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**Attention: Editor**  
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**PRESS RELEASE**



## **Cortec's New MCI® Technology Brochure Tackles Age-Old Problem of Infrastructure Deterioration!**

Cortec's freshly updated MCI® Technology brochure provides an excellent overview on using Migrating Corrosion Inhibitors (MCIs) to extend the service life of new and existing concrete structures. The brochure explains that corroding concrete reinforcing metal can cause serious problems such as costly repairs, financial losses, and injuries. To counteract these problems, Cortec's patented MCI® Technology proactively delays corrosion onset and keeps rates low after initiation, greatly extending concrete service life.

MCIs are based on a mixed inhibitor technology that affects both anodic and cathodic portions of a corrosion



**Durability and Sustainable Construction**

Sustainable construction has become a goal for owners across the globe. While much attention has gone to reducing carbon use and minimizing power and water consumption, an often overlooked aspect is the durability and service life of the final structure. However, this is undoubtedly one of the key parameters influencing structural sustainability.

By using MCP in severely corrosive environments, structures will have a stronger resistance to corrosion and therefore possess greater durability. Increased durability will mean fewer repairs, greater structural integrity, and a longer service life, all leading to greater sustainability.

MCP is made from a renewable raw material, enabling users to earn certain LEED credits. It is an excellent addition to building projects around the world seeking to meet sustainability standards such as the Estidama Pearl Rating System and BREEAM.

**Cost Effective Service Life Extension**

The Princess Towers in the United Arab Emirates utilize MCP-2005 in the podium substructure, similar to the Burj Khalifa project. The addition of MCP into the project more than doubled the Service Life of the building, which cost less than 1/10 of a percent of the total construction costs.



ITEM	COST (USD)
Construction Cost	180,000,000
Construction Cost of MCP-2005	136,000 (0.07%)
Service Life (Without MCP)	48 years
Service Life (With MCP)	103 years

Corotec's MCP products not only provide corrosion protection to metals on both new and existing structures, they benefit our environment. We have admixtures derived from renewable resources, and many of our products also meet NSF Standard 61 approval for use in structures holding potable water.



cell. MCIs can be applied as an admixture or topical treatment that migrates through the concrete pore structure. When the MCIs reach embedded metals, they are ionically attracted to the metal surface where they form a protective molecular layer against corrosive elements.

Structural durability and service life are key (but often overlooked) parameters influencing the increasingly important goal of sustainable construction around the globe. MCI® Technology helps achieve this goal by giving concrete structures greater resistance to corrosion in severe environments. Adding to its sustainability, MCI® is made from a renewable raw material and enables users to

earn certain LEED credits. It is an excellent addition when building according to sustainable standards such as the Estidama Pearl Rating System and BREEAM. The cost-effective advantages are great when considering the use of MCI® in structures such as the UAE Princess Tower, where MCI® doubled the projected service life at less than 1/10 of a percent of total construction costs.

The brochure describes the various MCI® delivery systems that can be used for new construction, repair, and surface treatment. MCI® admixtures offer important advantages over other corrosion inhibiting admixtures that rely on pore blockers or are limited by a chloride threshold. MCI® admixtures work independently of chlorides, protect even when cracks occur, and can actually delay set time for better workability. They also do not affect concrete physical properties when used properly. Various independent testing results show the important advantages of using MCI® to inhibit corrosion.

**Comparison of Corotec® MCI® Admixtures to Other Inhibitors:**

Feature	Corotec® MCI® Inhibitor	Calcium Nitrite
Environmentally friendly, derived from renewable resources	TRUE	FALSE
Used in small quantities—less than 1.5 parts/100 (1 liter/m³)	TRUE	FALSE
Required dosage rate is not affected by expected chloride exposure	TRUE	FALSE
Ability to migrate through concrete in vapor phase at ambient temperatures	TRUE	FALSE
Does not increase shrinkage compared to a control	TRUE	FALSE
Does not require adjustments to concrete mix design (chemical or water)	TRUE	FALSE
Does not affect concrete reactivity	TRUE	FALSE
Does not accelerate concrete set time	TRUE	FALSE
Has US approval to meet NSF Standard 61 (contact with potable water)	TRUE	FALSE
Spills can be flushed with large quantities of water down drain	TRUE	FALSE



**Repair**

MCP is important for ensuring the longest possible lifespan of concrete restoration projects. MCP not only slows the rate of corrosion begun in deteriorating structures, but also protects against the troublesome ring anode/insipient anode effect that often follows concrete repairs. MCP is ideal and convenient to add to concrete repair mixtures and migrates through adjacent areas after application to protect embedded reinforcement. MCP is also available as a passivating grout for use on exposed rebar, or as a topical treatment to existing surfaces.

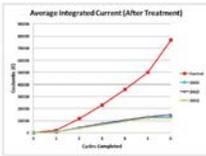
The brochure contrasts MCI® admixtures with the shortcomings of calcium nitrite and mentions the important benefits of using MCI® in repairs. MCI® is important for ensuring the longest possible lifespan of concrete restoration projects and protecting against the common troublesome ring anode/insipient anode effect. MCI® can be added to repair mixtures or used as a passivating grout.



