

## TEST REPORT

No. : SHIN1401001459ML

Date : Jan 23, 2014

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CUSTOMER NAME: P.T. ALMINDO JAYA ABADI  
ADDRESS: RUKO PETERONGAN PLAZA B-5,JI.M.T HARYONO 719, SEMARANG,  
CENTRAL JAVA, Indonesia

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

Sample Name : Aluminum Composite Panel  
Product specification : 0.50/0.50 1220×2440×4mm  
Test Required : As per client's requirement  
Date of Receipt : Jan 09, 2014  
Testing start date : Jan 09, 2014  
Testing end date : Jan 23, 2014  
Test result(s) : For further details, please refer to the following page(s)

Signed for  
SGS-CSTC Standards Technical  
Services ( Shanghai ) Co., Ltd.



Kant Xu  
Authorized signatory

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1. Total Panel Thickness

Sample Description: Metal panel with white coating

Test Method: Provided by client

Test Condition:

Measured by vernier-caliper

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

Test Result:

Sample	Total panel thickness (mm)
Aluminum Composite Panel	3.97

Sample Photo:



Fig.1 Test sample

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## 2. Coating Thickness

Sample Description: Metal panel with white coating

Test Method: ISO 2360:2003

Test Condition: Eddy Current Method

Test Result:

Sample	Mean Coating Thickness (µm)
Aluminum Composite Panel	31

Sample Photo:



Fig.2 Test sample

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### 3. Gloss

Sample Description: Metal panel with white coating

Test Method: ASTM 523-08

Test Condition:

Geometry: 60°

Test Result:

Sample	Gloss(Mean value)
Aluminum Composite Panel	40.7

Sample Photo:



Fig.3 Test sample

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## 4. Dry Adhesion

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.4.1.1 and client's requirement

Test Condition:

Space: 1mm

Tape: 3M®610#

Test Result:

Sample	Test result	Requirement in AAMA 2605-05	Conclusion
Aluminum Composite Panel	No removal of film.	No removal of film under the tape within or outside of cross-hatched area or blistering anywhere on the test specimen.	Pass

Test Photo:



Fig.4 Original Sample

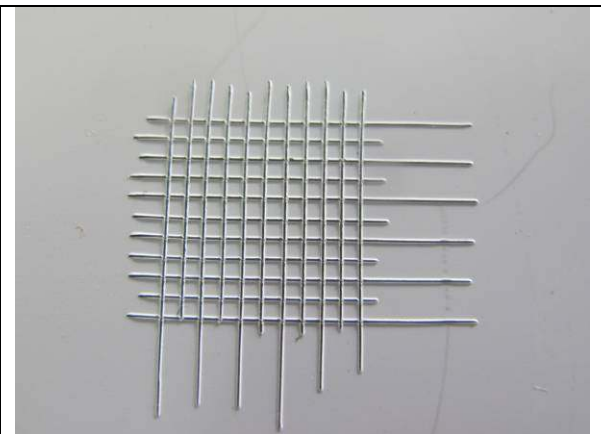


Fig.5 The close-up of adhesion

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## 5. Wet Adhesion

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.4.1.2 and client's requirement

Test Condition:

Water bath: 38°C, 24h

Space: 1mm

Tape: 3M®610#

Test Result:

Sample	Test result	Requirement in AAMA 2605-05	Conclusion
Aluminum Composite Panel	No removal of film.	No removal of film under the tape within or outside of cross-hatched area or blistering anywhere on the test specimen.	Pass

Test Photo:



Fig.6 Original Sample

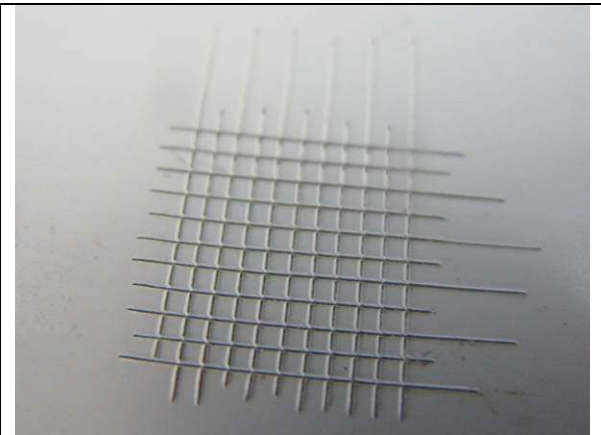


Fig.7 The close-up of adhesion

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## 6. Boiling Water Adhesion

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.4.1.3 and client's requirement

Test Condition:

Water bath: 90-100°C, 20min

Space: 1mm

Tape: 3M®610#

Test Result:

Sample	Test result	Requirement in AAMA 2605-05	Conclusion
Aluminum Composite Panel	No removal of film.	No removal of film under the tape within or outside of cross-hatched area or blistering anywhere on the test specimen.	Pass

Test Photo:



