TEST REPORT
REACTION TO FIRE TEST

Test Sponsor:

Jadara Building Materials Co.
Dammam Industrial Area 2
Kingdom of Saudi Arabia
T: +966 55 502 9208
Website: www.deltasaudi.com

Test Material / Assembly:

4.3 mm thick Delta Aluminium Composite Panel

Test Standard:

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

THOMAS BELL-WRIGHT
INTERNATIONAL CONSULTANTS

Test Date: 27-Mar-23
Issue Date: 22-May-23
Test Reference No: WL072-1

PO BOX 26385, DUBAI UAE T +971 (0)4 821 5777 fire@bell-wright.com www.bell-wright.com

DUBAI 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

GCC Accreditation Center (GAC) – Testing Laboratory: **ATL-0017**
www.GCC-accreditation.org

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 under the accreditations of **ISO 17025 UKAS and ISO 17025 GAC.**

Table of Contents

1. INTRODUCTION

Determination of the flame spread index and the smoke developed index of 4.3 mm thick Delta Aluminium Composite Panel as per ASTM E84 – 21a; Standard Test Method for Surface Burning Characteristics of Building Materials.

2. SPONSOR

Name: Jadara Building Materials Co.
Address: Dammam Industrial Area 2
Kingdom of Saudi Arabia
T: +966 55 502 9208
Website: www.deltasaudi.com

3. TESTING LABORATORY

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

4. DATE OF TEST

Sample received date: 22-Mar-23
Test date: 27-Mar-23

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.

Product Tested	4.3 mm thick Delta Aluminium Composite Panel *		
Product Name	Delta Aluminum Composite Panels*		
Manufacturer	Jadara Building Materials Co.*		
Product Description	Fire Retardant Aluminum Composite Panels*		
Product Details	Topcoat (Fireside)	Product Name	Delta*
		Manufacturer	Please provide detail
		Thickness, DFT	27 µm* (stated)
		Density	2.70 g/cm^3* (stated)
	Top Aluminium skin	Product Name	Aluminum Top Coil*
		Manufacturer	
		Thickness	0.28mm* (stated)
		Area Weight	0.83 kg/m^2* (stated)
	Adhesive	Product Name	Adhesive Film*
		Manufacturer	

		Thickness	0.05mm* (stated)
		Area Weight	0.092 kg/m^2* (stated)
	Fire Retardant Core	Product Name	Fire Retardant Core*
		Manufacturer	
		Thickness	4mm* (stated)
		Area Weight	5.10 kg/m^2* (stated)
	Adhesive	Product Name	Adhesive Film*
		Manufacturer	
		Thickness	0.05mm* (stated)
		Area Weight	0.092 kg/m^2* (stated)
	Back Aluminium skin	Product Name	Aluminum Bcak Coil*
		Manufacturer	
		Thickness	0.28mm* (stated)
		Area Weight	0.79 kg/m^2* (stated)
	Back Coat	Product Name	Delta*
		Manufacturer	Jadara Building Materials Co.*
		Thickness	31 µm* (stated)
		Density	2.70 g/cm^3* (stated)
Total Area Weight	7.38 kg/m^2* (Measured by TBWIC)		
Dimension per panel	2440 x 600 x 4.3mm (l x w x t) (Measured by TBWIC)		
Quantity	3 nos.		
Total dimension	7320 x 600 x 4.3mm (l x w x t) (Measured by TBWIC)		
Specimen Placement	The three (3) panels of 4.3 mm thick Delta Aluminium Composite Panel were butt jointed end-to-end. The test specimen was placed directly to the tunnel ledges with the top surface (fire side) towards the flame source.		

