MIGRATING CORROSION INHIBITORS
FROM GREY TO GREEN

03 30 00	Cast in Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

MCI®-2005 Patented & CE according to EN 934-2

DESCRIPTION

MCI®-2005 is a water-based, organic, corrosion inhibiting admixture for protection of metallic reinforcement in concrete structures. This product also offers set retarding effects.

When incorporated into concrete, MCI-2005® forms a protective, monomolecular layer on embedded metals that inhibits corrosion and provides set retarding effects. In new construction, this is quantified by an increase in critical chloride threshold and subsequent reduction in corrosion rates when corrosion does initiate. When used with repair mortars and grouts, MCI®-2005 not only protects rebar within the patch, it is able to migrate into undisturbed concrete adjacent to the repair, to protect reinforcement already in place.

MCI®-2005 has been awarded the USA BioPreferred™ designation (www.biopreferred.gov).

PACKAGING & STORAGE

Available in 5 gallon (19 L) pails, 55 gallon (208 L) drums, and 265 gallon (1000 L) totes.

Store away from direct sunlight and at ambient temperatures – above 32ºF (0ºC) and up to 131ºF (55ºC). When properly stored, MCI®-2005 has a shelf life of 24 months.

HOW IT WORKS

MCI®-2005 is an organic corrosion inhibitor and set retarding admixture. It is considered ambiodic (mixed), meaning it protects both anodic and cathodic areas within a corrosion cell. MCI®- 2005 contains a blend of amine salts of carboxylic acids which form a protective layer on embedded reinforcement delaying the onset of corrosion as well as reducing existing corrosion rates.

MCI®-2005 is effective at enhancing the durability and extending the service life of concrete structures exposed to corrosive environments (carbonation, chlorides, and atmospheric attack).

WHERE TO USE

- Reinforced concrete including precast, pre-stressed, and post-tensioned structures
- Used in repair mortars and injection mixtures
- Corrosive environments including exposure to deicing salts, saline groundwater, airborne chlorides, and carbonation
- Marine and coastal structures, highways and bridges, parking decks, balconies, pools, concrete tanks, pilings, substructures, piers, pillars, pipes, and utility poles

ADVANTAGES

- Biobased (67%), awarded USA BioPreferred™ designation (www.biopreferred.gov)
- Earns credit towards LEED certification
- Lower toxicity and environmental impact than traditional corrosion inhibiting admixtures such as calcium nitrite
- Low dosage rate with minimal effect on concrete properties (i.e. workability, strength development, air entrainment, etc.)
- Single dosage rate which is independent of expected exposure to chlorides
- Ability to migrate through porous substrates (concrete, masonry, limestone, etc.) by capillary action, vapor diffusion and ionic attraction
- Meets all requirements of ASTM C1582
- Certified to meet ANSI/NSF Standard 61 for use on structures holding potable water
- Field and lab tested worldwide
- Complies with CSA S413, Section C1.2, for corrosion inhibiting
- Meets EN 934-2 requirements
- UFI: A630-K05W-N001-4GEM

MCI®-2005 Patented & CE EN 934-2

PHYSICAL PROPERTIES

Appearance	Clear dark brown liquid
pH	9.5-11.5 (1% solution)
Non-volatile Content	40.85 – 45.15%
Density	10.01 ± 0.25 lb/gal (1.2 ± 0,03 g/cm^3)
Shelf Life	24 months

DOSAGE

Add MCI®-2005 to concrete mix or repair mortars at 1 pt/yd^3 (0.6 L/m^3). Dosage is fixed and independent of chloride levels.

APPLICATION

MCI®-2005 is best added with the mix water into ready mix concrete at the plant. Alternatively, it can be dosed into the ready-mix truck using portable dosing equipment. Concrete should be mixed thoroughly before placement.

STANDARD TEST RESULTS

Slump	ASTM C143 EN 934-2:2012, T8	Neutral Pass
Air Content	ASTM C231 EN 934-2:2012, T8	Neutral Pass
Density	ASTM C138 EN 934-2:2012, T8	Neutral Pass
Set Time	ASTM C403 EN 934-2:2012, T8	Delayed Pass
Flexural Strength	ASTM C78	Improved
Compressive Strength	ASTM C192 EN 934-2:2012, T8	Improved Pass
Corrosion Properties	ASTM C1582 STM G180	Meets Requirements
Biobased Content	ASTM D6866	67%
Workability	N/A	No adverse effects when used with pozzolans or other high performance concrete admixtures
Corrosion properties when used as set retarding admixture	EN 934-1:2008	Pass

