

FROM GREY TO GREEN

June 2016

Three Cortec[®] MCI[®] Products Mitigate Ongoing Corrosion!

Three MCI[®] products have been evaluated according to US Bureau of Reclamation M-82 (M0820000.714) Standard Protocol to Evaluate the Performance of Corrosion Mitigation Technologies in Concrete Repairs. Cortec[®] is one of the first manufacturers to complete this testing, which is the first of its kind to identify products effective against existing corrosion. The protocol creates a level playing field for DOTs, engineers, and owners to see which products can truly enhance the integrity of repairs to their structures.

According to July 2014 standards, the USBR M-82 Standard Protocol to Evaluate the Performance of Corrosion Mitigation Technologies in Concrete Repairs has the following significance (see Section 1.04):

- To predict how treatments will mitigate preexisting corrosion
- To compare various corrosion treatments to control specimens
- To develop studies of concrete corrosion mitigating repair systems
- To find black steel's chloride induced corrosion threshold in certain conditions

Tourney Consulting Group (TCG), a CCRL/AMRL inspected and AASHTO-accredited lab performed the test according to the protocol and reported the procedure and results. The Cortec® materials tested - MCI®-2018, MCI®-2019, and MCI®-2020-not only performed effectively in reducing corrosion rates, but did so from a higher chloride content starting point. The M-82 protocol requires the combined macrocell corrosion current to reach a level of 5,000 Coulombs before repair treatment can occur. Cortec's MCI® treatments were not applied until the average value was more than 10,000 Coulombs, which is an allowed alternative to the test if the surface applied repair does not depend upon the amount of chloride present at the reinforcing bars, or if protection higher initial chloride content level is to be demonstrated. The MCI® treated slabs showed a reduction in cracking in both length and area. MCI[®] treatments also provided a statistically significant reduction of corrosion relative to untreated slabs and were deemed effective in mitigating ongoing corrosion according to USBR M-82 (M0820000.714) Standard Protocol.



Control slab 12, top side of bars at end of test MCI®-2019 slab 21, top side of bars at end of test

MCI[®]-2018 is a combination water repellant and Migrating Corrosion Inhibitor (MCI[®]) whose added protection comes in the form of a 100% organosilane water repellant. This reduces the ingress of water, chloride, and other contaminants in addition to its migrating inhibitor abilities.

MCI[®]-2019 is similar to MCI[®]-2018 but contains only 40% organosilane in a solvent base, creating flexible treatment options for varying budget needs and repair expectations.

MCI[®]-2020 is a water-based corrosion inhibitor for concrete and masonry structures. This product provides the highest concentration of MCI[®] inhibitor in a topical treatment. Since MCI[®]-2020 does not have water repelling properties, a standard 40% silane

repellent was used over it during the M-82 protocol testing.

The M-82 protocol is a significant step forward in evaluating the effectiveness of various reinforced concrete corrosion inhibitors on the



market. With the successful performance of MCI[®]-2018, MCI[®]-2019, and MCI[®]-2020, users can have added confidence in selecting and applying these innovative corrosion inhibitors for the protection of important concrete and masonry structures.



In the News

Cortec's MCI® HPRS® Produces Amazing Results And Sharply Lowers Corrosion Rates In Concrete!

Spalling or deterioration of reinforced concrete does not inevitably signal the end of concrete structures. With Cortec's High Performance Repair System (HPRS®), it is possible to greatly reduce a structure's corrosion rate and extend useful service life. Cortec's highly durable, multifunctional, and compatible protection systems maximize the concentration of Migrating Corrosion Inhibitor (MCI®) molecules for the most effective repairs.