Fig.8 Original sample

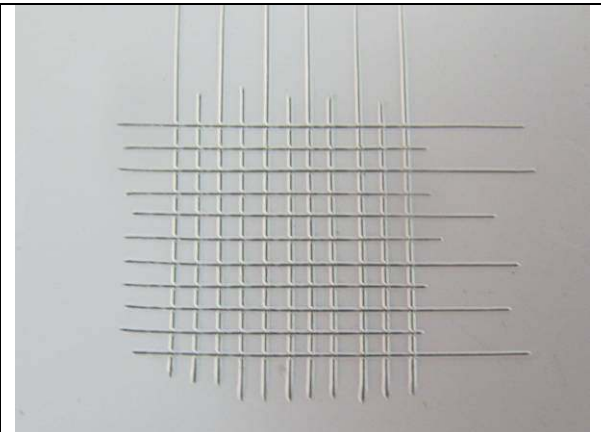


Fig.9 The close-up of adhesion

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### 7. Window Cleaner Resistance

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.7.5 and client's requirement

Test Condition:

Apply 10 drops of window cleaner (See note 1) to the sample and keep it for 24h.

Space: 1mm

Tape: 3M®610#

Test Result:

Appearance	Adhesion	Requirement in AAMA 2605-05	Conclusion
No visible change appeared.	No removal of film.	No blistering and other change in appearance. No removal of film under the tape within or outside of cross-hatched area.	Pass

Note:

1. Window cleaner: Dowanol PM: 5%, Propylene: 5%, Isopropanol: 35%, water: 55%.
2. According to ASTM D3359--09<sup>e2</sup> method B, in the adhesion classification-- 5B is the best, 0B is the worst.

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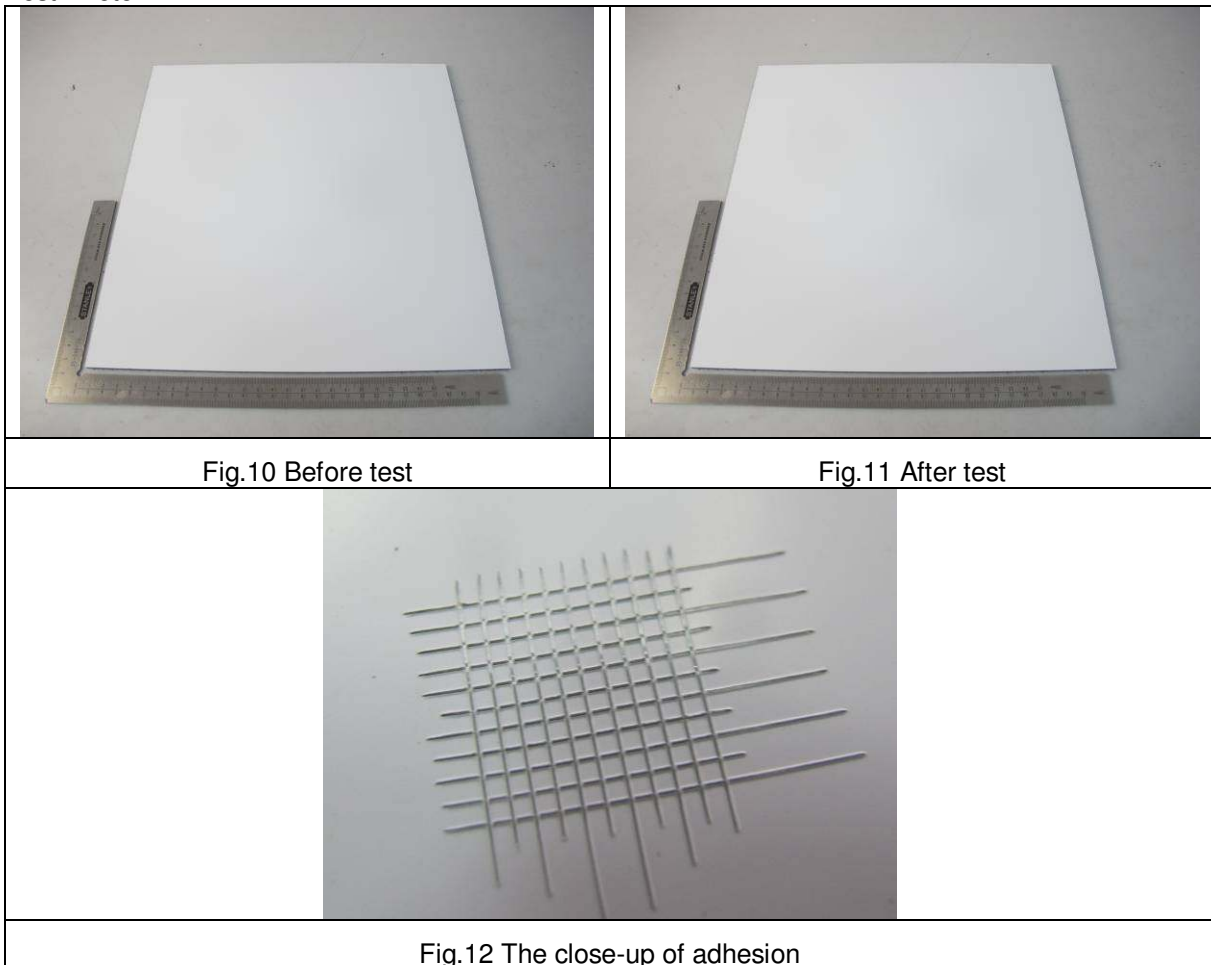
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## 8. Detergent Resistance

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.7.4 and client's requirement

Test Condition:

Immerse the sample into 3% detergent solution (See note 1) at 38°C for 72h.