Note: *The sponsor has declared that the sample submitted for testing has been selected by Jadara Building Materials Co., for the requirement given in Section 6.7 of SASO 2752/2019 (Aluminum Composite Panel for External Cladding and Internal Finish) standard*

6. SPECIMEN VERIFICATION

The choice and design and the definition of the specimen have been made by Jadara Building Materials Co., 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 three (3) panel of 4.3 mm thick Delta Aluminium Composite Panel mounted on a fiber cement board. The dimension per panel was 2440 x 600 x 4.3mm (l x w x t) and was butt jointed end-to-end. The total dimension of the specimen was 7320 x 600 x 4.3mm (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 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 22-Mar-23, the specimen was placed in a conditioned space where temperature and humidity were maintained between 23 ± 2.8°C and 50 ± 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)	2:04
Time to maximum flame front advance (min:sec)	9:53
Maximum flame spread (ft)	2.3
Time to end of tunnel reached (min:sec)	None
Maximum temp recorded at the exposed thermocouple located near the end of the tunnel (°F / °C)	547/286
Dripping (min:sec)	None
Blistering (min:sec)	None
Flaming on the floor (min:sec)	None
After flame on the top (min:sec)	Extinguished
After flame on the floor (min:sec)	None
Delamination (min:sec)	None
Sagging (min:sec)	None
Shrinkage (min:sec)	None
Fallout (min:sec)	None

FS*Time Area (ft*min)	5.17
Smoke Area (%A*min)	10.13
Heptane Smoke Area (%A*min)	85.7

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:

FLAME SPREAD INDEX (FSI)	**5**
SMOKE DEVELOPED INDEX (SDI)	**10**

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.

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

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

Tested By:

Malak Megly
Junior Fire Testing Engineer

Prepared By:

Fredilyn Paragoso
Fire Testing Support Engineer

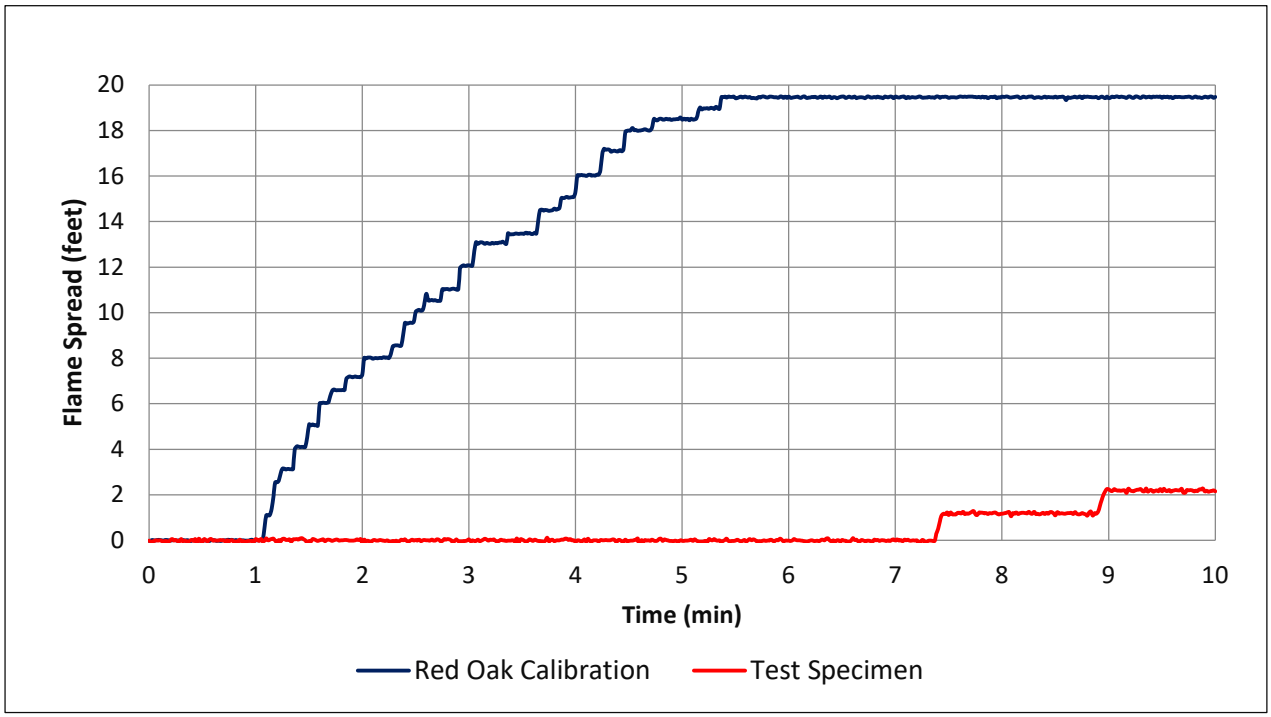
Reviewed & Approved By:

