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Evaluation of CORROSTOP-15 of Laal Chemicals – Final Report

1 Objective

To assess the performance of CORROSTOP-15 in inhibiting the corrosion of TMT steel embedded in cementitious system.

2 Experimental Program / Method Adopted

Linear Polarization Resistance (LPR) technique was adopted in this study. Table 1 shows the experimental design with the information on the mortar mix design, inhibitor type, recommended dosage, test type, and number of specimens. Figure 1 shows the schematic of lollipop test specimen. Four specimens each were cast with and without CORROSTOP-15. Specimens were cured for 28 days and then exposed to cyclic wet-dry exposure (2 days wet and 5 days dry) using 3.5% NaCl in simulated pore solution. The specimens were subjected to nine wet-dry cycles. The open circuit potential (OCP) and polarization resistance (Rp) were measured at the end of each wet period. Then, the corrosion rates were calculated using the measured Rp and an assumed Stern-Geary constant of 26 mV.

Table 1 Experimental design used for the test program.

Mortar (water:cement:sand)	Inhibitor type	Recommended dosage of inhibitor	Mix ID	Number of specimens
0.5:1:2.75	None	Nil	CM 0.5	4
0.5:1:2.75	CORROSTOP-15	4 ml/kg of cement	Laal 0.5	4

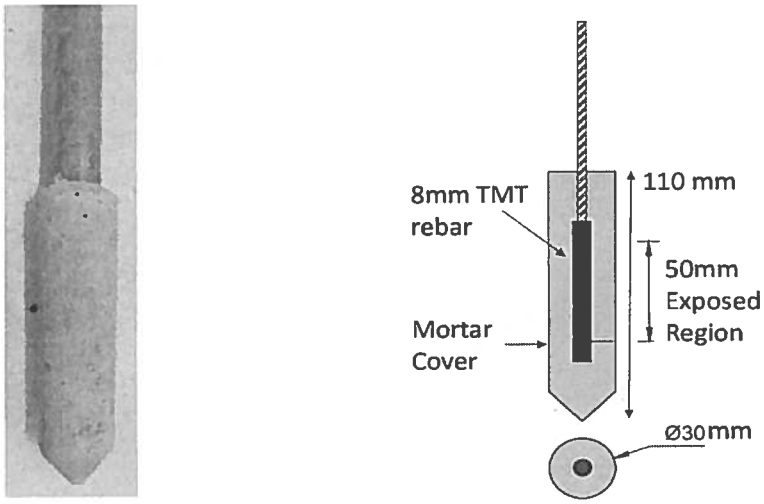

Figure 1 Schematics of the Lollipop specimens.

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3 Experimental Results

Figure 2(a) and (b) show the corrosion rate data from the control (CM) and CORROSTOP-15 (denoted as 'Laal' in graphs) specimens exposed for a period of about 120 days. The data is provided in Table 2. The control (CM) specimens (solid lines) exhibited higher corrosion rates at earlier exposure periods than the specimens with CORROSTOP-15 (dashed lines).

In general, the test results indicate that the addition of CORROSTOP-15 at a rate of 4 ml/kg of cement could enhance the corrosion resistance of concrete systems.

