



TESTECH SDN. BHD. (207361-H)

Materials, Structures and Geotechnical Testing

8, Jalan 30B/146, Desa Tasik, Sg. Besi, 57000 Kuala Lumpur, West Malaysia.
Tel: 03-90593587, 90593589 Fax: 03-90593455
E-mail: inquiry@testech.com.my Website: www.testech.com.my
North Office: 48, Jalan Perusahaan Jelutong 1, 11600 Pulau Pinang, West Malaysia.
Tel: 04-2886551, 2886552 Fax: 04-2886550
E-mail: penang@testech.com.my
GST No. 000782290944



TEST REPORT

ISSUED BY : KUALA LUMPUR OFFICE REPORT NO. : MIS 026/18/R 0310
DATE : 27-Apr-18 PAGE NO. : 1 OF 14

- 1 Test Requested :
1. Density, Absorption and Voids in Hardened Concrete.
*2. Scaling Resistance of Concrete surface exposed to deicing Chemicals.
3. Rapid Chloride Permeability Test.
*4. Apparent Chloride Diffusion Coefficient of Cementitious Mixture by Bulk Diffusion.
*5. Dry Film Thickness of Protective Coating (By Destructive Means)
*6. Wet Film Thickness Average Coating Thickness
*7. Carbon Dioxide Permeability for Coating Materials
*8. Water Vapour Transmission (Wet-Cup Method)
- 2 Customer :
DRITECH CHEMICALS SDN BHD
23-3a, Oval Damansara 685
Jalan Damansara
60000 Kuala Lumpur.
- 3 Project :
Mass Rapid Transit (MRT2).
- 4 Date Tested :
5-Mar-18 to 19-Apr-18
- 5 Category of Testing :
Laboratory Testing
- 6 Test Method :
- ASTM C642, ASTM C672, ASTM C 1202, ASTM C1556,
ASTM D4138, ASTM D4414, BS EN 1062 & BS EN ISO 7783.
- 7 Equipment Serial No. :
- E2/2(Balance), E3/6(Caliper), E9/2A(Oven),
E15/2(Digital Multimeter) - Traceable to Pyrometro.
- 8 Remarks :
a) The above test is solely based on the sample submitted by customer.
b) No copy of this report is valid without special original red stamp.
c) * Item no. 2, 4, 5, 6, 7 and 8 are NOT SAMM Accredited.

The accuracy of test measurements are probability at 95% confidence level.

Copyright of this test report is owned by the issuing laboratory and may not be reproduced other than in full except with the prior written approved of the Head of the issuing laboratory

REPORT NO. : MIS 026/18/R 0310
PAGE NO. : 2 OF 14

Customer : DRITECH CHEMICALS SDN BHD
Project : Mass Rapid Transit (MRT2).
Sample Description : System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).
Source : Dritech Chemicals Sdn Bhd Lab.Ref : C246/18

SUMMARY OF TEST RESULTS

Item	Description	Test Results	
		Treated	Control
1	Density, Absorption, and Voids (Porosity)		
	- Absorption after immersion for 36 hours (%)	0.42	2.25
	- Volume of permeable voids (%)	0.45	2.85
	- Percentage Improvement for Water Absorption as per Control Specimen is (%)	81.3	
2	Scaling Resistance after 50 cycles	No Effect	
3	Rapid Chloride Permeability Test (Corrected charge passed) (coulombs)	22.10	225.10
	- Percentage Improvement for RCPT as per Control Specimen is (%)	90.1	
4	Apparent Chloride Diffusion Coefficient (m ² /s)	7.37E-14	
5	Dry Film Thickness (μm)	170	
6	Wet Film Thickness Average Coating Thickness (μm)	450.0	
7	Carbon Dioxide Permeability (Carrier Gas) Equivalent air layer thickness (m)	272.3	
8	Water Vapour Transmission (g/m ² .d)	16.46	

Certified by,


Yap Sew Keong
Technical Manager



Prepared by: Aida
Checked by: Aifa

Lab.Ref : C246/18

REPORT NO. : MIS 026/18/R 0310
 PAGE NO. : 3 OF 14

DENSITY, ABSORPTION AND VOIDS IN HARDENED CONCRETE

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Sample Description : **System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).**
 Source : Dritech Chemicals Sdn Bhd
 Date Tested : 15-Mar-18
 Tested by : Ken
 Test Environmental Condition :-
 Temperature, °C : 28.8 - 30.9
 Relative Humidity (RH), % : 65.0 - 68.0