ASTM C1582 PHYSICAL PROPERTY RESULTS

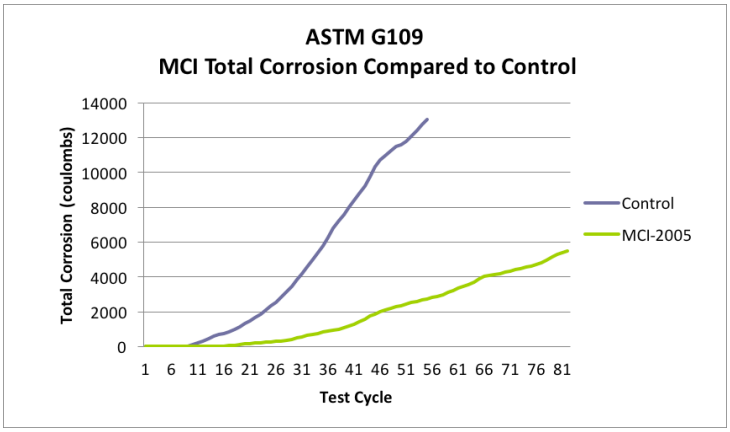
	Control	MCI 2005	Relative to Control	ASTM C1582 Requirement	Result
Setting Time					
Initial Set (Minutes)	312	431	+119	+/- 210 Min of Control	Meets Requirement
Final Set (Minutes)	404	524	+120	+/- 210 Min of Control	Meets Requirement
Compressive Strength					
3 Day (psi)	3290	3647	111%	Min 80% of Control	Meets Requirement
7 Day (psi)	4070	4377	108%	Min 80% of Control	Meets Requirement
28 Day (psi)	5143	5330	104%	Min 80% of Control	Meets Requirement
6 Month (psi)	6077	6650	109%	Min 80% of Control	Meets Requirement
1 Year (psi)	6463	6877	106%	Min 80% of Control	Meets Requirement
Flexural Strength					
3 Day (psi)	585	591	101%	Min 80% of Control	Meets Requirement
7 Day (psi)	661	691	104%	Min 80% of Control	Meets Requirement
28 Day (psi)	757	797	105%	Min 80% of Control	Meets Requirement
Shrinkage					
Length Change (%)	-0.025	-0.021	0.004	Max 0.010 Over Control	Meets Requirement
Durability					
Freeze/Thaw Durability	99.1	98.8	99.8	RDF 80%	Meets Requirement

ASTM C1582 CORROSION PROPERTIES - ASTM G180 RESULTS

Sample	Potential	Rp	1/Rp	Log (1/Rp)	Area (cm^2)	Dosage	Mean 1/Rp	SD 1/Rp	Log (1/Rp)	Log SD
	mV (SSC)	(Ohms)	(µS/cm^2)			(L/m^3)	(µS/cm^2)	(µS/cm^2)		
Cortec®-1	-509	8192	23.85	1.38	5.12	0.60	38.91	21.29	1.33	0.29
Cortec®-2	-530.6	3626	53.96	1.73	5.11					
Cortec®-3	-500.2	9373	20.85	1.32	5.12					
Cortec®-4	-457.9	24360	8.10	0.91	5.07					
Controls (13) Average of Results	-522.9 Average					0	394.71	214.21	2.49	0.35

The results from the inhibitor tests were compared to 13 control runs on the same steel heat, and using the same cement in lab database. The comparsison shows that MCI®-2005 reduces the corrosion current (1/Rp) by a factor of ten so it meets the ASTM C1582 requirement of being 1/8 the value (49.3 µS/cm^2) of the control specimens without inhibitor.

ASTM G109 RESULTS



ASTM G109 - Standard Test Method for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments

MCI®-2005 doubles the time to the onset of corrosion and reduces corrosion currents by 80% compared to untreated samples.

SET RETARDING EFFECTS ACCORDING TO EN 934-2:2012*

Property	Unit	Test results	
		Control	Test mixture
Slump – fresh mortar	mm	225	229
Water/cement ratio		0,50	0,49
Initial setting time	min	375	510
Difference of initial setting time		-	+135
Final setting time		530	645
Difference of final setting time		-	+115

*Test report number 72530-LB/20+21/20 INSTITUTE IGH d.d. Zagreb

CONSIDERATIONS

The use of MCI®-2005 causes a delay of initial setting time. The extent of this delay is dependent on the mix design, temperature and humidity. The combination of MCI®-2005 with certain superplasticizers can also increase the set delay experienced. Concrete properties are always best determined in a trial using the actual mix components. Cortec recommends a trial batch anytime you are using MCI®-2005 with new mix components. Consult with Cortecros Technical Support Department for further guidance if necessary.
Additional test information is available on request.

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CLASSIFIED UL US WATER QUALITY

USDA CERTIFIED BIOBASED PRODUCT PRODUCT 67%

ISO 9001 CERTIFIED QUALITY SYSTEM REGISTERED

ENVIRONMENTAL ISO 14001 CERTIFIED SYSTEM REGISTERED

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