

TEST REPORT

No. : SZIN1503001723PS

Date : Sep 17, 2015


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CUSTOMER NAME: FOSHAN VANCO BUILDING MATERIALS CO., LIMITED
ADDRESS: ROOM 1027 COUBON INTERNATIONAL BUILDING, NO.13 RONGQI ROAD, SHUNDE, GUANGDONG CHINA

The following sample(s) was/ were submitted and identified on behalf of the client as:

Sample Name : ALUMINIUM COMPOSITION PANEL
SGS Ref. No. : GZIN1503008118MR; SHCCM150300509
Product Specification : 4MM
Other Information : SA-146
Date of Receipt : Mar 06, 2015
Testing Start Date : Mar 06, 2015
Testing End Date : Sep 17, 2015
Test result(s) : For further details, please refer to the following page(s)

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



Ramber Li
Authorized signatory



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch / Shenzhen Branch Materials Laboratory

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Summary of Results:

No.	Test Item	Test Method	Result		Conclusion
1	Adhesion Test of Coatings	With reference to AAMA 2605-05 Section 7.4.1.1 and client's requirement	No visible peeling		Pass
2	Coating Thickness	ASTM D1400-00	25.0μm		Pass
3	Falling Sand Abrasion	ASTM D968-05(2010) Method A	66.1L/mil		Pass
4	Impact Resistance	With reference to AAMA 2605-05 Section 7.5 and client's requirement	No removal of film from substrate		Pass
5	Neutral Salt Spray Test	With reference to AAMA 2605-05 Section 7.8.2 & ASTM B117-11 and client's requirement	See results		Pass
6	Pencil Hardness	ASTM D3363-05(2011) ^{e2}	2H		Pass
7	Steady State Damp Heat Test	With reference to AAMA 2605-05 Section 7.8.1 & ASTM D2247-11 & ASTM D714-02(2009) and client's requirement	Sample	Blistering rating	Pass
			#1	10	
			#2	10	
8	Weathering Resistance	With reference to ASTM C481-99(2011) Cycle A and client's requirement	See test item 14-15		/



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No.	Test Item	Test Method	Result		Conclusion
9	Deflection Temperature under Load	With reference to ASTM D648-07 Method B and client's requirement	104.4 °C		Pass
10	Peel Strength	With reference to ASTM D903-98(2010) and client's requirement	20.4 kgf/25mm		Pass
11	Shear Strength	ASTM C273/C273M-11	As received	4.33 MPa	Pass
			After weathering resistance	4.30 MPa	
12	Thickness	Provided by client	4.19 mm		Pass
13	Mass per Unit Area	Provided by client	7.7 kg/m ²		Pass
14	Adhesion Test of Coating(after weathering resistance)	With reference to AAMA 2605-05 Section 7.4.1.1 and client's requirement	No visible peeling		Pass
15	Impact Resistance(after weathering resistance)	With reference to AAMA 2605-05 Section 7.5 and client's requirement	No visible peeling		Pass
16	Thermal conductivity	ASTM C518-10	0.924 W/(m·K)		/

Note: Pass : Meet the requirements;
 Fail : Does not meet the requirements;
 / : Not Apply to the judgment.



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1. Test Item: Adhesion Test of Coating

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.4.1.1 and client's requirement

Test Condition:

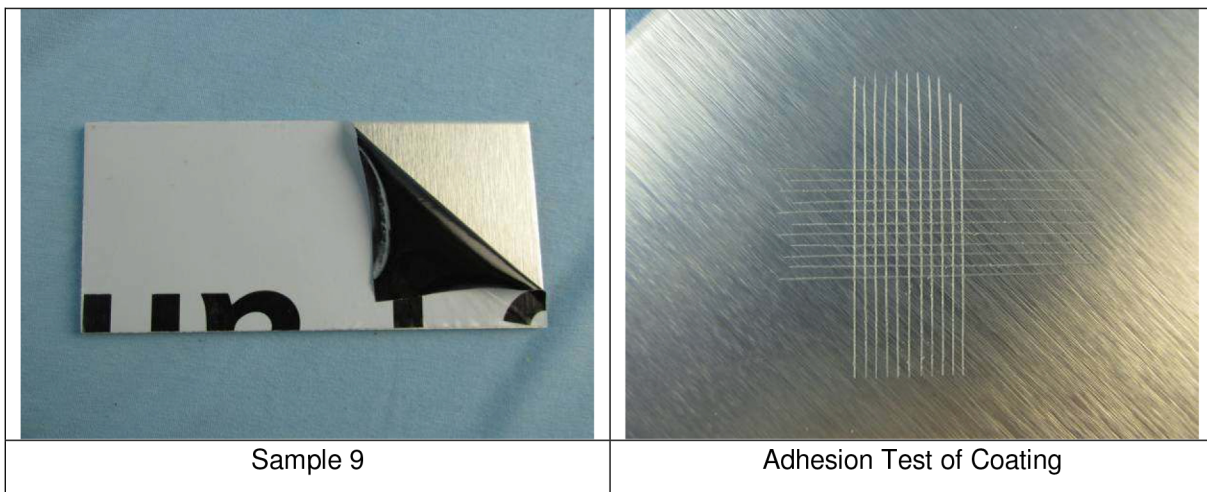
Space: 1mm

Tape: Elcometer 99

Test Result:

