



TEST REPORT

No. : XMIN181202596CCM

Date : Apr.01, 2019

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CUSTOMER NAME: FAZAH INDUSTRIAL COMPANY
ADDRESS: SECOND INDUSTRIAL AREA AI KHARJ ROAD, RIYADH SAUDI ARABIA

Sample Name : 3D ALUMINUM CORE COMPOSITE PANEL 4MM (ENGLISH REPORT)
Manufacturer : FAZAH INDUSTRIAL COMPANY
Material : 3D ALUMINUM COMPOSITE PANEL
Other Information : 3D ALUMINUM CORE COMPOSITE PANEL .4MM

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

SGS Ref. No. : AJFS190100053FF, GZIN1901000121MR, KV-19-00030,
SDHL1901000295FB, SHIN181203820CCM, XMIN1901000089PS

Date of Receipt : Dec.27, 2018

Testing Start Date : Dec.29, 2018

Testing End Date : Apr.02, 2019

Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

***** To be continued*****

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd Xiamen Branch
Testing Center

Civi Huang
Authorized signatory



SGS-CSTC Standards Technical Services Co., Ltd.
Xiamen Branch Testing Center Commercial Construction Material Laboratory

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Summary of Result(s):

No.	Test Item	Test Method	Result	SASO 2752/2016 requirement(s)
1	Impact Resistance	Reference to SASO 2752:2016 Section 2.16 & ISO 6272-2:2011 and client's requirement	No cracking or peeling with 50kg-cm	No peel-off, no crack
2	Coating thickness	ISO 2360:2003	32.2 μm	External wall: ≥25μm Internal wall: ≥16μm
3	Gloss	Reference to SASO 2752:2016 Section 2.12 & ISO 2813:2014 and client's requirement	20° Geometry: 9.4	Reflectance≥70, at 20 °
			85° Geometry: 62	Reflectance≤5, at 85 °
4	Pencil hardness	Reference to SASO 2752:2016 Section 2.13 & ISO 15184:2012 and client's requirement	2H	F-2H minimum
5	Adhesion Test of Coatings	Reference to SASO 2752:2016 Section 2.15 & ISO 2409:2013 and client's requirement	Classification 0	≥Grade 1
6	Chemical resistance	Reference to SASO 2752:2016 Section 2.21 & ISO 2812-1:2007 and client's requirement	See results	No change
7	Cyclic Corrosion Test	Reference to SASO 2752:2016 Section 2.20 & ISO 11997-1:2005 and client's requirement	Number of blister: 0	The number of blister ≤ 7
8	Hot water resistance	Reference to SASO 2752:2016 Section 2.22 & ISO 2812-2:2007 and client's requirement	No visible change	No change for a temperature of 99±1°C for 2h
9	Brush Resistance Test	With reference to SASO 2752:2016 Section 2.18 & ISO 11998-2006 Section 8.2 and client's requirement	Visual abrasion trace, but no worn-out to the substrate	≥10000times of no change

***** To be continued*****



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No.	Test Item	Test Method	Result	SASO 2752/2016 requirement(s)	
10	Deflection Temperature under Load	SASO 2752:2016 Section 2.8 & ISO 75-1:2013 & ISO 75-2:2013 Method A	93°C	≥85°C	
11	Falling Sand Abrasion	With reference to SASO 2752:2016 Section 2.17 & ASTM D968-17 Method A and client's requirement	1.42L/μm	External wall: ≥2L/μm Internal wall: /	
12	Coating Flexibility	With reference to SASO 2752:2016 Section 2.14 & ISO 17132:2007 and client's requirement	0T~1T	External wall: ≥2 without any cracks or damage on the coating Internal wall: ≥3 without any cracks or damage on the coating	
13	Light Ageing Test- Xenon-arc Exposure	With reference to SASO 2752:2016 Section 2.19 & ISO 16474-2:2013 Cycle 4 & ASTM D2244-16 & ASTM D523-14(2018) and client's requirement	Gloss change:17%, No visual change	Gloss change≤10% Other aging performance: no change	
14	Peel Strength	SASO 2752:2016 Section 2.7 & ISO 8510-2:2014	156N	≥9.0 N/mm	
15	Shear Strength	SASO 2752:2016 Section 2.6 & ASTM D732-17	25.7MPa	≥30MPa	
16	Tensile Strength	SASO 2752:2016 Section 2.4 & ISO 527-2:2012	58.6MPa	≥30MPa	
17	Flexural Test	SASO 2752:2016 Section 2.5 & ISO 178:2010/Amd.1:2013 Method A	Flexural strength	52.2MPa	≥70MPa
			Flexural modulus	9610MPa	≥1200MPa

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No.	Test Item(s)	Test Method	Result(s)	SASO 2752/2016 requirement(s)
18	Coefficient of linear thermal expansion	Ref. ASTM D696-16 Standard Test Method for Coefficient of Line Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer	-30°C ~ 30°C: 46.51 μm/m·°C	≤200 μm/m·°C
19	Thermal conductance	ASTM 518-17	0.100 W/(m·K)	≤4.5 W/(m·K)
	Thermal resistance		0.039 (m ² ·K)/W	≥0.2 (m ² ·K)/W
20	Self-ignition temperature	ASTM D1929-2016 Standard Test Method for Determining Ignition Temperature of Plastics	FIT = 450 °C SIT = 470 °C	Self-ignition temperature ≥ 343 °C
21	Surface Burning	In accordance with ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials	Flame-spread Index (FSI): 10 Smoke-developed Index (SDI): 80	Flame-spread Index ≤ 25; Smoke-developed Index ≤ 450
22	Non-combustibility (core material)	Accordance with ISO 1182:2010 Reaction to fire tests for products-Non-combustibility	Weight loss: 32.9%;	Weight loss ≤ 50%

Note: 1. Pass: Meet the requirements;

Fail: Does not meet the requirements;

/: Not Apply to the judgment.

2. The protected film was ripped off before test.

3. Test items 1~18 were carried out by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch, test item 18 was carried out by SGS Taiwan Ltd., test item 19 was carried out by SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd., test item 20 was carried out by SGS-CSTC Standards Technical Services Co., Ltd. Anji Branch, Test items 21~22 were carried out by SGS-CSTC Standards Technical Services Co., Ltd. Shunde Branch.

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1. Impact Resistance

Test Method: SASO 2752/2016 Section 2.16 & ISO 6272-2:2011

Test Condition:

Coating thickness: 29.9µm

Sample thickness: 3.61mm

Diameter of the punch: 15.9mm

Impact model: Intrusion

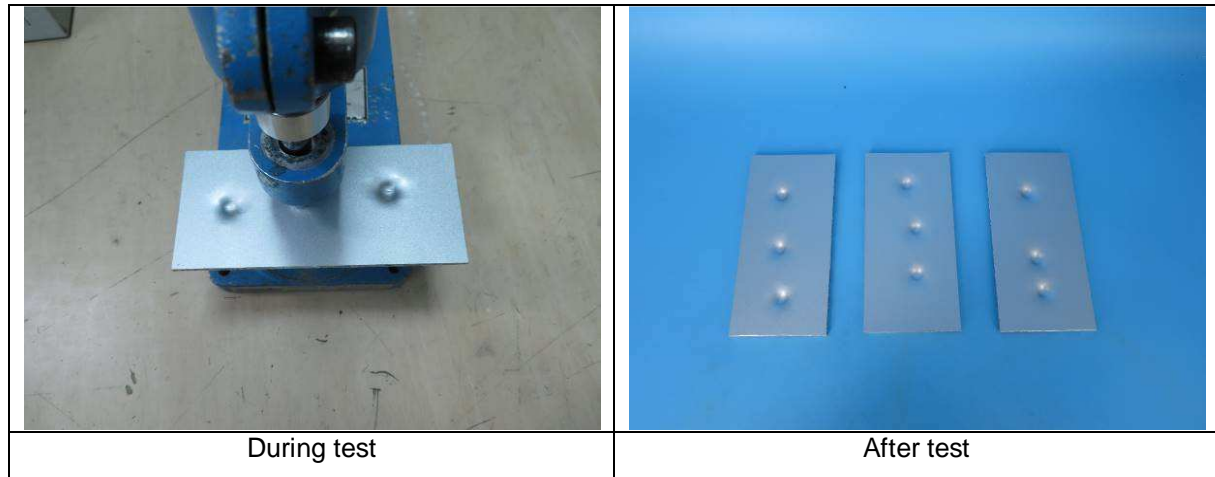
Impact weight: 1kg

Impact height: 50cm

Test Result:

Sample	Result
A1	No cracking or peeling with 50kg·cm

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Impact Tester	IG-1121	GZMR-AG-E004	2018-05-14	2019-05-13
Digital Vernier Caliper	CD-20AX	GZMR-AG-E128-02	2018-08-16	2019-08-15
Digital Coating Thickness Gauge	FNbasic	GZMR-AG-E170	2018-11-07	2019-11-06

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2. Coating thickness

Test Method: ISO 2360:2003

Test Condition:

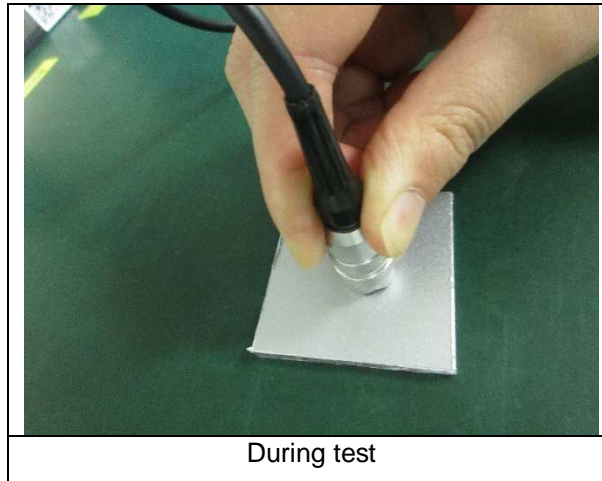
Eddy current method

Test Result:

Sample	Coating thickness
A2	32.2 μm

Note: The protected film was ripped off before test.