HPRS[®] utilizes a special sequence to maximize performance of MCI[®] in concrete repairs. This process begins with base surface preparation to remove all spalled, loose, and deteriorated concrete. Rust on exposed rebar is eliminated with VpCI[®]-426 rust remover or treated with CorrVerter[®] Rust Primer. Two coats of anti-corrosion MCI[®] grout are recommended on any exposed rebar or metal, followed by the application of various MCI[®] repair mortars to the concrete structure. Once the repair mortar is cured, MCI[®]-2020's powerful formula is sprayed, brushed, or rolled on in order for MCIs to penetrate through concrete and attach to and protect the surface of embedded reinforcing steel. After sufficient absorption, other materials such as coatings or water repellants may be applied on top.

A successful example of the HPRS[®] system in action is highlighted in Cortec's Case History 496 on the restoration and protection of concrete pipelines in Spain. The customer, C.A.T. (Consorci D'Aigües De Tarragona), had a network of prefabricated reinforced concrete pipes at least thirty years old that were experiencing corrosion problems. After removal of damaged concrete and rust, Quimilock passivating grout containing MCI[®]-2006 NS was applied to exposed rebar. Quimilock repair mortar with MCI[®]-2006 NS was used next, followed by MCI[®]-2020 application on the entire surface. Test results showed decreased corrosion rates, and the customer was very pleased with the results of Cortec's innovative MCI[®] products.

Case History 496 is only one example of the active corrosioninhibiting power of MCI[®]. Cortec[®] looks forward to providing more positive results in the future use of MCI[®] HPRS[®] for concrete repairs.

To view the entire case history, please visit: http://www.corteccasehistories.com/case-histories/ ch496.pdf

To find out more about Cortec's innovative MCI[®] product line, please visit: *www.cortecmci.com*



REPAIR, REHABILITATION AND RESTORATION SYSTEMS FOR REINFORCED CONCRETE AND MASONRY BASED ON PATENTED MIGRATING CORROSION INHIBITORS (MCIP) TECHNOLOGY









In the News

"Peel" Off Your Corrosion Problems with MCI® Peel-Off Coating! Powerful Multipurpose Solution for Construction Industry

MCI[®] Peel-off Coating is a corrosion inhibiting, modified water-based acrylic peelable coating powered by Migrating Corrosion Inhibitors (MCI[®]) technology. This product provides mechanical protection against nicks, abrasion, scratches and over-spray to the surface that is covers. MCI[®] Peel-off Coating can be used to protect non-porous walls, ceilings, floors, windows, and light fixtures: one coating can do it all!

In addition it enables cost savings and corrosion protection to the metals against atmospheric, salt and chemical induced corrosion. This formulation represents the ultimate in non-solvent peelable coatings. It is well stabilized against brittleness and will not be softened or penetrated by solventbased paints. MCI[®] Peel-off coating has extremely low VOC and meets the most strict VOC requirements.

Migrating Corrosion Inhibitors (MCI[®]) are the best solution on the market for restoration challenges. MCI's extend useful service life and can cut corrosion rates to one-fifth of previous corrosion. They are compatible with other materials for flexible and complete restoration.MCI[®] technology successfully passed various evaluations for concrete repair under severe conditions.

MCI® PEEL-OFF COATING FEATURES

- Water-based, VOC compliant
- Environmentally safe, non-flammable
- Can be disposed as a solid waste
- Reduces labor cost by reducing the application time
- Easily removed peels off in sheets
- Does not leave any residue after removal
- Easy application excellent sag resistance
- Contains corrosion inhibitors to prevent corrosion on unpainted metal surfaces

During construction or restoration projects, it is necessary to mask off all glass surfaces to protect them from debris and chemical etching. Using a masking tape and plastic film is a labor-intensive process that is not always effective since the plastic is susceptible to tearing. Recently an alternative method was desired by Cortec's customer for protecting glass surfaces during large construction project. MCI® Peeloff Coating was chosen for coating of window frames as an alternative to using plastic film as the product does not etch glass. At the end of the project the coating was easily removed by simply peeling it from the surface. It was then discarded as non-hazardous, solid waste. MCI® Peel-off Coating worked extremely well as a masking product for glass surfaces. It protected the covered surfaces from debris and chemical etching and provided cost savings by reducing labor and providing a more effective method of protection.

