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Report No: QRH02-4236
Client: Lanotec
Attention: Geoff Boyle
Address PO Box 360
Archerfield QLD 4108
Order No. 248
Job Description: Adhesion Testing of Coating Systems After Water Miscible RA1 Lanolin Was Applied to Concrete Formwork.



ETRS Pty Ltd
A.C.N. 006 353 046
A.B.N. 21 006 353 046
1 Acirl Street
Riverview Queensland
Australia 4303
PO Box 242
Booval Queensland
Australia 4304
Phone (07) 3282 2011
Fax (07) 3816 1107

INTRODUCTION

Lanotec Pty Ltd (the client) requested ETRS to perform adhesion testing of coatings systems applied to concrete blocks.

According to the client the timber formwork used to mould six concrete blocks (samples 1 to 6) was sprayed with a mix of water : water miscible RA-1 lanolin (ie samples 4, 5, and 6 were sprayed with a 2:1 mix. Samples 1, 2, and 3 with a 5:1 mix). The concrete was poured into the treated formwork, and the concrete allowed to cure for 28 days.

The client degreased half of each concrete block with the other half of each block being left untreated (ie not degreased).

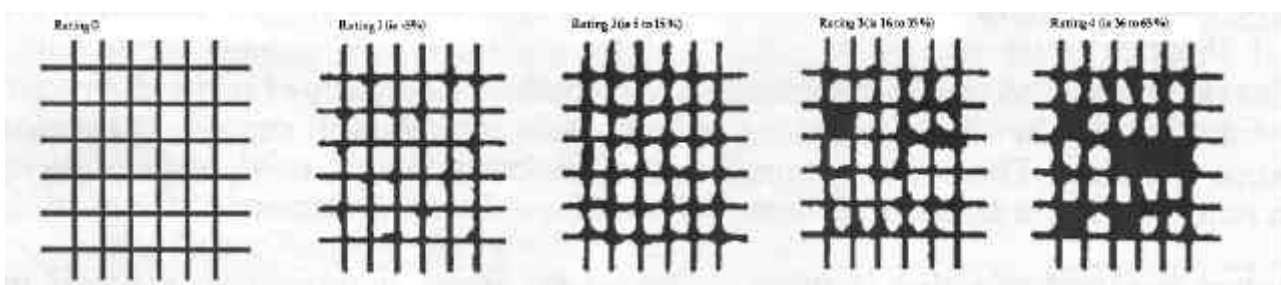
Two concrete blocks were left uncoated (samples 1 and 4), two were coated with an acrylic based coating system (white coating on samples 3 and 6) and two concrete blocks were coated with a two pack epoxy coating system (grey coating on samples 2 and 5).

PROCEDURE

Adhesion testing was performed in accordance with AS 1580.408 part 2, 4, and 5 “Paints and related materials - Methods of test - Adhesion”.

Knife method (AS 1580.408.2) scale is from 0 (good adhesion with no removal) to 5 (very poor adhesion with coating removable beyond the area subtended by the cuts).

Cross cut adhesion testing (AS 1580.408.4) uses the guide below as a reference. Rating 0 refers to minimal removal of coating, rating 1 refers to <5%, rating 2 refers to 5 to 15%, rating 3 refers to 15 to 35%, rating 4 refers to 35 to 65%, rating 5 (not shown) refers to >65% removal of the coating.



Pull-off testing (AS 1580.408.5) was performed using an Elcometer (model 106) adhesion tester and aluminium dollies¹ adhered² to the horizontal surface of the submitted concrete slabs.

RESULTS

Table 1 – Adhesion testing of submitted concrete blocks (coated and non-coated).

Sample Number and Identification	Average Adhesion ³ MPa	Failure location of three test sites.	Adhesion	
			Knife	Cross Cut
Sample 1 – No coating system applied Formwork treated with 5:1 (Water : RA1) Degreased half.	3.2	All three locations was a cohesion failure of the concrete (i.e. substrate)	Not Tested	
Sample 1 – No coating system applied Formwork treated with 5:1 (Water : RA1) Untreated half.	2.3	All three locations was a cohesion failure of the concrete (i.e. substrate)	Not Tested	
Sample 2 –epoxy coating system applied. Formwork treated with 5:1 (Water : RA1) Degreased half.	1.8	All showed cohesive failure of the concrete except for 10% of test site 1 which showed cohesion failure of the epoxy coating.	0	0
Sample 2 –epoxy coating system applied. Formwork treated with 5:1 (Water : RA1) Untreated half.	1.0	All three locations was a cohesion failure of the concrete (i.e. substrate)	0	0
Sample 3 – Acrylic based coating system applied. Formwork treated with 5:1 (Water : RA1) Degreased half.	2.1	Test sites showed a cohesive failure of the concrete and coating system.	0	0
Sample 3 – Acrylic based coating system applied. Formwork treated with 5:1 (Water : RA1) Untreated half.	0.75	Test sites showed a cohesive failure of the concrete and coating system.	0	0
Sample 4 – No coating system applied. Formwork treated with 2:1 (Water : RA1) Degreased half.	1.2	All three locations was a cohesion failure of the concrete (i.e. substrate)	Not Tested	
Sample 4 – No coating system applied. Formwork treated with 2:1 (Water : RA1) Untreated half.	1.3	All three locations was a cohesion failure of the concrete (i.e. substrate)	Not Tested	
Sample 5 –epoxy coating system applied. Formwork treated with 2:1 (Water : RA1) Degreased half.	0.8	Majority of test sites was a cohesion failure of the concrete. (i.e. substrate)	0	0
Sample 5 –epoxy coating system applied. Formwork treated with 2:1 (Water : RA1) Untreated half.	1.5	All three locations was a cohesion failure of the concrete (i.e. substrate)	0	0
Sample 6 – Acrylic based coating system applied. Formwork treated with 2:1 (Water : RA1) Degreased half.	2.1	Majority of test sites was a cohesion failure of the concrete. (i.e. substrate)	0	0
Sample 6 – Acrylic based coating system applied. Formwork treated with 2:1 (Water : RA1) Untreated half.	0.4	All three locations was a cohesion failure of the concrete (i.e. substrate)	0	0