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Coating thickness gauge	Positector 6000	XMML-POL-016	2018-07-03	2019-07-02

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3. Gloss

Test Method: Reference to SASO 2752/2016 Section 2.12 & ISO 2813:2014 and client's requirement

Test Condition:

Geometry: 20°, 85°

Test Result:

Sample	Gloss	
A1	20°	9.4
	85°	62

Note: The protected film was ripped off before test.

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Gloss meter	260	XMML-CON-020	2018-07-02	2019-07-01

***** To be continued *****



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4. Pencil hardness

Test Method: Reference to SASO 2752:2016 Section 2.13 & ISO 15184:2012 and client's requirement

Test Condition:

Test pencil: Zhong Hua® 101

Load: (750±10) g

Test Result:

Sample	Pencil hardness
A1	2H

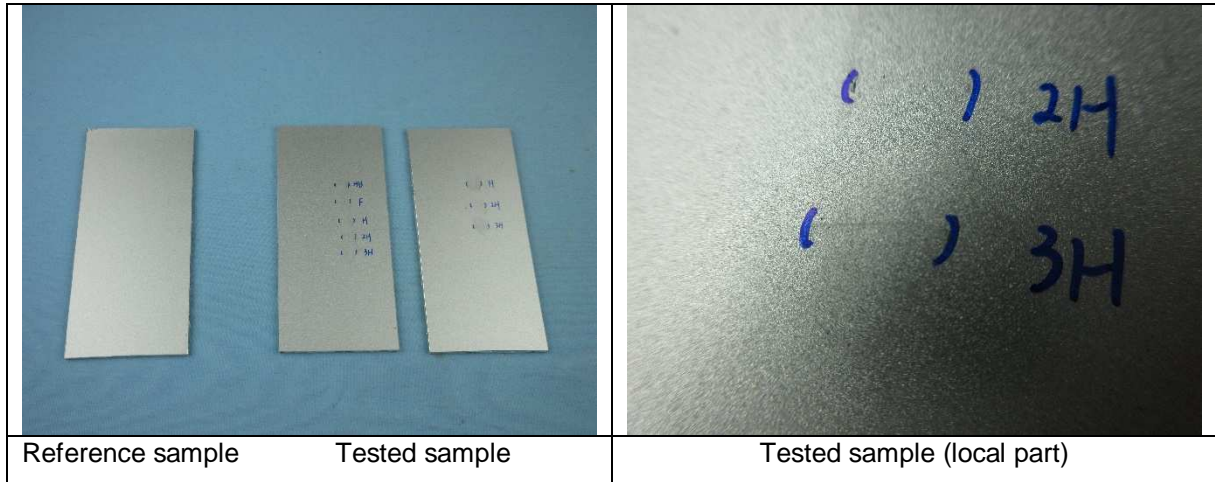
Note:

1. In Zhong Hua® 101 test pencil, 6H is the hardest and 6B is the softest.
6B-5B-4B-3B-2B-B-HB-F-H-2H-3H-4H-5H-6H

softer----->harder

2. The protected film was ripped off before test.

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Pencil hardness tester	BGD 505	XMML-POL-059	2018-11-01	2019-10-31

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5. Adhesion Test of Coatings

Test Method: Reference to SASO 2752:2016 Section 2.15 & ISO 2409:2013 and client's requirement

Test Condition:

Space: 1mm

Tape: 3M 600(Scotch®)

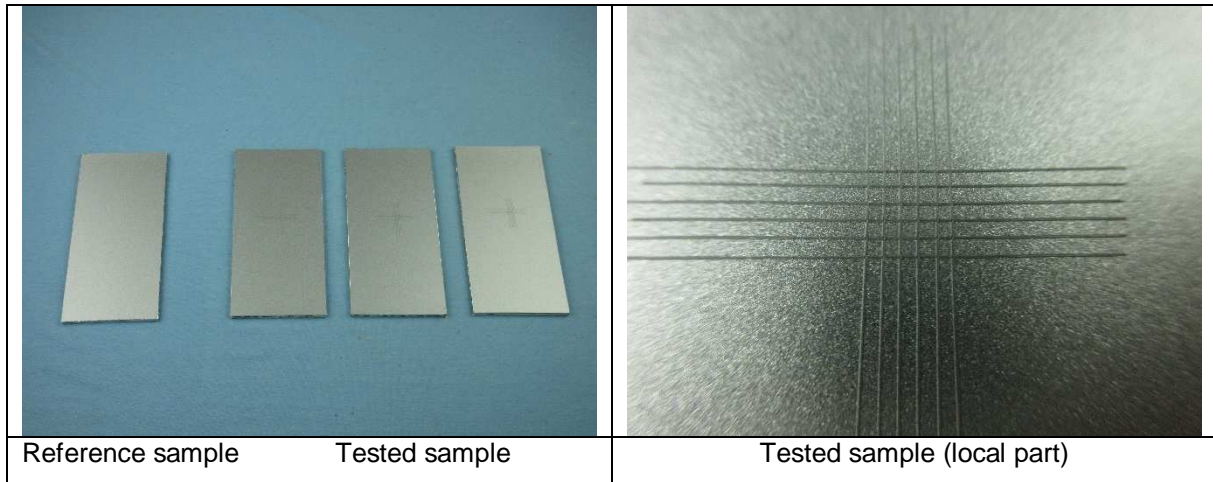
Test Result:

Sample	Adhesion classification
A1	0

Note:

1. According to ISO 2409:2013, in the adhesion classification--Classification 0 is the best and classification 5 is the worst.
2. The protected film was ripped off before test.

Test Photo:



Reference sample

Tested sample

Tested sample (local part)

Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Film adhesion grating	BGD 503	XMML-POL-035	2018-09-20	2019-09-19

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6. Chemical resistance

Test Method: Reference to SASO 2752:2016 Section 2.21 & ISO 2812-1:2007 and client's requirement

Test Condition:

Test temperature: (23±2) °C

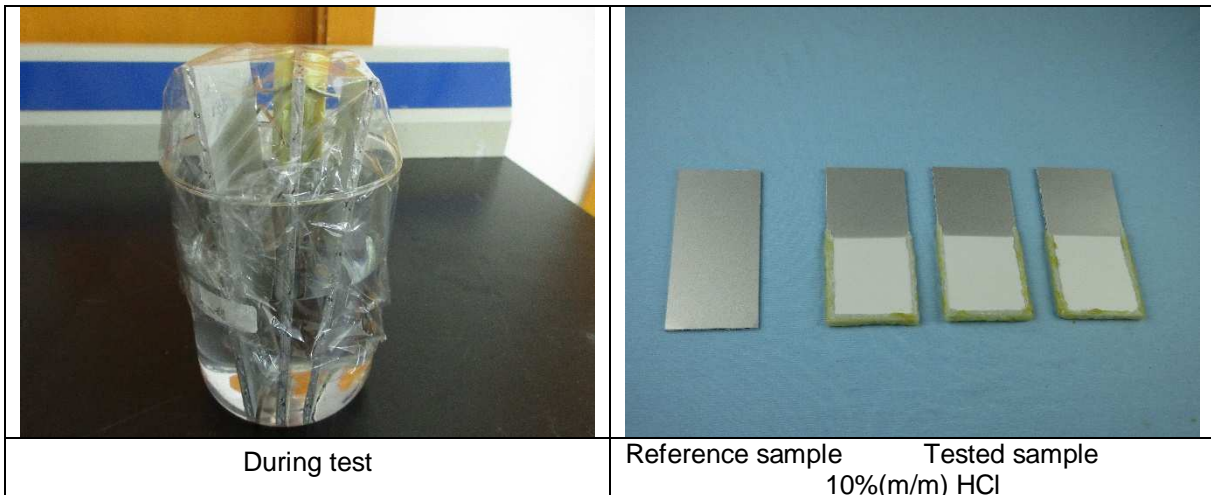
Duration of the test: 72 h

Test Result:

Sample	Chemical	Appearance
A1	10%(m/m) HCl	Visible discoloration and blisters
	5%(m/m) NaOH	Visible discoloration and blisters
	Mitsubishi® DiaQueen Motor Engine Oil SL GF-3 10W-30	No visible change
	Isopropanol	No visible change

Note: The protected film was ripped off before test.

Test Photo:



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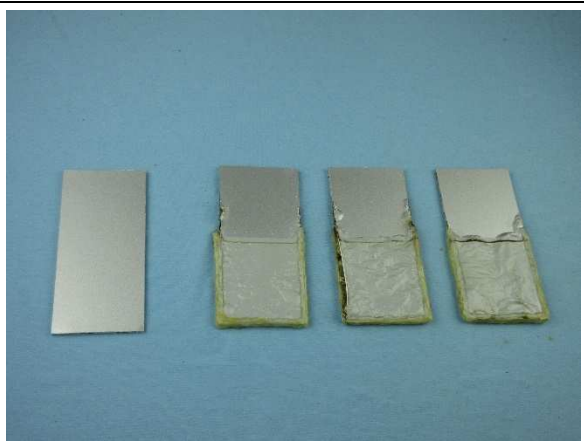

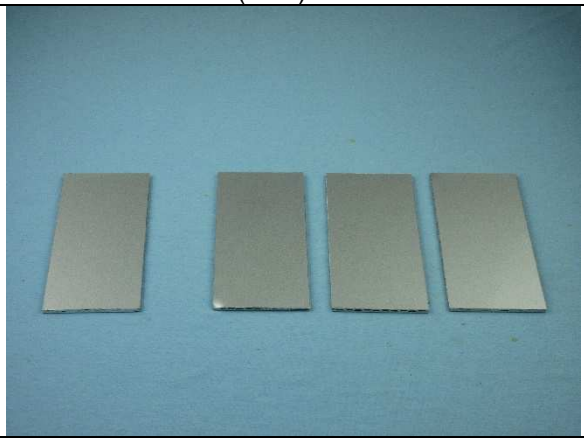
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<p>Tested sample (10%(m/m) HCl, local part)</p>	<p>Reference sample Tested sample 5%(m/m) NaOH</p>
	
