

TEST REPORT

REPORT NO. 2018CE1583 – S1

PAGE: 1 OF 8

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Applicant (Internal) : PRODUCT CERTIFICATION & INSPECTION SECTION,
Mechanical & Automotive Group, Building 25,
(Attn: En. Hasnol Zakaria)

Licensee : MBOND MANUFACTURER SDN. BHD.
No. 9, Jalan TPP 3, Taman Perindustrian Putra,
47130 Puchong, Selangor Darul Ehsan, MALAYSIA

Manufacturer : MBOND MANUFACTURER SDN. BHD.
No. 9, Jalan TPP 3, Taman Perindustrian Putra,
47130 Puchong, Selangor Darul Ehsan, MALAYSIA

Product : Aluminium Composite Panel

Reference standard / Method of test : 1) **MS 2571: 2017** – Title: Aluminium Composite Panel for Exterior and Interior Cladding – Specification
2) **MS 2040: 2017** – Title: Aluminium and Aluminium Alloys – Sheets and coiled sheets – Specification (First Revision)

Description of sample : Received one (1) sample of **Aluminium Composite Panel** for testing which was identified as:
Sample details : Refer to page 2
PP2 Ref. : P5-010704 (Dated on: 29/3/2017)

Date Received of Complete Application : 20th August 2018

Job No. : J20181401618

Description of Overall Test Result : The submitted test samples of Aluminium Composite Panel 2 Coats Polyvinylidene Difluoride (PVDF) as described in this test report complied with all the requirements of the above Reference Standard.

Issued date : 12th April 2019

Approved Signatory


(ABDUL AZIZ HARON)
Senior Testing Executive


(HAHNAS MAHBUT)

Head,
Chemical & Consumer Section (CEST),
Testing Services Department.

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NOTES:

1. This is a supplementary test report.
2. This test report is issued as continuation of the original **SIRIM Test Report No. 2018CE1583** dated **29th November 2018** and shall be read in conjunction with the report issued.
3. The continuation of original test report are as follows:

DESCRIPTION OF SAMPLES:

Product : Aluminium Composite Panel

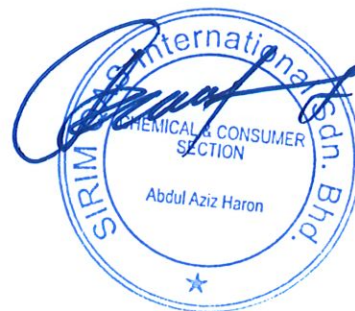
Brand : MBond

Sample selection : Production Line

Descriptions	Sizes, mm (W x L)	Alloy type/ Temper grade	Thickness, mm Composite panel/ Aluminium skin	Core materials	Coating types
Metallic Silver (9072)	1250 x 4880	AA3003/H16	4 / 0.5	3.0 mm FR*	2 Coats Polyvinylidene Difluoride (PVDF)

Note:

** FR indicates Fire Retardant core material*



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DESCRIPTION OF REFERENCE STANDARD

MS 2571: 2017 – Title: ALUMINIUM COMPOSITE PANEL FOR EXTERIOR AND INTERIOR CLADDING - SPECIFICATION

Clause	Scope	Information for result
Clause 6.4	Table 4a. Performance requirements of coating	Applicable
Clause 7	Test Method	
Clause 7.10.3	Artificial weathering aging resistance	Applicable
Clause 7.10.4	Cyclic corrosion testing	Applicable



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Test Results

Product : Aluminium Composite Panel
Brand : MBond
Descriptions : Metallic Silver (9072)
Product thickness : 4 mm
Alloy thickness : 0.50 mm
Alloy Type : 3003
Temper grade : H16
Coating type : 2 Coats Polyvinylidene Difluoride (PVDF)
Core Material : FR (Fire Retardant)
Sample selection : Production Line

Test clause : **MS 2571: 2017 – Clause 6.4 Performance**
 Performance of aluminium composite panel shall be consistent with requirements of Table 4a and Table 4b.

Test Method : **MS 2571: 2017 Clause 7.10.3** - Artificial weathering aging resistance
ASTM G154 - 12a Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Test Exposure Condition:

Lamp used : UV-B 313
Irradiance : 0.62 W/m²
Approximate wavelength : 313 nm
Exposure cycle : 20 hours UV at 60 ± 3°C, 4 hours Condensation at 50 ± 3°C (Cycle 5)
Total exposure period : 5000 hours

No.	Test item	Technical requirements MS 2571: 2017 Table 4a: Exterior	Results	Remarks
1.	Artificial weathering aging resistance [MS 2571: 2017 Clause 7.10.3]			
1.1	Color difference, ΔE	$\Delta E \leq 5.0$ at 5,000 h QUV-B	1.79	Pass
1.2	Gloss retention, %	Minimum 50% at 5,000 h QUV-B	64.7	Pass
1.3	Chalking, Rating	Minimum 6 at 5,000 h QUV-B for white Minimum 8 at 5,000 h QUV-B for colour	8	Pass



