Test Report No. 7191043034-MEC12-ED
dated 6 Nov 2012

PSB Singapore

Choose certainty. Add value.

Note: This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.

SUBJECT:

Testing of flexible-cementitious waterproofing membrane

TESTED FOR:

Schomburg GmbH & Co. KG
Aquafinstrasse 2-8
D-32760 Detmold
Germany

Attn: Mr Albert J Schomburg

SAMPLE DESCRIPTION:

The following items were received on 5 Sep 2012 as shown:

Sample	Size	Quantity
'Aquafin 2 K/M' (refer to Photo 1) Part A : Powder Part B : Liquid	 25 kg 10 kg	 1 bag 1 pail

As specified by the client, the mix ratio was 2.5 parts of Part A to 1 part of Part B by weight.
The test samples were prepared by TUV SUD PSB Pte Ltd.

Substrate	Area of application	Quantity
a. 286 mm x 219 mm release paper	275 mm x 210 mm	6 pcs
b. 200 mm x 200 mm x 50 mm concrete slab	200 mm x 200 mm	4 pcs
c. 75 mm x 40 mm x 25 mm concrete t-block	50 mm x 50 mm	3 pcs

TEST METHODS:

Material Identification/Verification

1. Material Identification/Verification By Fourier Transform Infra-Red Spectrometric Analysis (FTIR)

Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223

Water Penetration

2. Adopted DIN 1048 Part 5 : 1991
Testing Concrete
Testing Of Hardened Concrete
Specimens Prepared In Mould
Section 7.6 : Water Permeability

Substrate	:	200 mm x 200 mm x 50 mm concrete slab
Test condition	:	0.2 kgf/cm^2 for 6 hours
Test area	:	∅97 mm (7390 mm^2)
No. of determinations	:	3

Adhesion-to-substrate

3. Adopted ASTM D4541 : 2009 Standard Test Method For Pull-Off Strength Of Coatings Using Portable Adhesion Testers

Substrate	:	200 mm x 200 mm x 50 mm concrete slab
Test area	:	50 mm x 50 mm
Crosshead speed	:	250 N/s
No. of determinations	:	3

Crack Bridging

4. Adopted ASTM C836/C836M : 2005 Standard Specification For High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane For Use With Separate Wearing Course
Section 5.7 : Crack Bridging

Substrate	:	75 mm x 40 mm x 25 mm concrete t-block
Width of gap	:	a. 2 mm b. 1 mm for 10 cycles
Crosshead speed	:	0.05 mm/min
No. of determinations	:	3 per gap width

Hardness

5. Adopted ASTM D2240 : 2005 Standard Test Method For Rubber Property (Durometer Hardness)

Apparatus	:	Durometer (Shore A)
Time interval	:	1 second
No. of determinations	:	5

Set-to-touch

6. ASTM D1640 : 2009 Standard Test Methods For Drying, Curing Or Film Formation Of Organic Coatings At Room Temperature

Tensile Properties

7. ASTM D412 : 2006 Standard Test Method For Vulcanized Rubbers And Thermoplastic Elastomers-Tension

Test Conditions:

a. Before ageing
b. After ageing at 50°C in oven for 2 weeks
c. After chemical immersion for 3 days
i. 0.5% NaOCl (Sodium Hypochlorite)
ii. 1.25% NH_4OH (Ammonium Hydroxide)
iii. 3.7% HCl (Hydrochloric Acid)

Test specimen	:	Dumbbell shape, die C
Gauge length	:	25 mm
Grip length	:	64 mm
Crosshead speed	:	500 mm/min
No. of determinations	:	5 per test condition

Chloride Content

8. Chloride Content By Potentiometric Titration

CONDITIONING:

Unless otherwise specified, all test specimens were conditioned at 23 ± 2°C, 70 ± 15% relative humidity and tested at 23 ± 2°C, 65 ± 5% relative humidity. The tensile properties test was conducted at 23 ± 2°C and 50 ± 5% relative humidity.

TEST RESULTS:

Test	Unit	'Aquafin 2 K/M'	HDB specification: Flexible-Cementitious Waterproof Membrane (Water-Based) For New Construction Project & Upgrading Contracts For Use With Concrete Water Tank
1. Material Identification/Verification By FTIR	-	Styrene-acrylate co-polymer (refer to Figure 1)	Polymer which undergoes hydrolysis should not be used
2. Water Penetration, average	mm	0, no water penetration	Depth of penetration should be 0
3. Adhesion-to-substrate, average	N/mm^2	0.4	≥ 0.3 N/mm^2
4. Crack Bridging a. 2 mm b. 1 mm	mm	 No cracks No cracks	No cracking at 2 mm width No cracks after 10 cycles of stretching and closing to a width of 1 mm
5. Hardness (Shore A), median	-	45	≥ 40
6. Set-to-touch (based on one coat)	mins	45	Should touch dry within 2 hours

TEST RESULTS:

Test	Unit	'Aquafin 2 K/M'	HDB specification: Flexible-Cementitious Waterproof Membrane (Water-Based) For New Construction Project & Upgrading Contracts For Use With Concrete Water Tank
7.			
a. Maximum Tensile Strength, median	N/mm^2		
i. Before ageing		1.5	≥ 1.5 N/mm^2
ii. After ageing at 50°C in oven for 2 weeks		1.6	
change in tensile strength	%	+6.7	≥ 1.2 N/mm^2 and
iii. After chemical immersion for 3 days			-ve change ≤ 40%
0.5% NaOCl		1.5	No limit for positive change
change in tensile strength	%	0	
1.25% NH4OH		1.6	
change in tensile strength	%	+6.7	
3.7% HCl		1.7	
change in tensile strength	%	+13.3	
b. Elongation At Break, median	%		
i. Before ageing		202.9	≥ 150%
ii. After ageing at 50°C in oven for 2 weeks		135.4	
change in elongation	%	-33.3	≥ 120% and
iii. After chemical immersion for 3 days			-ve change ≤ 40%
0.5% NaOCl		242.9	No limit for positive change
change in elongation	%	+19.7	
1.25% NH4OH		163.3	
change in elongation	%	-19.2	
3.7% HCl		157.2	
change in elongation	%	-22.5	
c. Elongation At Break, displacement	mm		
i. Before ageing		50.7	
ii. After ageing at 50°C in oven for 2 weeks		33.9	
iii. After chemical immersion for 3 days			
0.5% NaOCl		60.7	
1.25% NH4OH		40.8	
3.7% HCl		39.3	
8. Chloride Content	% weight	0.005	≤ 0.1%

REMARKS:

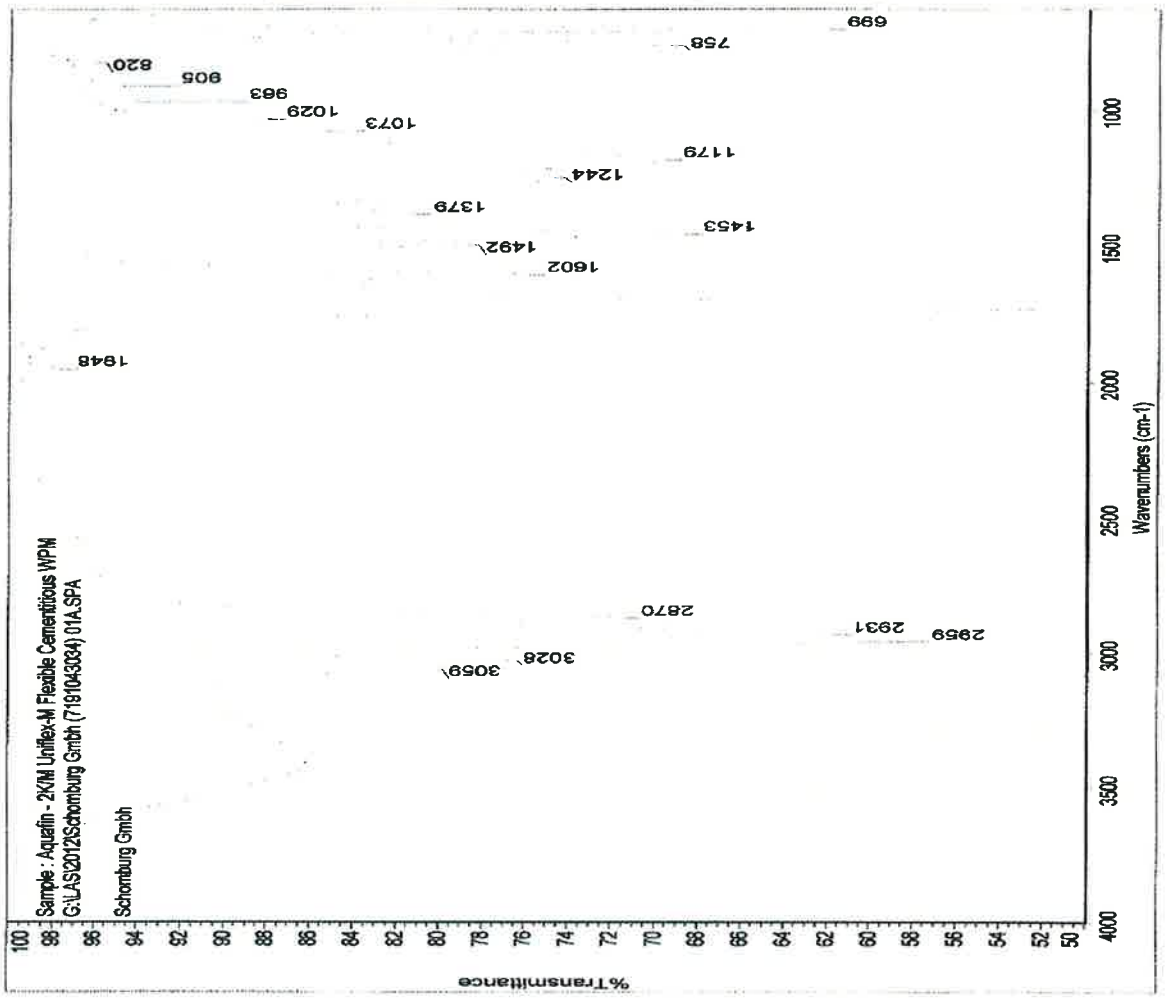
Test age : 28 days cured in air minimum prior to test unless otherwise specified.

Eddie Suwand
Associate Engineer

Sebestian Koh
Engineer
Construction
Mechanical Centre

Photo 1 : 'Aquafin 2 K/M'

Figure 1 : IR spectrum of 'Aquafin 2 K/M'



Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.

2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.

4. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.

5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011