Test Report No. 7191199380-MEC19/01-ED
dated 6 Jun 2019

PSB Singapore

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SUBJECT:

Testing of sealant

TESTED FOR:

Soudal NV
Everdongenlaan 18
B-2300 Turnhout
Belgium

Attn: Mr Werner Dierckx/Mr Manu De Smedt

SAMPLE DESCRIPTION:

The following items were received on 29 Jan 2019 as shown:

Sample/Substrate	Size	Quantity
'Soudaseal 215LM Sealant' (refer to Photo 1)	600 ml/sausage	12 sausages
Marble	75 mm x 25 mm x 25 mm	30 pcs
Granite	75 mm x 25 mm x 25 mm	30 pcs

Photo 1: 'Soudaseal 215LM Sealant'

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TEST METHODS:

Adopted ASTM C920 : 2014a Standard Specification For Elastomeric Joint Sealants

Staining And Colour Change, UV Exposure

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

Test equipment	:	QUV Weatherometer
Lamp designation	:	Fluorescent UVA 340 mm
Test cycle	:	8 hours UV exposure at 55°C and 4 hours condensation at 45°C (ASTM G154)
Exposure duration	:	100 hours
No. of determinations	:	4 samples: 2 samples with sealant and 2 samples without sealant (For UV Exposure) 2 control samples: 1 sample with sealant and 1 sample without sealant (Standard Conditions)

Staining And Colour Change, Standard Conditions In Distilled Water

Test apparatus	:	Container with distilled water
Test condition	:	Distilled water immersion for 1 minute, once a day, (5 days per week)
Test duration	:	14 days
No. of determinations	:	2 samples: 1 sample with sealant and 1 sample without sealant (For distilled water immersion) 2 control samples: 1 sample with sealant and 1 sample without sealant (Standard Conditions)

Extrudability

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

Test pressure	:	40 psi
No. of determination	:	1

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 : 2006 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
Substrates : Mortar and aluminium
Test temperature : Room temperature
No. of determinations : 3 for class 50

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 equipment	:	QUV Weatherometer
Test cycle	:	8 hours UV exposure at 55°C and 4 hours condensation at 45°C (ASTM G154)
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

Substrates	:	Mortar and aluminium
Crosshead speed	:	50 mm/min
No. of determinations	:	4 per substrate

Material Identification/Verification

10. ASTM E1252 : 2007 Standard Practice For General Techniques For Obtaining Infra-Red Spectra for Qualitative Analysis
Material Identification/Verification By Fourier Transform Infra-Red Spectrometric Analysis (FTIR)

Staining On Porous Substrates

11. Adopted ASTM C1248 : 2008 (2012) Standard Test Method For Staining Of Porous Substrate By Joint Sealants

Test: Standard Conditions, 23°C and 50% relative humidity

Curing conditions	:	23°C and 50% relative humidity for 21 days Compression at class 25
Test conditions	:	Standard Conditions, 23°C and 50% relative humidity, 14 and 28 days
No. of determinations	:	4 pcs for standard conditions, 23°C and 50% relative humidity, 2 for 14 days and 2 for 28 days

Test: Heat Ageing in Oven

Test equipment	:	Thermal Oven
Curing conditions	:	23°C and 50% relative humidity for 21 days Compression at class 25
Test conditions	:	Heat ageing: 70°C in oven, 14 and 28 days
No. of determinations	:	4 pcs, 2 for 14 days and 2 for 28 days

Test: UV Exposure

Test equipment	:	QUV Weatherometer
Lamp designation	:	Fluorescent UVA 340 mm
Curing conditions	:	23°C and 50% relative humidity for 21 days Compression at class 25
Test conditions	:	UV exposure: 4 Hours UV at 60°C and 4 hours condensation at 50°C,14 and 28 days (ASTM G154)
No. of determinations	:	4 pcs for UV exposure, 2 for 14 days and 2 for 28 days

Standard Condition parameters: 23 ± 2°C and 50 ± 5% relative humidity.

CONDITIONING:

Unless otherwise specified, all test specimens were tested at 23 ± 2°C and 50 ± 5% relative humidity.
Standard Conditions parameters: 23 ± 2°C and 50 ± 5% relative humidity.