<p>Tested sample (5%(m/m) NaOH, local part)</p>	<p>Reference sample Tested sample Mitsubishi® DiaQueen Motor Engine Oil SL GF- 3 10W-30</p>

***** To be continued*****



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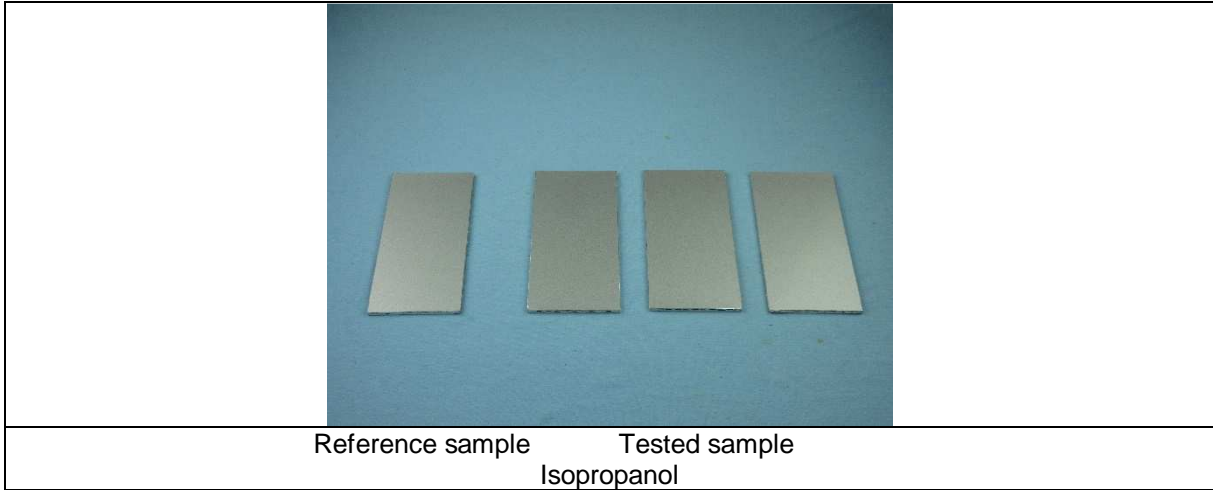
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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Electronic balance	BS 2202S	XMML-CON-001	2018-12-05	2019-12-04

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7. Cyclic Corrosion Test

Test Method: Reference to SASO 2752:2016 Section 2.20 & ISO 11997-1:2005 and client's requirement

Test Condition:

- ① Salt spray test (see note1),24 h
- ② (40±2) °C, 100 %RH, 8 h
- ③ (23±2) °C, (50±20) %RH, 16 h
- ④ (40±2) °C, 100 %RH, 8 h
- ⑤ (23±2) °C, (50±20) %RH, 16 h
- ⑥ (40±2) °C, 100 %RH,8 h
- ⑦ (23±2) °C, (50±20) %RH, 16 h
- ⑧ (40±2) °C, 100 %RH, 8 h
- ⑨ (23±2) °C, (50±20) %RH, 16 h
- ⑩ (23±2) °C, (50±20) %RH, 48 h

Step ①~⑩ as 1 cycle, total 5 cycles

Test Result:

Sample		Number of blister
A3	1 #	0
	2 #	0
	3 #	0
	4 #	0
	5 #	0
	6 #	0

Note:

- Salt spray test
Concentration of salt solution: (50±10) g/L NaCl
Chamber temperature: (35±2) °C
Volume of salt solution collected: (1.0~2.0) ml/(80cm²·h)
pH of salt solution at 25 °C: 6.0~7.0

- Note: The protected film was ripped off before test.

***** To be continued*****



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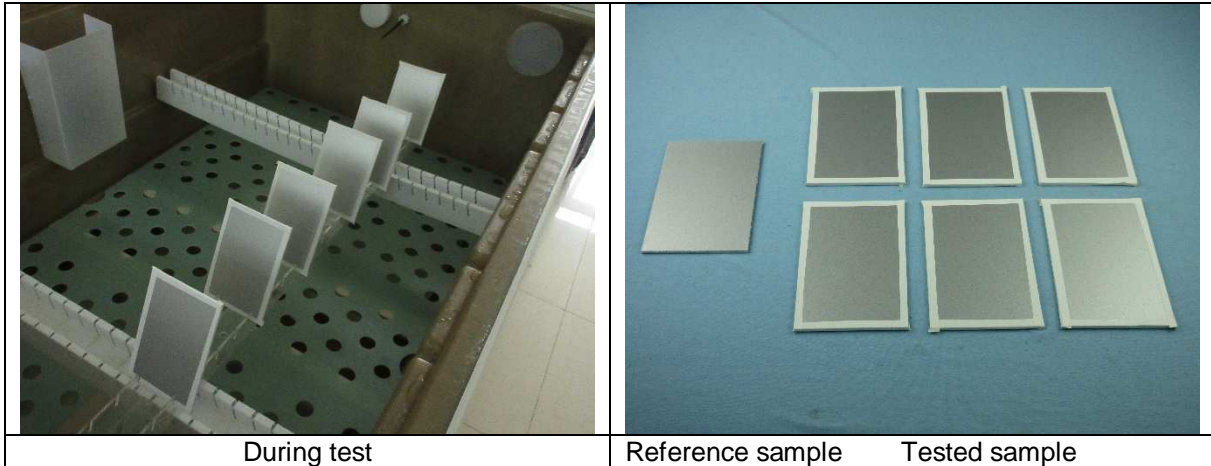
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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Salt spray test chamber	Q-FOG/CCT1100	XMML-POL-066	2018-07-04	2019-07-03

8. Test Item: Hot water resistance

Test Method: Reference to SASO 2752:2016 Section 2.22 & ISO 2812-2:2007 and client's requirement

Test Condition:

Temperature: 99 °C

Duration: 2h

Test Result:

Sample	Appearance
A1	No visible change

Note: Note: The protected film was ripped off before test.

***** To be continued*****



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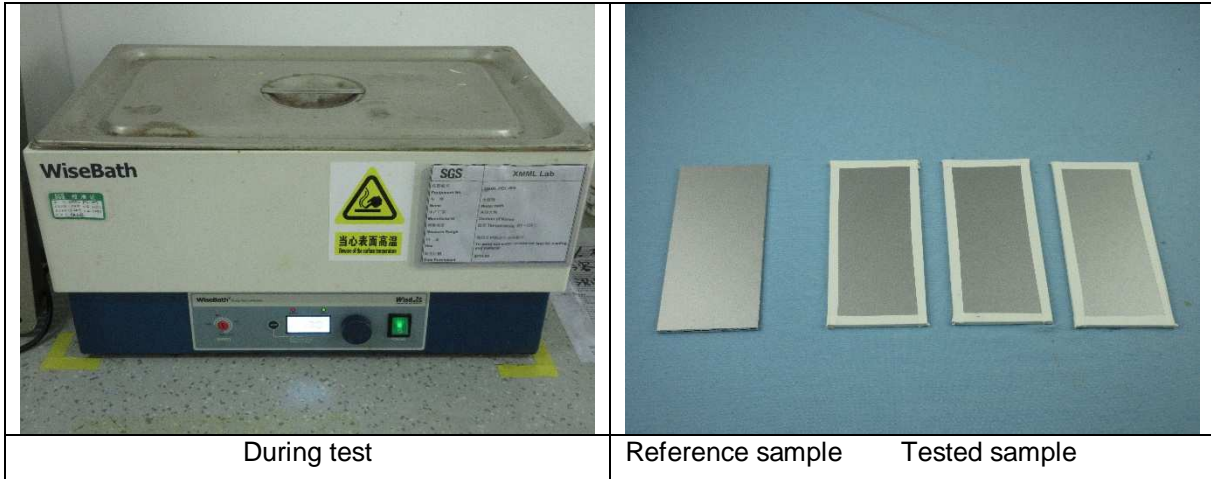
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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Water bath pot	WB-22	XMML-POL-009	2018-12-05	2019-12-04

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9. Brush Resistance Test

Test Method: With reference to SASO 2752:2016 Section 2.18 & ISO 11998-2006 Section 8.2 and client's requirement

Test Condition:

Abrasive pad: 3M Scotch Brite® No.7448

Speed: 37 ± 2 cycles/min

Load: 135 ± 1g

Cycles: 10000

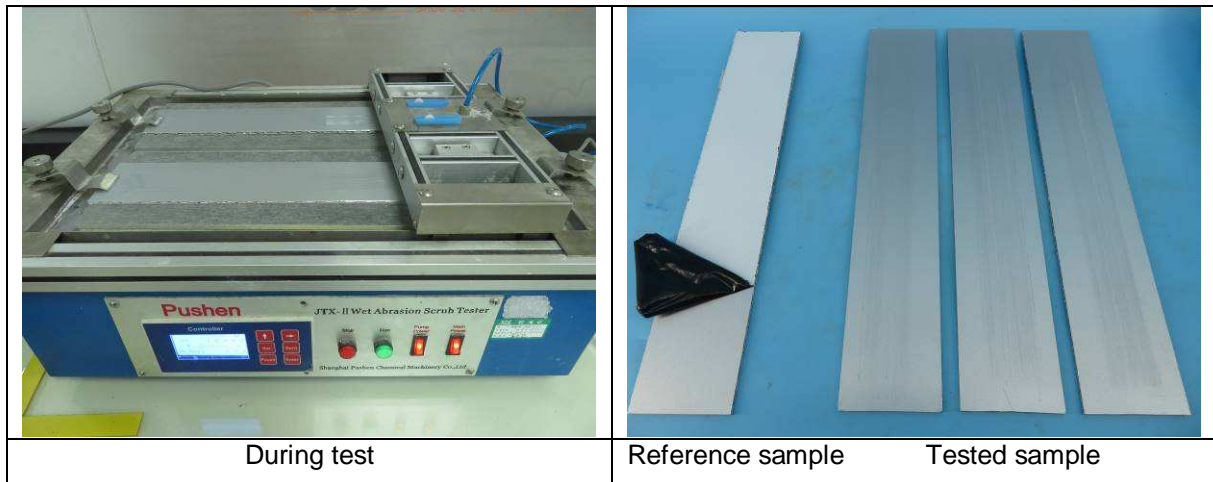
Reagent: Deionized water

Test Result:

Sample	Appearance
A	Visual abrasion trace, but no worn-out to the substrate

Note: The protected film was ripped off before test.

