

# TEST REPORT

## REACTION TO FIRE TEST

### Test Sponsor:

Modern Industrial Co., Ltd  
Sudair Industry and Business City, KSA  
T: +966 16 421 0220  
Website: [www.unibond.sa](http://www.unibond.sa)

### Test Material / Assembly:

4mm thick Aluminium Composite Panel (Grade B1)

### Test Standard:

ASTM E84 - 21a: Standard Test Method for Surface Burning Characteristics of Building Materials



**THOMAS BELL-WRIGHT  
INTERNATIONAL CONSULTANTS**

Test Date: 15-Aug-21

Issue Date: 15-Nov-21

Test Reference No: VG104-1 (Rev.01)

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DUBAI

ABU DHABI

DOHA

RIYADH



## Accreditation

### Testing

ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories with:

United Kingdom Accreditation Service (UKAS) - Testing Laboratory: **4439**

[www.ukas.com](http://www.ukas.com)



GCC Accreditation Center (GAC) – Testing Laboratory: **ATL-0017**

[www.GCC-accreditation.org](http://www.GCC-accreditation.org)



## Memberships

Members of European Group of Organization for Fire Testing, Inspection and Certification

[www.egolf.org.uk](http://www.egolf.org.uk)

Member of Association for Specialist Fire Protection

[www.asfp.org.uk](http://www.asfp.org.uk)

Member of Centre for Window and Cladding Technology

[www.cwct.co.uk](http://www.cwct.co.uk)



The work which is the subject of this report falls under the accreditations of **ISO 17025 UKAS** and **ISO 17025 GAC**.



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## **1. INTRODUCTION**

Determination of the flame spread index and the smoke developed index of 4mm thick Aluminium Composite Panel (Grade B1) as per ASTM E84 - 21a; Standard Test Method for Surface Burning Characteristics of Building Materials.

## **2. SPONSOR**

Name: Modern Industrial Co., Ltd  
Address: Sudair Industry and Business City, KSA  
T: +966 16 421 0220  
Website: [www.unibond.sa](http://www.unibond.sa)

## **3. TESTING LABORATORY**

Name: Thomas Bell-Wright International Consultants (TBWIC)  
Address: Corner of 46<sup>th</sup> and 47<sup>th</sup> streets, Jebel Ali Industrial Area 1  
P.O. Box 26385, Dubai, U.A.E.  
T: +971 (0) 4 821 5777  
[www.bell-wright.com](http://www.bell-wright.com)

## **4. DATE OF TEST**

Sample received date: 09-Aug-21  
Test date: 15-Aug-21

The test has not been witnessed by the sponsor.



## 5. SPECIMEN DESCRIPTION

*Note: The testing laboratory does not hold any responsibility for the information that has been provided by the test sponsor which could not be verified by the testing laboratory, as this could affect the validity of the test result. All information that could not be verified will be indicated by an asterisk (\*) mark.*

<b>Product Tested</b>		4mm thick Aluminium Composite Panel (Grade B1)* (stated)	
<b>Trade Name</b>		Unibond* (stated)	
<b>Manufacturer</b>		Modern Industrial Co., Ltd. Sudair Industry and Business City, Saudi Arabia* (stated)	
<b>Fire side</b>		<b>Top coated surface</b>	
<b>Product Description</b>		Fire resistant aluminium composite panel. (Grade B1)* (stated)	
<b>Area weight</b>		8.5 kg/m <sup>2</sup> * (stated)	
<b>Density</b>		2 kg/m <sup>3</sup> * (stated)	
<b>Product Details</b>	<b>Layer 1</b>	<b>Description</b>	Color coating* (stated)
		<b>Manufacturer</b>	Shandong Jairun New Material Co., Ltd* (stated)
		<b>Thickness</b>	0.05mm* (stated)
		<b>Area weight</b>	0.05 kg/m <sup>2</sup> * (stated)
		<b>Density</b>	0.96 kg/m <sup>3</sup> * (stated)
	<b>Layer 2</b>	<b>Description</b>	Aluminium foil* (stated)
		<b>Manufacturer</b>	Good Luck* (stated)
		<b>Thickness</b>	0.3mm* (stated)
		<b>Area weight</b>	0.83 kg/m <sup>2</sup> * (stated)
		<b>Density</b>	2.71 kg/m <sup>3</sup> * (stated)
	<b>Layer 3</b>	<b>Description</b>	Adhesive Polymer film* (stated)
		<b>Manufacturer</b>	Taizhou Weimei New Material Co., Ltd.* (stated)
		<b>Thickness</b>	0.05mm* (stated)
		<b>Area weight</b>	0.05 kg/m <sup>2</sup> * (stated)
		<b>Density</b>	0.96 kg/m <sup>3</sup> * (stated)
	<b>Layer 4</b>	<b>Description</b>	B1 Fireproof particles* (stated)
		<b>Manufacturer</b>	Jaishan Rixin New Material Co., Ltd* (stated)
		<b>Thickness</b>	3.6mm* (stated)
		<b>Area weight</b>	7 kg/m <sup>2</sup> * (stated)
		<b>Density</b>	1.9 kg/m <sup>3</sup> * (stated)
	<b>Layer 5</b>	<b>Description</b>	Adhesive Polymer film* (stated)
		<b>Manufacturer</b>	Taizhou Weimei New Material Co., Ltd.* (stated)
		<b>Thickness</b>	0.05mm* (stated)
		<b>Area weight</b>	0.05 kg/m <sup>2</sup> * (stated)
<b>Density</b>		0.96 kg/m <sup>3</sup> * (stated)	
<b>Layer 6</b>	<b>Description</b>	Aluminium foil* (stated)	
	<b>Manufacturer</b>	Good Luck* (stated)	
	<b>Thickness</b>	0.3mm* (stated)	
	<b>Area weight</b>	0.83 kg/m <sup>2</sup> * (stated)	