Space: 1mm

Tape: 3M®610#

Test Result:

Appearance	Adhesion (See note 2)	Requirement in AAMA 2605-05	Conclusion
No visible change appeared.	5B No removal of film.	No blistering and other change in appearance. No loss of adhesion.	Pass

Note:

### 1. Detergent solution:

Tetrasodium pyrophosphate( $\text{Na}_4\text{P}_2\text{O}_7$ ): 53%

Sodium sulfate( $\text{Na}_2\text{SO}_4$ ): 19.0%

Sodium metasilicate( $\text{Na}_2\text{SiO}_3$ ): 7.0%

Sodium carbonate( $\text{Na}_2\text{CO}_3$ ), 1.0%

Sodium salt of a liner alkylarylsulfonate: 20.0%

### 2. According to ASTM D3359--09<sup>e2</sup> method B, in the adhesion classification-- 5B is the best, 0B is the worst.

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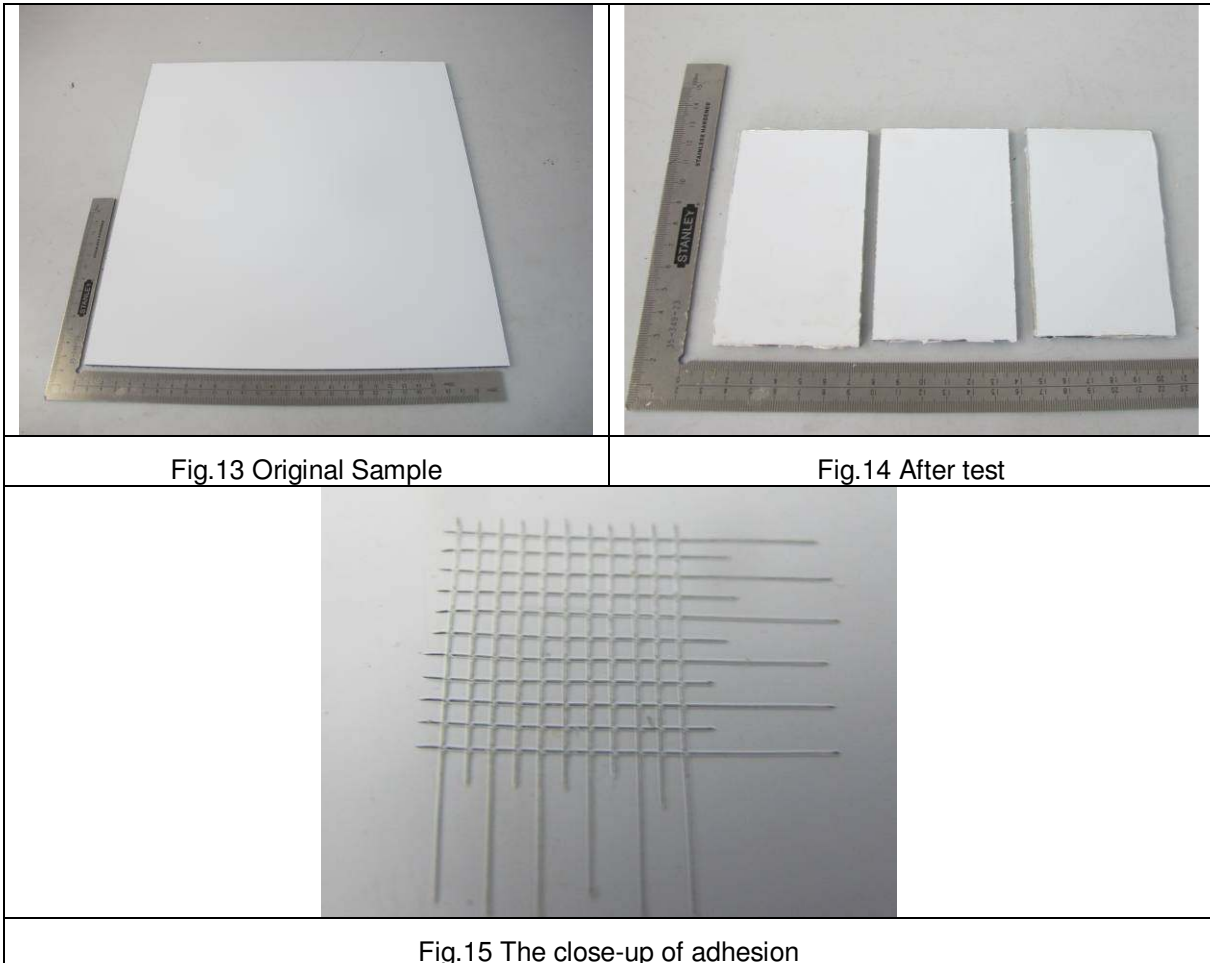
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### 9. Impact Resistance