Sample	Appearance	Client's requirement	Conclusion
9	No visible peeling	No visible peeling	Pass

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Cross Rules	BGD	GZMR-AG-E036-03	2015-05-19	2016-05-18



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2. Test Item: Coating Thickness

Sample Description: Panel with coating

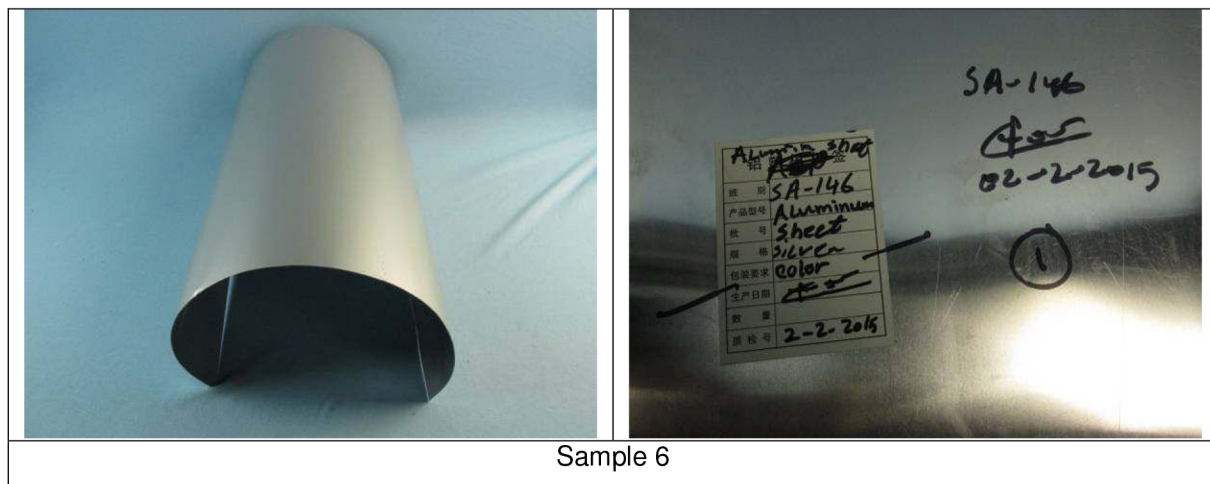
Test Method: With reference to ASTM D1400-00 and client's requirement

Test Condition: Eddy Current Method

Test Result:

Sample	Test result	Client's requirement	Conclusion
6	25.0µm	≥25µm	Pass

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Coating Thickness Gauge	FN2.2	GZMR-AG-E016	2014-08-28	2015-08-27



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3. Test Item: Falling Sand Abrasion

Sample Description: Aluminum composite panel

Test Method: ASTM D968-05(2010) Method A

Test conditions:

Litres of abrasive: 74.0L

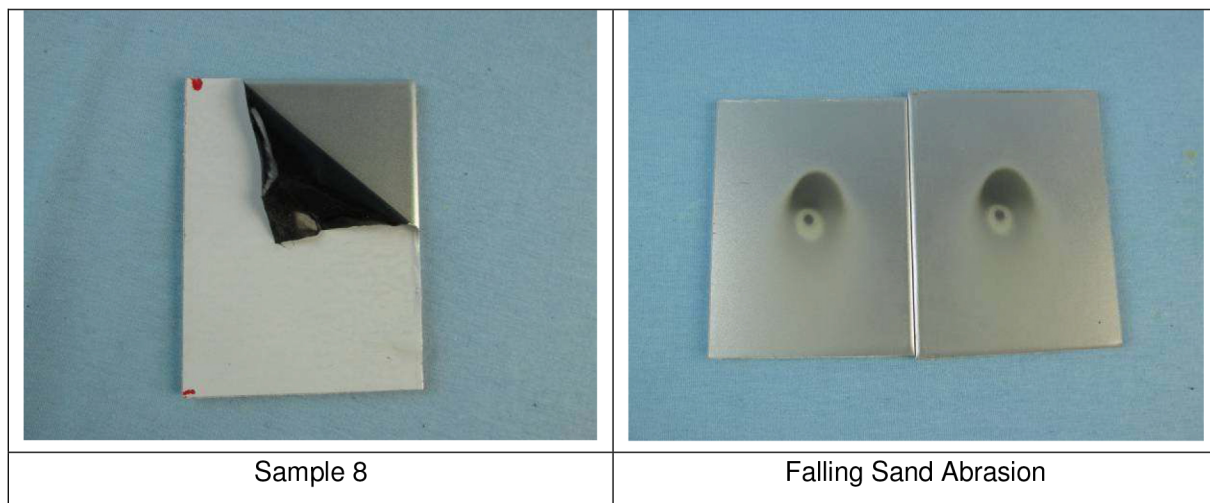
Coating thickness: 1.12mil

Test Result:

Sample	Test result	Client's requirement	Conclusion
8	66.1L/mil	≥50L/mil	Pass

Note: The sample(s) of test item 3 were submitted by client for the second time. Date received: Apr. 07, 2015

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Coating Thickness Gauge	FN2.2	GZMR-AG-E016	2014-08-28	2015-08-27
Falling Sand Abrasion Tester	NA	GZMR-AG-E021	2015-02-11	2016-02-10



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4. Test Item: Impact Resistance

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.5 and client's requirement

Test Condition:

Impact head: 16mm

Drop height: 50cm

Impact weight: 2kg

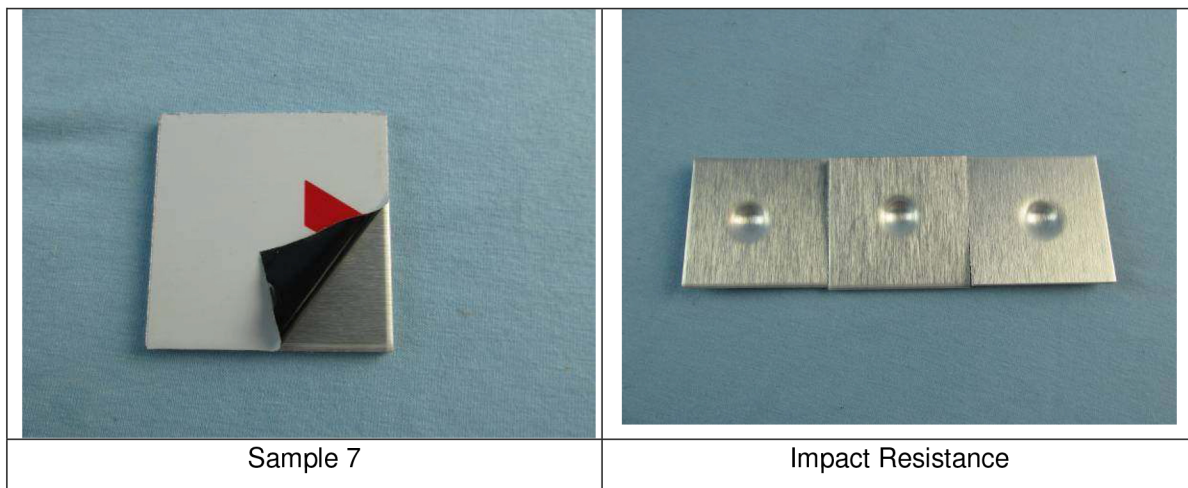
Impact model: intrusion

Tape: Elcometer 99

Test Result:

Sample	Test result	Client's requirement	Conclusion
7	No removal of film from substrate	No removal of film from substrate	Pass

Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Coating Thickness Gauge	FN2.2	GZMR-AG-E016	2014-08-28	2015-08-27
Impact Tester	NA	GZMR-AG-E004	2015-08-12	2016-08-11



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5. Test Item: Neutral Salt Spray Test

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.8.2 & ASTM B117-11 and client's requirement

Test Condition:

Concentration of solution collected: (5±1)% NaCl(m/m)

Chamber temperature: (35±2)°C

Volume of salt solution collected: (1.0~2.0)ml/(80cm²·h)

pH of collected solution at 25°C: 6.5~7.2

Exposure period: 4000h

Test Result:

Sample		Unscribed areas		Scribed areas		Requirement in AAMA 2605-05 Section 7.8.2.2	Conclusion
13	#1	Blistering rating (see note 1)	10	Rating of failure (see note 2)	10	1. Rating of failure at scribe≥7 2. Blistering rating≥8	Pass
	#2		10		10		



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Note:

1. Blistering rating refers to AAMA 2605-05 Table 2, as follows:

Area failed (%)	Rating number
No failure	10
0 to 1	9
2 to 3	8
4 to 6	7
7 to 10	6
11 to 20	5
21 to 30	4
31 to 40	3
41 to 55	2
56 to 75	1
Over 75	0

2. Rating of failure at scribed area refers to ASTM D1654-08, as follows (Tape: Elcometer 99):

Millimeters	Rating number
Zero	10
Over 0 to 0.5	9
Over 0.5 to 1.0	8
Over 1.0 to 2.0	7
Over 2.0 to 3.0	6
Over 3.0 to 5.0	5
Over 5.0 to 7.0	4
Over 7.0 to 10.0	3
Over 10.0 to 13.0	2
Over 13.0 to 16.0	1
Over 16.0 to more	0

