

SETSCO SERVICES PTE LTD

RECEIVED

1 4 MAY 2010

18 Teban Gardens Crescent Singapore 608925

Tel: (65) 6566 7777 Fax: (65) 6566 7718 Website: www.setsco.com Business Reg. No. 196900269D ACCOUNTS DEPT

Your Ref.:-

Our Ref.: CT-13069/JAS

Date: 11/03/2010

(This Report is issued subject to the terms & conditions set out below)

Page 1 of 4

Subject

Determination of Water Sorptivity Test and Depth of penetration of Protectosil®

BHN silane on concrete substrate cores submitted by Evonik Degussa (SEA)

Pte Ltd on 01/02/2010.

Tested for

Evonik Degussa GmbH

Weissfrauenstrasse 9 60287 Frankfurt am Main

GERMANY.

Method of Test:

1) Water Sorptivity Test

BS EN 13057: 2002 Adopted

2) Depth of Penetration

BS EN 1504-2:2004 Adopted

Description of :

Sample

Seven numbers (7) of 150mm Grade 45concrete and one bottle of

Protectosil® BHN approximately 2 liters was received

Mix Design of Concrete as provided by client:

Target Mean Strength : 53N/mm2
Cement : 420kg/m³
Fine Aggregate : 779kg/m³
Coarse Aggregate : 999kg/m³

Water : 160kg/m³

Free Water/Cement ratio : 0.36
Admix 1(Daratard 91) : 500ml/per

Admix 1(Daratard 91) : 500ml/per 100kg of cement
Admix 2 (Daracem 130 : 1000ml/per 100kg of cement

Admix 3 (DCI-S) : 10 liters per meter cubic of concrete

v commi

erms & conditions:

- (1) The Report is prepared for the sole use of the Client and is prepared based upon the Item submitted, the services required by the Client and the conditions under which the Services are performed by SETSCO. The Report is not intended to be representative of similar or equivalent Services on similar or equivalent Items. The Report does not constitute an endorsement by SETSCO of the item.
- (2) SETSCO agrees to use reasonable diligence in the performance of the Services but no warranties are given and none may be implied directly or indirectly relating to the Services, the Report or the facilities of SETSCO.
- (3) The Report may not be used in any publicity material without the written consent of SETSCO.
- (4) The Report may not be reproduced in part or in full unless approval in writing has been given by SETSCO.
- (5) SETSCO shall under no circumstances be liable to the Client or its agents, servants or representatives, in contract, tort (including negligence or breach of statutory duty) or otherwise for any direct or indirect loss or damage suffered by the Client, its agents, servants or representative howsoever arising or whether connected with the Services provided by SETSCO herein.

CT-13069/JAS Page 2 of 4

Application Preparation and Testing for Water Sorptivity Test

- 1) Four 150mm cubes surface to be applied was wire brushed and cleaned before application was cleaned and dry.
- 2) A coat of Protectosil® BHN was applied onto the dry clean surface at coverage of 150g/m².
- 3) A second coat at the same coverage was applied once the first was dry (approximately 1 hour later)
- 4) The applied cubes were cure in air for 3 days before the samples of 50mm cores were cored out for the applied surface.
- 5) A layer of epoxy was applied around the side surface of the concrete core leaving only the test surface (applied surface) exposed.
- 6) The concrete core was conditioned in an oven at 40°C for 48 hrs until constant weight was achieved before the test was conducted.
- 7) The test surface of each test specimen was placed on supports in a shallow tray containing water such that the depth of immersion up the sides of each specimen was 2 ± 1mm at 23°C.
- 8) The cores were removed at interval of 5, 10, 30, 60, 120 and 240 minutes, swabbed dry and weighed. Then immediately placed back on the test bed until all time intervals were completed.
- 9) A total of three (3) treated cores and three (3) control cores were tested for water sorptivity.

Testing Procedure for Depth of Penetration

- 1) One of treated cube was cut open in a plane perpendicular to the applied area.
- 2) The freshly exposed faces were wet with a spray of plain water. The water was absorbed into the inner untreated concrete but not into the effected outer layer, which shows water repellency.
- 3) The penetration depth of Protectosil® BHN was measured with a pair of vernier calipers. Three evenly spaced measurements were taken around the perimeter of one face of each cube. The average value was calculated and reported as the depth of penetration.

Results:

- 1. The results of the dimensional measurement and water sorptivity test are give in Table 1.
- 2. The results of the Depth of Penetration of Protectosi® BHN given in Table 2.

Ravi Vaiamalai Testing Officer

Jasbeer Singh Assistant Engineer

Construction Technology Division



Results:

Table 1: Water Sorptivity of Cores Samples

Sample Reference		Control			Protectosil® BHN 72 hours			
It shows that after the Specimen Reference		C1	C2	C3	T1	T2	Т3	
Surface area of test face (m ²)		0.002	0.002	0.002	0.002	0.003	0.002	
Height of specimen (mm)		78.4	76.7	79.0	75.3	78.8	75.2	
Time		Matou I Intoleo (km/m²)						
(min)	(h^0.5)	Water Uptake (kg/m²)						
0	0	0	0	0	0	0	0	
5	0.29	0.2514	0.2133	0.2038	0.0326	0.0395	0.0401	
15	0.50	0.3791	0.3446	0.3628	0.0489	0.0473	0.0522	
30	0.71	0.5027	0.4636	0.4892	0.0775	0.0592	0.0642	
60	1	0.5893	0.5046	0.5218	0.0898	0.0671	0.0802	
120	1.41	0.7047	0.5825	0.6115	0.0979	0.0749	0.0923	
240	2	0.7253	0.5948	0.6319	0.1142	0.0868	0.1043	
Sorption Coefficient (Kg/m²hr ^{0.5})		0.3428	0.2749	0.2946	0.0541	0.037	0.0472	
Ave Sorption Coefficient (Kg/m²hr ^{0.5})		0.3041			0.0461			
Sorption Coefficient (mm/min ^{0.5})		0.0443	0.0355	0.0380	0.0069	0.0048	0.0061	
Ave Sorption Coefficient (mm/min ^{0.5})		0.0393			0.0059			

Table 2: Depth of Penetration of Protectosil® BHN into Concrete Specimens

Sample Refere	nce	Protectosil® BHN 72 hours		
	1	5.49	5.81	
Depth of Penetration of Protectosil® BHN (mm)	2	4.89	4.34	
	3	3.62	3.85	
Average Penetration of Protec	tosil® BHN (mm)	4.7		

Remarks: The measurements were randomly selected at six evenly spaced points.







Photograph 1 Shows one bottle of Protectosil® BHN as received.