MCI[®] Peel-off Coating conforms to NACE Standard RP 0487-2000 and ASTM-2196 and is VOC and RoHS compliant.







Cortec[®] Welcomes New MCI[®] Talent

We are very pleased to welcome Ivana Liposcak to Cortec[®] as Technical Sales Manager, MCI[®] Products, reporting to Ivana Radic Borsic, VP International Sales, Europe. Ivana started May 1, 2016, and works out of the Cortec[®] office located in Zagreb, Croatia. She is responsible for obtaining sales and profit objectives for Cortec[®] products used in the concrete and masonry segments of the construction industry. Ivana comes well-equipped to build long-term client relationships with structural engineers, quality control professionals, construction project managers, and other related personnel.

Ivana has a Master's degree in Civil Engineering from the University of Zagreb, Croatia. She is a certified engineer with the Croatian Chamber of Civil Engineers.

Liposcak originally started with Cortec[®] as a Technical Sales and R&D Engineer, from 2002-2004. In her role, she developed concrete protection and repair products. She then moved to Zagreb to work for Crosco Integrated Drilling & Well Services Co., Ltd., with whom she was employed until just recently.

From 2004-2006, Ivana served as a Project Manager in the Geoservice sector. Her next role with Crosco was as the Marketing and Sales Head from 2006-2011. Liposcak then worked from 2011-2015 as a Contract Manager in the Marketing Sector. Most recently, Liposcak was an Oil and Gas Services Contracting Expert in the Sales & Commercial Sector of Crosco. In addition to speaking Croatian, Liposcak is fluent in both English and Italian.





Joining us from Cortec[®] Middle East (CME) is Ashraf Hasania, whom Cortec[®] Corporation was happy to welcome on June 1, 2016, as MCI[®] Technical Sales and Market Manager for Canada. He will be working out of Ontario to raise awareness among design consultants, engineers, general contractors, and ready mix companies about the capabilities of Migrating Corrosion Inhibitors to increase the durability and service life of new and existing concrete structures. Hasania will report to Jessi Meyer, V.P. of Sales – Asia/MCI[®]/Additives.

Hasania has about four years of MCI[®] product focus experience with CME, our largest MCI[®] market, where he started as a technical support engineer. He eventually became the area manager for the UAE and eventually the GCC (Gulf Cooperation Council, including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE). Prior to this, he served as a technical support engineer at Hilti Emirates, a major supplier of construction tools and engineering products.

Hasania holds a Bachelor of Science degree in Civil Engineering and a Master of Science degree in Water and Environmental Engineering. He speaks English and Arabic.

In the News



Case Histories

Restoration And Protection Of Concrete Pipelines

C.A.T.'s network of pipes in Tarragona, Spain, is composed of prefabricated reinforced concrete. After 30 years, corrosion problems were detected in different areas of their 13.300 m2 pipeline system.

The damaged concrete and rust were removed using hydrojet. Q-2023 passivating grout with MCI[®]-2006 NS was applied to the exposed rebar, followed by Q-2039 Repair Mortar with MCI[®]-2006 NS. Finally MCI[®]-2020 was applied to the entire surface.

Test results completed after application confirm a decrease in corrosion rates. The customer is very pleased with the results of using Cortec's innovative corrosion protection products, which were applied by the contractor H.C.C.



Crosley Tower Renovation

Crosley Tower, built in 1969, was one of a series of high-rise buildings erected on the University of Cincinnati, Ohio, campus in that era. Restoration of this tower was done in the fall of 2010. Due to the low cover of concrete over the rebar, corrosion was evident. MCI®-2020 or MCI®- 2020 V/O was specified in order to address the corrosion issue.

A mock-up was done with both versions of MCI[®]. Due to the porosity of the concrete, it was determined that MCI[®]-2020 would be appropriate. MCI[®]-2020 was applied and after 45 days, 2" cores were pulled for testing and analysis of penetration. QAC (Quaternary Ammonium Compound) testing was done by Cortec's ISO/IEC 17025 certified lab. The results of the QAC test indicated MCI[®] present in all samples. Migration to the steel on that specific structure was a depth within 2.5 inches.