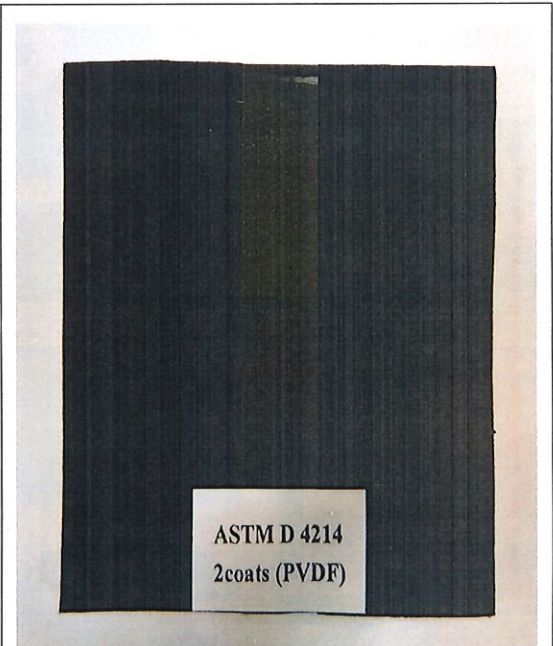
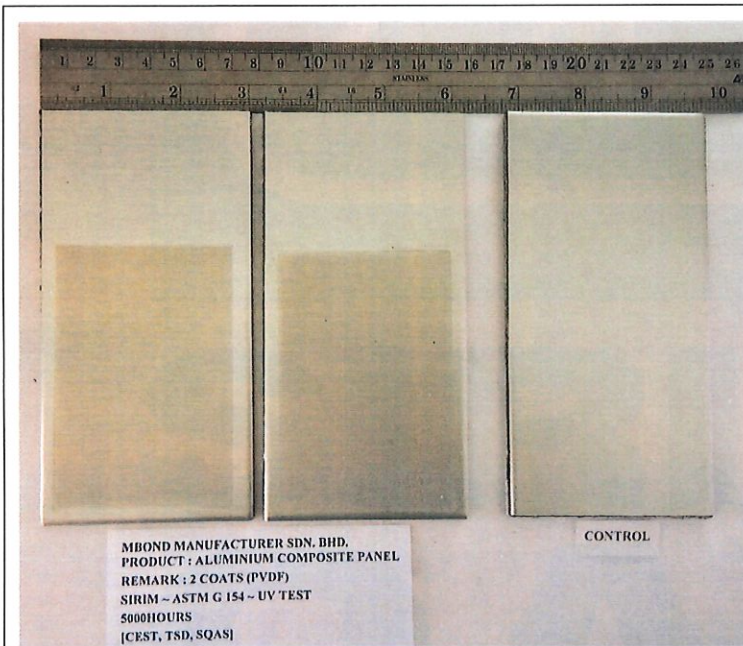
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Test Results

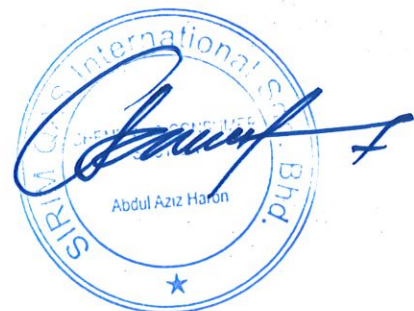
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Temper grade : H16
Coating type : 2 Coats Polyvinylidene Difluoride (PVDF)
Core Material : FR (Fire Retardant)
Sample selection : Production Line

Test clause : **MS 2571: 2017 – Clause 6.4 Performance**
Performance of aluminium composite panel shall be consistent with requirements of Table 4a and Table 4b.

Test Method : **MS 2571: 2017 Clause 7.10.3 - Artificial weathering aging resistance**
ASTM G154 - 12a Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials



Chalking assessment - Aluminium Composite Panel of 2 coats Polyvinylidene Difluoride (PVDF) at 5000 hours Artificial weathering aging resistance



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Alloy Type : 3003
Temper grade : H16
Coating type : 2 Coats Polyvinylidene Difluoride (PVDF)
Core Material : FR (Fire Retardant)
Sample selection : Production Line

Test clause : MS 2571: 2017 – Clause 6.4 Performance
 Performance of aluminium composite panel shall be consistent with requirements of Table 4a and Table 4b.

Test method : MS 2571: 2017 Clause 7.10.4 - Cyclic corrosion testing
 ASTM G85-11 Standard Practice for Modified Salt Spray (Fog) Testing

Test exposure condition:

Duration of exposure : 2000 hours
Cycles : 2 hours repetitive cycles of 1-hour spray with exposure zone temperature at ambient temperature of 24 ± 3 °C, and 1 hour dry off at 35 ± 2 °C.
Salt solution used : 0.05% of NaCl + 0.35 % $(\text{NH}_4)_2\text{SO}_4$
pH of collected solution : 5.0 – 5.4
Volume of salt collected in : 1.2 ml/hr
 ml/h/80 cm²