**Surface Treatment: Water Repellent MCI®**

MCI® cements combine water repellency with the added protection of Migrating Corrosion Inhibitors. These MCI® surface treatments seal surface pores to block carbonation and protect against the ingress of water, chlorides, and other aggressive contaminants. Below the surface, MCI® penetrates to the depth of embedded rebar, reinforcing it to form a protective monomolecular layer on the surface of the rebar. This protective layer delays the onset of corrosion and reduces corrosion rates after initiation, greatly extending the service life of structures.

Several MCI® materials have been tested according to U.S. Bureau of Reclamation M-82 Protocol. The MCI® materials were applied after 70,000 Cycles. Corrosion of rebar was reduced or held stable. This is the criteria used if the performance of the surface applied repair does not depend upon the amount of chloride present at the reinforcing bars, or if protection at a higher initial chloride content level is to be demonstrated. All materials tested were found to significantly reduce corrosion and cracking at a high level of chloride exposure.



For surface treatment, two different types of MCI® topical treatments are available—pure inhibitors that migrate and protect reinforced concrete at the rebar level, and water repellent MCIs that offer extra protection against the ingress of corrosive contaminants. Several MCI® surface treatments have been tested according to U.S. Bureau of Reclamation M-82 Protocol and found to significantly reduce corrosion and cracking at a high level of chloride exposure.

Cortec® also offers excellent solutions for the unique corrosion problems present in post-tensioning applications such as bridges and overpasses. For example, PTC emitters were designed to help

arrest corrosion on the suspension cables of the Severn Bridge located between England and Wales. MCI® Mini Grenades were added to grout cover for cable strands on the Cochrane Bridge in Mobile, Alabama.

Specialty products are also available for multiple aspects of the construction industry. Many of these products are a result of customer suggestions that meet specific end user needs. In addition to Migrating Corrosion Inhibitors, Cortec® offers products for concrete cleaning, rebar storage, and rust conversion.

A helpful MCI® product application guide in the center of the brochure visualizes MCI® application for three different stages of concrete:

- New Concrete
- Existing Structures, No Visible Corrosion Damage
- Existing Structures, Visible Corrosion Damage