3. The protected film was ripped off before test.



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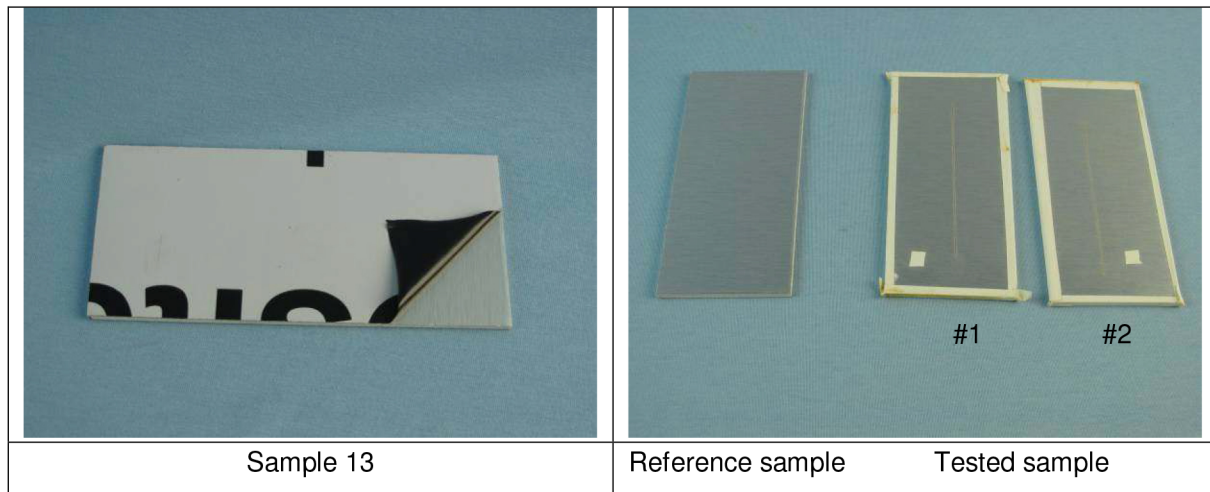
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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Salt Spray Chamber	TG-2100-M	GZMR-AG-E124	2015-08-11	2016-08-10



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6. Test Item: Pencil Hardness

Sample Description: Aluminum composite panel

Test Method: ASTM D3363-05(2011)^{E2}

Test Condition:

Test Pencil: Mitsubishi®

Test Result:

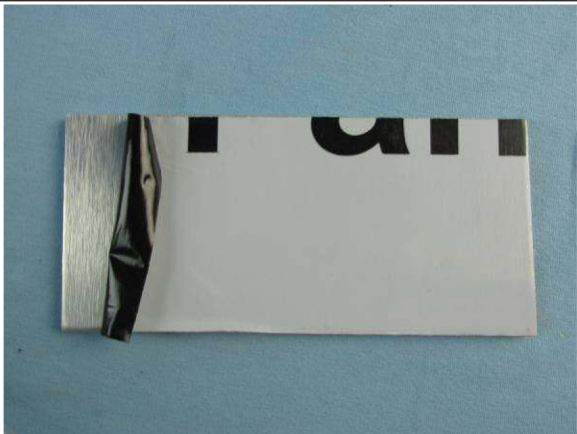
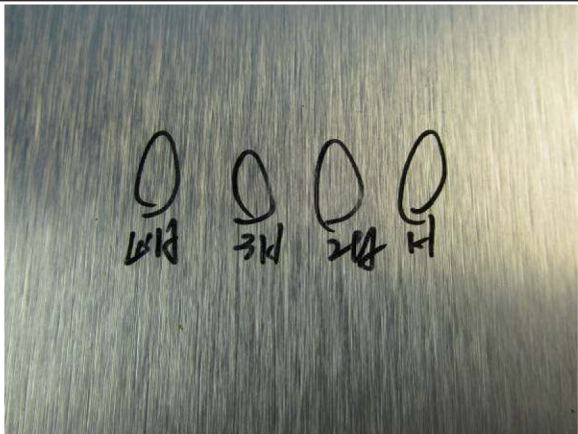
Sample	Pencil Hardness	Client's requirement	Conclusion
10	2H	≥2H	Pass

Note: According to ASTM D3363-05(2011)^{E2}, 6H is the hardest and the grade 6B is the softest.

6B—5B—4B—3B—2B—B—HB—F—H—2H—3H—4H—5H—6H

Softer←-----→Harder

Test Photo:

	
Sample 10	Pencil Hardness

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7. Test Item: Steady State Damp Heat Test

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.8.1 & ASTM D2247-11 & ASTM D714-02(2009) and client's requirement

Test Condition: 38℃, 100%RH, 4000h

Test Result:

Sample		Blistering rating	Requirement in AAMA 2605-05 Section 7.8.1.2	Conclusion
14	#1	10	≥8(F)	Pass
	#2	10		

Note:

1. Blistering rating refers to ASTM D714-02(2009), rating 10 is the best and rating 0 is the worst.

2. Reference standards have been selected for four steps in frequency at each step in size, designated as follows:

Dense, D,

Medium dense, MD,

Medium, M, and

Few, F.