Test Photo:



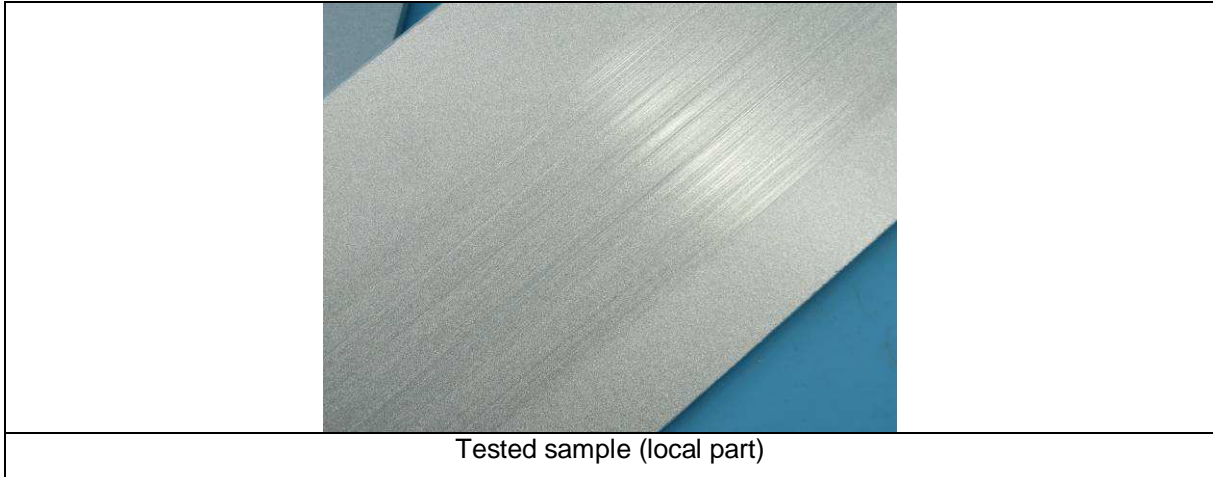
***** To be continued *****

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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Straight Line Washability Machine for Architecture Coatings	JTX-II	GZMR-AG-E151	2018-08-21	2019-08-20

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10. Deflection Temperature under Load

Test Method: SASO 2752:2016 Section 2.8 & ISO 75-1:2013 & ISO 75-2:2013 Method A

Test Condition:

Specimen: 81mm×10.80mm×3.86mm

Heat-transfer media: Silicone oil

T_r1.8

Rate of temperature:120°C/h

Span: 64mm

Lab Environmental Condition: (23±2)°C, (50±5)%RH

Test Result:

Test Item	Test Result
Deflection Temperature under Load	93°C

Note:

1. The surface with protected film was faced to the loading.
2. The protected film was ripped off before test.

Test Photo:



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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
HDT and VICAT Tester	6970.000	GZMR-PL-E091	2018-04-17	2019-04-16

11. Falling Sand Abrasion

Test Method: With reference to SASO 2752:2016 Section 2.17 & ASTM D968-17 Method A and client's requirement

Test conditions:

Abrasive: Standard Abrasive

Falling Speed: 2L/21-23.5s

Litres of abrasive: 40.0L

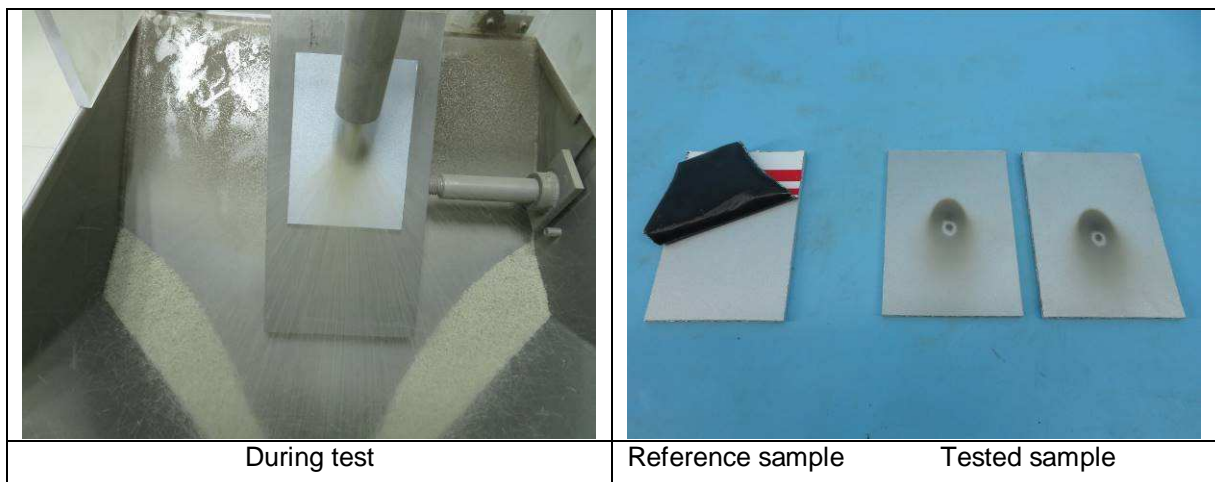
Coating thickness: 1.11mil

Test Result:

Sample	Abrasion resistance
A	1.42 L/μm

Note: The protected film was ripped off before test.

Test Photo:



During test

Reference sample

Tested sample

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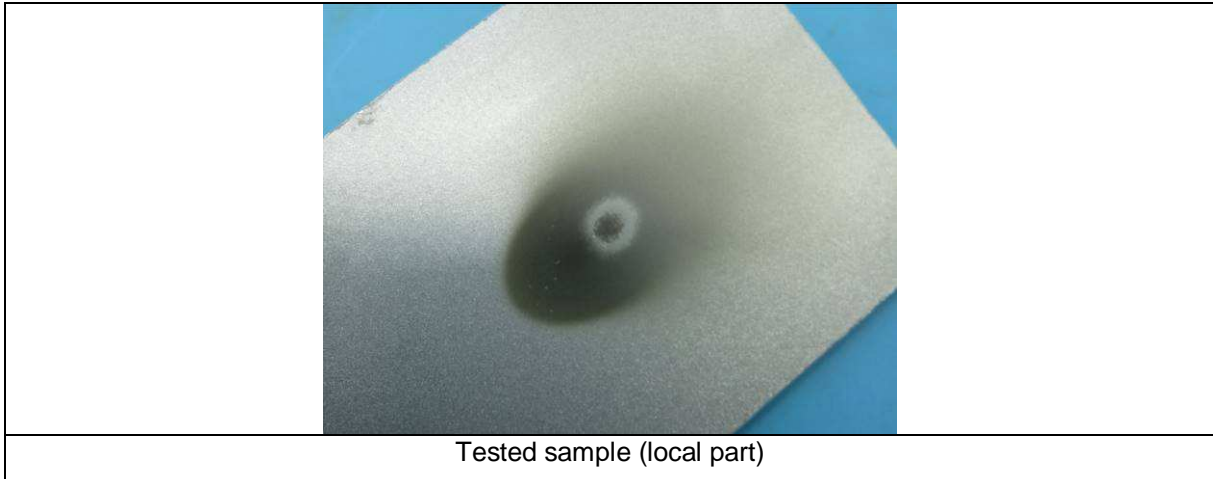
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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Falling Sand Abrasion Tester	TG-8310-AT	GZMR-AG-E209	2018-04-08	2019-04-07
Digital Coating Thickness Gauge	FNbasic	GZMR-AG-E170	2018-11-07	2019-11-06

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12. Coating Flexibility

Test method: With reference to SASO 2752:2016 Section 2.14 & ISO 17132:2007 and client's requirement

Test Condition:

Thickness of spacer panels: 0.62mm

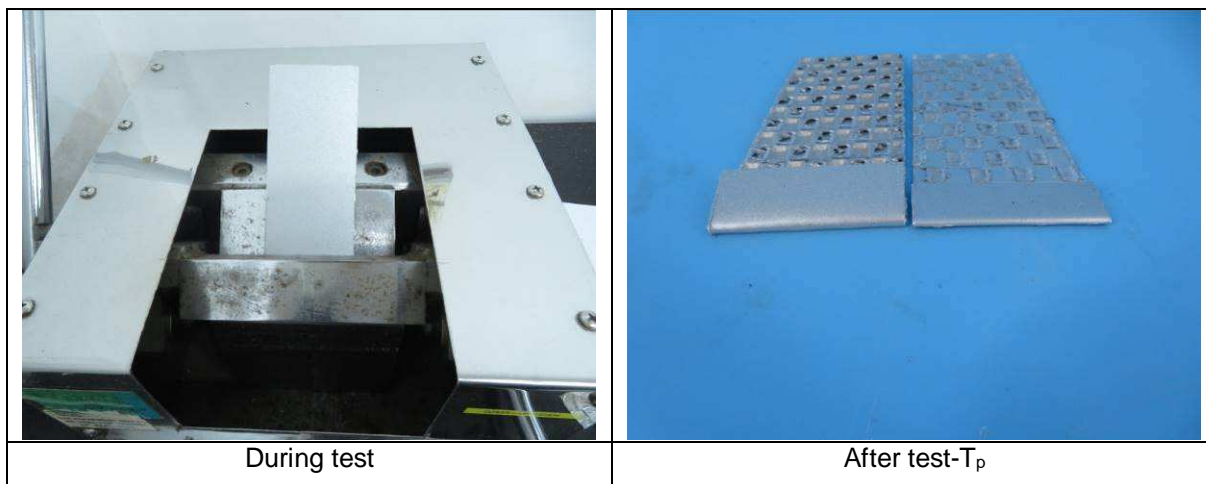
Diameter of mandrel: 0.6mm

Test result(s):

Sample	Test Condition	Appearance
A	T_p	No cracking or damage with 0T
	T_f	No cracking or damage with 1T
	T_m	No cracking or damage with 0T

Note: The protected film was ripped off before test.