Suketa Tyagi
Reaction to Fire - Manager

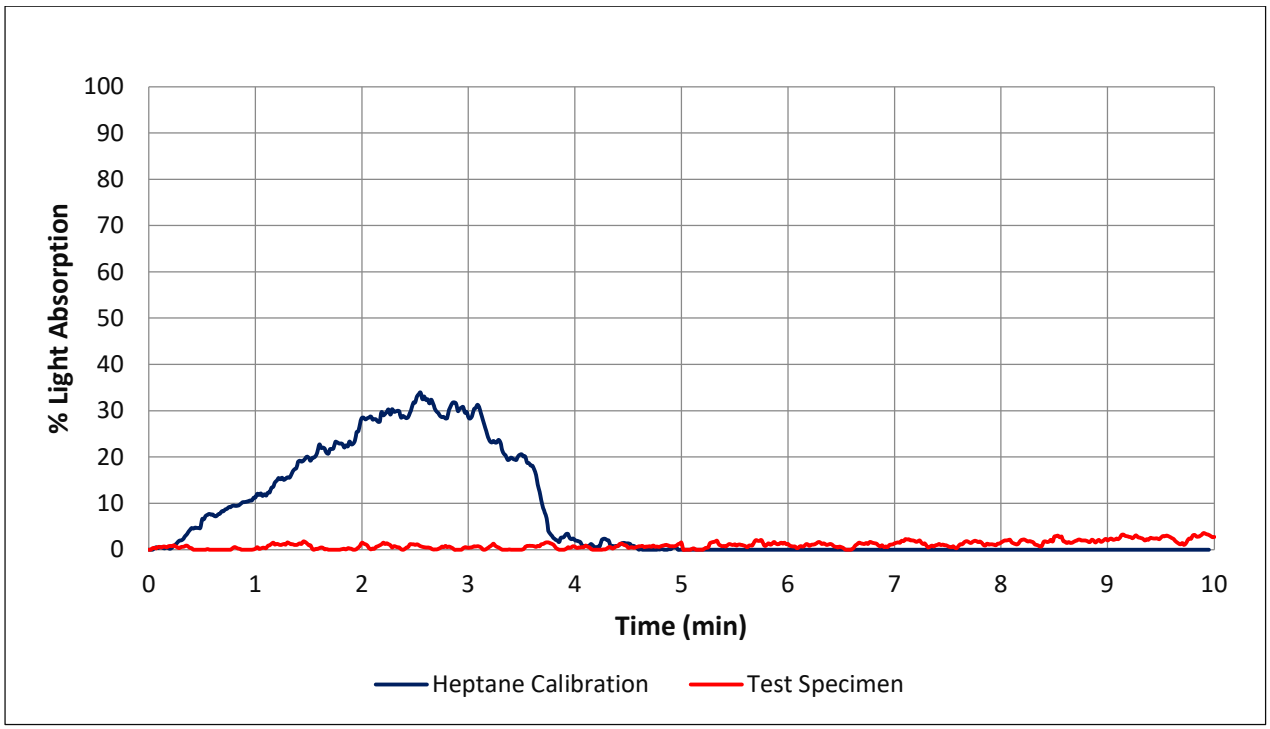
P.O.Box: 26385
DUBAI - U.A.E.
Thomas Bell-Wright Int'l Consultants (Dubai Br.)

Report Revision Tracking		
Revision No.	**Date Issued**	**Notes & Amendments**
Rev. 00	22-May-23	This is the first issue of the report. No revisions are included.