	<b>Density</b>	2.71 kg/m <sup>3</sup> * (stated)
<b>Dimensions per panel</b>	1220 x 600 x 4mm (l x w x t) (Measured by TBWIC)	
<b>Quantity of panels</b>	6 Nos.	
<b>Total dimension</b>	7320 x 600 x 4mm (l x w x t) (Measured by TBWIC)	
<b>Specimen placement</b>	The 6 panels of 4mm thick Aluminium Composite Panel (Grade B1) were butt jointed end-to-end. The test specimen was placed directly to the tunnel ledges with the top coated surface (fire side) towards the flame source.	

## 6. SPECIMEN VERIFICATION

The choice and design and the definition of the specimen have been made by Modern Industrial Co., Ltd, and TBWIC testing laboratory has not been involved in the selection or design of the specimen. The results apply to the samples as received.

*Note: There are contexts where information has been provided by the sponsor and verification of information has been done through either technical datasheet or other document submission, or as indicated directly by the sponsor. For this reason, materials have been tested in an as-received condition and TBWIC bears no liability for the legitimacy of the submitted information.*

## 7. METHOD OF TEST

### 7.1. Placing of test specimen

The test specimen consisted of 6 panels of 4mm thick Aluminium Composite Panel (Grade B1). The dimension per panel was 1220 x 600 x 4mm (l x w x t) and was butt jointed end-to-end. The total dimension of the specimen was 7320 x 600 x 4mm (l x w x t).

Several sections of cement board butt jointed end-to-end with overall dimensions of 7350 x 600mm (l x w), were placed at the back of the sample to protect the furnace lid assembly.

### 7.2. Test Method

The specimen was placed in the ceiling position, supported horizontally on the ledges of the Steiner Tunnel. The top coated surface (fire side) was exposed face down to the ignition source during the 10-minute test duration.

Flame Spread and Smoke Density were measured, and the results were compared against standard calibration materials (fiber-cement board, heptane and red oak flooring).

### 7.3. Conditioning

After delivery on 9-Aug-21, the specimen was placed in a conditioned space where temperature and humidity were maintained between  $23 \pm 2.8^{\circ}\text{C}$  and  $50 \pm 5\%$  respectively, until constant weight was attained.

Note: There were deviations observed in the temperature and relative humidity in 4 separate probes of thermo-hygrometer in our conditioning room, however the average values were within the limit.



## 8. OBSERVATION

Test Data and Observation

Observations	Result
Ignition Time (min:sec)	2:45
Time to maximum flame front advance (min:sec)	8:30
Maximum flame spread (ft)	1.5
Time to end of tunnel reached (min:sec)	Not Reached
Maximum temp recorded at the exposed thermocouple located near the end of the tunnel (°F / °C)	569/298
Dripping (min:sec)	None
Flaming on the floor (min:sec)	None
After flame on the top (min:sec)	None
After flame on the floor (min:sec)	None
Delamination (min:sec)	None
Sagging (min:sec)	0:40
Shrinkage (min:sec)	None
Fallout (min:sec)	None
FS*Time Area (ft*min)	7.35
Smoke Area (%A*min)	0.77
Heptane Smoke Area (%A*min)	85.6

## 9. SUMMARY OF RESULTS

The test specimen has been evaluated in accordance with ASTM E84 - 21a; Standard Test Method for Surface Burning Characteristics of Building Materials.