Sample Description: Metal panel with white coating

Test Method: ASTM D2794-93(2010) and client's requirement

Test Condition:

Diameter of the punch: 15.9mm

Weight: 8lb

Impact model: Intrusion

Test Result:

Impact failure end point: 1.89kg·m

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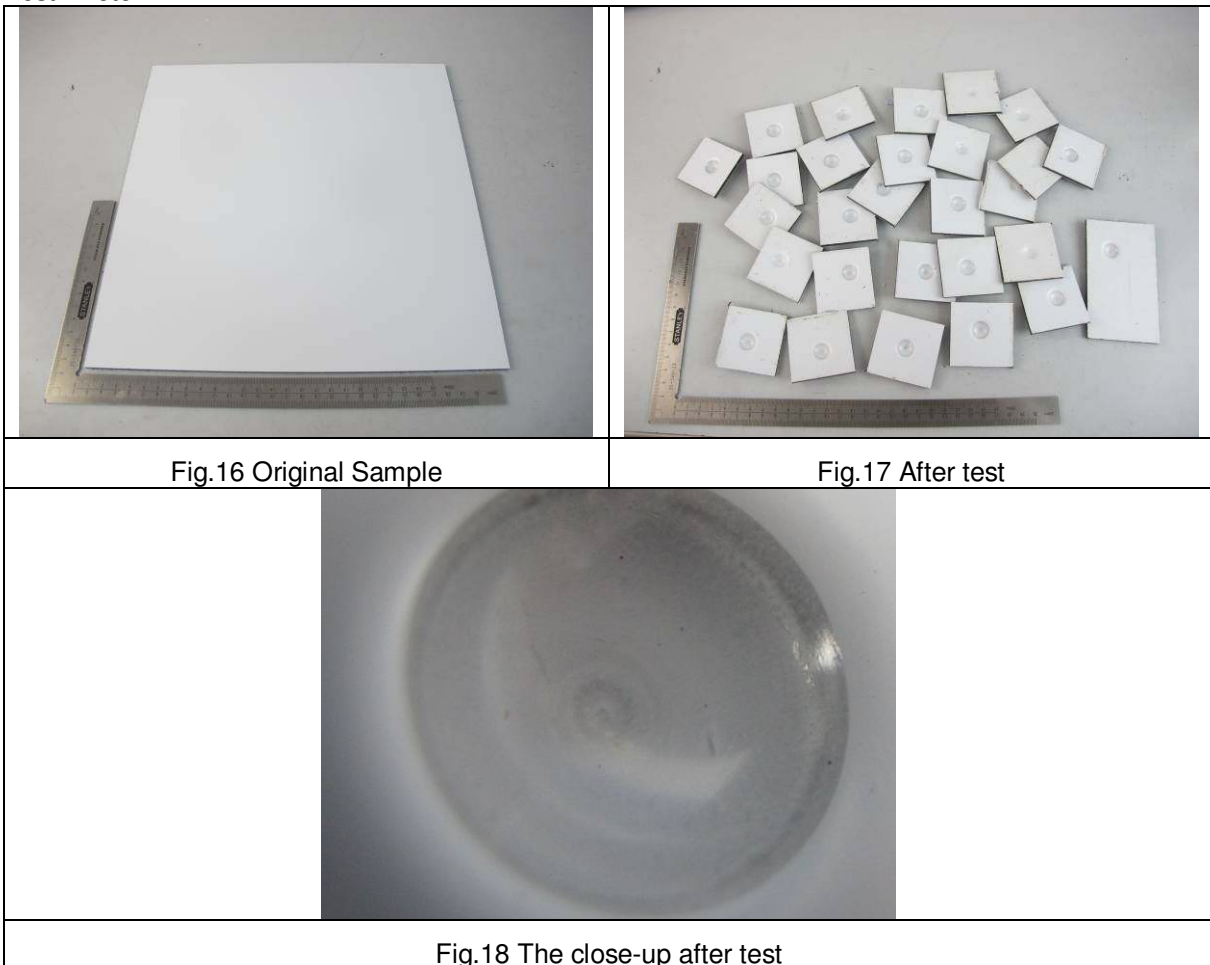
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## 10. Mass per Unit Area

Sample Description: Metal panel with white coating

Test Method: Provided by client

Test Condition:

