

REPORT NUMBER: AU12094055-3  
ORIGINAL ISSUE DATE: January 16, 2013

EVALUATION CENTER

Intertek Testing Services Ltd., Shanghai Jinqiao Branch  
Building T52-8, No. 1201 Gui Qiao Road,  
Jinqiao Development Area, Pudong District  
Shanghai 201206

RENDERED TO

Jiangsu Xiecheng Science And Technology Deve.Co.,Ltd  
Industrial Zone, Jinhu county Jiangsu,China

PRODUCT EVALUATED

A2 Fire Resistant Aluminum Composite Panel  
Model: PVDF 4mm 50S

EVALUATION PROPERTY

THERMAL CONDUCTIVITY, LINEAR THERMAL EXPANSION  
FLEXURAL PROPERTIES, TENSILE STRENGTH  
GLOSSINESS DEVIATION, FILM HARDNESS BY PENCIL  
BOND STRENGTH TEST, FIRE RESISTANCE TEST  
SURFACE BURNING CHARACTERISTICS TEST  
SOUND TRANSMISSION LOSS TEST AND CLASSIFICATION

Report of Testing A2 Fire Resistant Aluminum Composite Panel for compliance with the applicable requirements of the following criteria:

ASTM C518-2010, ASTM E831-2012, ASTM D790-2010, ASTM E8-2011, ASTM D523-2008, ASTM D3363-2005, ASTM D1781-2012, ASTM E84-2012, ASTM E119-2012, ASTM E90-2009 and ASTM E413-2010.



"This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program."

## 1 Table of Contents

---

1	Table of Contents.....	2
2	Introduction.....	3
3	Test Samples.....	3
3.1.	SAMPLE SELECTION.....	3
3.2.	SAMPLE AND ASSEMBLY DESCRIPTION.....	3
4	Testing and Evaluation Methods.....	3
4.1.	THERMAL CONDUCTIVITY.....	3
4.2.	LINEAR THERMAL EXPANSION.....	3
4.3.	FLEXURAL PROPERTIES.....	4
4.4.	TENSILE STRENGTH.....	4
4.5.	GLOSSINESS DEVIATION.....	4
4.6.	FILM HARDNESS BY PENCIL.....	4
4.7.	BOND-STRENGTH TEST.....	4
4.8.	SURFACE BURNING CHARACTERISTICS TEST.....	5
4.9.	FIRE RESISTANCE TEST.....	5
4.10.	SOUND TRANSMISSION LOSS TEST AND CLASSIFICATION.....	5
5	Testing and Evaluation Results.....	6
5.1.	RESULTS AND OBSERVATIONS.....	6
6	Conclusion.....	7
7	Revision Page.....	8

Jiangsu Xiecheng



## 2 Introduction

---

Intertek has conducted testing for Jiangsu Xiecheng Science And Technology Deve.Co.,Ltd on A2 Fire Resistant Aluminum Composite Panel - PVDF 4mm 50S in accordance with ASTM C518-2010, ASTM E831-2012, ASTM D790-2010, ASTM E8-2011, ASTM D523-2008, ASTM D3363-2005, ASTM D1781-2012, ASTM E84-2012, ASTM E119-2012, ASTM E90-2009 and ASTM E413-2010. This evaluation began November 25, 2012 and was completed December 20, 2012.

## 3 Test Samples

---

### 3.1. SAMPLE SELECTION

Samples were randomly selected on November 16, 2012 by Intertek representative Star Shi, at Jiangsu Xiecheng Science And Technology Deve.Co.,Ltd manufacturing facility, located at Industrial Zone, Jintu county Jiangsu, China. Samples were received at the Evaluation Center on November 25, 2012.

### 3.2. SAMPLE AND ASSEMBLY DESCRIPTION

A2 Fire Resistant Aluminum Composite Panel  
Nominal Thickness: 4mm  
Trade name: ALMINE

## 4 Testing and Evaluation Methods

---

### 4.1. THERMAL CONDUCTIVITY

The test was conducted in accordance with ASTM C518 -2010. By using the heat flow meter apparatus, the density of heat flow rate, heat flow rate, and the metering area that the heat flow rate crosses were measured; and the temperature difference across the specimen was measured by temperature sensors fixed at surfaces in contact with the specimens. Then thermal conductivity was calculated from measured density of heat flow rate, heat flow rate, metering area and temperature difference.

### 4.2. LINEAR THERMAL EXPANSION

The test was conducted in accordance with ASTM E831-2012. The test temperature range was from -30°C to 60°C. The thickness of the conditioned specimens was measured at room temperature. The specimen was mounted in a dilatometer until no further movement indicated by the measuring device over a period of 5 to 10 minutes. The other specimen was mounted in another dilatometer until no further movement indicated by the measuring device over a period of 5 to 10 minutes. Then the coefficient

---

of linear thermal expansion over the temperature range was calculated in accordance with the requirements in ASTM E831-2012.

#### 4.3. FLEXURAL PROPERTIES

The test was conducted in accordance with ASTM D790-2010. At least five test specimens should be tested in each direction of test. The test speed was 1.7 mm/min. Record the force and the corresponding deflection of the specimen during the test. Calculated the flexural strength by the test data, and expressed it in MPa.