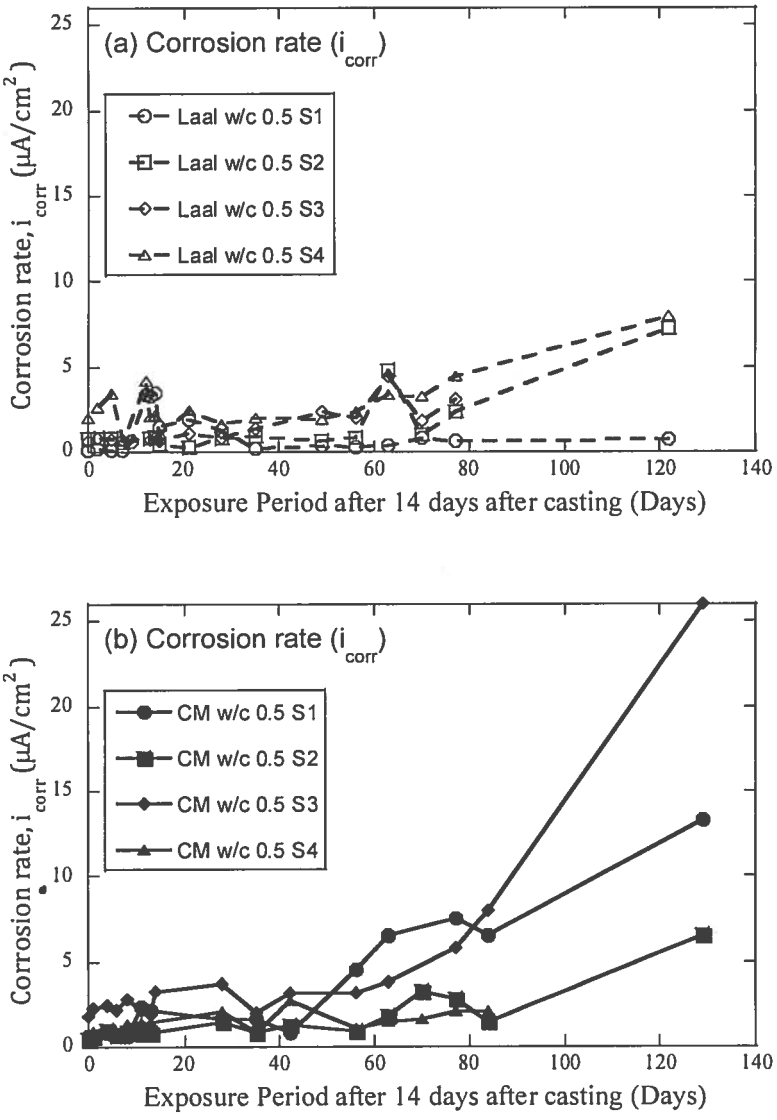

Figure 2 Corrosion rates observed on Lollipop specimens.

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Table 2 Corrosion rate data from the Laal and control specimens

Exposure time	Corrosion rate (microAmps/cm2)			
	Laal 1	Laal 2	Laal 3	Laal 4
0	0.11	0.82	0.66	2.02
2	0.15	0.81	0.78	2.65
5	0.13	0.84	0.69	3.46
7	0.12	0.56	0.70	0.66
9	0.62			
12	3.36			4.13
13	3.25	0.81	0.74	2.10
14	3.45	0.88	0.80	2.13
15	1.41	0.42	0.64	1.06
21	1.86	0.23	1.10	2.48
28	1.31	0.81	0.82	1.62
35	0.17	0.92	1.35	2.00
49	0.39	0.64	2.31	1.91
56	0.32	0.83	2.02	2.37
63	0.41	4.77	4.39	3.34
70	0.83	1.01	1.81	3.25
77	0.65	2.39	3.03	4.46
122	**0.71**	**7.24**		**7.98**

Exposure time	Corrosion rate (microAmps/cm2)			
	Control 1	Control 2	Control 3	Control 4
0	0.61	0.48	1.82	0.62
1	0.52	0.65	2.22	0.88
4	0.82	0.97	2.42	1.12
6	0.73	0.71	2.16	0.94
8	0.65	0.90	2.79	1.33
11	2.32	0.79	2.19	1.49
13	2.17	0.86	1.88	1.45
14			3.30	
21				
28	1.64	1.44	3.68	2.07
35	1.67	0.83	1.99	0.83
42	0.78	1.31	3.18	2.70
56	4.55	0.94	3.20	1.04
63	6.51	1.81	3.78	1.40
70		3.27		1.63
77	7.46	2.78	5.79	2.09
84	6.48	1.48	7.97	2.04
129	**13.30**	**6.52**	**26.00**	

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