TEST METHOD : ASTM C 642-13

Sample Reference			Treated		Control
			1	2	1
Mass of oven dry sample in air	= A	(g)	738.5	724.5	737.4
Mass of surface dry sample in air after immersion in water	= B	(g)	741.5	727.2	753.9
Mass of surface dry sample in air after immersion and boiling	= C	(g)	741.7	727.4	754.0
Apparent Mass of sample in water after immersion	= D	(g)	408.4	400.9	418.8

RESULTS

ABSORPTION AFTER IMMERSION IN WATER	$= \frac{B - A}{A} \times 100$	(%)	0.41	0.37	2.24
ABSORPTION AFTER IMMERSION FOR 36 HOURS	$= \frac{C - A}{A} \times 100$	(%)	0.43	0.40	2.25
			0.42		2.25
BULK DENSITY - SURFACE DRY, ρ	$= \frac{A}{C - D}$	(Mg/m ³)	2.22	2.22	2.20
BULK DENSITY AFTER IMMERSION, ρ	$= \frac{B}{C - D}$	(Mg/m ³)	2.22	2.23	2.25
BULK DENSITY AFTER IMMERSION FOR 36 HOURS, ρ	$= \frac{C}{C - D}$, (g ₁)	(Mg/m ³)	2.23	2.23	2.25
APPARENT DENSITY, ρ	$= \frac{A}{A - D}$, (g ₂)	(Mg/m ³)	2.24	2.24	2.32
VOLUME OF PERMEABLE VOIDS	$= \frac{g_2 - g_1}{g_2} \times 100$	(%)	0.45	0.45	2.85
			0.45		2.85

Measurement uncertainty.

Sample reference	Bulk Density After Immersion for 36 hours, ρ (Mg/m ³)	Apparent Density, ρ (Mg/m ³)	Volume of Permeable Voids (%)
Treated 1	± 0.02	± 0.02	± 0.01
Treated 2	± 0.02	± 0.02	± 0.01
Control 1	± 0.02	± 0.03	± 0.04

Note : Without boiling procedure due to coating did not provide breathing for internal air.

Remarks : Percentage Improvement for Water Absorption as per Control Specimen is : 81.3%

Certified by

Yap Sow Keong
 Technical Manager



Prepared by : Aida
 Checked by : Afifa

Lab.Ref : C246/18

REPORT NO. : MIS 026/18/R 0310
 PAGE NO. : 4 OF 14

SCALING RESISTANCE OF CONCRETE SURFACES EXPOSED TO DEICING CHEMICALS

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Sample Description : **System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).**
 Substrate Mix Details : 40 MPa Concrete
 Source : Dritech Chemicals Sdn Bhd
 Type of Deicer Used : Calcium Chloride
 Rate of Application : 4g of Anhydrous Calcium Chloride for 100ml of water
 Specimen Conditioning Procedure : Ambient Room
 Freezing Cabinet S/N : E20/04 Balance S/N : E02/02
 Tested by : Ken Date Tested : 05-Mar-18

Test Environmental Condition :- Temperature, °C : 27.0 - 29.6
 Relative Humidity (RH), % : 58.0 - 60.0

TEST METHOD : ASTM C 672-01 (2012)(Method B)

Sample Reference	Examination for Visual Rating of the Test Specimen Surface after Prescript Exposed Cycles					Remarks
	5	10	15	25	50	
1	0	0	0	0	0	Slight loss of gloss and discolouration
2	0	0	0	0	0	
3	0	0	0	0	0	

Results : After 50 cycles Exposed no Scaling effect.

Notes : 1) Place specimens in a freezing environment for 16 to 18h. At the end of this time remove them from the freezer and place them in laboratory air at $23 \pm 2.0^{\circ}\text{C}$ [$73.5 \pm 3.5^{\circ}\text{F}$] and a relative humidity of 45 to 55% for 6 to 8 h. Add water between each cycle as necessary to maintain the proper depth of solution. Repeat this cycle daily, flushing off the surface thoroughly at the end of each 5 cycles. After making a visual examination, replace the solution and continue the test.

