



MIGRATING CORROSION INHIBITORS
FROM GREY TO GREEN

December 2015

NEWSLETTER

Why Use MCI® Products in Restoration?

Corrosion is the biggest enemy of reinforced concrete structures. Once corrosion reaches the rebar, it is only a matter of time before the corrosion expands and incites cracking and deterioration of the concrete structure. To preserve structural integrity, the reinforced concrete must be restored. However, even repairs can potentially undermine the stability of surrounding rebar.

Migrating Corrosion Inhibitors (MCI®) are an excellent solution for concrete restoration challenges. MCIs extend useful service life and can cut corrosion rates to one-fifth of previous corrosion. MCIs are compatible with other materials (admixtures, sealers, and coatings, etc.) for flexible and complete restoration. They also help reduce the troublesome ring anode/insipient anode effect that often follows concrete repairs. MCI® is certified for use in structures containing potable water and has successfully passed various evaluations for concrete repair under severe conditions.

MCI® migrates to rebar by capillary action, vapor phase, and ionic attraction. This allows the MCI® molecules to infiltrate and protect rebar both in newly patched and undisturbed areas. The result is a change in potential at both anodic and cathodic sites. A monomolecular layer is created and forms a tenacious bond on the surface of the rebar where it is physically adsorbed.

How Should I Choose My Product?

Cortec® MCIs come in a variety of applications that can be tailored to your needs:

- Surface treatments
- Water repellants (silane, silane/siloxane, or silicate)
- Coatings
- Admixtures



Treatment will differ depending on project specifications and MCI® characteristics. For example, different types of MCI® water repellants will affect the way water does or does not puddle on concrete surfaces. Other MCIs may provide a stronger straight migrating corrosion inhibitor that can stand alone or be reinforced with a separate sealer. Admixtures in repair mortars can have slower MCI® migration but tend to last longer.

Some questions to help guide your choice of treatment include:

- What are current chloride, carbonation, water, and corrosion issues at the jobsite?
- What is the desired outcome of the restoration project?
- What are the expectations of the engineer or owner?
- What are budget constraints?

Cortec® can help you consider these important issues in order to select the best MCI® treatment for your needs.

In The News

Cortec® Helps Aging Oil And Gas Structures In The Middle East Get A New Lease On Life!

As oil and gas facilities in the Middle East are aging and approaching their anticipated design life, operators are asking whether the end is really near, and whether a new lease on life is possible.

Operating equipment is usually designed for a 25 to 30 year service life; therefore structures are often designed with a corresponding service life. International codes time and again fall short of delivering the end goal in the Arabian Gulf's extreme environment with high humidity, temperatures 20 degrees above global average, and salinity levels higher than anywhere else in the world.

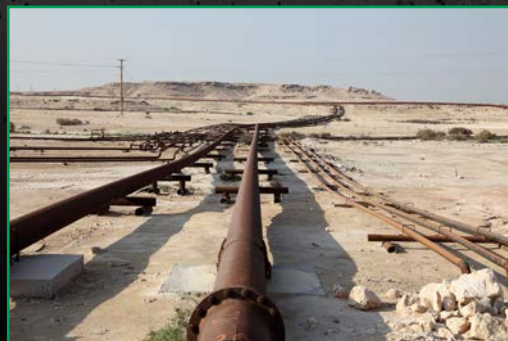
To maximize value, facility owners are demanding service life beyond original design. In addition, maintenance during operations is expected to minimize down time and increase stretches of uninterrupted operation.

Cortec® is leveraging its knowledge, experience, and wide portfolio of products to assist multiple facilities in the Middle East in adopting such improvements. Its Global Services team provides assistance in all stages of the asset's lifecycle: from condition assessments, project management, engineering, design, and application and training services.

With more than 500 products covering a range of technology platforms, Cortec® has access to many tools that facilitate its mission. For example:

- Concrete structures are treated with surface-applied migrating corrosion inhibitors (MCI®) providing quantified increase in service life.
- Steel structures can be protected with environmentally friendly waterborne coatings that provide effective protection in the harshest of environments. With the use of CorrVerter® Rust Converter and Primer, disruptive surface preparation can be avoided allowing maintenance without operational interruptions.
- CorroLogic® solution for aboveground storage tanks can be applied while in-service to provide effective protection against soil side corrosion. Besides protecting against the detrimental effects of leaks, it allows the extension of time-to-maintenance.

In the presence of one of the most challenging corrosion environments on earth, Cortec® is helping oil and gas facilities to preserve key assets beyond their expected lifetimes. Cortec's innovative solutions enable these facilities to minimize maintenance downtime and maximize operational uptime while simultaneously giving structures a new lease on life.