TEST RESULTS:

Test	'Soudaseal 215LM Sealant'	ASTM C920 : 2014a Standard Specification For Elastomeric Joint Sealants
1. Staining And Colour Change	No staining No colour change	The sealant shall not cause any visible stain on the top surface of a white cement mortar base
2. Extrudability	11.2 ml/min	Type S (single component), grade NS (non-sag or gunnable sealant) shall have an extrusion rate of not less than 10 ml/min
3. Rheological (Flow) Properties	Vertical displacement: 0 mm sag Horizontal displacement: No deformation	Grade NS (non-sag) or gunnable sealant shall have flow characteristics such that it does not sag more than 4.8 mm ($^{3}/_{16}$ in.) in vertical displacement. Also the sealant shall show no deformation in horizontal displacement (refer to Types II and IV in the tests)

TEST RESULTS:

Test	'Soudaseal 215LM Sealant'	ASTM C920 : 2014a Standard Specification For Elastomeric Joint Sealants
4. Indentation Hardness	test piece 1, average : 24.6 test piece 2, average : 24.9 average of 2 test pieces : 24.8	Use T_1 (traffic) sealant shall have a hardness reading, after being properly cured, of not less than 25 Use T_2 (traffic) sealant shall have a hardness reading, after being properly cured, of less than 25 Use NT (non-traffic) sealant shall have a hardness reading, after being properly cured, of less than 60
5. Tack-Free Time	No transfer of test specimens to the polyethylene film	There shall be no transfer of the sealant to the polyethylene film when tested at 72 hours
6. Adhesion & Cohesion Under Cyclic Movement, Class 50 a. Mortar b. Aluminium	 No loss in bond No loss in bond	The total loss in bond and cohesion areas among the three specimens tested for each surface shall be no more than 9 cm^2 ($1^1/_2$ $in.^2$) with standard mortar, glass, and aluminium or any other specified substrates
7. Effects Of Heat Ageing On Weight Loss, Cracking And Chalking, average	1.4% No cracking and chalking	The sealant shall not lose more than >7% of its original weight or show any cracking and chalking
8. Effects Of Accelerated Weathering	No cracks after UV exposure and bend test	The sealant shall show no cracks greater than those shown in example #2 of Figure 1 in ASTM C793 after the specified UV exposure and shall show no cracks greater than those shown in example #2 of Figure 2 in ASTM C793 after exposure at cold temperature and the bend test (refer to Photo 2)
9. Adhesion-In-Peel, average a. Mortar b. Aluminium	 53.1 N (12.0 lbf) 98.1 N (22.1 lbf) cohesive failure within the sealant and no adhesive bond loss between sealant and substrate for each test piece	The peel strength for each individual test shall not be less than 22.2 N (5 lbf) when tested with standard mortar, glass, and aluminium or any other specified substrate. In addition, the sealant shall show no more than 25% adhesive bond loss for each individual test
10. Material Identification/ Verification By FTIR	MS Polymer-based material (refer to Figure 1)	-

TEST RESULTS:

Test, Standard Conditions, 23°C and 50% RH	'Soudaseal 215LM Sealant'	
	Marble	Granite
11. Staining On Porous Substrates Observation for Staining after		
a. Standard conditions, 23°C and 50% relative humidity,14 days	No surface stain was observed	No surface stain was observed
b. Standard conditions, 23°C and 50% relative humidity, 28 days	No surface stain was observed	No surface stain was observed

Test, Heat Ageing in Oven	'Soudaseal 215LM Sealant'	
	Marble	Granite
Observation for Staining after		
a. Heat ageing: 70°C in oven, 14 days	No surface stain was observed	No surface stain was observed
b. Heat ageing: 70°C in oven, 28 days	No surface stain was observed	No surface stain was observed

Test, UV Exposure	'Soudaseal 215LM Sealant'	
	Marble	Granite
Observation for Staining after		
a. UV exposure, 14 days	No surface stain was observed	No surface stain was observed
b. UV exposure, 28 days	No surface stain was observed	No surface stain was observed

REMARKS:

1. The test conditions for staining and colour change tests, effects of accelerated weathering test and staining on porous substrates test were adopted from ASTM G154 : 2016 Standard Practice For Operating Fluorescent Light Apparatus For UV Exposure Of Non-Metallic Materials.
2. For effects of accelerated weathering test, in ASTM C793, Photo 2 consists of Figure 1 which indicate the presence of cracks after UV exposure and Figure 2 which indicate the presence of cracks after bend test.
3. The class 50 joint movement for cyclic adhesion/cohesion test was specified by the client.
4. The types of substrates were specified by the client for cyclic adhesion/cohesion and adhesion-in-peel tests.
5. The substrates did not require priming prior to application of the sealant as specified by the client.
6. The tests were requested by the client.

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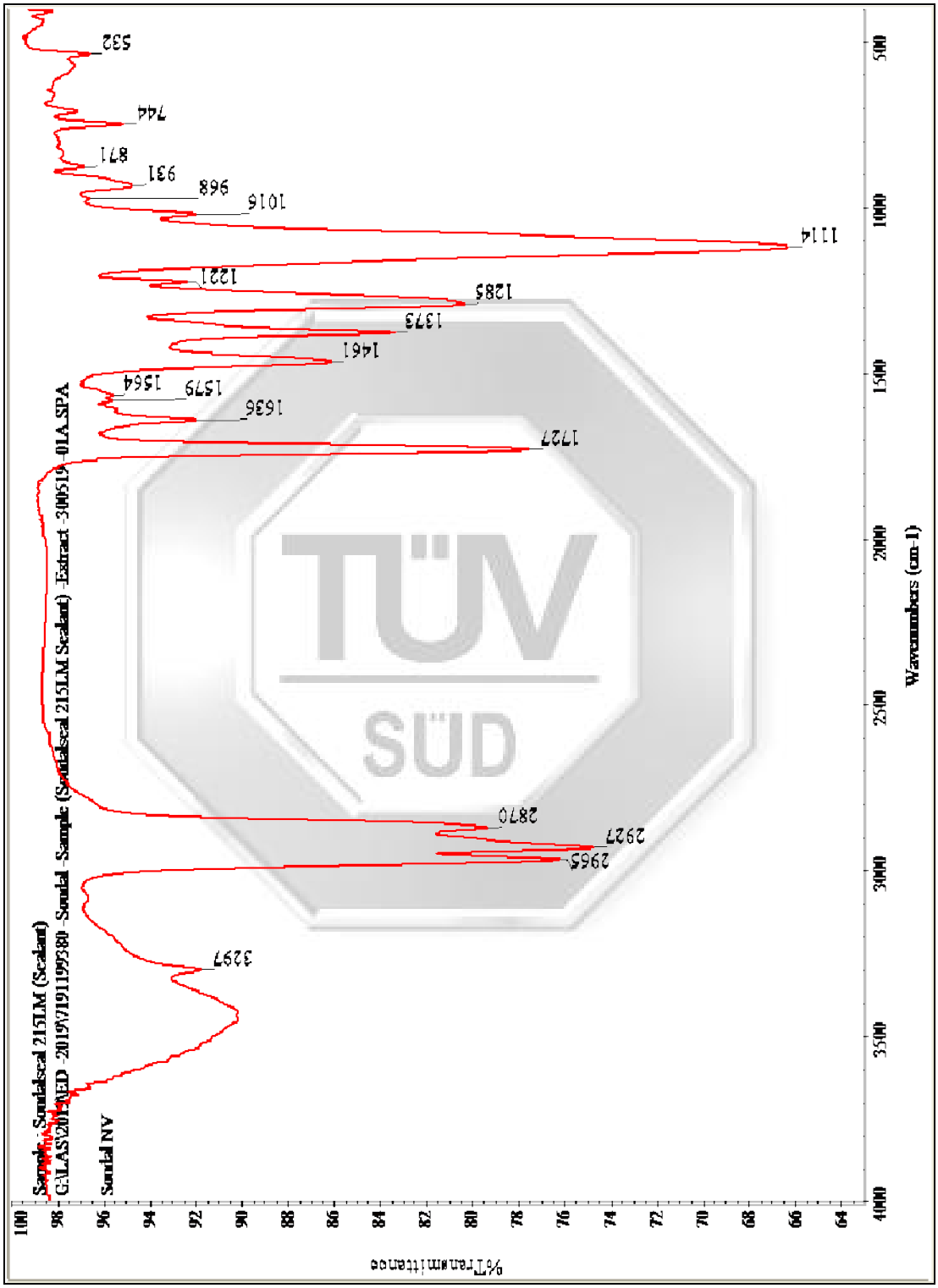
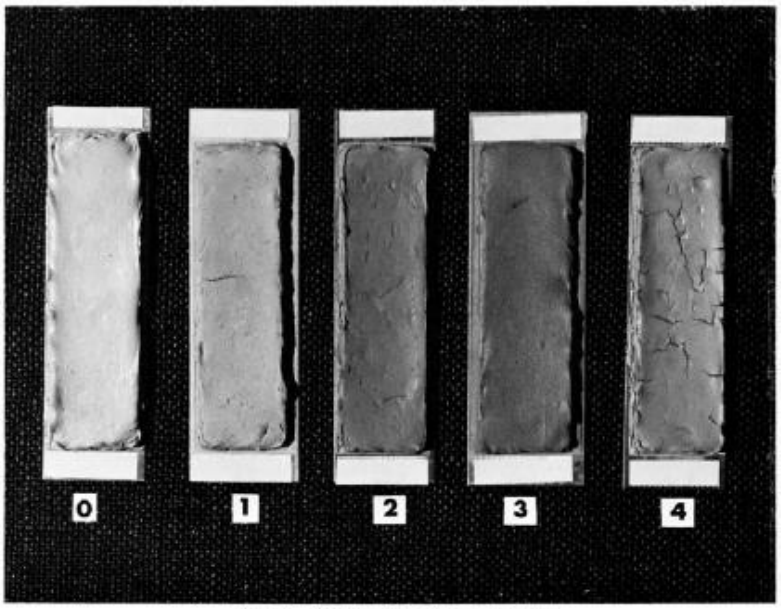
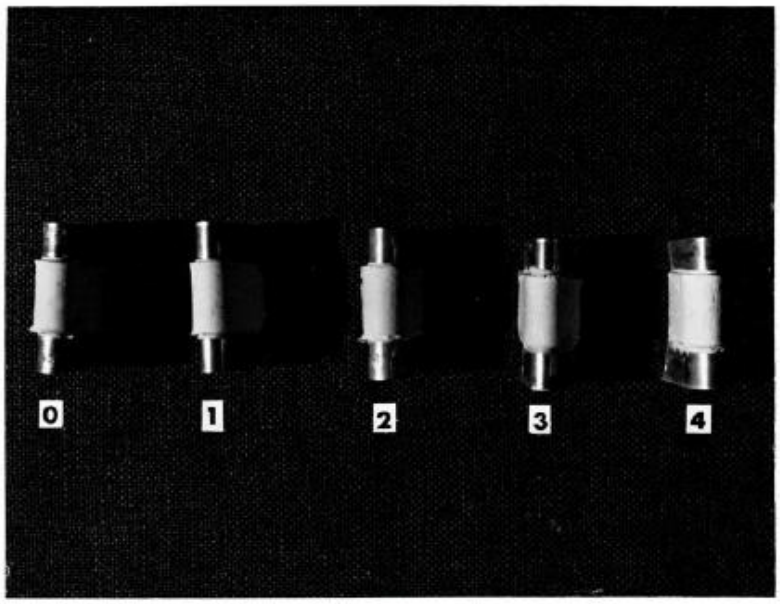


Figure 1 : IR spectrum of 'Soudaseal 215LM Sealant'

C793 – 05 (2017)



NOTE 1—Number *0* represents no cracks.
FIG. 1 Examples of Cracking Obtainable After the Weathering Test



NOTE 1—Number *0* represents no cracks.
FIG. 2 Examples of Cracking Obtainable After the Bend Test

Photo 2 : Figures 1 and 2 showing presence of cracks after UV exposure and after bend test respectively (taken from ASTM C793 as a guide and are not client's samples)

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July 2011