2)

Rating	Condition of Surface
0	no Scaling
1	very slight scaling (3 mm [1/8 in.] depth, max, no coarse aggregate visible)
2	slight to moderate scaling
3	moderate scaling (some coarse aggregate visible)
4	moderate to severe scaling

Certified by

Yap Seow Keong
 Technical Manager



Prepared by : Aida
 Checked by : Aftfa

Lab.Ref : C246/18

Customer : DRITECH CHEMICALS SDN BHD
Project : Mass Rapid Transit (MRT2).
Sample Description : System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).

SUMMARY OF RAPID CHLORIDE PERMEABILITY TEST RESULT

Structure	Date of Casting	Specimen Reference	Corrected charge passed (coulombs)		* Relative chloride permeability
			Specimen	Average	
System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800) - Treated Specimen.	-	1	28.7	22.1	Negligible
		2	16.8		Negligible
		3	20.8		Negligible
Control Specimen (Without Coating)	-	C1	225.1	225.1	Very Low

Note :
1. * Refer ASTM C1202-12, Table X1.1

Table X1.1 : Chloride ion penetrability based on charge passed.

Charge passed (coulombs)	Chloride Ion Penetrability
> 4,000	High
>2,000 - 4,000	Moderate
>1,000 - 2,000	Low
100 - 1,000	Very Low
< 100	Negligible

Certified by,

Yap Seow Keong
Yap Seow Keong
Technical Manager



Prepared by : Aida
Checked by : Afifa

Lab.Ref : C246/18

REPORT NO. : MIS 026/18/R 0310

PAGE NO. : 6 OF 14

RAPID CHLORIDE PERMEABILITY TEST

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Structure : System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800) - Treated Specimen.
 Tested by : Zul
 Type of Specimen received : Cube Type of Concrete : Normal Curing History of Specimen : Moist Curing
 Test Environmental Condition : Temperature, °C : 25.2 - 25.4 Relative Humidity(RH) ,% : 42.0
 Test Method : ASTM C1202 - 12.

Specimen Reference		1					2					3				
Location of specimen within core		Middle					Middle					Middle				
Diameter of specimen (mm)		100.0					100.0					100.0				
Length of specimen (mm)		50.0					50.0					50.0				
*Date of casting		-					-					-				
*Date of Testing		13-Mar-18					13-Mar-18					13-Mar-18				
Age at time of test (days)		-					-					-				
Density of specimen (kg/m ³)		2250					2240					2240				
Resistor, R (Ohms)		1					1					1				
Initial Temperature of Specimen (°C)		27.4					27.4					27.4				
Applied Voltage Cell (°C)		24.6					24.6					24.6				
Time	Elapse Time (Hours)	Air Temp. °C	Voltage, (millivolt)		Current, I (milliamperes)		Temperature, °C		Voltage, (millivolt)		Current, I (milliamperes)		Temperature, °C			
			NaCl	NaOH	NaCl	NaOH	NaCl	NaOH	NaCl	NaOH	NaCl	NaOH	NaCl	NaOH		
10:30 AM	0:0 (Initial)	25.2	0.4	0.4	25.1	25.1	0.4	0.4	25.2	25.1	0.4	0.4	25.1	25.0		
11:00 AM	0:30	25.2	0.9	0.9	25.1	25.1	0.6	0.6	25.2	25.1	0.7	0.7	25.1	25.1		
11:30 AM	1:00	25.2	1.0	1.0	25.2	25.1	0.7	0.7	25.2	25.2	0.8	0.8	25.2	25.1		
12:00 PM	1:30	25.2	1.3	1.3	25.2	25.2	0.8	0.8	25.2	25.2	1.0	1.0	25.2	25.1		
12:30 PM	2:00	25.3	1.5	1.5	25.3	25.3	0.8	0.8	25.3	25.3	1.1	1.1	25.2	25.2		
1:00 PM	2:30	25.3	1.7	1.7	25.3	25.3	0.9	0.9	25.3	25.3	1.2	1.2	25.3	25.3		
1:30 PM	3:00	25.4	1.7	1.7	25.4	25.3	0.9	0.9	25.3	25.3	1.2	1.2	25.3	25.3		
2:00 PM	3:30	25.4	1.7	1.7	25.4	25.3	0.9	0.9	25.3	25.3	1.2	1.2	25.3	25.3		
2:30 PM	4:00	25.4	1.7	1.7	25.4	25.4	0.9	0.9	25.4	25.3	1.2	1.2	25.3	25.3		
3:00 PM	4:30	25.4	1.7	1.7	25.5	25.4	1.0	1.0	25.4	25.3	1.2	1.2	25.3	25.3		
3:30 PM	5:00	25.4	1.7	1.7	25.5	25.4	1.0	1.0	25.4	25.4	1.2	1.2	25.4	25.3		
4:00 PM	5:30	25.4	1.7	1.7	25.5	25.5	1.1	1.1	25.4	25.4	1.2	1.2	25.4	25.3		
4:30 PM	6:00	25.4	1.7	1.7	25.5	25.5	1.1	1.1	25.4	25.4	1.2	1.2	25.4	25.3		

