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***Impedance Testing of MCI-2005 and MCI-2005 NS in Low
Density Concrete***

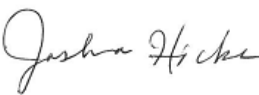
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Project #: 11-233-1425(bis)

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Background: The customer works on projects where concrete with a low water to cement ratio is used and they would like to determine if MCI is a valuable addition to the weaker concrete.

Method: EIS analysis

Materials: 3/8th inch diameter rebar
VpCI-395 Epoxy
Portland cement
Playground sand
MCI-2005 NS Batch # 10391
MCI-2005 Batch # 91211
Potentiostat

Procedure:

1. Prepare steel rebar by removing any rust with a wire wheel. The bars were then cut to 20 centimeters and submerged in methanol.
2. A coating of epoxy was applied to the bar leaving 5 cm sections uncoated at the top and in the center of the rebar. The coating was given 5 days to cure before the bars were cast into the samples of concrete.
3. Samples were mixed according to the table below.

	Inhibitor (g)	Water (g)	Type I Portland Cement (g)	Playground Sand (g)
Control	0	139	215	645
MCI-2005	0.3	139	215	645
MCI-2005 NS	0.5	139	215	645

4. The mortar samples were given 3 days to set up and then they were removed from the beaker molds. They were transferred into 5 gallon buckets with two 200 milliliter beakers of water and sealed for 25 days.
5. After 28 days the samples were removed and coated with epoxy leaving a 5 cm band around the circumference of the block uncoated. The epoxy layer was allowed to dry for 5 days.
6. Each of the blocks was placed into a beaker containing 3.5% sodium chloride for 20 hours after which time period the impedance was measured with the potentiostat to determine the corrosion rate.

Results:

Electrochemical Impedance Spectroscopy

	Rp (kohms)	i _{corr} (µA/cm ²)	Corrosion rate (µm/yr)
Control	5.226	5.980E-04	0.0069
MCI-2005	11.170	2.798E-04	0.0032
MCI-2005 NS	7.172	4.357E-04	0.0051

Interpretations:

1. Based on this EIS test both MCI-2005 and MCI-2005 NS effectively reduce the corrosion rate when used in concrete with a water cement ratio of 0.65. The EIS tests show that the condition
2. According to these test results, MCI-2005 reduces the corrosion by 53 percent and MCI-2005 NS reduces the corrosion by 27 percent.