

TEST REPORT FOR REACTION TO FIRE

Test Sponsor:

Modern Industrial Co. Ltd
Sudair Industrial & Business City,
Sudair, Riyadh,
Kingdom of Saudi Arabia
T: +966 920005774
Website: www.unibond.sa

Test Specimen:

4 mm thick "Unibond" FR-A2 Aluminium Composite Panel

Test Standard:

BS EN ISO 1716:2018 – Reaction to Fire Tests for Products - Determination of the Gross Heat of Combustion (Calorific Value)



Test Reference No.: Y1069-4
Test Date: 08-Sep-25
Issue Date: 13-Oct-25

Thomas Bell-Wright International Consultants (Dubai Branch)

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Accreditation

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

United Kingdom Accreditation Service (UKAS) - Testing Laboratory: **4439**
www.ukas.com



Memberships

Members of European Group of Organization for Fire Testing, Inspection and Certification
www.egolf.org.uk

Member of Association for Specialist Fire Protection
www.asfp.org.uk

Member of Centre for Window and Cladding Technology
www.cwct.co.uk



The work which is the subject of this report falls within the scope of the listed ISO/IEC 17025 accreditation above.

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1. INTRODUCTION

This report outlines the determination of the calorific potential of 4 mm thick “Unibond” FR-A2 Aluminium Composite Panel during combustion in accordance with:

BS EN ISO 1716:2018 – Reaction to fire tests for products - Determination of the Gross Heat of Combustion (Calorific Value).

2. SPONSOR

Name: Modern Industrial Co. Ltd
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Website: www.unibond.sa

3. TESTING LABORATORY

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4. DATE OF TEST & WITNESSES

The test was conducted on 08-Sep-25 and was not witnessed by the sponsor.

5. TEST SAMPLES

5.1. Product Details

Product Description		4 mm thick "Unibond" FR-A2 Aluminium Composite Panel*	
Product Reference		"Unibond" FR-A2*	
Manufacturer		Modern Industrial Co. Ltd*	
Overall Thickness		4.15 mm (measured by TBWIC)	
		4 ± 2 mm (stated)	
Overall Area Weight		8.61 kg/m ² (measured by TBWIC)	
		8.35 kg/m ² (stated)	
Density		2178 kg/m ³ (stated)	
Product Details	1 st Layer (Fire Side)	Product Name	PVDF Topcoat*
		Reference	CF101 PVDF Ultramar Bright Silver., SI – G1545*
		Manufacturer	Spectrum Industries LLC*
		Colour	Bright Silver*
		No. of coats	2*
		Total Thickness, DFT	19 - 21 microns*
		Specific Gravity	1.12 - 1.18*
	2 nd Layer	Product Name	Primer*
		Type	Polyester*
		Reference	CP445, Yellow*
		Manufacturer	Spectrum Industries LLC*
		Thickness, DFT	5 - 8 microns*
		Specific Gravity	1.122*
	3 rd Layer	Reference	Aluminium top skin*
		Alloy & Temper	3003H46*
		Manufacturer	Good Luck Decorative Materials Manufacturer L.L.C.*
		Coated Thickness	0.5 ± 0.02 mm*
		Area Weight	1.355 kg/m ² *
		Density	2710 kg/m ³ *
	4 th Layer	Reference	Adhesive Film*
		Manufacturer	Rixin Plastic Industries LLC*
		Thickness	Stated: 0.1 mm Measured: 0.08 mm
		Area Weight	Stated: 0.093 kg/m ² Measured: 0.073 kg/m ²
		Density	926 kg/m ³ *
	5 th Layer	Reference	FR A2 (Fire Retardant A2) core*
		Manufacturer	Jiangsu Beike Decoration Materials Technology Co., Ltd.*
		Thickness	3.2 mm*
		Area Weight	5.92 kg/m ² *
		Density	1850 kg/m ³ *
	6 th Layer	Reference	Adhesive Film*
		Manufacturer	Rixin Plastic Industries LLC*
		Thickness	Stated: 0.1 mm Measured: 0.08 mm
		Area Weight	Stated: 0.093 kg/m ² Measured: 0.073 kg/m ²
		Density	926 kg/m ³ *
	7 th Layer	Reference	Aluminium top skin*