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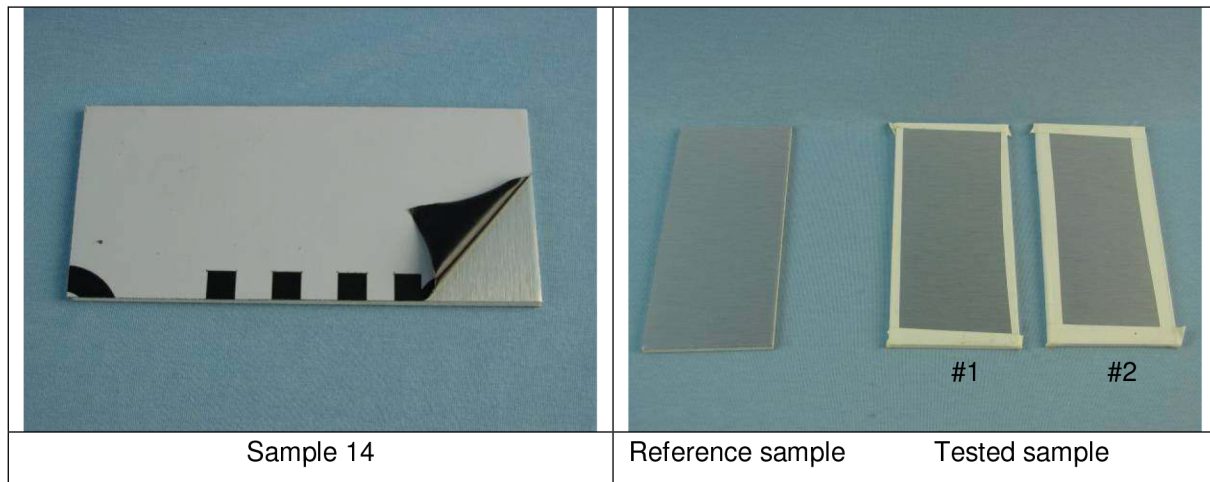
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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Cyclic Corrosion Tester	BCX3000	GZMR-AG-E054	2014-12-15	2015-12-14



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8. Test Item: Weathering Resistance

Sample Description: Aluminum composite panel

Test Method: ASTM C481-99(2011) Cycle A

Test Condition:

Interval	Initial condition	Final condition	Duration
1	Water bath, 50±2℃	Water bath, 50±2℃	1h
2	Spray with stream and water vapor, 95℃	Spray with stream and water vapor, 95℃	3h
3	-12±3℃	-12±3℃	20h
4	Dry air, 100±2℃	Dry air, 100±2℃	3h
5	Spray with stream and water vapor, 95±3℃	Spray with stream and water vapor, 95±3℃	3h
6	Dry air, 100±2℃	Dry air, 100±2℃	18h
Repeat the 48 hours cycle above, total 6 cycles			

Test Result:

Sample	Test result
11,12	See test item 14-15



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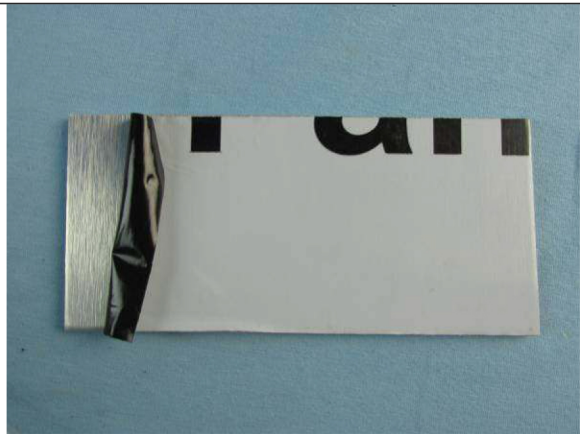

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Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
High/Low Temperature Cyclic and Damp Heat Chamber	KTHB-415TBS	GZMR-AG-E084	2014-12-15	2015-12-14
Oven	UF 160	GZMR-AG-E149	2015-08-11	2016-08-10
Constant temperature water tank	TG-7218-LX	GZMR-AG-E150	2014-12-09	2015-12-08
Stream Aging Tester	ZA-3	GZMR-RL-E069	2015-04-21	2016-04-20

Test Photo:

	
Sample 11	Sample 12



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9. Test Item: Deflection Temperature Under Load

Sample Description: Aluminum composite panel

Test Method: With reference to ASTM D648-07 Method B and client's requirement

Test Condition:

Specimen: 127 mm×12.78 mm×4.15 mm

Heat-transfer media: Silicone oil

Rate of temperature: 120 °C/h

Load: 1.82 MPa

Span: 100 mm

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

Test Result:

Sample	Test Item	Test Result	Client's Requirement	Conclusion
1	Deflection Temperature Under Load	104.4 °C	≥100 °C	Pass

Note:

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



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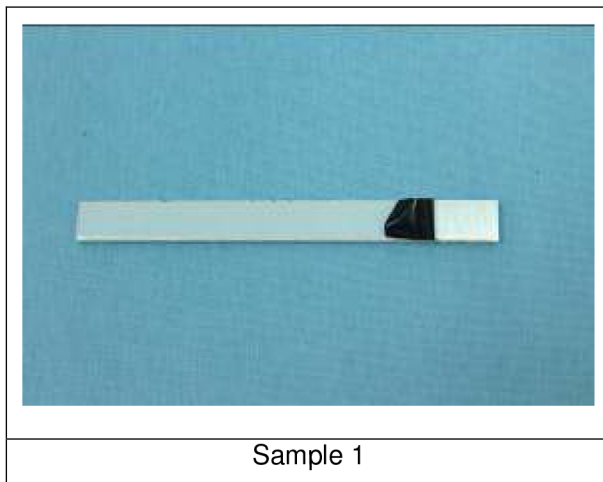
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Original Sample Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
HDT and VICAT Tester	6970.000	GZMR-PL-E091	2015-07-03	2016-07-02



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10. Test Item: Peel Strength

Sample Description: Aluminum composite panel

Test Method: With reference to ASTM D903-98(2010) and client's requirement

Test Condition:

Specimen width: 25 mm

Seperation speed: 152.4 mm/min

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

Test Result:

Sample	Test Item	Test Result	Client's Requirement	Conclusion
2	Peel strength	20.4 kgf/25mm	> 10 kgf/25mm	Pass

Note:

1. The surface with protected film was tested.
2. The protected film of test specimens was ripped off before test.



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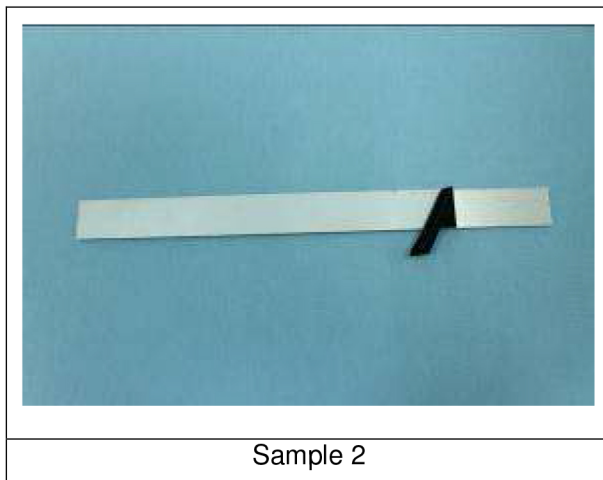
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Original Sample Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal Testing Machine	CMT4304	GZMR-PL-E062	2014-12-16	2015-12-15



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11. Test Item: Shear Strength

Sample Description: Aluminum composite panel

Test Method: ASTM C273/C273M-11

Test Condition:

Specimen: 71 mm×61 mm

As received condition: 23±2 °C, 50±5 %RH, 48 h

Weathering resistance condition: See test item 8

Testing speed: 0.5 mm/min

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

Test Result:

Sample	Test Item	Test Result		Client's Requirement	Conclusion
3	Shear Strength	As received	4.33 MPa	>3.2 MPa	Pass
		After weathering resistance	4.30 MPa		Pass

Note:

1. Failure mode: Core material failure and core-to-facesheet failure.
2. The protected film of test specimens was ripped off before test.



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Test Photo:

	
Sample 3	After test- As received
	
After test- After weathering resistance	

Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Universal Testing Machine	CMT4304	GZMR-PL-E062	2014-12-16	2015-12-15

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12. Test Item: Thickness

Sample Description: Aluminum composite panel

Test Method: Provided by client, measure the specimen thickness by thickness gauge.

Test Condition:

Pressure: 25 kPa

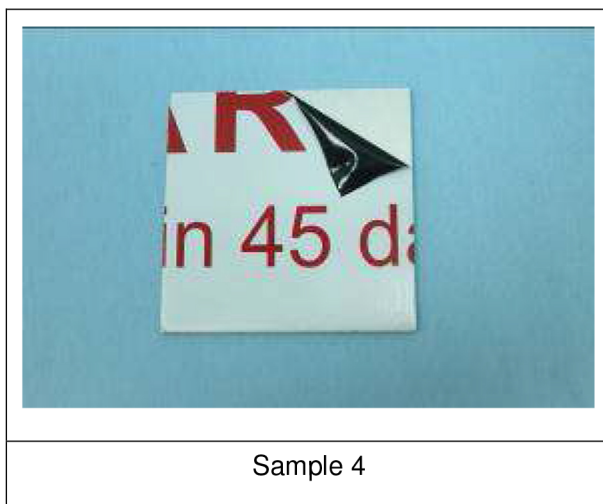
Lab Environmental Condition: 23±2 °C, 50±5 %RH

Test Result:

Sample	Test Item	Test Result	Client's Requirement	Conclusion
4	Thickness	4.19 mm	4.0±0.2 mm or 6.0±0.3 mm	Pass

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

Original Sample Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Bench Thickness Measurement	MY-3130-A2	GZMR-PL-E074	2015-05-15	2015-11-14



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13. Test Item: Mass per Unit Area

Sample Description: Aluminum composite panel

Test Method: Provided by client, measure the specimen by vernier caliper and balance. And calculate the mass per unit area.