Sample Reference	1	2	3
Maximum current recorded (mA)	1.7	1.1	1.2
Total Charge passed during the 6 hours period $Q = 900 (I_0 + 2I_{30} + 2I_{60} + \dots + 2I_{330} + I_{360})$, where Q = charge passed (coulombs) I ₀ = current (amperes) immediately after voltage is applied. I _t = current (amperes) at t min after voltage is applied	31.8	18.6	23.0
Corrected charge passed $Q_s = Q_x \times \left[\frac{95}{x} \right]^2$ Q _s = charge passed (coulombs) through a 95mm diameter specimen Q _x = charge passed (coulombs) through x in. dia. Specimen. x = diameter (in.) of the non standard specimen	28.7	16.8	20.8
Average Corrected charge passed (Coulombs)	22.1		
Measurement Uncertainty (%)	± 2.61	± 3.32	± 2.97

Remarks :- Percentage Improvement for RCPT as per Control Specimen is : 90.1%

Prepared by : Aida
 Checked by : Affa

Lab.Ref : C246/18

REPORT NO. : MIS 026/18/R 0310
 PAGE NO. : 7 OF 14

RAPID CHLORIDE PERMEABILITY TEST

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 *Structure : Control Specimen (Without Coating)
 Tested by : Zul
 Type of Specimen received : Cube Type of Concrete : Normal Curing History of Specimen : Moist Curing
 Test Environmental Condition : Temperature, °C : 25.2 - 25.4 Relative Humidity(RH) ,% : 42.0
 Test Method : ASTM C1202 - 12.

Specimen Reference		C1											
Location of specimen within core		Middle											
Diameter of specimen	(mm)	100.0											
Length of specimen	(mm)	50.0											
*Date of casting		-											
*Date of Testing		13-Mar-18											
Age at time of test		(days) -											
Density of specimen		(kg/m ³) 2240											
Resistor, R		(Ohms) 1											
Initial Temperature of Specimen		(°C) 27.4											
Applied Voltage Cell		(°C) 24.6											
Time	Elapse Time (Hours)	Air Temp. °C	Voltage, (millivolt)	Current, I (milliamps)	Temperature, °C								
					NaCl	NaOH							
10:30 AM	0:0 (Initial)	25.2	6.6	6.6	25.3	25.3							
11:00 AM	0:30	25.2	8.1	8.1	25.3	25.3							
11:30 AM	1:00	25.2	9.0	9.0	25.4	25.3							
12:00 PM	1:30	25.2	9.9	9.9	25.4	25.3							
12:30 PM	2:00	25.2	10.6	10.6	25.5	25.4							
1:00 PM	2:30	25.3	11.9	11.9	25.5	25.5							
1:30 PM	3:00	25.3	12.4	12.4	25.6	25.6							
2:00 PM	3:30	25.4	12.8	12.8	25.7	25.6							
2:30 PM	4:00	25.4	13.0	13.0	25.7	25.6							
3:00 PM	4:30	25.4	13.1	13.1	25.8	25.7							
3:30 PM	5:00	25.4	13.5	13.5	25.8	25.8							
4:00 PM	5:30	25.4	13.9	13.9	25.9	25.9							
4:30 PM	6:00	25.4	14.1	14.1	25.9	25.9							