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. (Fire Side)

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

Photo 3: Specimen after the test. (As seen from the fire-end)

Photo 4: Specimen after the test. (As seen from the exhaust-end)

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

TEST REPORT
REACTION TO FIRE TEST

Test Sponsor:

Jadara Building Materials Co.
Dammam Industrial Area 2
Kingdom of Saudi Arabia
T: +966 55 502 9208
Website: www.deltasaudi.com

Test Material / Assembly:

4.3 mm thick Delta Plus Aluminium Composite Panel

Test Standard:

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

THOMAS BELL-WRIGHT
INTERNATIONAL CONSULTANTS

Test Date: 27-Mar-23
Issue Date: 22-May-23
Test Reference No: WL072-5

PO BOX 26385, DUBAI UAE T +971 (0)4 821 5777 fire@bell-wright.com www.bell-wright.com

DUBAI 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

GCC Accreditation Center (GAC) – Testing Laboratory: **ATL-0017**
www.GCC-accreditation.org

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 under the accreditations of **ISO 17025 UKAS and ISO 17025 GAC.**

Table of Contents

1. INTRODUCTION

Determination of the flame spread index and the smoke developed index of 4.3 mm thick Delta Plus Aluminium Composite Panel as per ASTM E84 – 21a; Standard Test Method for Surface Burning Characteristics of Building Materials.

2. SPONSOR

Name: Jadara Building Materials Co.
Address: Dammam Industrial Area 2
Kingdom of Saudi Arabia
T: +966 55 502 9208
Website: www.deltasaudi.com

3. TESTING LABORATORY

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

4. DATE OF TEST

Sample received date: 22-Mar-23
Test date: 27-Mar-23

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.

Product Tested	4.3 mm thick Delta Plus Aluminium Composite Panel *		
Product Name	Delta Plus Aluminum Composite Panels*		
Manufacturer	Jadara Building Materials Co.*		
Product Description	Fire Retardant Aluminum Composite Panels*		
Product Details	Topcoat (Fireside)	Product Name	Delta Plus*
		Manufacturer	Jadara Building Materials Co.*
		Thickness, DFT	38 µm* (stated)
		Density	2.70 g/cm^3* (stated)
	Top Aluminium skin	Product Name	Aluminum Top Coil*
		Manufacturer	
		Thickness	0.45mm* (stated)
		Area Weight	1.328 kg/m^2* (stated)
	Adhesive	Product Name	Adhesive Film*
		Manufacturer	

		Thickness	0.05mm* (stated)
		Area Weight	0.092 kg/m^2* (stated)
	Fire Retardant Core	Product Name	Fire Retardant Core*
		Manufacturer	
		Thickness	4mm* (stated)
		Area Weight	5.10 kg/m^2* (stated)
	Adhesive	Product Name	Adhesive Film*
		Manufacturer	
		Thickness	0.08mm* (stated)
		Area Weight	0.092 kg/m^2* (stated)
	Back Aluminium skin	Product Name	Aluminum Bcak Coil*
		Manufacturer	
		Thickness	0.45mm* (stated)
		Area Weight	1.264 kg/m^2* (stated)
	Back Coat	Product Name	Delta Plus*
		Manufacturer	Jadara Building Materials Co.*
		Thickness	36 µm* (stated)
		Area Weight	2.70 g/cm^3* (stated)
Total Area Weight	7.96 kg/m^2* (Measured by TBWIC)		
Dimension per panel	2440 x 600 x 4.3mm (l x w x t) (Measured by TBWIC)		
Quantity	3 nos.		
Total dimension	7320 x 600 x 4.3mm (l x w x t) (Measured by TBWIC)		
Specimen Placement	The three (3) panels of 4.3 mm thick Delta Plus Aluminium Composite Panel were butt jointed end-to-end. The test specimen was placed directly to the tunnel ledges with the top surface (fire side) towards the flame source.		