Test Photo:



***** To be continued *****



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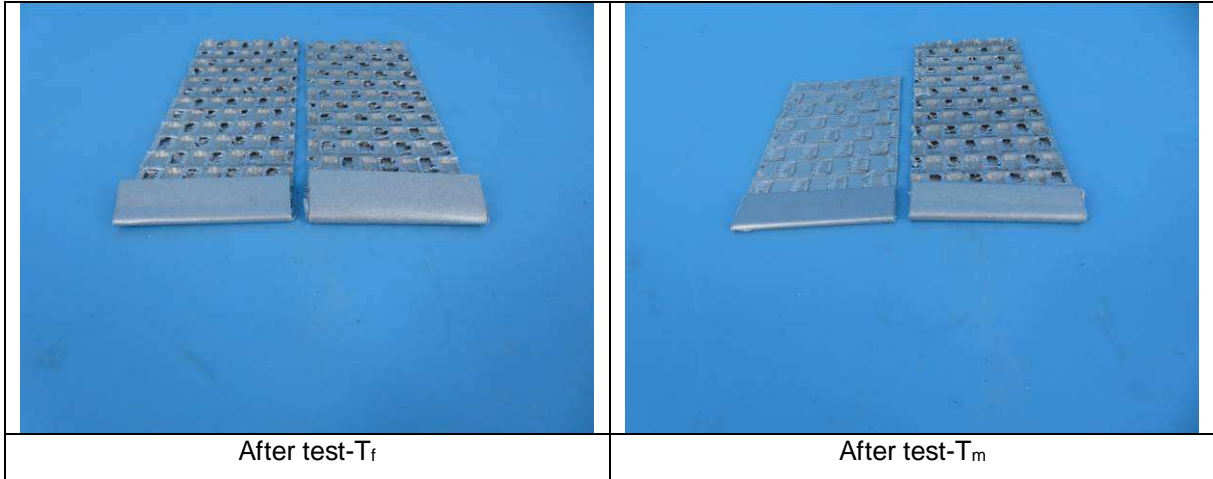
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13. Light Ageing Test-Xenon-arc Exposure

Test Method: With reference to SASO 2752:2016 Section 2.19 & ISO 16474-2:2013 Cycle 4 & ASTM D2244-16 & ASTM D523-14(2018) and client's requirement

Test Condition:

Exposure cycle:

ISO 16474-2:2013 Cycle 4

Irradiance: $(0.51 \pm 0.02)W/(m^2 \cdot nm)$ @340nm

102 min light at $(63 \pm 3)^\circ C$ BPT, $(38 \pm 3)^\circ C$ CT, $(50 \pm 10)\%$ RH

18 min light and water spray

Filter: Boro/Boro

Exposure period : 2000h

Test Result:

Sample	ΔE^*_{ab} (See note 1)	Gloss loss (See note 2)	Appearance
A	0.3	17%	No visual change

Note:

- ΔE^*_{ab} was measured by sphere spectrophotometer under D65 standard light source and with 10° observer. The results include specular reflection condition, 25mm aperture.
- Gloss loss(60° geometry)= (The gloss before test - the gloss after test) /the gloss before test X100%.
- The protected film was ripped off before test.

***** To be continued*****



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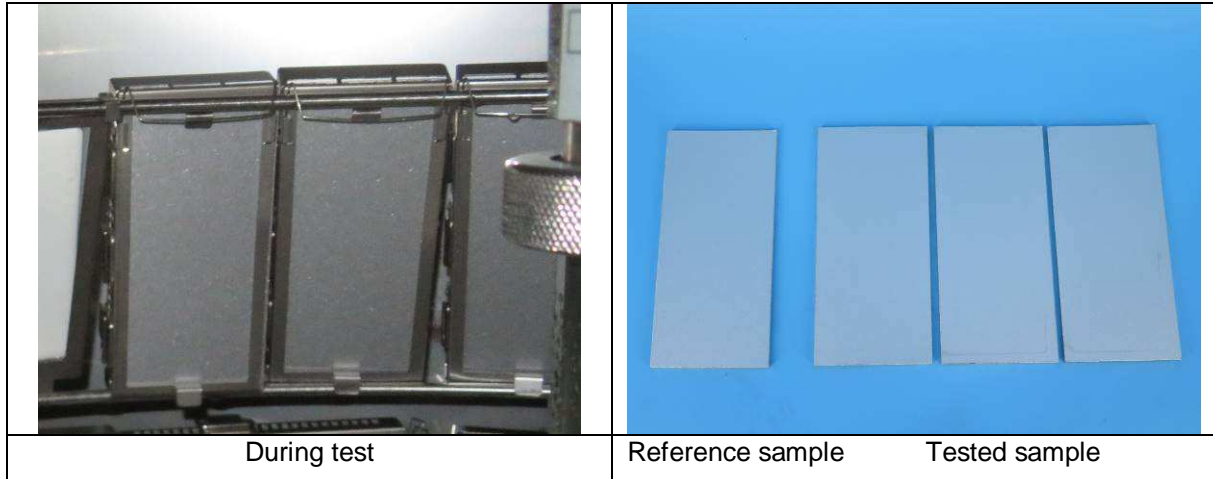
TEST REPORT

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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Xenon Weathering Tester	Ci5000	GZMR-AG-E169	2018-10-29	2019-10-28
Sphere Spectrophotometer	Color i7	GZMR-AG-E155	2019-03-13	2020-03-12
Specular Gloss Meter	4446	GZMR-AG-E119	2018-05-08	2019-05-07

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14. Peel Strength

Test Method: SASO 2752:2016 Section 2.7 & ISO 8510-2:2014

Test Condition:

Specimen width: 25.6mm

Testing speed: 100mm/min

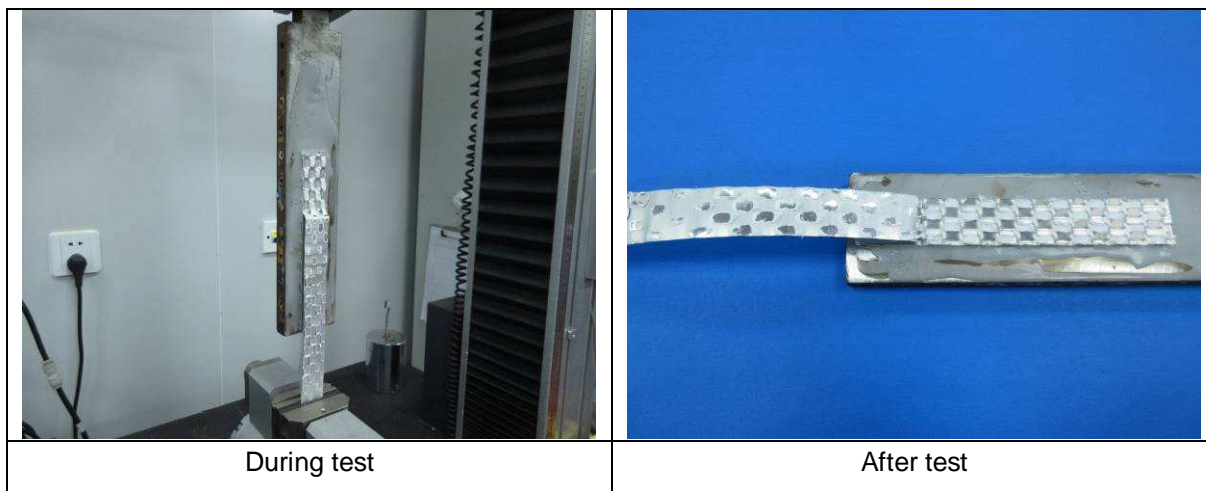
Lab Environmental Condition: 23±2°C, 50±5%RH

Test Result:

Sample	Test Item	Test Result
A	Peel strength	156N

Note: Failure type: Adhesion Failure.

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal Testing Machine	CMT4304	GZMR-PL-E062	2018-09-18	2019-09-17

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15. Shear Strength

Test Method: SASO 2752:2016 Section 2.6 & ASTM D732-17

Test Condition:

Specimen thickness: 3.86mm

Punch diameter: 25mm

Testing speed: 1.3mm/min

Lab Environmental Condition: (23±2)°C, (50±5)%RH

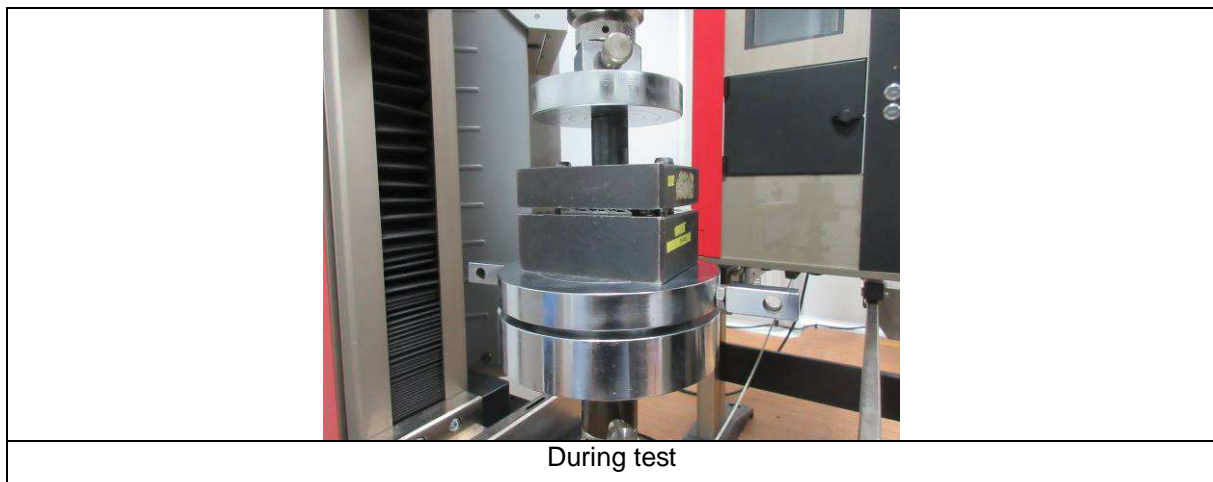
Test Result:

Sample	Test Item	Test Result
A	Shear Strength	25.7MPa

Note:

1. The surface with protected film was faced to the loading.
2. The protected film of test specimens was ripped off before test.
3. Test specimens were cut from the sample.

