Test Report No. 7191168129-MEC17-ED
dated 5 Oct 2017

PSB Singapore

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SUBJECT:

Testing of sealant

TESTED FOR:

PFE Technologies Pte Ltd
No. 9 Gul Street 4
Singapore 629238

Attn: Mr Hans Goh

SAMPLE DESCRIPTION:

The following items were received on 28 Jul 2017 as shown:

Sample	Size	Quantity
'Pereseal Polyurethane Sealant' (Photo 1)	600 ml/sausage	10 sausages

TEST METHODS:

HDB Specification : Sealant - Semi-Precast Construction

Staining And Colour Change

1. Adopted ASTM C510 : 2016 Standard Test Method For Staining And Colour Change Of Single Or Multi-Component Joint Sealants

Test cycle	:	8 hours UV exposure at 55°C and 4 hours condensation at 45°C
Exposure duration	:	100 hours
No. of determination	:	1 for staining test, 1 for colour change test, 1 as control

Extrudability

2. Adopted ASTM C1183/C1183M : 2013 Standard Test Method For Extrusion Rate Of Elastomeric Sealants

Test pressure	:	40 psi
No. of determination	:	1

TÜV SÜD PSB

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Flow Properties

3. ASTM C639 : 2015 Standard Test Method For Rheological (Flow) Properties Of Elastomeric Sealants

Method	:	Test method for 'Type II' sealant
Test conditions	:	a) 4.4°C in environmental chamber for 4 hours b) 50°C in oven for 4 hours
No. of determinations	:	2 for vertical and horizontal displacements

Hardness

4. ASTM C661 : 2015 Standard Test Method For Indentation Hardness Of Elastomeric-Type Sealants By Means Of A Durometer

Test Conditions:
a) 23°C and 50% relative humidity for 7 days
b) 38°C and 95% relative humidity for 7 days
c) 23°C and 50% relative humidity for 7 days

No. of determinations	:	2, 3 points per test piece

Tack-Free Time

5. ASTM C679 : 2015 Standard Test Method For Tack-Free Time Of Elastomeric Sealants

No. of determinations	:	2

Cyclic Adhesion & Cohesion

6. Adopted ASTM C719 : 2014 Standard Test Method For Adhesion And Cohesion Of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

Test Conditions:
a) 23°C and 50% relative humidity for 7 days
b) 38°C and 95% relative humidity for 7 days
c) 23°C and 50% relative humidity for 7 days
d) Immersion in distilled water at 23°C for 7 days
e) Drying in oven at 70°C for 7 days

Test temperature	:	Room temperature
No. of determinations	:	3 for class 25

Effects Of Heat Ageing

7. ASTM C1246 : 2017 Standard Test Method For Effects Of Heat Ageing On Weight Loss, Cracking, And Chalking Of Elastomeric Sealants After Cure

Test Conditions:
a) 23°C and 50% relative humidity for 28 days
b) 70°C for 21 days

No. of determinations	:	3, 1 as control

Effects Of Accelerated Weathering

8. Adopted ASTM C793 : 2005 (2017) Standard Test Method For Effects Of Accelerated Weathering On Elastomeric Joint Sealants

Test cycle	:	8 hours UV exposure at 55°C and 4 hours condensation at 45°C
Lamp designation	:	Fluorescent UVA 340 mm
Exposure duration	:	250 hours
No. of determinations	:	3 (1 as control)
Bend test		
Apparatus	:	Steel mandrel
Test condition	:	-26°C for 24 hours
No. of determinations	:	3

Adhesion-In-Peel

9. ASTM C794 : 2015a Standard Test Method For Adhesion-In-Peel Of Elastomeric Joint Sealants

Test Conditions:

a) 23°C and 50% relative humidity for 7 days
b) 38°C and 95% relative humidity for 7 days
c) 23°C and 50% relative humidity for 7 days
d) Immersion in water at 23°C for 7 days

Crosshead speed	:	50.8 mm/min
No. of determinations	:	4

Material Identification/Verification

10. ASTM E1252 : 1998 (2013) e1 Standard Practice For General Techniques For Obtaining Infra-Red Spectra For Qualitative Analysis
Material Identification/Verification By Fourier Transform Infra-Red Spectrometric Analysis (FTIR)

CONDITIONING:

Unless otherwise specified, all test specimens were tested at 23 ± 2°C and 65 ± 5% relative humidity.

TEST RESULTS:

Test	'Pereseal Polyurethane Sealant'	Sealant - Semi-Precast Construction
1. Staining And Colour Change	No staining and no colour change	No visible staining on white cement mortar base
2. Extrudability	14.8 ml/min	>10 ml/min
3. Rheological (Flow) Properties	Vertical displacement: 0 mm sag Horizontal displacement: No deformation	Vertical displacement <4.8 mm Horizontal displacement : No deformation
4. Indentation Hardness	test piece 1, average : 35.6 test piece 2, average : 36.0 average of 2 test pieces : 35.8	25 to 50 (traffic) 15 to 50 (non-traffic)

TEST RESULTS:

Test	'Pereseal Polyurethane Sealant'	Sealant - Semi-Precast Construction
5. Tack-Free Time	No transfer of test specimens to the polyethylene film	No transfer of sealant to PE film
6. Adhesion & Cohesion Under Cyclic Movement, class 25	No loss in bond	Total loss in bond and adhesion <9 cm^2
7. Effects Of Heat Ageing On Weight Loss, Cracking And Chalking, average	1.1% No cracking and chalking	Loss in weight <7% No cracking and chalking
8. Effects Of Accelerated Weathering	No cracks after UV exposure and bend test	No cracks
9. Adhesion-In-Peel, average	60.7 N cohesive failure within the sealant and no adhesive bond loss between sealant and substrate for each test piece	Peel strength >22.2 N Bond loss <25%
10. Material Identification/Verification By FTIR	Polyurethane-based material (Figure 1)	PU/Silicone

REMARKS:

The test conditions for staining and colour change tests and effects of accelerated weathering test were adopted from ASTM G154 : 2006 Standard Practice For Operating Fluorescent Light Apparatus For UV Exposure Of Non-Metallic Materials.