Specimen: 100mm×100mm

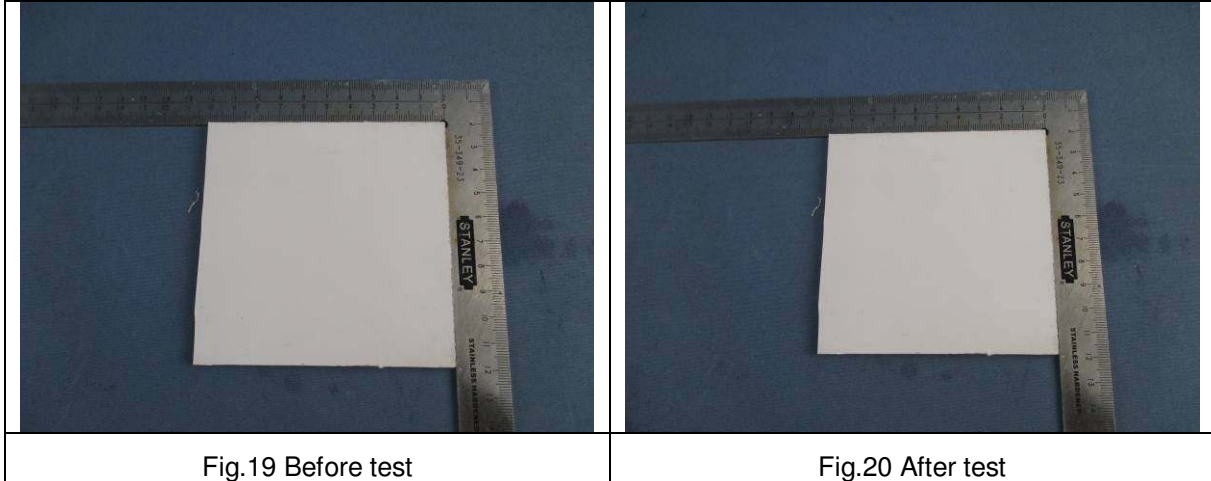
Lab Environmental Condition: 23±2°C, 50±5%RH

Test Result:

Test Item	Test Result
Mass per Unit Area	5720g/m <sup>2</sup>

Note: Test specimens were cut from the sample.

Test Photo:



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### 11. Muriatic acid resistance

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.7.1

Test Condition:

Specimen: 100mm×100mm

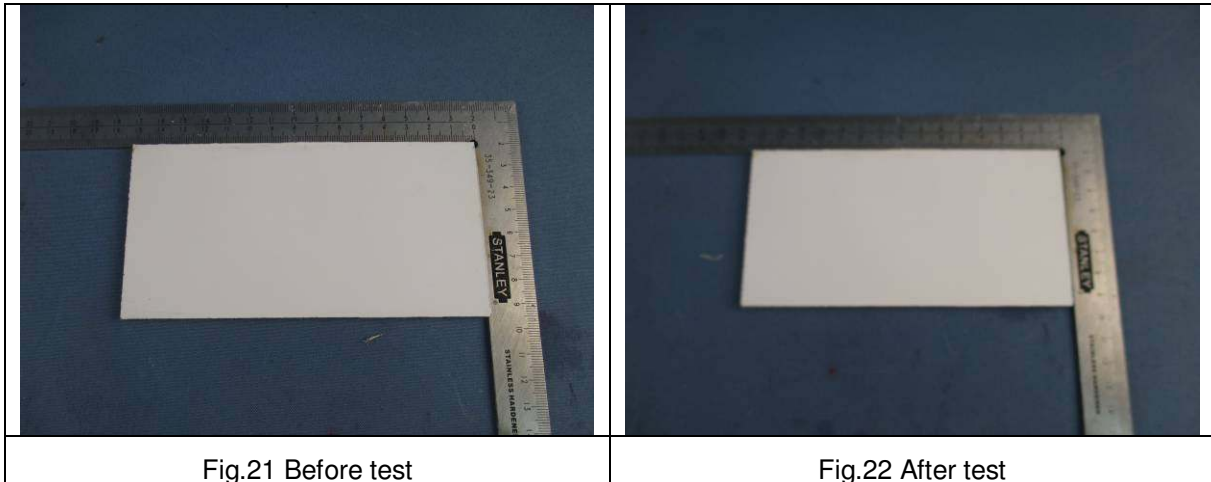
Test condition: 10 drops of 10% HCl, 15min

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

Test Result: No blister and visible change.

Note: Test specimens were cut from the sample.