Test Photo:



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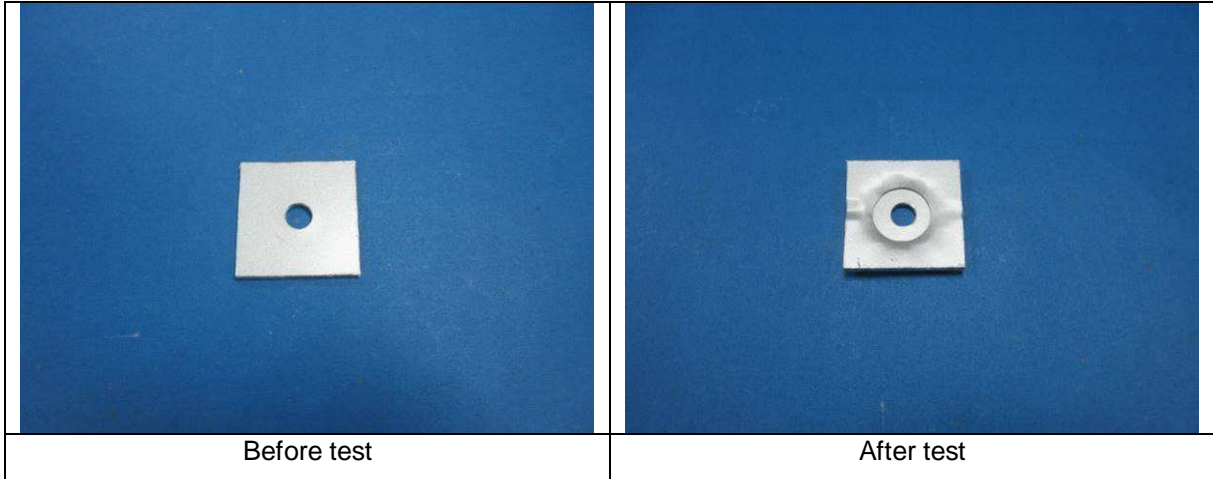
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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal testing machine	Z020	GZMR-PL-E264	2018-10-18	2019-09-27

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16. Tensile Strength

Test Method: SASO 2752:2016 Section 2.4 & ISO 527-2:2012

Test Condition:

Specimen: Type 1B

Specimen thickness: 3.82 mm

Testing speed: 5 mm/min

Initial distance between grips: 115 mm

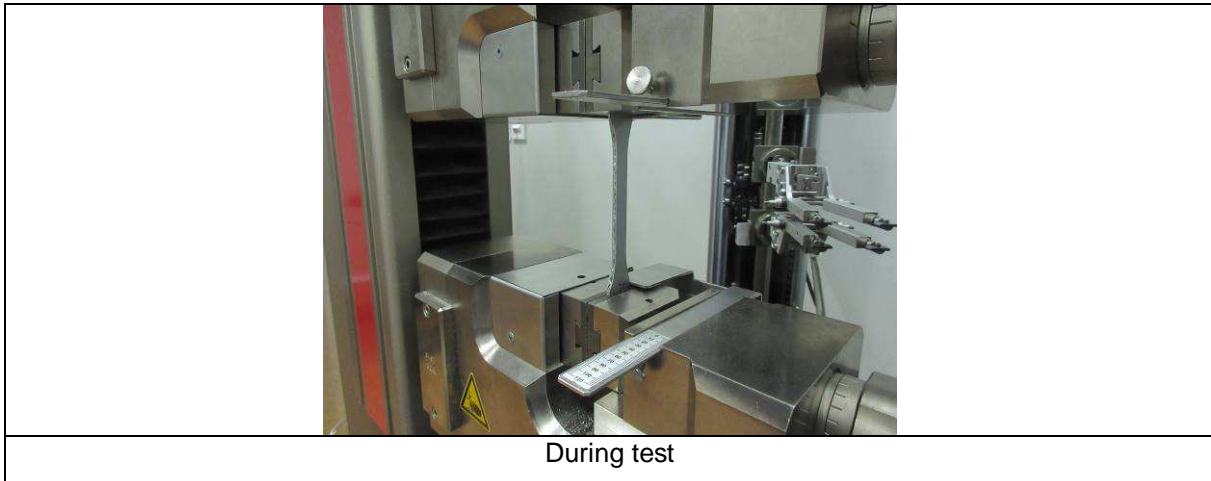
Lab Environmental Condition: 23 ± 2 °C, 50 ± 5 % RH

Test Result:

Sample	Test Item	Test Result
A	Tensile Strength	58.6MPa

Note: he protected film of test specimens was ripped off before test.

Test Photo:



***** To be continued*****



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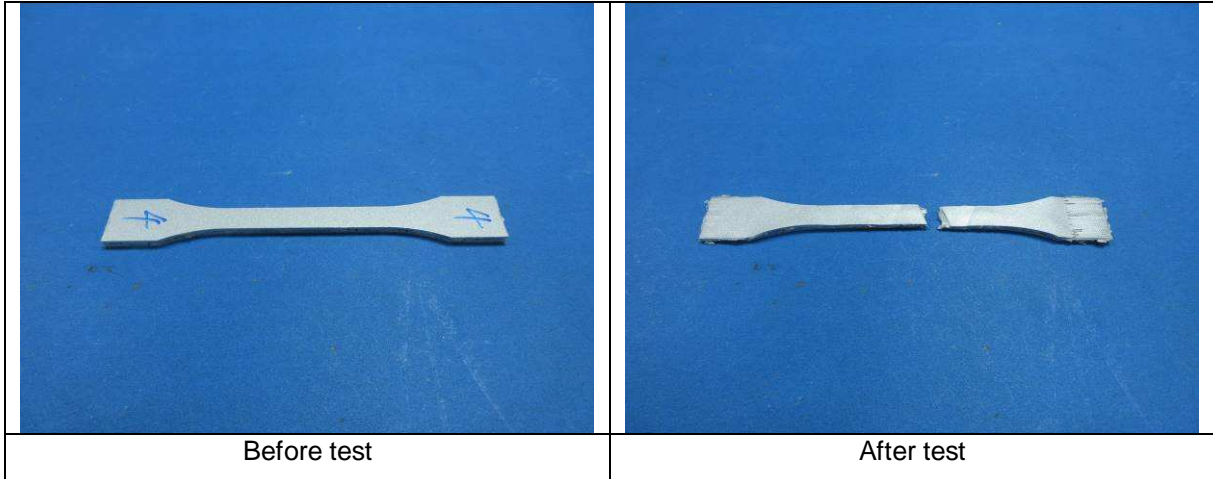
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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal Testing Machine	Z030	GZMR-PL-E140	2018-09-18	2019-09-17

17. Flexural Test

Test Method: SASO 2752:2016 Section 2.5 & ISO 178:2010/Amd.1:2013 Method A

Test Condition:

Specimen: 80mm×10.52mm×3.87mm

Testing speed: 2mm/min

Span: 64mm

Lab Environmental Condition: (23±2)°C, (50±5)%RH

Test Result:

Sample	Test Item	Test Result
A	Flexural Strength	52.2MPa (See table 1)
	Flexural Modulus	9610MPa (See table 1)

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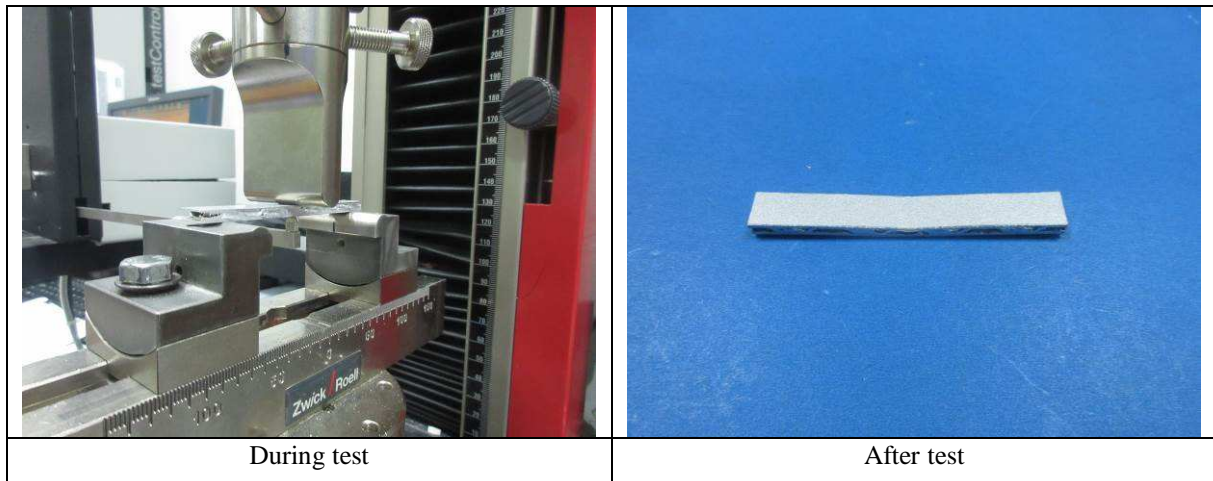
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Table 1:

Specimen	#1	#2	#3	#4	#5	#6
Flexural Strength, MPa	58.18	52.39	48.99	54.06	56.85	42.86
Flexural Modulus, MPa	10460	8375	9233	10160	9919	9499

Note: he protected film of test specimens was ripped off before test.

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal testing machine	Z1.0	GZMR-PL-E252	2018-04-17	2019-04-16

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18. Coefficient of linear thermal expansion

Test Method:

Ref. ASTM D696-16

Standard Test Method for Coefficient of Line Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.