Sample Reference	C1		
Maximum current recorded	mA	14.1	
Total Charge passed during the 6 hours period $Q = 900 (I_0 + 2I_{30} + 2I_{60} + \dots + 2I_{330} + I_{360})$, where Q = charge passed (coulombs) I ₀ = current (amperes) immediately after voltage is applied. I _t = current (amperes) at t min after voltage is applied		249.4	
Corrected charge passed $Q_s = Q_x \times \left[\frac{95}{x} \right]^2$ Q _s = charge passed (coulombs) through a 95mm diameter specimen Q _x = charge passed (coulombs) through x in. dia. Specimen. x = diameter (in.) of the non standard specimen		225.1	
Average Corrected charge passed	(Coulombs)	225.1	
Measurement Uncertainty	(%)	± 1.40	

Prepared by : Aida
 Checked by : Aifa

Lab. Ref : C246/18

REPORT NO. : MIS 026/18/R 0310

PAGE NO. : 8 OF 14

**DETERMINING THE APPARENT CHLORIDE DIFFUSION COEFFICIENT OF
 CEMENTITIOUS MIXTURE BY BULK DIFFUSION**

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Sample Description : System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).
 Source : Dritech Chemicals Sdn Bhd
 Method of Sampling : Grinding Dust Powder Sampling Date : 16-Apr-18
 Date Start Submersion : 21-Feb-18 Mixture Details : G40 MPa
 Period of Exposure : 56 days Curing Employed : Air Cure
 Date Tested for Chloride : 18-Apr-18 Tested by : Ken
 Test Environmental Condition :- Temperature, °C : 27.0 - 29.5
 Relative Humidity (RH), % : 56.0 - 59.0

TEST METHOD : ASTM C 1556 - 11a (2016)

Sample Reference	Control	Primer (Digard AC 800) & Top Coat (Digard AC800)		
		1	2	3
Specimen No.	1	1	2	3
Specimen Exposure Time, <i>t</i> (s)	4838400	4838400	4838400	4838400
Initial Chloride - Ion Concentration of the Sample, <i>C_i</i> (% m/m)	0.0015	0.0010	0.0010	0.0010
Depth Below Exposed Surface, <i>x</i> (m)	0.0010	0.0010	0.0010	0.0010
Chloride - Ion Concentration Measure at Depth, <i>x</i> and Exposed Time, <i>t</i> , <i>C(x,t)</i> (% m/m)	0.0057	0.0013	0.0015	0.0016
Projected Chloride Concentration at the Interface between Exposure Liquid and Test Specimen Determine by Regression Analysis, <i>C_s</i> (% m/m)	0.0085	0.0032	0.0041	0.0045
Apparent Chloride Diffusion Coefficient, <i>D_a</i> (m ² /s)	1.83E-12	6.60E-14	7.54E-14	7.97E-14
Average	1.83E-12	7.37E-14		

Note : Submersion exposure liquid (165 ± 1 g NaCl per litre water)