### Test Photo:



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### 12. Nitric acid resistance

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-05 section 7.7.3

Test Condition:

Specimen: 100mm×100mm

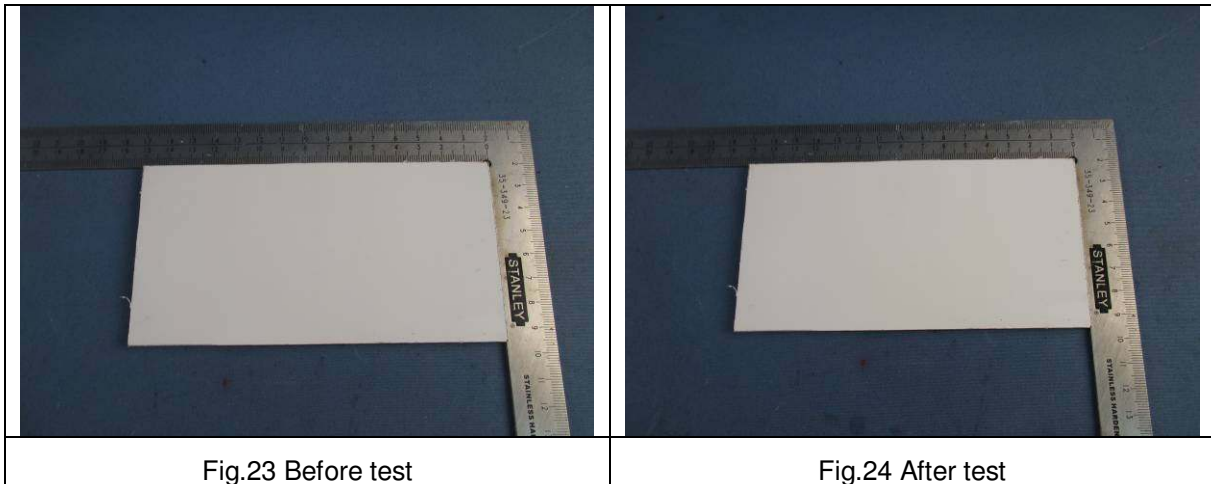
Test condition: Fill the bottle one-half full of 70% HNO<sub>3</sub>, then place the sample over the mouth of the bottle, 30min

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

Test Result: No blister and visible change.

Note: Test specimens were cut from the sample.

### Test Photo:



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### 13. Tensile test

Sample Description: Metal panel with white coating

Test Method: ASTM E8/E8M-11 and client's requirement

Test Condition:

Specimen width of narrow section: 12.67mm

Specimen thickness: 4.125mm

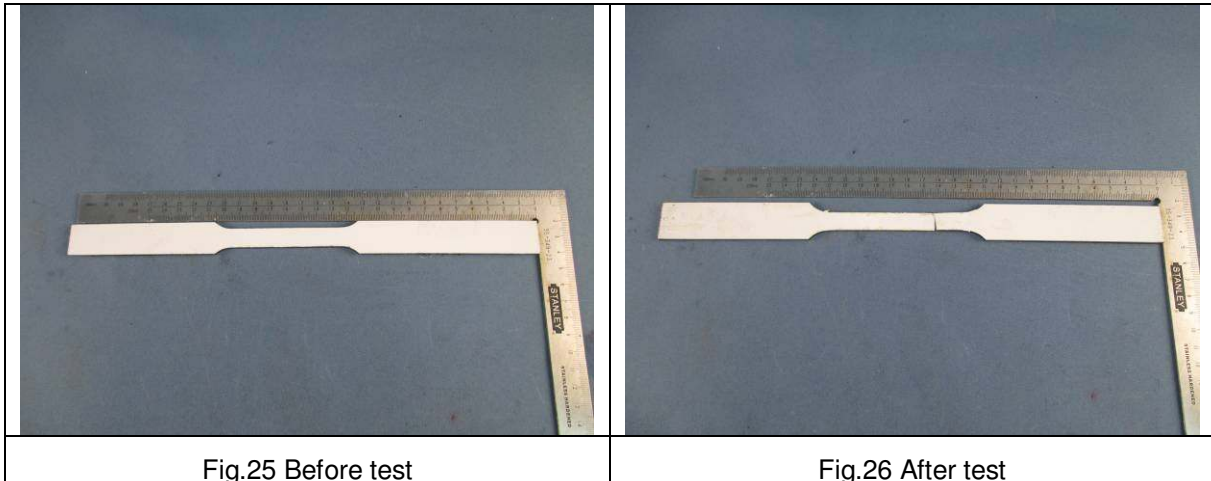
Gauge length: 50mm

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

Test Result:

Test Item	Result
Tensile strength	48.9MPa
Elongation at break	27.2%

Test Photo:



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## 14. Mortar resistance

Sample Description: Metal panel with white coating

Test Method: AAMA 2605-2005 Section 7.7.2

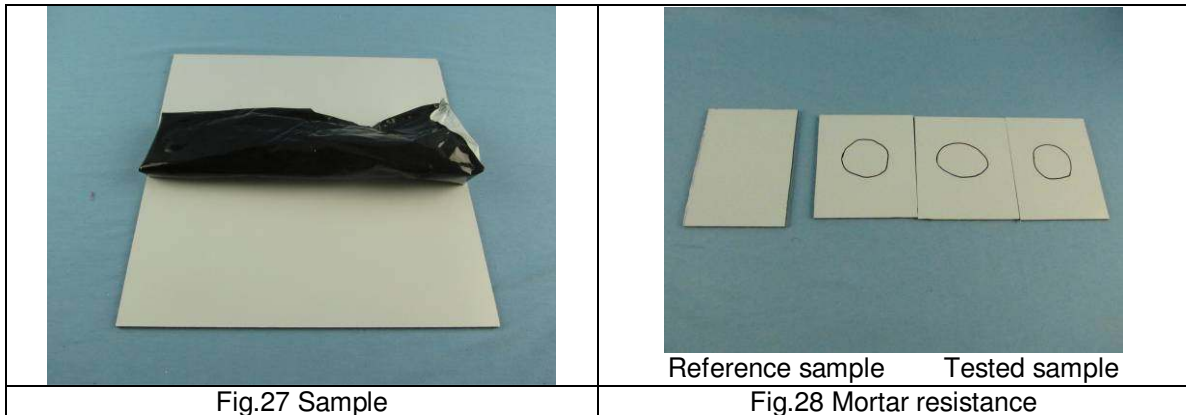
Test Condition: 38°C, 100%RH, 24h

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

Test Result: No loss of film adhesion or visual change in appearance.

Note: The test item was carried out by SGS internal laboratory.

Test Photo:



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### 15. Abrasion resistance

Sample Description: Metal panel with white coating

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

Test Condition:

Litres of abrasive: 115.0L

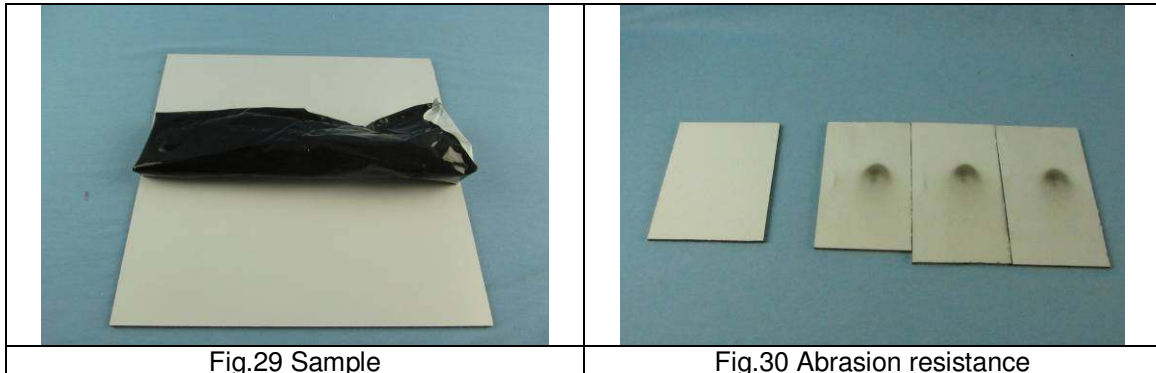
Coating thickness: 1.14mil

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

Test Result: Abrasion resistance: 100.9L/mil

Note: The test was carried out by SGS internal laboratory.

Test Photo:



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## 16. Coating Thickness Test:

Test Method: ISO 1463:2003

Sample	Result (μm)					Average thickness (μm)
Front	551.7	550.6	550.7	552.8	546.3	550.4
Back	553.9	556.1	556.1	557.1	557.2	556

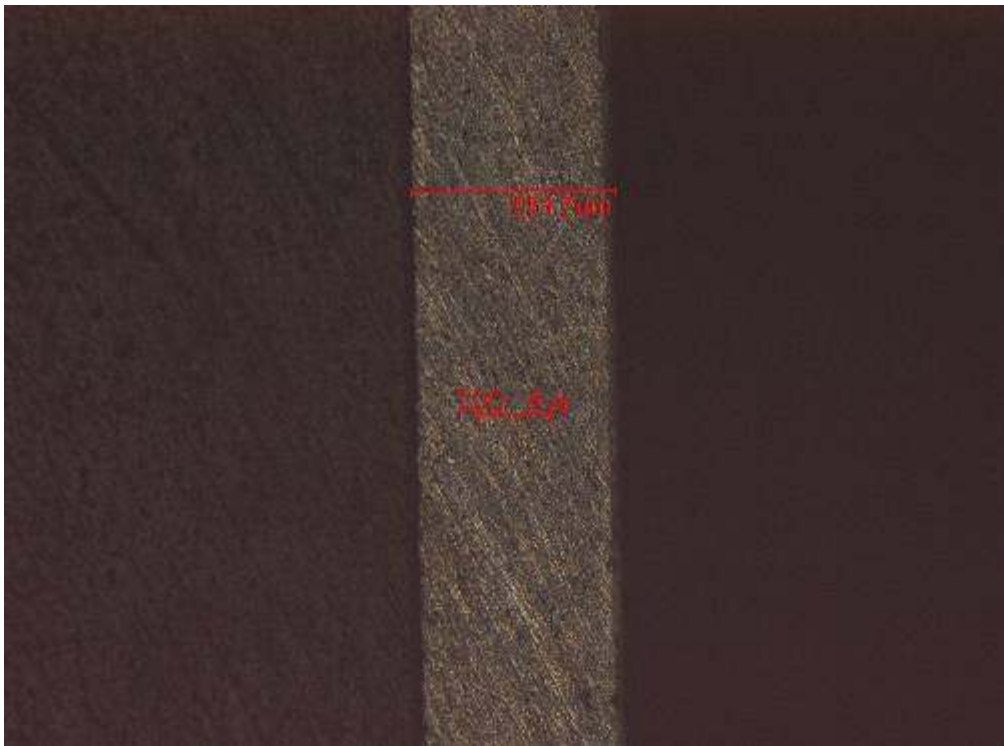


Fig.31 Coating thickness of the sample front 50X

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Fig.32 Coating thickness of the sample back 50X