Test Condition:

Test temperature range : Ramp 10°C/min from -30°C to 30°C

Probe Type: Expansion

Force: 0.05N

Measurement Direction: Customer specified(Thickness)

Purge gas: Nitrogen (N₂), Purity 99.999%, Flow rate 50ml/min

Test Result:

Test Item	Test Results
Coefficient of linear thermal expansion (µm/m·°C)	-30°C ~ 30°C: 46.51

***** To be continued*****



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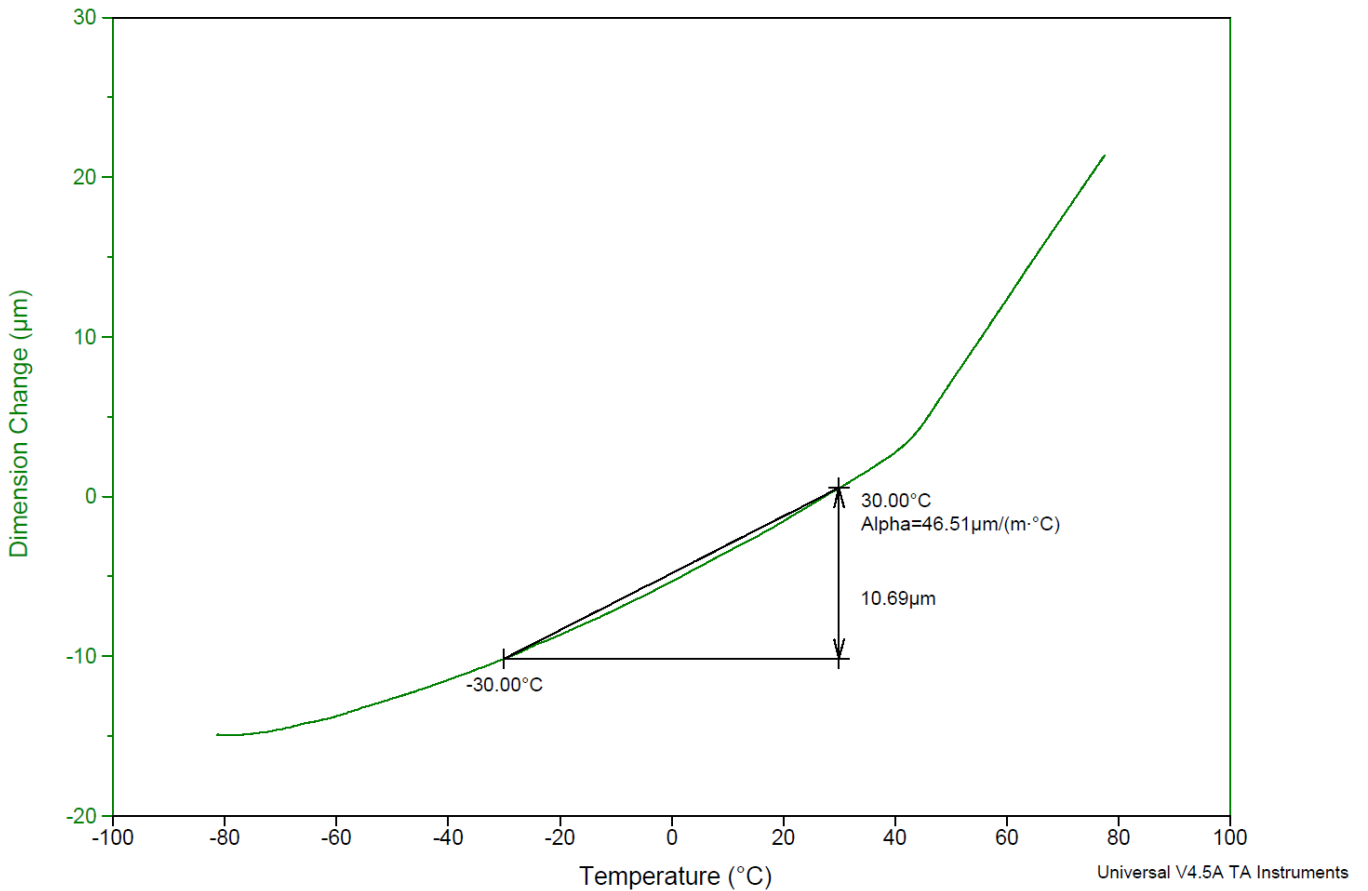
Test Spectrum:

Sample: KV-19-00030
Size: 3.8298 mm

TMA

File: C:\TA\Data\TMA\201901\KV-19-00030.001
Operator: Mina Hsu
Run Date: 14-Jan-2019 13:26
Instrument: TMA Q400 V7.4 Build 93

Comment: XMIN181202596CCM



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Sample Photo :



Test Equipment:

Name	Brand	Model
Thermomechanical Analyzer (TMA)	TA	Q-400

19. Thermal conductance and Thermal resistance

Test method:

ASTM 518-17

Test condition:

Specimen: 300mm×300mm×3.9mm, 1pc

Density: about 951kg/m³

Mean temperature: 23°C

Temperature difference: 10°C

Lab environmental condition: 23±2°C, 50±5%RH

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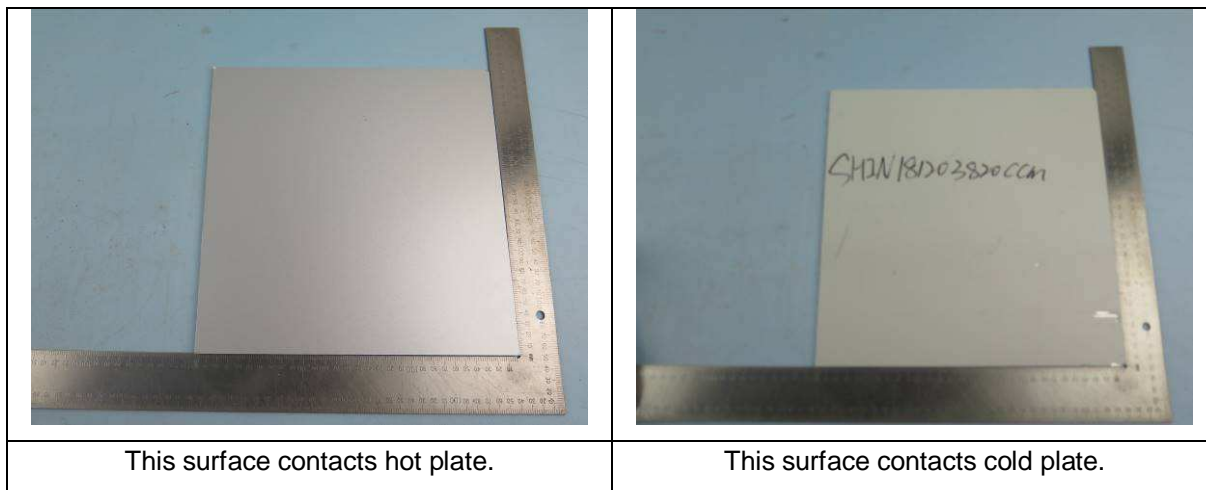
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Test result:

Test Item	Test Result
Thermal conductivity	0.100 W/(m·K)
Thermal resistance	0.039 (m ² ·K)/W

Note: The test result can not be compared with other results obtained from different test conditions and should not be cited to the use condition directly.

Specimen photo(s):



20. Self-ignition temperature

Test method:

This test is conducted as per ASTM D1929–2016 Standard Test Method for Determining Ignition Temperature of Plastics.

Details of tested specimen

Description	Aluminum honeycomb
Color	Silver
Form of material	Sheet
Mass of specimen, g	3.0
Size of sample	20mm×20mm×4mm

***** To be continued*****



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Conditioning	T :23± 2°C, H :50±5%, 40 h
--------------	----------------------------

Test results:

Flash ignition temperature (FIT) °C		
No.	T /°C	Observation
1	400	No ignition
2	450	Ignition
3	440	No ignition

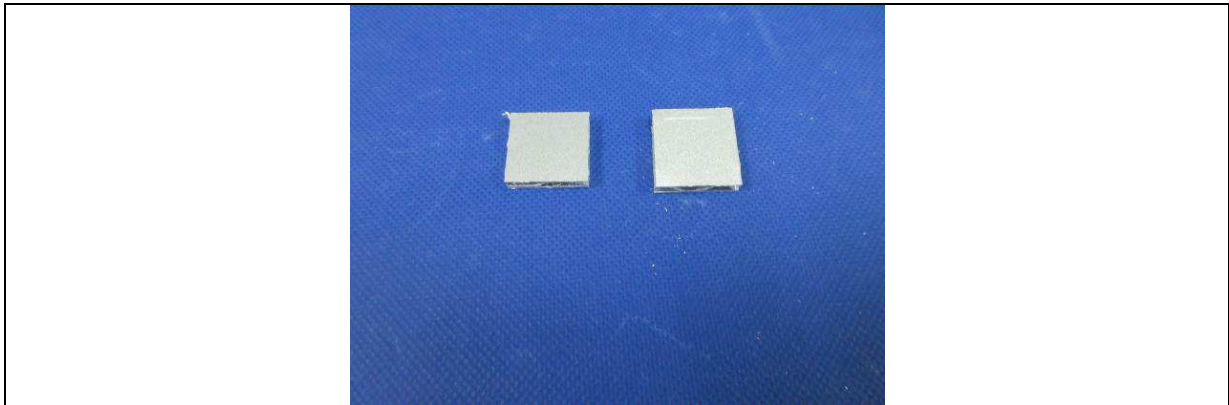
Spontaneous ignition temperature (SIT) °C		
No.	T /°C	Observation
1	400	No Ignition
2	450	No Ignition
3	500	Ignition
4	490	Ignition
5	480	Ignition
6	470	Ignition
7	460	No Ignition

Summary of test results:

FIT = 450 °C

SIT = 470 °C

Photo Appendix:



***** To be continued*****



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21. Surface Burning

Test method:

This test was conducted in accordance with ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials

Introduction:

The method, designated as ASTM E84-18b, "Standard Method of Test for Surface Burning Characteristics of Building Materials", is designed to determine the relative surface burning characteristics of materials under specific test conditions. Results are expressed in terms of flame spread index (FSI) and smoke developed index (SDI).