Certified By,

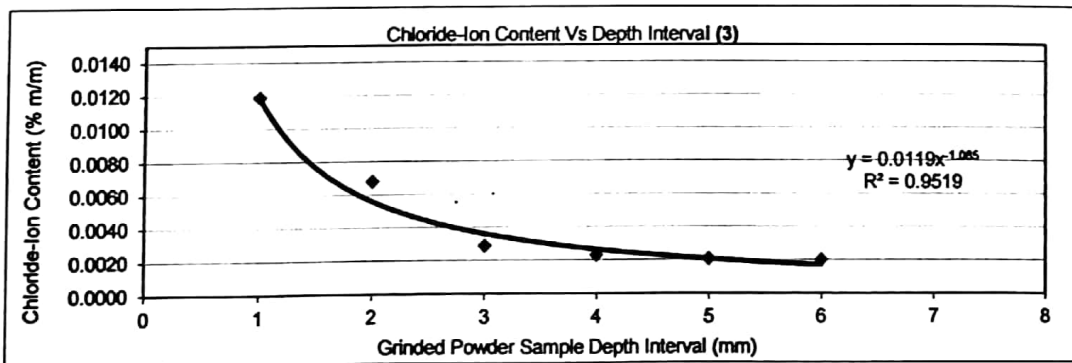
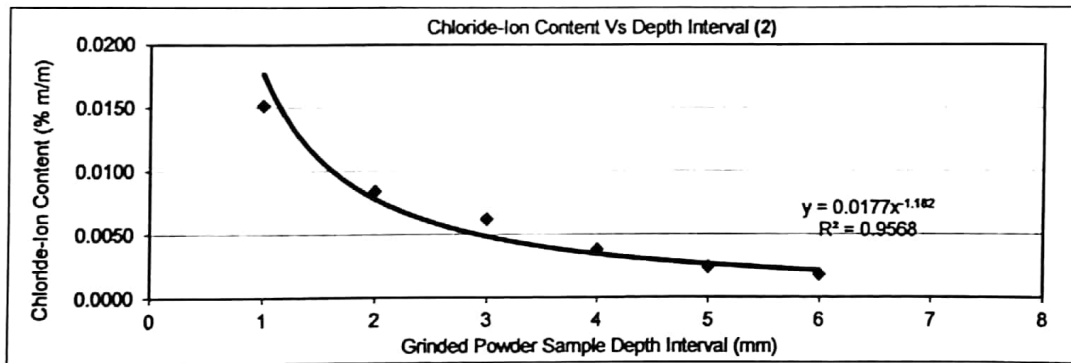
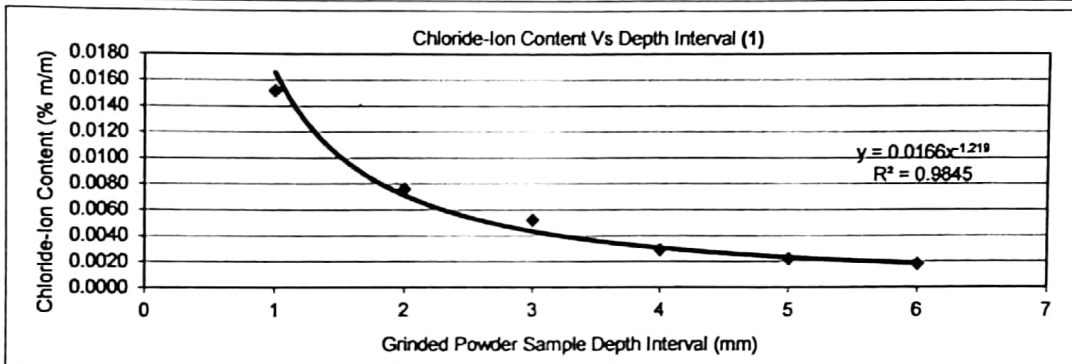
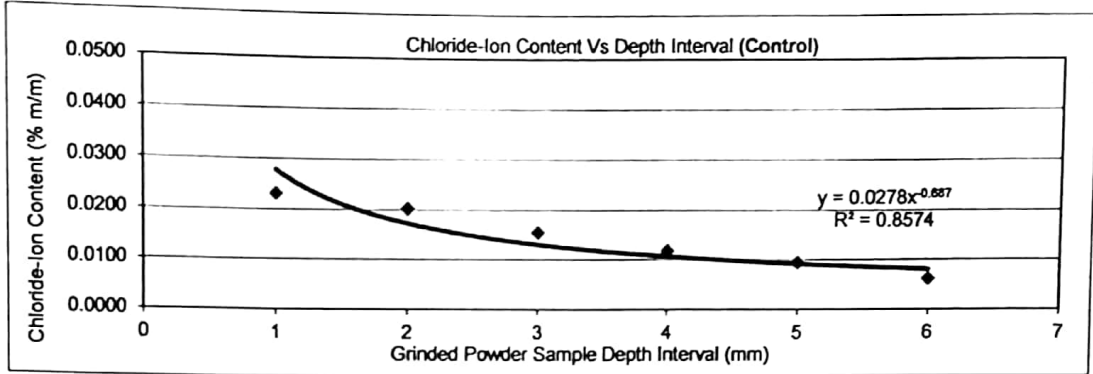
Yap, Seow, Keong
 Technical Manager