The test results are:

<b>FLAME SPREAD INDEX (FSI)</b>	<b>5</b>
<b>SMOKE DEVELOPED INDEX (SDI)</b>	<b>0</b>

Results are valid for the tested configuration only.



## 10. CLASSIFICATIONS

The following information is designed to help put these test results into context. Flame Spread Index and Smoke Developed Index results from an ASTM E84 test are often used by regulatory agencies to approve materials for various applications. For example, the International Building Code 2021, Section 803.1.2 requires that:

Interior wall and ceiling finish materials shall be classified in accordance with ASTM E84 or UL 723-11th Ed. 2021. Such interior finish materials shall be grouped in the following classes in accordance with their flame spread and smoke-developed indices.

Class A: Flame spread index 0 - 25; smoke-developed index 0 - 450.

Class B: Flame spread index 26 - 75; smoke-developed index 0 - 450.

Class C: Flame spread index 76 - 200; smoke-developed index 0 - 450.

Note that the above example is the IBC requirement for interior wall and ceiling finishes only; the application of the tested specimen may differ.





## 11. LIMITATIONS

Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by the testing materials that remain in place.

Thomas Bell-Wright International Consultants recommend that the relevance of test reports should be considered after a period of five years.

This test report is respectfully submitted by: Thomas Bell-Wright International Consultants

Prepared/Tested By:

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Approved By:

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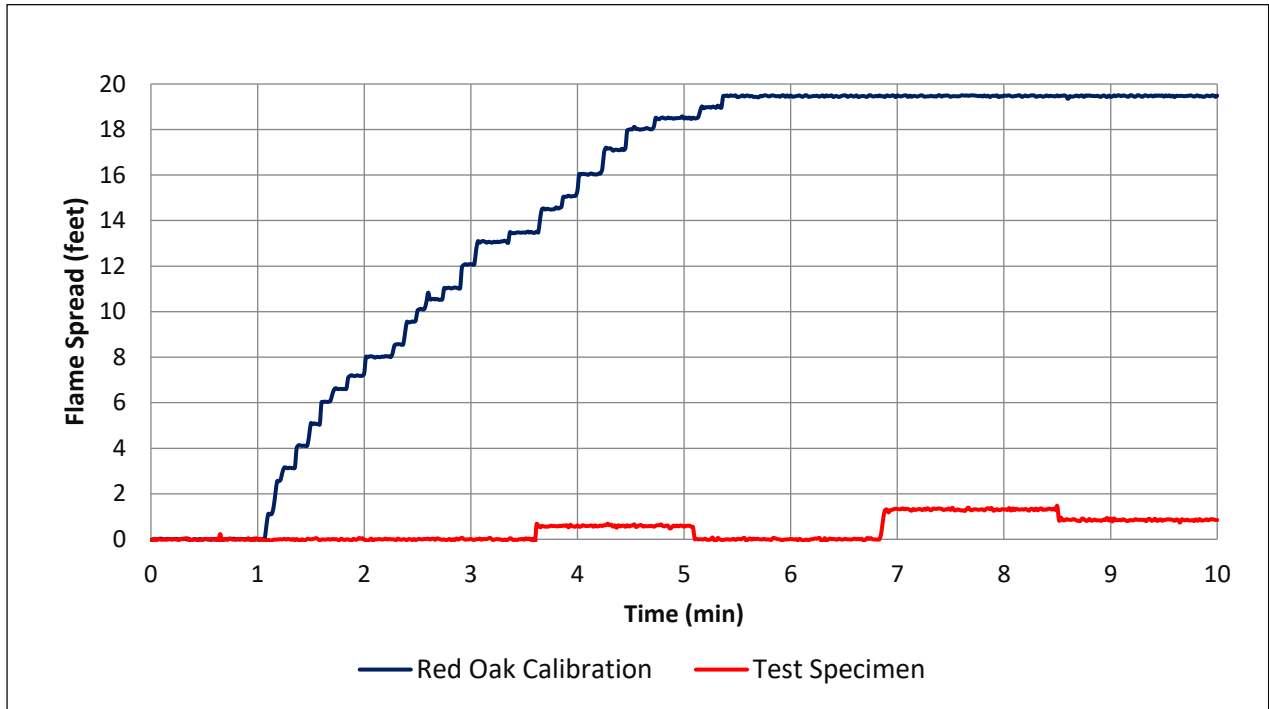
Suketa Tyagi  
Reaction to Fire - Manager