The purpose of this test method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke developed index are reported. However, there is not necessarily a relationship between these two measurements.

Test Procedure:

The tunnel is preheated to 150°F, as measured by the floor-embedded thermocouple located 23.25 feet downstream of the burner ports, and allowed to cool to 105°F, as measured by the floor-embedded thermocouple located 13 feet from the burners. At this time the tunnel lid is raised and the test sample is placed along the ledges of the tunnel so as to form a continuous ceiling 24 feet long, 12 inches above the floor. The lid is then lowered into place.

Upon ignition of the gas burners, the flame spread distance is observed and recorded every 15 seconds. Flame spread distance versus time is plotted ignoring any flame front recessions. If the area under the curve (A) is less than or equal to 97.5 min-ft, $FSI = 0.515 \cdot A$; if greater, $FSI = 4900 / (195 - A)$. Smoke developed is determined by comparing the area under the obscuration curve for the test sample to that of inorganic reinforced cement board and red oak, arbitrarily established as 0 and 100, respectively.

Sample Description:

Thickness	:	Approximately 4mm
Exposed face	:	Tearing the membrane surface

***** To be continued *****



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Sample Preparation:

Prior to testing, the specimen was conditioned to constant weight at a temperature of (73.4± 5)°F (23 ± 2.8)°C and a relative humidity of (50 ± 5)%.

The test specimen consisted of a total of 3 sections of material. The sections were butted together during testing to form the requisite specimen length.

Test Results:

Test data and observations:

Ignition time:	258 seconds.
Maximum flame spread (ft):	3
Time To Maximum Spread:	537 seconds.
Observations of the burning characteristics	No
Test Duration:	10 minutes.
FS*Time area (ft*min):	20.4
Smoke area (%A*min):	70.5
Red oak smoke area (%A*min):	90.8

Summary of results:

Flame-spread Index (FSI)	Smoke-developed Index (SDI)
10	80

***** To be continued*****



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Rating:

The National Fire Protection Association Life Safety Code 101, "Interior Wall and Ceiling Finish Classification", has a means of classifying materials with respect to Flame Spread and Smoke Developed when tested in accordance with NFPA 255, (ASTM E84) "Method of Test of Surface Burning Characteristics of Building Materials".

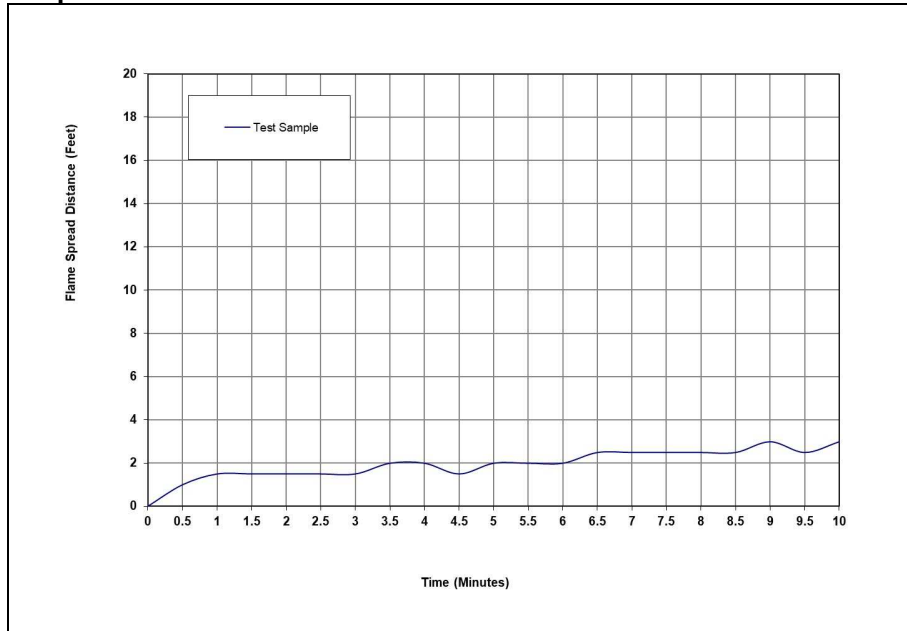
The classifications are as follows:

	<u>Flame-Spread Index (FSI)</u>	<u>Smoke-developed Index(SDI)</u>
Class A	0 - 25	0 - 450
Class B	26 - 75	0 - 450
Class C	76 - 200	0 - 450

Conclusion:

Refer to the National Fire Protection Association Life Safety Code 101, "Interior Wall and Ceiling Finish Classification", the submitted sample meets the requirement of Class A.

Appendix 1-Graphs:



Graph1. Flame Spread Index

***** To be continued*****



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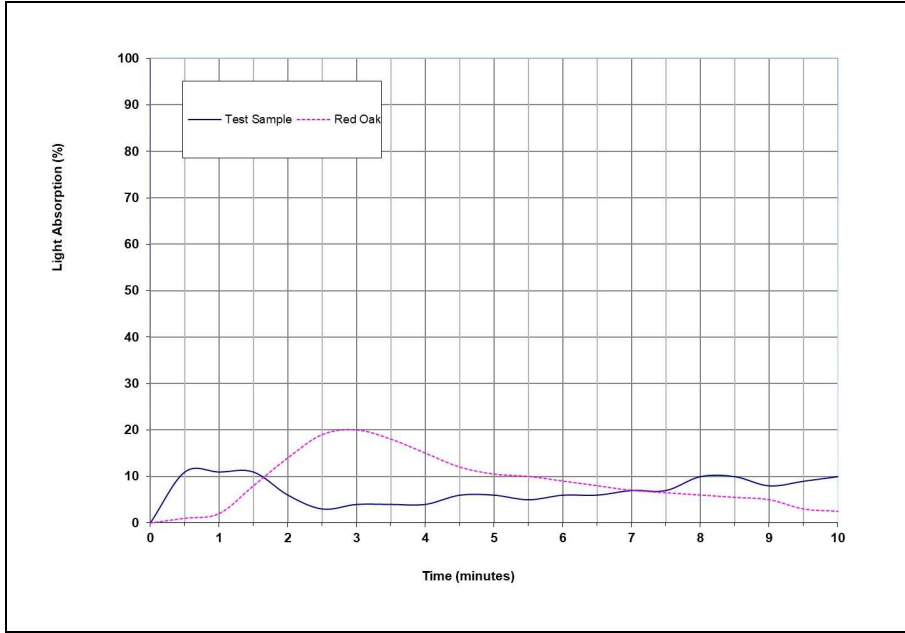
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Graph2. Smoke Developed Index

***** To be continued *****



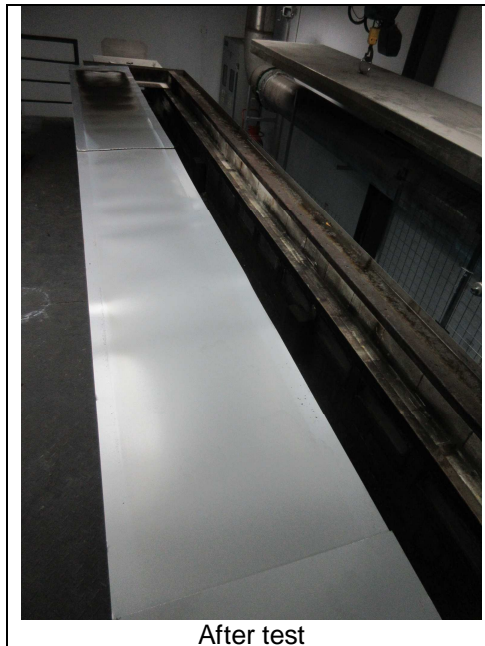
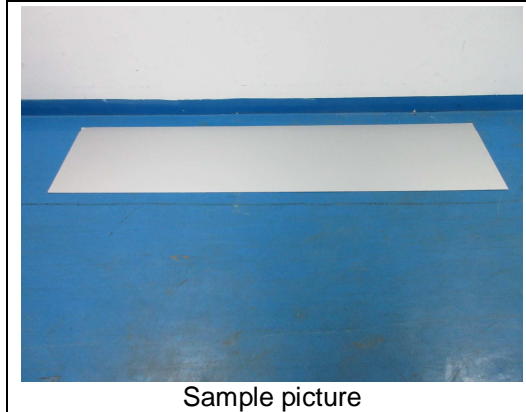
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Appendix 2-Pictures:



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22. Non-combustibility

Test method:

This test is conducted accordance with ISO 1182:2010 Reaction to fire tests for products-Non-combustibility.

Conditioning of specimen:

Preconditioning: Temperature: (60±5) °C; Duration: 24h

Test Results:

Specimen	ΔT_f (°C)	ΔT_c (°C)	ΔT_s (°C)	Mass loss (%)	Flame continuance (s)
1	105.8	104.8	117.3	24.4	308
2	100.6	97.1	106.7	20.6	317
3	81.3	106.6	86.9	18.6	312
4	85.8	89.5	86.2	18.8	323
5	104.4	87.0	99.5	19.1	330
Average	95.6	97.0	99.3	20.3	318

Remark: ΔT_f -Temperature rise of the maximum furnace thermocouples above the final furnace temperature;

ΔT_c -Temperature rise of the maximum specimen centre thermocouples above the final specimen centre temperature;

ΔT_s -Temperature rise of the maximum specimen surface thermocouple above the final specimen surface temperature ;

Mass Loss (%) =[initial mass (g) – mass after testing (g)]/ initial mass (g) x 100%;

Flame continuance (s): the total duration of sustained flaming.

***** To be continued*****



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SAMPLE INFORMATION AND PICTURES

Actual size of Specimen: Diameter about:45mm
Height about:4mm

Remark: The tested specimens were made of 12 layers submitted specimen, and the thickness of specimens were about 48mm.



***** End of report*****



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