Prepared by : Aida

Checked by : Aifa

Customer : DRITECH CHEMICALS SDN BHD
 Source : Dritech Chemicals Sdn Bhd



Certified By,

Yap Seow Keong
 Technical Manager

Prepared by : Aida
 Checked by : Afifa

Lab.Ref : C246/18

REPORT NO : MIS 026/18/R 0310
PAGE NO : 11 OF 14

MEASUREMENT OF DRY FILM THICKNESS OF PROTECTIVE COATING (BY DESTRUCTIVE MEANS)

Customer : DRITECH CHEMICALS SDN BHD

Project : Mass Rapid Transit (MRT2).

Sample Description : **System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).**

Source : Dritech Chemicals Sdn Bhd

Description of Sample : Primer Drigard AC 800, Top Coat Drigard AC800

Tested by : Ken

Paint Inspection Gauge S/N : 20010/030

Date Tested : 16-Mar-18

Test Environmental Condition : - Temperature , °C : 25.0 - 26.0

Relative Humidity (RH) , % : 58.0 - 60.0

TEST METHOD : ASTM D 4138 - 07a

Sample Marking	Coating Thickness, μm		
	Minimum Thickness	Maximum Thickness	Average Thickness
1	165	175	170

Certified By,

Yap Seow Keong
Technical Manager



Prepared by : Alda
Checked by : Afifa

MEASUREMENT OF WET FILM THICKNESS OF PROTECTIVE COATING (BY NOTCH GAUGES)

Customer : DRITECH CHEMICALS SDN BHD

Project : Mass Rapid Transit (MRT2).

Sample Description : **System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).**

Source : Dritech Chemicals Sdn Bhd

Wet Film Notch Gauge Serial No. : 12371

Date Tested : 14-Mar-18

Tested by : Ken

Test Environmental Condition :- Temperature , °C : 28.7 - 29.3
Relative Humidity (RH) , % : 66.0 - 67.0

TEST METHOD : ASTM D 4414-95 (2013)

Spot Reference No.	Individual Measurement of Coating Thickness, µm			AVERAGE
	1	2	3	
1st Coating	250	225	225	233.3
2nd Coating	200	225	225	216.7
Total Thickness of 2 Coats	450	450	450	450.0

Certified by



Yap Seow Keong
Yap Seow Keong
Technical Manager

Prepared by : Aida
Checked by : Aiffa

DETERMINATION OF CARBON DIOXIDE PERMEABILITY FOR COATING MATERIALS (Carrier Gas Method)

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Coating Description : System : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800).
 Substrate Description & Thickness : 100mmφ x 10.0mm thick G40 MPa Concrete Piece Coated with Drigard AC 800 system.
 Conditioning Procedure : By Customer
 Sample Reference : 1, 2 & 3
 Source : Dritech Chemicals Sdn Bhd
 Date Tested : 19-Mar-18 Tested by : Ken & Yap
 Test Environmental Condition : Temperature , °C : 28.0 - 29.0
 Relative Humidity (RH), % : 57.0 - 58.0

TEST METHOD : BS EN 1062-6 : 2002, Method B

Calibration volume, V_c : 1.509E-05 m³ Carbon Dioxide Gas Analyzer S/N : 022123
 Effective area of test sample, A : 6.36E-03 m²
 Ambient atmospheric pressure during calibration, p_{amb1} : 101.135 kPa

Specimen No.	1	2	3	Average
Ambient atmospheric pressure during measurement, p_{amb2} kPa	101.325	101.325	101.325	
Measurement temperature at cell during measurement, T_m K	297.765	297.765	297.765	
Difference in the carbon dioxide concentration in the measuring and carrier gas, Δc g/m ³	8.10	7.92	7.80	
Time start test : (Initial) (hrs. / min.)	15:00	15:30	16:00	
Time ending test : (hrs. / min.) (Concentration in the carrier gas reached steady state)	19:42	20:05	20:28	
Time to reach the calibration mart, t (minutes) (Concentration in the carrier gas reached steady state)	282	275	268	
Carbon dioxide permeability, $i = \frac{V_c \times 7.68 \times 10^3 \times p_{amb1}}{A \times t \times \Delta c \times T_m \times p_{amb2}}$ g/(m ² .d)	0.0385	0.0404	0.0421	
Dry film thickness of coating or coating system, s μm	200.0	190.0	190.0	
The thickness of substrate, t_s m	0.01	0.0102	0.0102	
Diffusion equivalent air layer thickness, $s_D = \frac{D_{CO_2} \times \Delta c }{i}$ m	290.3	270.6	255.8	272.3
Diffusion resistance number, $\mu = \frac{s_D}{s + t_s}$	1.45E+06	1.42E+06	1.35E+06	1.41E+06