		Alloy & Temper	3003H46*
		Manufacturer	Good Luck Decorative Materials Manufacturer L.L.C.*
		Coated Thickness	0.5 ± 0.02 mm*
		Area Weight	1.355 kg/m ² *
		Density	2710 kg/m ³ *
	8 th Layer	Reference	Back coat*
		Type	PE*
		Manufacturer	Spectrum Industries LLC*
		Colour	Grey*
		No. of coats	1*
		Thickness, DFT	6 – 12 microns*
		Specific Gravity	1.22 – 1.30
Specimen Placement		A minimum of three test specimens were tested using the crucible method in accordance with §7.9 of BS EN ISO 1716:2018 test standard.	
Note: the testing laboratory does not hold responsibility for information that has been provided by the sponsor and which could not be verified by the testing laboratory. As this could affect the validity of the tests results, any and all such information which could not be verified has been marked with an asterisk (*).			

5.2. Standard Specific Conditions

In accordance with §7.2.1 of BS EN ISO 1716:2018, a sample of a minimum mass of 50 g was taken from the substantial component of the non-homogenous product. A minimum mass of 10 g was taken from the non-substantial components of the non-homogeneous product.

The samples were prepared as per §7.2.3 and §7.2.4 of BS EN ISO 1716:2018.

In accordance with §7.4 of BS EN ISO 1716:2018, the samples were reduced into small granules or pieces and the specimen obtained was treated as a powder.

6. SPECIMEN DEFINITION & VERIFICATION

6.1. Specimen Definition & Verification of the Test Specimen

TBWIC testing laboratory has not been involved in the selection or design of the specimen. However, the materials were selected, marked, and signed by Mr. Suresh Kumar from TBWIC Certification (Certification Body) on 10-Aug-25 as shown below.



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. Similarly, the results of the test apply only to the samples as received.

6.2. Specimen Conditioning

The specimens were delivered on 01-Sep-25 and conditioned to constant mass at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity, in accordance with §6 of BS EN 13823 and as prescribed in EN 13238:2010 - *Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates*.

7. METHOD OF TEST

7.1. Test Procedure

The test was performed in accordance with the requirements of BS EN ISO 1716:2018 - *Reaction to fire tests for products - Determination of the Gross Heat of Combustion (Calorific Value)*.

The test was carried out using the crucible method in accordance with §7.9.

The combustion was facilitated using a combustion aid, benzoic acid, an additional combustible substance of known and high calorific value. The water equivalent (E) was determined on 6-Aug-25 in accordance with §8.2. The water equivalent values for Bomb 1 and Bomb 2, respectively, were 0.005666 MJ/K and 0.005640 MJ/K, respectively.

In accordance with §8.3 of BS EN ISO 1716:2018, Aluminium or other metallic component of the product was not tested in the bomb calorimeter, as it carries the risk of serious injury to the operator due to overheating and/or overpressure causing the bomb calorimeter to explode.

7.2. Performance Criteria

BS EN ISO 1716:2018 - §9 outlines calculation criteria for the final value of the gross heat of combustion Q_{PCS} as an average of the individual gross heats of combustion of three tests within a given series, depending on whether a specimen is constituted as substantial or non-substantial, then validated in accordance with the guidelines given in §11 – Table 1 of the standard, shown below.

Gross heat of combustion	Acceptance criteria	Range of validity
$Q_{PCS}[\text{MJ}/\text{kg}]$	$\leq 0.2 \text{ MJ}/\text{kg}$	From any negative value to 3.2 MJ/kg
	Within 5 % of the average of the 3 results	From 3.2 MJ/kg to 20.0 MJ/kg
	Within 10 % of the average of the 3 results	Greater than 20.0 MJ/kg
$Q_{PCS}[\text{MJ}/\text{m}^2]^a$	$\leq 0.1 \text{ MJ}/\text{m}^2$	From any negative value to 4.1 MJ/m ²
	Within 5 % of the average of the 3 results	From 4.1 MJ/m ² to 20 MJ/m ²
	Within 10 % of the average of the 3 results	Greater than 20 MJ/m ²
^a For non-substantial components only.		