No.	Test item	Technical requirements MS 2571: 2017 Table 4a: Exterior	Results	Remarks
2.	Cyclic corrosion testing*, grade [MS 2571: 2017 Clause 7.10.4] Test duration: 2000 hours			
2.1	Blister on cut edges	Minimum Rating 7	Rating 8	Pass
2.2	Blister on test specimen	Minimum Rating 8	Rating 10	Pass

Note: * The grade of failure rating is based on MS 2571:2017 Clause 7.10.4.2 Table 5 & 6



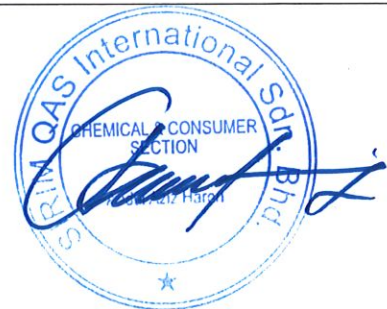
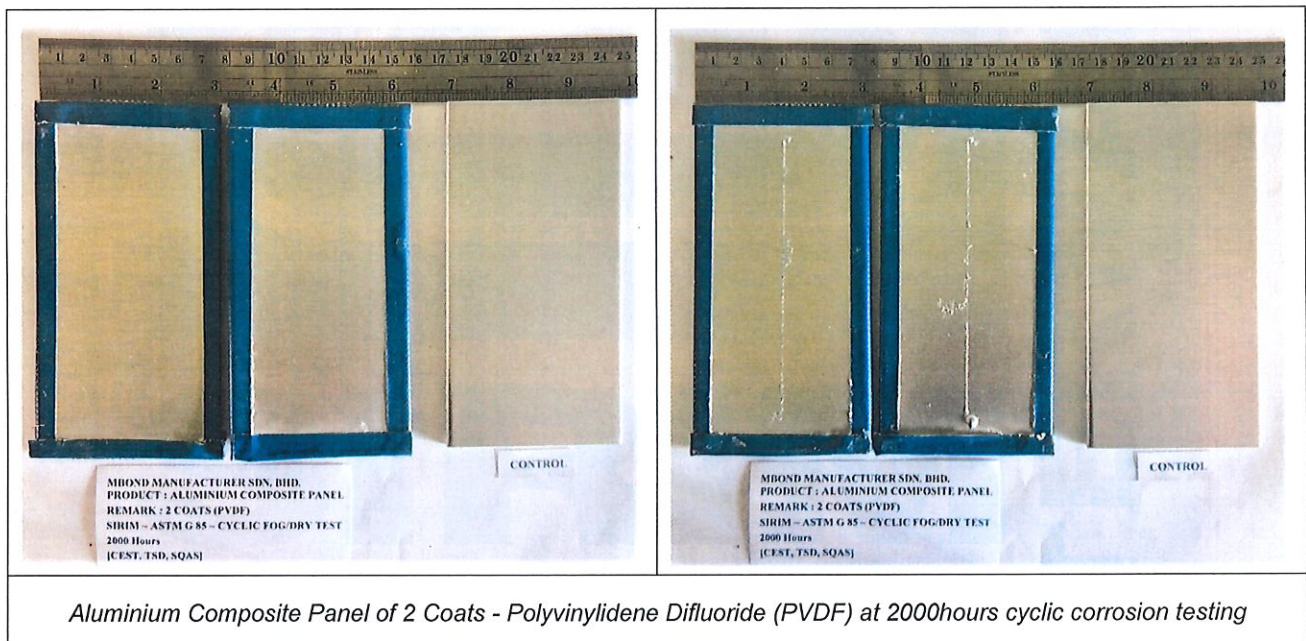
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Alloy thickness : 0.50 mm
Alloy Type : 3003
Temper grade : H16
Coating type : 2 Coats Polyvinylidene Difluoride (PVDF)
Core Material : FR (Fire Retardant)
Sample selection : Production Line

Test clause : MS 2571: 2017 – Clause 6.4 Performance
Performance of aluminium composite panel shall be consistent with requirements of Table 4a and Table 4b.

Test Method : MS 2571: 2017 Clause 7.10.3 - Cyclic corrosion testing
ASTM G85-11 Standard Practice for Modified Salt Spray (Fog) Testing



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Test Results

Product : Aluminium Composite Panel
Brand : MBond
Descriptions : Metallic Silver (9072)
Product thickness : 4 mm
Alloy thickness : 0.50 mm
Alloy Type : 3003
Temper grade : H16
Coating type : 2 Coats Polyvinylidene Difluoride (PVDF)
Core Material : PE (Polyethylene Core)

Test clause : MS 2571: 2017 – Clause 6.4 Performance
Performance of aluminium composite panel shall be consistent with requirements of Table 4a and Table 4b.

No.	Test item	Technical requirements MS 2571: 2017 Table 4b: Exterior	Results	Remarks
3.	Thermal distortion temperature**, °C [MS 2571: 2017 Clause 7.10.10]	≥ 95	99	Pass

Note: **Thermal distortion temperature test was conducted by Plastic & Composite Section (PCST) SIRIM QAS Int. Sdn Bhd