MCI® Product Application Guide			Features & Benefits	Relevant Case Histories
Condition of Structure	Objective & Requirements	MCI® Protection		
<p><b>STAGE 1</b> New Concrete</p> <ul style="list-style-type: none"> <li>Aggressive Chloride Environment</li> <li>Aggressive Chloride Environment</li> </ul>	<ul style="list-style-type: none"> <li>Extend useful service life</li> <li>Prevent rebar corrosion</li> <li>Prevent the natural appearance of the concrete</li> </ul>	<ul style="list-style-type: none"> <li>MCI-2000 water repellency can double to triple the time to rebar corrosion initiation, and once corrosion starts, they can cut rates by more than 50% compared to a control.</li> </ul>	<ul style="list-style-type: none"> <li>Low Shrinkage Rate</li> <li>Meets or exceeds ACI 308.4R-03 Requirements</li> <li>No effect on concrete strength</li> <li>Can double the service life of many concrete structures</li> </ul>	<p><b>Construction of New Drinking Water Reservoir</b> <b>Severn City, Scotland</b> <b>MCI-2000 (M-212)</b></p> <p>The construction of a new 1,000 m<sup>3</sup> (264,000 gal) drinking water reservoir had been programmed and the best protection was needed to reduce the chance of long-term problems.</p> <p>Over 100,000 m<sup>2</sup> (1,076,391 sq ft) of reinforced concrete was poured using MCI-2000 at a dosage rate of 1.5 kg/m<sup>3</sup> (3.75 gal/cy).</p> <p>The MCI-2000 Standard U<sup>1</sup> approval of MCI-2000 MC validated this project and an important factor in saving time for future reservoirs.</p> <p><b>See also:</b></p> <ul style="list-style-type: none"> <li>Black Water Tower, MCI-2000 (M-212)</li> <li>Wells Fargo Parking Garage, MCI-2000 (M-212)</li> <li>Monticello Gas Storage Facility, MCI-2000 (M-212)</li> <li>Parsons Water Bridge, MCI-2000 (M-212)</li> <li>St. John's Brewery, MCI-2000 (M-212)</li> </ul>
<p><b>STAGE 2</b> Existing Structures, No Visible Corrosion Damage</p> <ul style="list-style-type: none"> <li>Carbonation</li> <li>Rebar of steel</li> </ul> <ul style="list-style-type: none"> <li>Consider structures without visible corrosion</li> <li>Aggressive environment</li> <li>Reduction of corrosion</li> <li>No spalling or cracking</li> </ul>	<ul style="list-style-type: none"> <li>Slow the rate of corrosion</li> <li>Protect against possible concrete damage</li> <li>Protect against further corrosion due to carbonation and/or chloride penetration</li> </ul>	<ul style="list-style-type: none"> <li>Application of MCI-2000 over carbon content prevents the rapid, localized, or linear spread by the application of an early inhibitor coating such as MCI-2000 or MCI-2000 MC, or MCI-2000 MC, or MCI-2000 MC.</li> </ul>	<ul style="list-style-type: none"> <li>High strength grade</li> <li>Meets or exceeds ACI 308.4R-03 Requirements</li> <li>Non-shrinkable</li> <li>Minimize the time to reach repair of the structure</li> <li>Lower costs (rebar cover, extra coats, bar cover, and products)</li> <li>Can be 10 times more cost-effective to repair MCI-2000 MC versus MCI-2000 MC</li> </ul>	<p><b>Portage: Restoration of All Exterior Walls</b> <b>MCI-2000 (M-212)</b></p> <p>Construction of reinforced concrete wall was causing spalling on the walls. Carbonation depth to 3.0 m (9 ft) on the walls caused the loss of the concrete causing the corrosion.</p> <p>The requirements to protect exterior structure program design, stop water absorption, reduce or stop concrete, and maintain the appearance of the walls, the repair program consisted of: provide 10% extra air of surface finish (polish and seal) (MCI-2000 MC) or treated with MCI-2000 MC, and a visible face coating.</p> <p>MCI-2000 MC was chosen to protect and repair the walls based on its durability and its full cure on the other specified repair design requirements.</p> <p><b>See also:</b></p> <ul style="list-style-type: none"> <li>Severn Water Tower, MCI-2000 (M-212)</li> <li>Trinity Church, MCI-2000 (M-212)</li> <li>Wells Fargo Parking Garage, MCI-2000 (M-212)</li> <li>Parsons Water Bridge, MCI-2000 (M-212)</li> <li>St. John's Brewery, MCI-2000 (M-212)</li> </ul>
<p><b>STAGE 3</b> Existing Structures, Visible Corrosion Damage</p> <ul style="list-style-type: none"> <li>Carbonation</li> <li>Rebar of steel</li> </ul> <ul style="list-style-type: none"> <li>Consider surface with visible corrosion damage</li> <li>Spalling and cracking repairs are necessary</li> <li>Rebar or chloride at depth of rebar is high</li> </ul>	<ul style="list-style-type: none"> <li>Repair of damaged surface</li> <li>Long term protection against future ingress of carbonation</li> <li>Long term protection against the oxidizing environment</li> <li>Reduction of rebar corrosion</li> <li>Reduction of rebar corrosion (prevent anodic effect)</li> </ul>	<ul style="list-style-type: none"> <li>Coating of exposed reinforcement with 2 coats of MCI-2000 MC or MCI-2000 MC</li> <li>Application of Cortec® MCI-2000 MC to exposed reinforcement and repair area</li> <li>Application of Cortec® MCI-2000 MC repair material</li> <li>Application of Cortec® MCI-2000 MC to rebar bar</li> <li>Apply coat of Cortec® T-Substrate</li> </ul>	<ul style="list-style-type: none"> <li>Structurally proven evaluation of structure in a safe condition</li> <li>Complete repair and protection against corrosion damage</li> <li>Non-shrinkable</li> <li>Minimize the time to reach repair of the structure</li> <li>Lower costs (rebar cover, extra coats, bar cover, and products)</li> <li>Can be 10 times more cost-effective to repair MCI-2000 MC versus MCI-2000 MC</li> </ul>	<p><b>Build Submerged Foundation Repair</b> <b>Wells Fargo</b> <b>MCI-2000, Cortec® T-Substrate</b> <b>MCI-2000 (M-212)</b></p> <p>Ingress of Chloride from the concrete can cause surface cracking, spalling, and the penetration of the concrete foundation of the foundation structure of the Wells Fargo building.</p> <p>Foundations were examined and the spalled and deteriorated concrete removed. MCI-2000 MC was applied to exposed rebar surfaces. Cortec® T-Substrate was applied to exposed and carbon rebar instead of using aluminum. MCI-2000 MC was applied to the concrete foundation of the building and repair. The repair program consisted of: provide 10% extra air of surface finish (polish and seal) (MCI-2000 MC) or treated with MCI-2000 MC, and a visible face coating.</p> <p><b>See also:</b></p> <ul style="list-style-type: none"> <li>Severn Water Tower, MCI-2000 (M-212)</li> <li>Trinity Church, MCI-2000 (M-212)</li> <li>Wells Fargo Parking Garage, MCI-2000 (M-212)</li> <li>Monticello Gas Storage Facility, MCI-2000 (M-212)</li> <li>Parsons Water Bridge, MCI-2000 (M-212)</li> <li>St. John's Brewery, MCI-2000 (M-212)</li> </ul>

The guide contains relevant case histories from around the world that demonstrate the application of MCI® at varying construction, maintenance, and repair levels.