Pull-off adhesion testing of the coating systems above showed the majority was a cohesive failure of the substrate (ie the concrete). The results vary quite substantially most likely due to the concrete strength in different areas. This indicates adhesion of the applied coating system is greater than the cohesive strength of the substrate (ie concrete).

1 Six dollies were positioned on each concrete block (i.e. three dollies for each degreased and untreated section.)

2 A two pack epoxy glue was allowed to cure for a minimum of 24 hrs at approximately 25°C

3 Refer to ETRS report dated 8 April 2002. Report number QRH02-4104

Knife test and cross cut adhesion testing showed that water miscible RA1 lanolin applied to the formwork did not cause poor adhesion of the coating systems applied to the concrete blocks.

SUMMARY

Adhesion testing as per AS1580.408 methods 2, 4 and 5 indicate, the use of formwork treated with water miscible RA-1 lanolin did not cause adhesion failure of the coating system at the coating/concrete interface of coating systems (ie 2-pack epoxy & acrylic) to the cured concrete.

For further information with regard to this, please contact Lanotec Australia Pty Ltd



Matthew Johnson
Materials & Process Chemist



Corporate Signatory

Supervising Consultant:

Roger Mendel
Senior Materials & Process Chemist

APPENDIX A



Figure 1 04080003
View of sample 1 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate.



Figure 2 04080007
View of sample 1 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate.



Figure 3
View of sample 2 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate.

04080011



Figure 4
View of sample 2 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate.

04080015



Figure 5

04080019

View of sample 3 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate and coating. Figure shows no adhesive failure of the coating system.



Figure 6

04080023

View of sample 3 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate and coating. Figure shows no adhesive failure of the coating system.



Figure 7 04080029
View of sample 4 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate.



Figure 8 04080033
View of sample 4 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate.



Figure 9

04080037

View of sample 5 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate. Test point 5Db shows the glue used to adhere the dolly to the coating had failed. Figure shows no adhesive failure of the coating system.



Figure 10

04080041

View of sample 5 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate. Figure shows no adhesive failure of the coating system.



Figure 11

04080045

View of sample 6 (degreased) after dolly adhesion testing showing cohesive failure of the concrete substrate and coating. Figure shows no adhesive failure of the coating system.

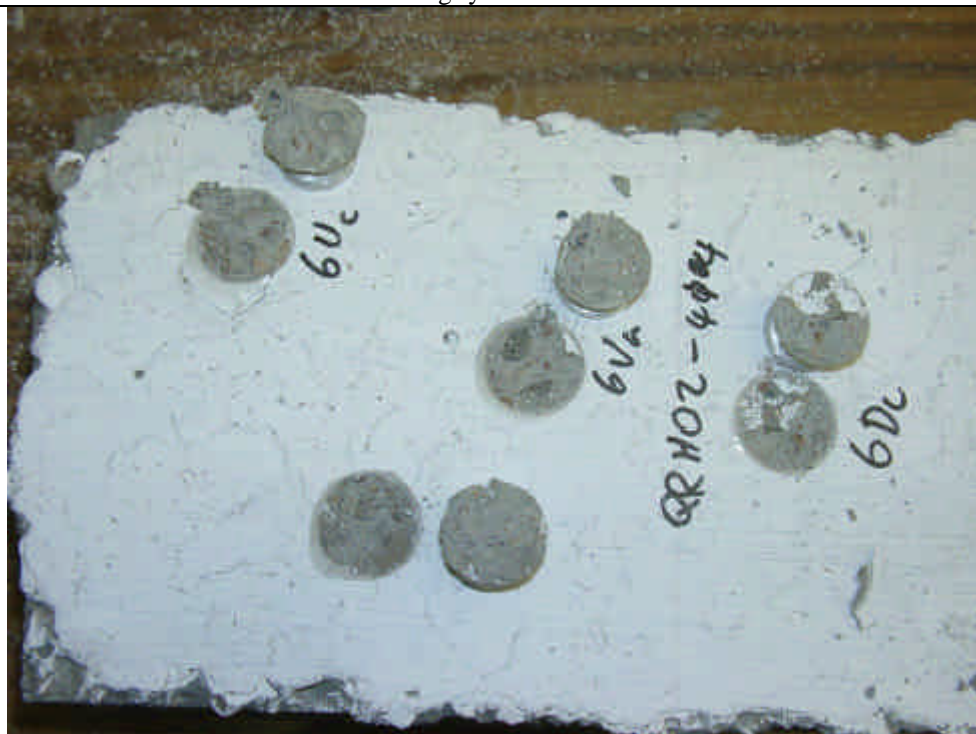


Figure 12

04080050

View of sample 6 (untreated) after dolly adhesion testing showing cohesive failure of the concrete substrate. Figure shows no adhesive failure of the coating system.