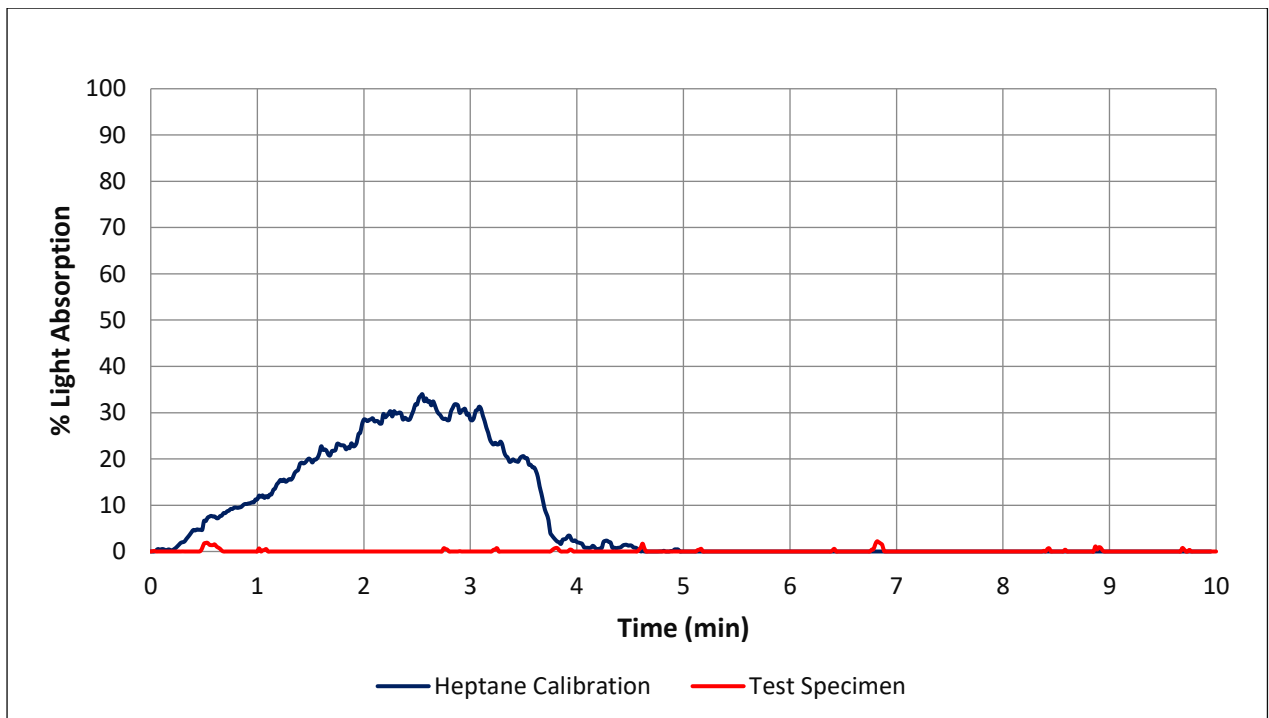
Report Revision Tracking		
Report Reference	Date Issued	Notes & Amendments
Rev.00	31-Aug-21	This is the first issue of the report. No revisions are included.
Rev.01	14-Nov-21	The Specimen Description table (Section 5) has been updated. Layer 2&6 thickness and area weight were updated.



## 12. APPENDIX 1 – GRAPHS



Graph 1: Flame Spread Index (FSI)



Graph 2: Smoke Developed Index (SDI)



### 13. APPENDIX 2 – PICTURES



Photo 1: Specimen before the test.  
(Non-Fire Side)



Photo 2: Specimen before the test.  
(Fire Side)



Photo 3: Specimen after the test.  
(Fire side from the fire-end)

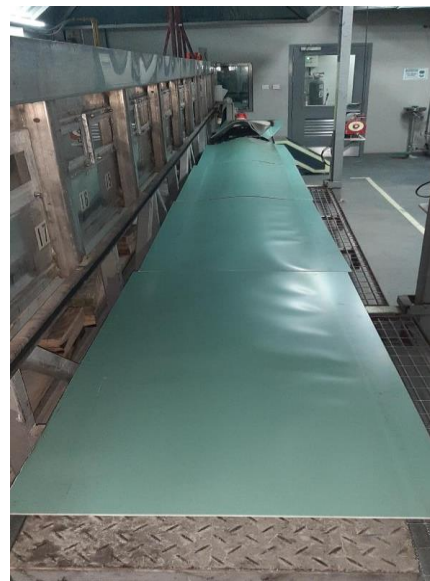


Photo 4: Specimen after the test.  
(Fire side from the exhaust end)

----- End of Test Report -----