. GpC-777 coating is easy to apply and it is less expensive than conventional systems. How does this coating fit Cortec's MCI® line?

Cortec's MCI®-2020 could be applied on the concrete surface as a primer for GpC-777 coatings. These two products will work complementary for each other: galvanic protection will start right away but will serve only for a few years; Migrating Corrosion Inhibitors (MCI®) will migrate through the concrete slowly but surely, providing long-term of protection to rebars. In addition, these two approaches will not effect each other.

A field trial for GpC-777 is scheduled in Florida for the week of May 16, 2003.

High Temperature Coating is Developed

Recently, customers from several industries have requested that Cortec supply a high-temperature coating. The demand for this product was so high that after several months of work, VpCI®-397 was developed. Since Cortec is always concerned about the environment, this coating is water-based, and is very unique in this area.

VpCI®-397 is one-part high temperature aluminum waterborne silicone coating, that provides excellent corrosion resistance on metal substrates. VpCI®-397 will dry tack free at room temperature to form a soft non-tacky brilliant aluminum finish. This coating is cured at 482°F (250°C) for 30 minutes to 2 hours.

The film hardness goes from <6B (very soft) to 9H + (extremely hard). Solvent resistance is also exceptional.

Methyl Ethyl Ketone (MEK) does not affect the surface after 200 double rubs. The maximum temperature that we have reached is 1100°F

(593°C), and a temperature of 1200°F (649°C)



Several industries have been eagerly awaiting the release of Cortec's VpCI-397 High Temperature Coating.

should be possible. In most cases, the metal itself starts failing before VpCI®-397 fails at these high temperatures!

High temperature aluminum waterborne coatings do require a certain amount of special handling:

- A gradual bake is needed so that all of the solvent and organic materials do not evaporate at once. Blistering results if this procedure is not done.
- It is necessary to make certain that all substrates can tolerate the high temperatures. Metal warping, blistering, and flaking can occur.
- Waterborne coatings, that contain aluminum should be used in 4-6 months if possible, because of limited stability. All coating containers need to be vented for potential gassing.

Common Questions and Answers for Water Treatment and Powders

by Greg Hocking, Technical Service Engineer



Hello, the following are a few of the most commonly asked questions pertaining to the water treatment, powders, and process additives product lines here at Cortec.

Q. How do I determine the concentration of S-69 P & L (powder and liquid) and VpCI®-649 P&L (powder and liquid) in a water treatment solution (closed loop system)?

A. Theoretically, closed loop systems should only need the initial batch treatment to establish the proper concentration of corrosion inhibitor. However, anyone who works with cooling towers, chilled-water loops, etc, knows that this is not always the case. For whatever reasons many situations develop which require a readjustment of the product concentration. To do this it is typically necessary to first determine the existing concentration of product currently in the solution. It can be difficult to establish ways in which to do this. Here at Cortec, we have incorporated ways to try to facilitate this into our water treatment products.

Our S-69 P&L "building block" inhibitor and VpCI®-649 P&L "total package" inhibitor are very widely accepted industrial solutions to closed loop system corrosion. The powder forms of these products are manufactured with a minute, traceable amount of molybdate. This allows any user to easily utilize an MoO4 (molybdate) test kit for concentration determination. The liquid forms of these products offer a slightly more difficult solution. While the powder and liquid form of these products do exactly the same thing, their individual chemistries are distinctly different. This difference does not allow us to utilize a

molybdate tracer in the liquid products in question. For this problem, we recommend an ammonia test kit. It can be difficult to distinguish between the lower concentrations, around the 500-1500 ppm range. However, once the concentrations of S-69 L and VpCI®-649 L begin to be within typically observed operational ranges, 1500-2000 ppm, the ammonia test kit becomes a useful tool in concentration determination.

Helpful standard curves have been constructed for both the MoO₄ and ammonia test kits; they are available to you by contacting technical service. These kits and their results aren't fail-safe, and certain environments can give misleading results. Nevertheless, as a whole many people have found these methods to be the easiest way to maintain a working knowledge of their closed-loop inhibitor concentration.