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### 17. Thermal Conductivity

Test Method: ASTM C518-10

#### Test Result

No.	Test Condition		Test Result
	Mean temperature (°C)	Temperature difference (°C)	Thermal Conductivity [W/(m·K)]
1	40.61	9.50	0.097
2	5.22	9.82	0.092
3	-4.99	9.46	0.088
4	-14.77	9.76	0.086
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.		

### 18. Linear Thermal Expansion:

Test Method: ASTM E831-12

#### Test condition:

Heat from -30°C to 30°C at 5.0°C/min, F=50mN

Sample	Test item	Result μm/(m·°C)			Average μm/(m·°C)
		172.8	194.5	210.4	192.6
Aluminum Composite Panel	Linear Thermal Expansion (-30°C~30°C)				

Note: The test was carried out by external laboratory assessed as competent.

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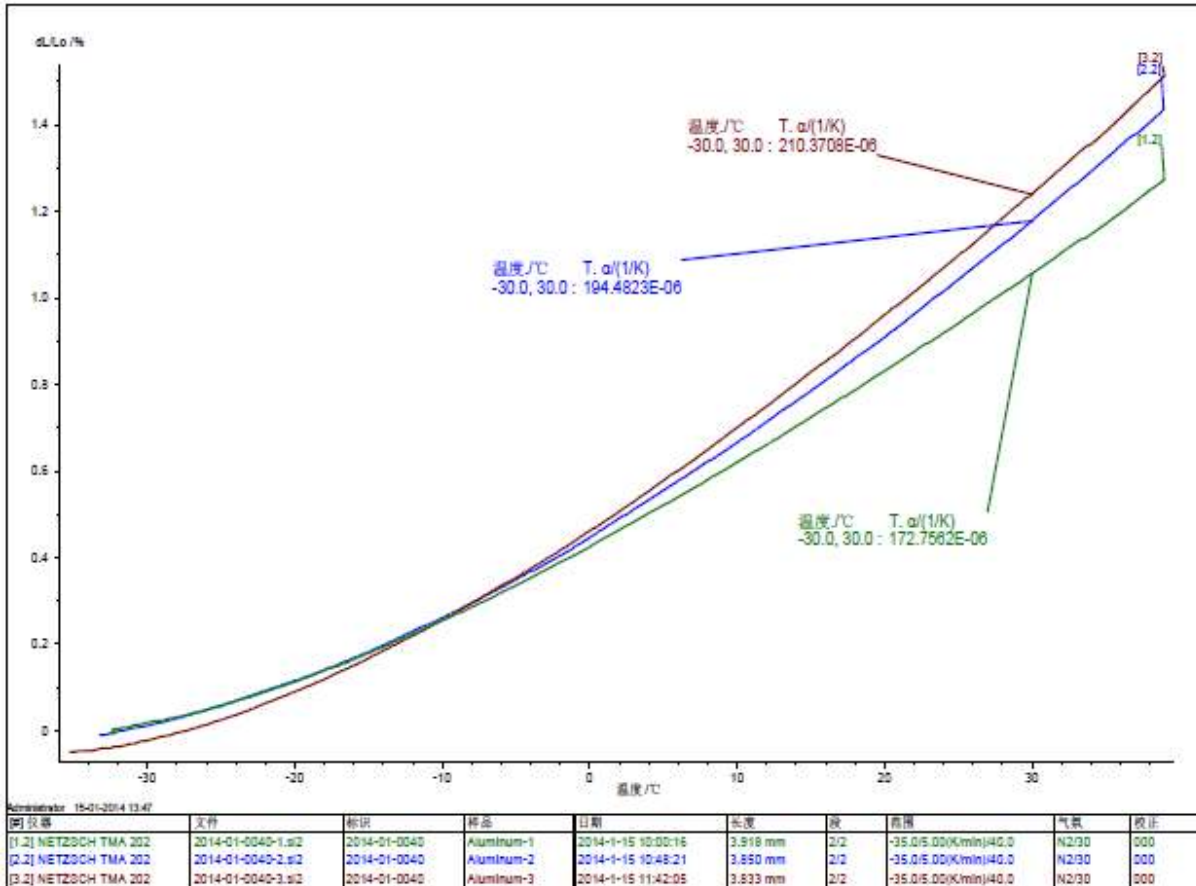


Fig.33 TMA Curve

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Sample photo

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

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