Eddie Suwand
Testing Officer
Senior Associate Engineer

Fabien Tan
Engineer
Real Estate & Infrastructure
Mechanical Centre

Photo 1 : 'Pereseal Polyurethane Sealant'

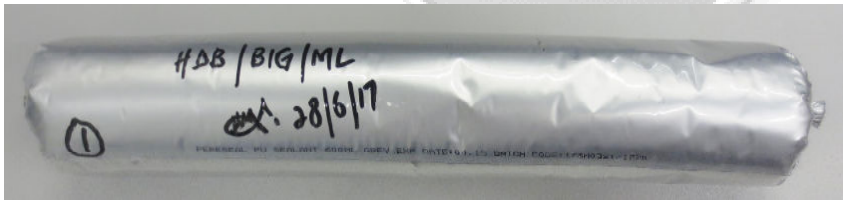
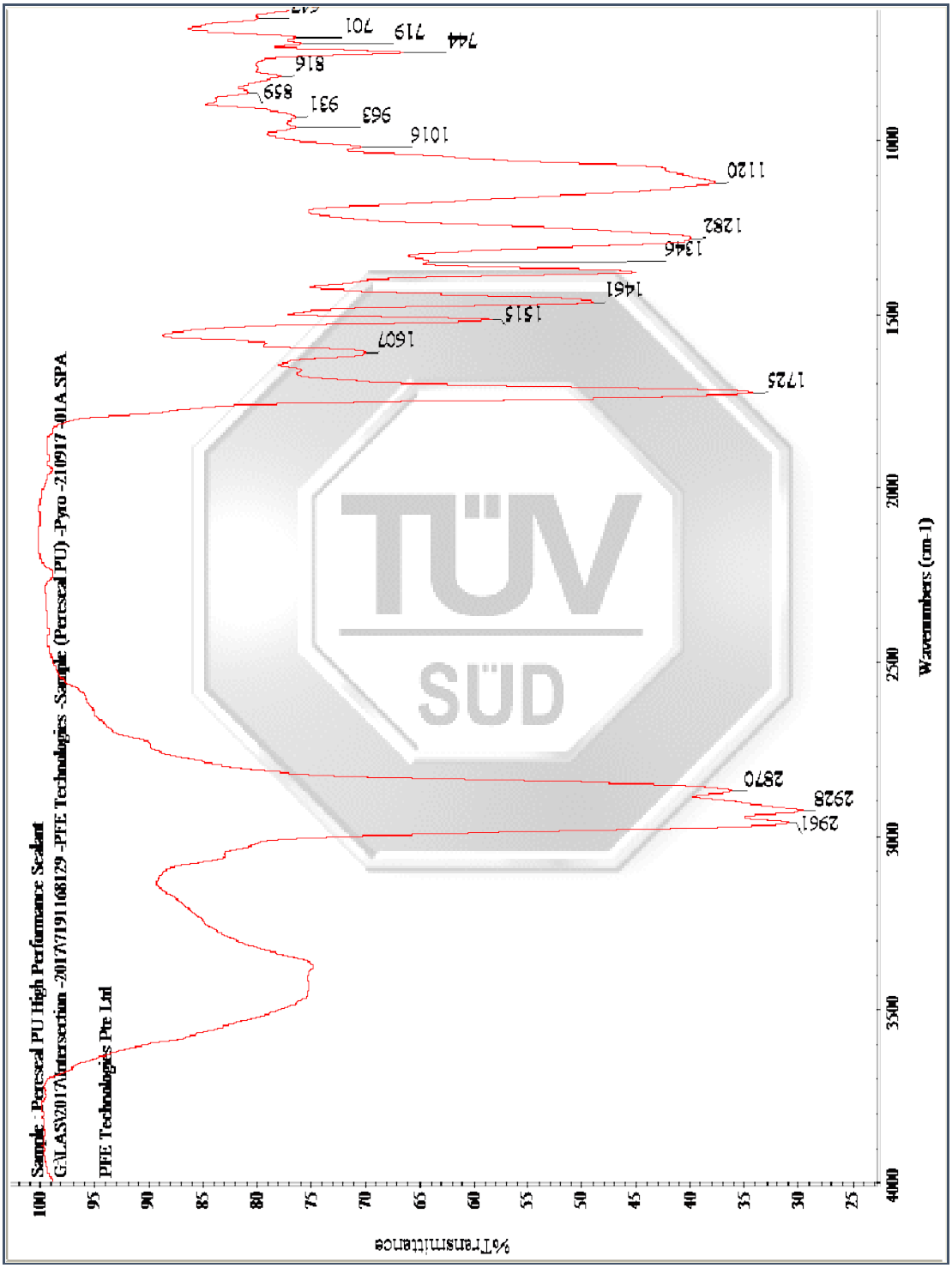


Figure 1 : IR spectrum of 'Pereseal Polyurethane Sealant'



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July 2011