Q. What is the difference between Cortec's VpCI®-645 and M-645?

A. In recent months, there have been questions involving confusion between our VpCI®-645 and our M-645. They are both products designed to inhibit metals in the saltwater solution, and this is why they share 645 in their names. However, their individual chemistries are very different.

VpCI®-645 is a water-based corrosion inhibitor designed to inhibit corrosion in aggressive solutions, including brines, saltwater, and freshwater with high halogen content. VpCI®-645 is most commonly used in cooling and heating systems meeting these aggressive environments, but can be used in a multitude of different harsh applications, including fertilizer plants, mines, and ballast tanks. For cooling and heating VpCI®-645 is recommended between 0.25-0.75%, depending on the chloride content.

M-645 is an oil-based inhibitor also designed for corrosion induced by seawater and brine. M-645 has become a very popular product here as of late, especially with customers interested in it's main application; a "float-coat" for ballast tanks containing seawater. M-645 is a highly surface active concentrate which displaces corrosive solutions and leaves an oily protective film on metal surfaces. Typical ballast tank application involves pumping down and cleaning tank, placing determined amount (1 gallon covers up to 1250 - 1900 ft²) into hold, and then filling with seawater. This floats the coat up the walls and to the ceiling, covering every inch of interior tank space with the protective layer of corrosion inhibition. Then pump ballast to desired level, and you're on your way. One of the most popular aspects of this product is that its discharge concentration is incredibly low, and therefore usually suitable for discharge straight into the ocean with no added attention. M-645 can also be utilized as an additive to oils, and for hydrotesting of pipelines.

Q. How do I safely and effectively dispose of my Cortec VpCI® Powders (VpCI®-609, VpCI®-309 and VmCI-307™)?

A. Issues concerning the disposal of Cortec powders (VpCI®-609, VpCI®-309, and VmCI-307™) are very common. The typical problem encountered in this area is legality, and I stress that the local county and state authorities on such matters are contacted for approval before any process is put into action. (Note: county and state regulations can vary dramatically from one to the next.) However, in most cases I offer the three following options for disposal of our powder products:

1. Used material can be packaged into drums and shipped via a waste transportation/disposal company. This isn't the most cost-effective option, but many times, it is the only valid option. Cortec powders are considered "Non-hazardous Waste" and therefore can be shipped in non-RCRA and non-DOT regulated containers, it also will not count against your companies hazardous waste generation limit.

2. A second option is incineration. For companies with access to an incinerator, this is an obviously easy and quick choice for disposal. Companies that find themselves with a steady accumulation may want to investigate incinerators as an option.

3. The third common option pertains only to VpCI®-609 and VpCI®-309 (not VmCI-307™ due to its insolubility and more complex chemical nature). This option simply involves a 1.0% by weight dilution with water, and a discharge into a sanitary sewer.

Again, I stress that these steps aren't acted upon without the approval of the local regulatory agencies.

Notice: Concerning Cortec Corporation's VmCI-307™ powder

One of our powders has undergone an official name change. As the only Cortec powder that is designed for multimetal protection, VpCI-307 is now VmCI-307™. The chemical nature and product performance has not changed. This is simply a step to highlight 307's ability to protect ferrous, non-ferrous, and yellow metals.



4119 White Bear Parkway, St. Paul, MN 55110 USA
Phone (651) 429-1100, Fax (651) 429-1122
Toll Free (800) 4-CORTEC, E-mail info@cortecvci.com
Internet <http://www.cortecvci.com>



Cortec®, Cor-Mitt™, EcoAir™, Eco-Corr®, Eco Emitter™, EcoLine™, EcoSpray®, EcoClean®, EcoShield™, EcoWeave®, MCI®, Cor-Lube™, Cor-Mastic™, Cor-Pak®, CorShield®, Corrosorb™, CorCrete™, Corwipe®, EcoCoat™, ElectriCorr®, MCI®Grenade® Migrating Corrosion Inhibitors™, Migratory Corrosion Inhibitors™, Primecoat™, Total Corrosion Control™, VpCI®, VpCI CorVerter™, VpCI Film Color of Blue™ and HPRS™ are trademarks of Cortec Corporation.

©Cortec Corporation 2003. All rights reserved.



Certificate No. 70781

Certificate No. 81867