7.3. Method Variations

With respect to §6.2 *Specimen Conditioning* of this report, there were deviations observed in the consistency of the temperature and relative humidity in the four separate probes of monitoring equipment in the laboratory's conditioning room. However, the materials were still conditioned to constant mass, in accordance with the test standard, and it was agreed upon by both the laboratory and the sponsor to proceed with the test.

8. FIRE TEST

8.1. Observations

After each individual test and in accordance with §8.3.11(e) of BS EN ISO 1716:2018, the tested specimens were observed to have completely combusted, as indicated by the absence of sooty deposit inside the bomb and traces of residual carbon on the sides of the crucible.

8.2. Summary of Results

The test specimen has been evaluated in accordance with BS EN ISO 1716:2018 - *Reaction to fire tests for products - Determination of the Gross Heat of Combustion (Calorific Value)*.

8.2.1. Test Results

The test results for each layer, as an average of three samples in each trial, are outlined in the following table:

Gross Calorific Value of Each Layer							
		YI069-4 Topcoat	YI069-5 Primer	Aluminium skins	YI069-7 Adhesive Film	YI069-8 Core	YI069-6 Back Coat
Trial 1	Specimen weight (g)	0.1001	0.1010	-	0.1001	0.1005	0.1002
	Gross calorific value (MJ/kg)	20.2	18.8	-	45.9	0.9	14.1
Trial 2	Specimen weight (g)	0.0997	0.1006	-	0.1001	0.1007	0.1008
	Gross calorific value (MJ/kg)	21.8	18.6	-	44.8	0.9	14.8
Trial 3	Specimen weight (g)	0.1004	0.1009	-	0.1005	0.1008	0.1003
	Gross calorific value (MJ/kg)	23.0	18.4	-	44.3	0.7	13.6
Average Gross calorific value (Q_{PCS}) in MJ/kg		21.7	18.6	0.0 ^{Note 1}	45.0	0.8	14.2
Area Weight (kg/m ²)		0.025*	0.009*	1.355*	0.073	5.549	0.016*
Average Gross Calorific Value (MJ/ m ²)		0.5	0.2	0.0	3.3	4.4	0.2

Note 1: Value deemed to be 0 in accordance with §9.4.1 of BS EN ISO 1716:2018

Gross Calorific Value of the Whole Product							
Layer	Component		Thickness (mm)	Area Weight (kg/m²)	Gross Heat of Combustion Q _{PCS} (MJ/kg)	Gross Heat of Combustion Q _{PCS} (MJ/m²)	
1	Component 1 (External non-substantial layer)	Topcoat	0.021	0.025	21.7	0.5	0.7
		Primer	0.008	0.009	18.6	0.2	
2	Component 2 (Substantial layer)	Aluminium Top Skin	0.5	1.355	0.0 ^{Note 1}	0.0	
3	Component 3 (Internal non-substantial layer)	Adhesive Film	0.080	0.073	45.0	3.3	
4	Component 4 (Substantial layer)	Core	3.2	5.549	0.8	4.4	
5	Component 5 (Internal non-substantial layer)	Adhesive Film	0.080	0.073	45.0	3.3	
6	Component 6 (Substantial layer)	Aluminium Bottom Skin	0.5	1.355	0.0 ^{Note 1}	0.0	
7	Component 7 (External non-substantial layer)	Back Coat	0.012	0.016	14.2	0.2	
(A) Sum of Calorific Values, MJ/m²						11.9	
(B) Sum of Area Weights, kg/m²(measured by TBWIC)						8.61	
Gross Heat of Combustion of the Whole Product (Q _{PCS}), MJ/kg						1.4	

8.3. Limitation

The test results relate only to the behaviour of the test specimen of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard for the product in use.

This report and all records of the test to which it relates may not be retained by TBWIC beyond 5 years from the date of testing.

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

Tested By:



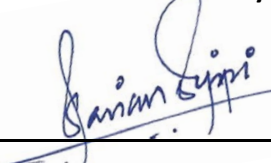
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Fire Testing Director



Report Revision Tracking		
Revision No.	Date	Notes & Amendments
Rev. 00	13-Oct-25	This is the first issue of the report. No revisions are included.

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