Note : Measuring Gas = 10% (v/v) CO₂ / 90 % (v/v) N₂

Carrier Gas = N₂ or air

D_{CO_2} is the diffusion coefficient for carbon dioxide in air, in square metres per day ($D_{CO_2} = 1.38 \text{ m}^2/\text{d}$ in air at 23 °C)

$|\Delta c|$ is the difference, in grams per cubic metres, in carbon dioxide concentration of the carbon dioxide-free air and the carbon dioxide-containing air ($|\Delta c| = 180 \text{ g/m}^3$ for 10 % (v/v) at 23 °C)

Certified by

Yap Seow Keong
 Technical Manager



Prepared by : Aida

Checked by : Afta

Lab. Ref : C246/18

REPORT NO. : MIS 026/18/R 0310
 PAGE NO. : 14 OF 14

DETERMINATION OF WATER VAPOR TRANSMISSION PROPERTIES
(Wet Cup Method)

Customer : DRITECH CHEMICALS SDN BHD
 Project : Mass Rapid Transit (MRT2).
 Sample Description : **System** : - Primer (Drigard AC 800) and Top Coat (Drigard AC 800) - Treated Specimen.
 Climate Chamber S/N : E20/01
 Type of Coating : Non-Self-Supporting
 Type of Substrate used : Grade 50.0 MPa
 Substrate average thickness : 10.0 mm
 Height of water in cup, mm : 25.0 mm
 Conditioning Climate Chamber : Temperature , °C : (23 ± 2) Relative Humidity (RH), % : (50±5)

Balance S/N : E02/09
 Date Tested : 16-Mar-18
 Tested by : Ken

TEST METHOD : BS EN ISO 7783 : 2011 (Wet Cup Method A)

Water Method

Data		1 (Initial)	2	3	4	5	6	7	8	9	10
Date		12-Mar-18	12-Mar-18	12-Mar-18	12-Mar-18	13-Mar-18	14-Mar-18	16-Mar-18			
Time, (hr:min)		9:00	12:00	1:00	5:00	9:00	9:00	9:00			
Time Interval (hrs)		0	3	4	8	24	48	96			
Mass of test Specimen + Dish (g)	Specimen Ref.	1	338.24	338.19	338.19	338.19	338.21	338.19	337.97		
		2	322.64	322.60	322.60	322.60	322.60	322.57	322.34		
		3	334.23	334.19	334.19	334.22	334.23	334.23	333.99		

RESULT

Specimen Reference		1	2	3	AVG
Water Vapor Transmission					
Weight change, grains, g	= G	0.22	0.23	0.24	
Time during which G occurred, h	= t	48	48	48	
Slope of the straight line, g/h	= G/t	0.0046	0.0048	0.0050	
Test area (cup mouth area), m ²	= A	0.007	0.007	0.007	
Water-vapour transmission rate (V), g/m ² d	WVT = ((G/t)/A) X 24	15.771	16.457	17.143	16.457
Permeance					
Standard atmospheric pressure at test temperature (101.325 Pa at 23°C)	Pa = P _o	101.325	101.325	101.325	
Coating dry Film Thickness	(μm) = d	160	160	110	
Water -vapour diffusion equivalent air layer thickness, S _d	(m) = 20.4 / V	1.29	1.24	1.19	
Water-vapour resistance factor, μ	= (S _D / d) x 10 ⁶	8063	7750	10818	8877

Certified by


 Yap Seow Keong
 Technical Manager

Prepared by : Aida
 Checked by : Aifa