The project was a success due to the engineering specification of appropriate patch repair, a migratory corrosion inhibitor and an elastomeric coating (LOXON XP - Sherwin Williams). Other materials needed for this restoration were also specified in order to complete appropriate repair. The benefit of MCI®-2020's lack of damage to substrates including glass, vegetation and automotive finish was also appreciated by the University. The lack of having to mask the windows and risk over spray on such a large structure was also appreciated by the contractor (RAM Construction) and was a definite consideration in choosing MCI®.







Case Histories

Reservoir Preservation

C.A.T. (Consorci D'Aigües De Tarragona) in Tarragona, Spain, had experienced many corrosion problems in their previous facilities. For this new construction project, they required an innovative corrosion protection product for the concrete mixture.

MCI[®]-2005 was used directly by different ready mix suppliers in a dosage of 0.6 liters per cubic meter. The total amount of product was 900 liters for 1500 cubic meters of concrete. The reservoir design was rectangular with an interior dimension of 43.5 x 23 meters. The structure consisted of reinforced concrete walls with variable thicknesses (0.5 to 0.65 meters). The bottom of the reservoir was 0.3 meters thick and the roof was 0.3 meters thick.

Past corrosion issues prompted the customer to improve the durability of their concrete construction projects from the beginning. Because the customer also needed a product that could be in contact with drinking water, Cortec's MCI®-2005 was the perfect and obvious solution. Quimilock S.A. represented Cortec® in this project.



Al Hadeel at Al Bandar Application

This luxurious project is an expansion for Al Raha Beach Development and is located in Al Bandar, UAE. It sits on the seafront of Al Raha Beach, and consists of two basements, ground floor, plus 10-stories. Maintaining projects and meeting durability and service life requirements in Abu Dhabi is extremely challenging. The chloride levels in the soil are extremely high, which is coupled with high temperature levels. In addition, this project is located very close to the sea and the ground water table is high, making the substructure concrete located in an ideal environment for corrosion.

Aurecon, the project designer, specified MCI[®]-2005 for the whole substructure. This included 5,000 m3 of piling concrete, and 5,000 m³ of raft and basement concrete. Due to its proven technology, Cortec's MCI[®]-2005 was the only corrosion inhibitor specified and used to protect the substructure of the project. The contract work was performed by Al Faraa.







MCI® EDUCATION

MCI® Presentation at NACE/ICRI/ACI Concrete Service Life Extension Conference

A good crowd was on hand to hear Jessi Meyer, Cortec[®] VP of Sales – Asia/MCI[®]/Additives, give a presentation at the NACE Concrete Service Life Extension Conference, held May 23rd-25th in Orlando, Florida. Meyer shared how three Cortec[®] MCI[®] products recently passed M-82 testing, showing their power to significantly inhibit corrosion on concrete repairs. About 40-50 people attended Meyer's presentation during the conference's ICRI (International Concrete Repair Institute) track, which focused on concrete repair issues.



MCI® Sales Training Takes Place in Saint Paul, Minnesota!

MCI[®] Sales Training took place June 13-14th at Cortec[®] headguarters in Saint Paul, Minnesota. Attendance was strong and the room was packed as training started out Monday morning with special guest Josh Edwards from AVR speaking on Concrete 101. This informative presentation gave a solid background for understanding concrete characteristics that can come into play when working with MCI®. Jessi Meyer continued the training with MCI[®] 101, which included specific information on the chemistry behind MCI® products and their important advantages over the competition. Additional training consisted of a session on water repellants (regarding testing and where to use specific products) and a strategy session for sales members from different divisions. This was a great opportunity for those interested in MCI[®] to build their knowledge base and connect with other sales members from around the globe! Stay tuned for future opportunities to participate in MCI® Sales Training!



Upcoming events



ICRI Fall Cleveland, OH November 9-11, 2016



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