Test Condition:

Specimen: 101 mm × 100 mm

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

Test Result:

Sample	Test Item	Test Result	Client's Requirement	Conclusion
5	Mass per Unit Area	7.7 kg/m ²	≥7.7 kg/m ² for 4.0 mm or ≥10.8 kg/m ² for 6.0 mm	Pass

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



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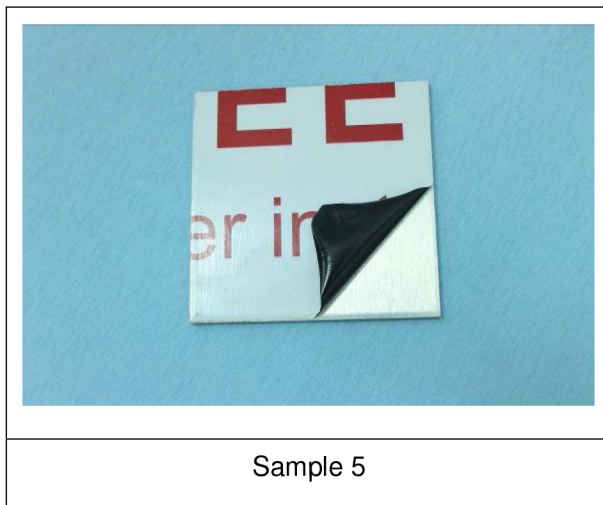
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Original Sample Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Vernier Caliper	0~150mm/0.01mm	GZMR-PL-E041-07	2015-01-15	2016-01-14
Electron Balance	CP225D	GZMR-PL-E004-05	2015-02-11	2016-02-10



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14. Test Item: Adhesion Test of Coating(after weathering resistance in test item 8)

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.4.1.1 and client's requirement

Test Condition:

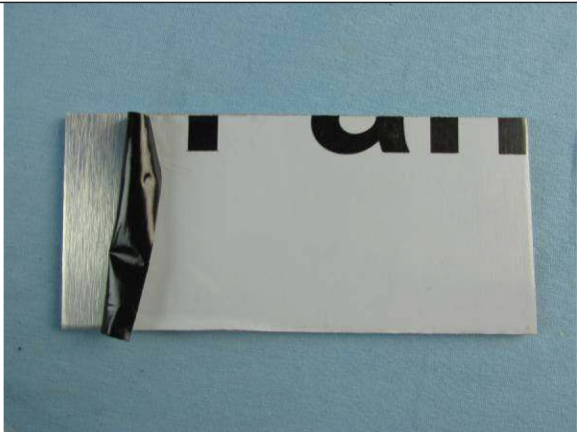
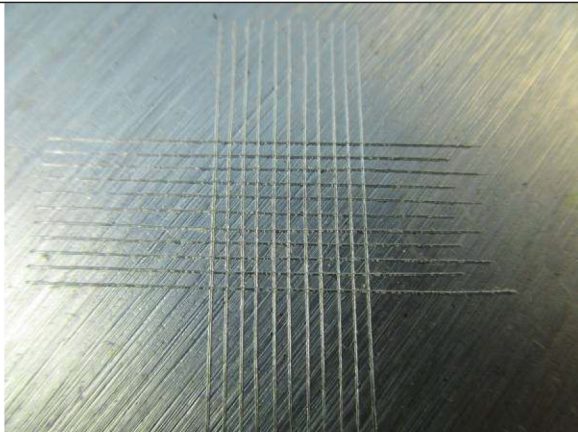
Space: 1mm

Tape: Elcometer 99

Test Result:

Sample	Appearance	Client's requirement	Conclusion
11	No visible peeling	No visible peeling	Pass

Test Photo:

	
Sample 11	Adhesion Test of Coating

Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Cross Rules	BGD	GZMR-AG-E036-03	2015-05-19	2016-05-18



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15. Test Item: Impact Resistance(after weathering resistance in test item 8)

Sample Description: Aluminum composite panel

Test Method: With reference to AAMA 2605-05 Section 7.5 and client's requirement

Test Condition:

Impact head: 16mm

Drop height: 50cm

Impact weight: 2kg

Impact model: intrusion

Tape: Elcometer 99

Test Result:

Sample	Test result	Client's requirement	Conclusion
12	No visible peeling	No removal of film from substrate	Pass

Note: The sample(s) of test item 15 were submitted by client for the second time. Date received: Apr. 07, 2015



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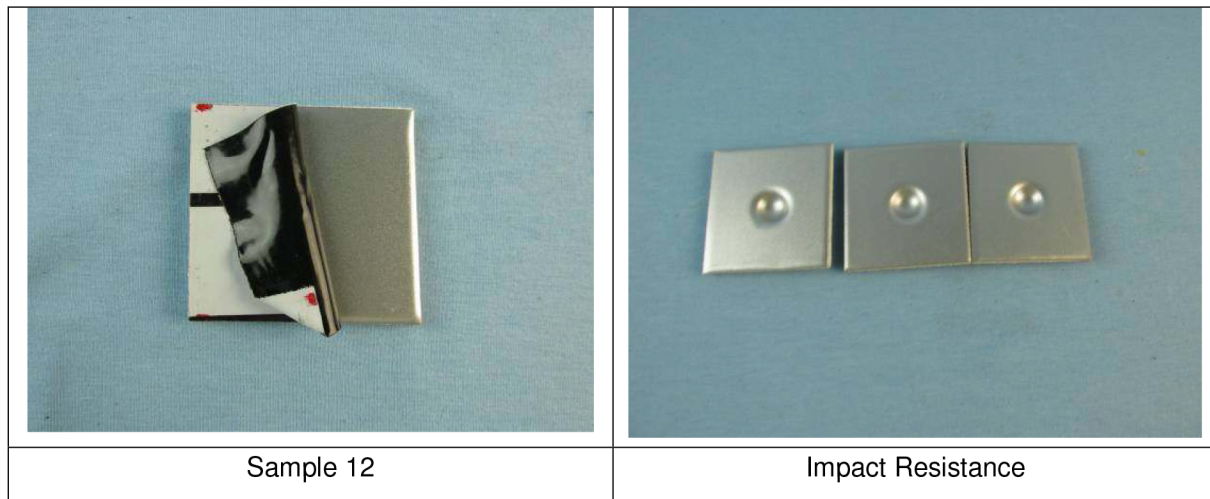
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Test Photo:



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Digital Coating Thickness Gauge	FN2.2	GZMR-AG-E016	2014-08-28	2015-08-27
Impact Tester	NA	GZMR-AG-E004	2015-08-12	2016-08-11



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16. Test Item: Thermal conductivity

Sample Description: 308mm×308mm×4.2mm

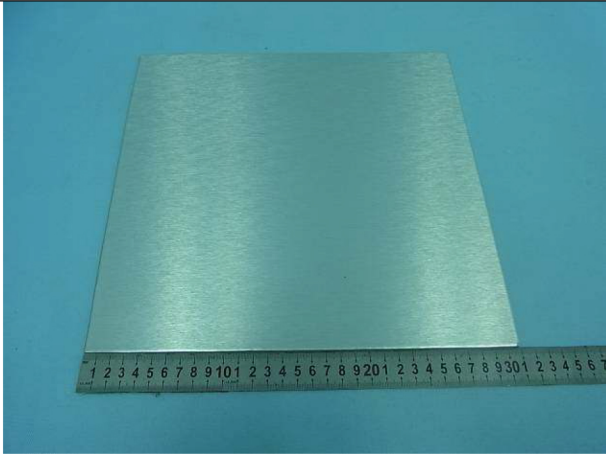
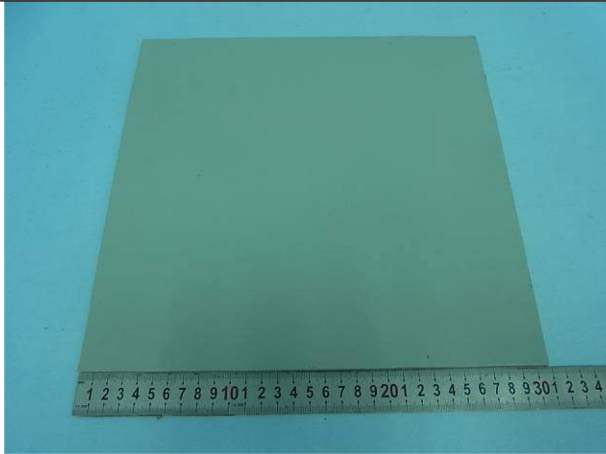
Test Method: ASTM C518-10

Test Result:

Test Method	Test Condition		Test Result
	Mean temperature (°C)	Temperature difference (°C)	Thermal conductivity [W/(m·K)]
ASTM C518-10	70.54	11.40	0.924
Remark	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. Instruments effective range is 0.005~0.5[W/(m·K)], the test result is for reference only.		

Statement: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Sample photos:

	
This surface contacts hot plate.	This surface contacts cool plate.

Note: The above tests were carried out by a SGS laboratory.

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



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