Featured Product

MCI® Coating for Rebar NT- Superior Corrosion Resistance for Reinforced Metal

Cortec's MCI® (Migratory Corrosion Inhibitor) Coating for Rebar NT is water based, environmentally friendly product that provides corrosion protection in outside storage as well as offering powerful corrosion resistance for embedded rebars. As a soft film, MCI® Coating for Rebar NT is an excellent choice for long-term indoor protection (up to 5 years) and short to medium-term (6-24 months) unsheltered outdoor protection.

Cortec's patented MCI® technology superiorly protects reinforcing metal in concrete from corrosion. MCIs rehabilitate existing concrete structures as well as extending the life span of new structures. Corroding rebar in deteriorating concrete often causes costly repairs, financial losses and even worse, hard injuries. MCI® technology is the best prevention of these problems available on the market today.

Cortec® MCI® products for concrete maintain structural integrity, rehabilitate vulnerable structures, and alleviate environmental concerns. A unique feature of MCI® is that the inhibitor will migrate a considerable distance through concrete to protect embedded ferrous metals.

MCI® Coating for Rebar NT protects steel, aluminum, cast iron, and tin. It is dilutable with water and does not affect concrete adhesion to rebar. This safe to use inhibitor cures to a soft film and eventually hardens. The recommended dry film thickness range is 25-50 microns (1-2 mils). It can be removed by using an alkaline cleaner such as MCI®-2060 if needed the coating works well in SO₂ and H₂S environment.



TYPICAL APPLICATIONS

- Protection of rebar partially embedded in concrete
- Jobsite/warehouse storage
- Processing protection
- Overseas shipping
- Maintenance repairs

Test Method	Thickness of Coating (mils/microns, DFT)	Time of Protection (hours)
Salt Spray (ASTM B-117)	1.0/25	250
	2.0/50	600
Humidity (ASTM D-1748)	1/25	1400
	2/50	1500 +

Corrosion Protection Properties

Applied Load, in pounds (kg)	Loaded End Elongation, in inches (mm)	
	Control*	MCI Coating for Rebar NT*
2,800 (1,270)	0.053 (1.35)	0.050 (1.27)
7,300 (3,311)	0.090 (2.29)	0.091 (2.31)
10,400 (4,717)	0.220 (5.59)	0.134 (3.40)
15,000 (6,804)	0.293 (7.44)	0.171 (4.34)
20,900 (9,480)	0.319 (8.10)	0.214 (5.44)

Bond Strength of Steel Reinforcing Bars to Concrete (ASTM A944-99)

MCI® Coating for Rebar NT can be used "as is" or diluted with water up to 50%, as long as a 25-50 microns (1.0-2.0 mils) dry film thickness is reached on surface to be protected. It can be applied by spray, brush, roll, or dip.

MCI® Coating for Rebar NT has been tested for adhesion to concrete in accordance with ASTM A 775/A 775 M and showed positive results, confirming that MCI® Coating for Rebar NT does not have to be removed prior to embedding in concrete.

Spreading the Word at Concrete Conventions

During 2015, Cortec® has been raising awareness of MCI® corrosion prevention solutions at conventions across the country. Here's a look at those events in the last half of 2015 and coming up in early 2016.

The Concrete Service Life Extension Conference took place June 29 – July 1, 2015, in Philadelphia, PA. It addressed the need for increasing the durability of reinforced concrete structures in light of the estimate that half of concrete repairs fail in ten years. Mark Christianson, Technical Sales Rep - MCI /Additives, was able to present the superior repair capabilities of MCI® with the visitors attending Cortec's helpful booth.

Jessi Meyer, Cortec® VP of Sales, Asia/MCI®/Additives, was able to provide similar assistance to those attending the ICRI (International Concrete Repair Institute) Fall Convention in Ft. Worth, Texas. The theme of this October 14 – 16, 2015, convention was "Modern Trends in the Repair Industry." Cortec® was again pleased to sponsor a booth offering what it feels are some of the most innovative and effective concrete repair solutions among current trends.

Cortec® invites you to join them soon at World of Concrete, exhibits running February 2 – 5, 2016, in Las Vegas, Nevada. Cortec® will be sharing samples and the latest corrosion prevention techniques at Booth # S10754, where it hopes to be a mainstay of answers to you and the many visitors attending the informative international event.

Subsequent conventions include the ICRI Spring Convention taking place March 16 – 18, 2016, in San Juan, Puerto Rico, on the topic of "Maintenance and Protection in Harsh Environments."

Upcoming Events



World of Concrete
Las Vegas, NV
February 1-5, 2016
Booth# 10754



ICRI Spring
San Juan, Puerto Rico
March 16-18, 2016



ICRI Fall
Cleveland, OH
November 9-11, 2016

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CORTEC
CORPORATION


Environmentally Safe VpCI®/MCI® Technologies



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

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