#### 4.4. TENSILE STRENGTH

The test was conducted in accordance with ASTM E8-2011. The test pieces should be the sheet-type. Measure the width and thickness of the specimen. Place the testing assembly in the grips and apply a force until rupture occurs. The rate of loading should be 1 MPa/s. Record the maximum load and calculate the tensile strength using the following equation:

$$T=P/(b*t)$$

Where:

- T was the tensile strength, MPa;
- P was the max load, N;
- b was the width of the specimen, mm;
- t was the thickness of the specimen, mm

#### 4.5. GLOSSINESS DEVIATION

The test was conducted in accordance with ASTM D523-2008. Three readings were taken on a 75 mm by 150 mm area of the test specimen. The angle of incidence used was 60°.

#### 4.6. FILM HARDNESS BY PENCIL

The test was conducted in accordance with ASTM D3363-2005. Placed the coated panel on a level, firm, horizontal surface. Holed the pencil with a 45° angle and pushed away from the operator. Exerted sufficient uniform pressure downward and forward either to cut or scratch the film. The length of the stroke was 6.5 mm. Repeated the process down the hardness scale until a pencil was found that would not cut through the film to the substrate for a distance of at least 3 mm.

#### 4.7. BOND-STRENGTH TEST

Each group of conditioned bonded MCM specimens was tested in accordance with ASTM D1781-2012. The peel resistance was determined over at least 152 mm of the bond by loading the apparatus in tension at a crosshead speed of 25.4 mm/min. Each group of six specimens should exhibit a minimum average peel torque of 100N-mm/mm.



Individual values within each group should be within 15 percent of average.

#### **4.8. SURFACE BURNING CHARACTERISTICS TEST**

The ASTM E84 - 2012 (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of mineral fiber cement board and select grade red oak flooring. The test specimen surface (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and density of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

#### **4.9. FIRE RESISTANCE TEST**

Testing was conducted in accordance with ASTM E119 - 2012, Standard Test Methods for Fire Tests of Building Construction and Materials.

The test assembly was installed in a steel restraint frame. The restraint frame was allowed the sample to be moved in front of the furnace for the fire exposure. The nominal dimensions of the test wall were 3m high by 3m wide.

After positioning the assembly frame over the furnace opening, the burners were ignited and the timer was started. Temperatures within the furnace were monitored using thermocouples and the data was recorded. The burners were controlled to keep the furnace temperatures within the allowable limits specified in the test standards. After 5 minutes, the furnace pressure was adjusted so that the neutral plane was established at a 1016mm (40in) or more below the top of the sample. Periodic observations were made of the surfaces of the test assembly during the fire resistance test.

Immediately after the Fire Endurance Test, the assembly frame was moved into position for the Hose Stream Test. The exposed surface of the test assembly was subjected to the impact, erosion, and cooling effects of a hose stream described in the test standards.

#### **4.10. SOUND TRANSMISSION LOSS TEST AND CLASSIFICATION**

The test method was conducted in accordance with ASTM E90-2009; the STC classification was determined by the ASTM E413 - 2010.

---

## 5 Testing and Evaluation Results

### 5.1. RESULTS AND OBSERVATIONS

The test results are summarized in the Table below.

Test Method	Item	Result
ASTM C518 -2010	THERMAL CONDUCTIVITY	0.30957 W/m · K
ASTM E831-2012	LINEAR THERMAL EXPANSION	20.7 $\mu$ m/(m·°C)
ASTM D790-2010	FLEXURAL PROPERTIES	MOR: 111 Mpa MOE: 6586 Mpa
ASTM E8-2011	TENSILE STRENGTH	51.9 Mpa
ASTM D523-2008	GLOSSINESS DEVIATION	26.7
ASTM D3363-2005	FILM HARDNESS BY PENCIL	Gouge Hardness : >6H Scratch Hardness: 2H
ASTM D1781-2012	BOND-STRENGTH TEST	149.63 (mm-N/mm)
ASTM E84 – 2012 <sup>1</sup>	SURFACE BURNING CHARACTERISTICS TEST	Flame Spread Index = 0 Smoke Developed Index = 10
ASTM E119 – 2012 <sup>2</sup>	FIRE RESISTANCE TEST	2 hours exposure period with hose stream
ASTM E90 – 2009 <sup>3</sup> ASTM E413 – 2010	SOUND TRANSMISSION LOSS TEST AND CLASSIFICATION	STC = 26 dB

Note: 1 Refer to test report 100980640SAT-001A Rev.1

2 Refer to test report AU12094055-1

3 Refer to test report AU12094055-2



## 6 Conclusion

---

The A2 Fire Resistant Aluminum Composite Panel-PVDF 4mm 50S identified and evaluated in this report have been tested in accordance with ASTM C518-2010, ASTM E831-2012, ASTM D790-2010, ASTM E8-2011, ASTM D523-2008, ASTM D3363-2005, ASTM D1781-2012, ASTM E84-2012, ASTM E119-2012, ASTM E90-2009 and ASTM E413-2010. This evaluation began November 28, 2012 and was completed December 20, 2012. The results were presented in Section 5 of this test report.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

### INTERTEK

Reported by: \_\_\_\_\_

*Star Shi*  
Star Shi  
Engineer, Building Products

Reviewed by: \_\_\_\_\_

*Sun Sun*  
Sun Sun  
Technical Supervisor, Building Products



Jiangsu Xiecheng

## 7 Revision Page

---

Revision No.	Date	Changes	Author	Reviewer
0	2013-1-16	First issue	Star Shi	Sun Sun

END OF DOCUMENT

Jiangsu Xiecheng