6. SPECIMEN VERIFICATION

The choice and design and the definition of the specimen have been made by Jadara Building Materials Co., 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 three (3) panel of 4.3 mm thick Delta Plus Aluminium Composite Panel mounted on a fiber cement board. The dimension per panel was 2440 x 600 x 4.3mm (l x w

x t) and was butt jointed end-to-end. The total dimension of the specimen was 7320 x 600 x 4.3mm (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 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 22-Mar-23, the specimen was placed in a conditioned space where temperature and humidity were maintained between 23 ± 2.8°C and 50 ± 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)	1:55
Time to maximum flame front advance (min:sec)	9:51
Maximum flame spread (ft)	1.6
Time to end of tunnel reached (min:sec)	None
Maximum temp recorded at the exposed thermocouple located near the end of the tunnel (°F / °C)	543/284
Dripping (min:sec)	None
Blistering (min:sec)	None
Flaming on the floor (min:sec)	None
After flame on the top (min:sec)	Extinguished
After flame on the floor (min:sec)	None
Delamination (min:sec)	None
Sagging (min:sec)	None
Shrinkage (min:sec)	None
Fallout (min:sec)	None

FS*Time Area (ft*min)	3.21
Smoke Area (%A*min)	3.07
Heptane Smoke Area (%A*min)	85.7

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:

FLAME SPREAD INDEX (FSI)	**0**
SMOKE DEVELOPED INDEX (SDI)	**5**

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.

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

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

Tested By:

Malak Megly
Junior Fire Testing Engineer

Prepared By:

Fredilyn Paragoso
Fire Testing Support Engineer

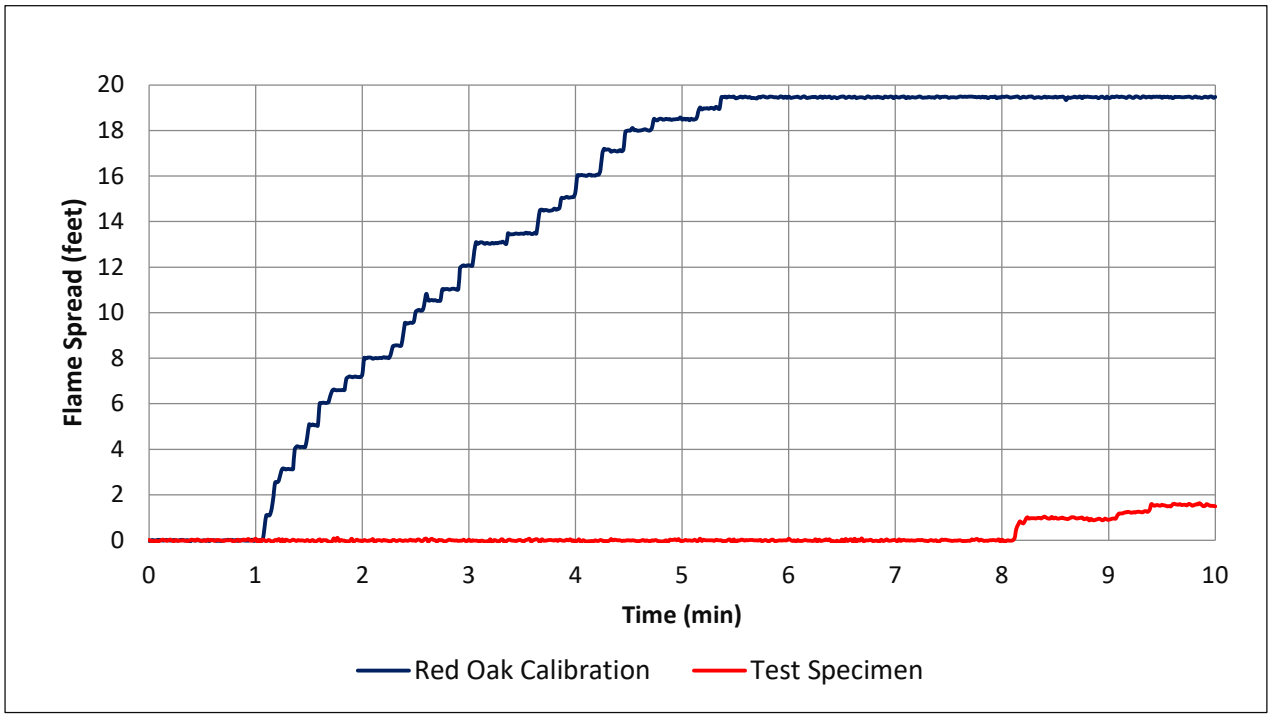
Reviewed & Approved By:

Suketa Tyagi
Reaction to Fire - Manager

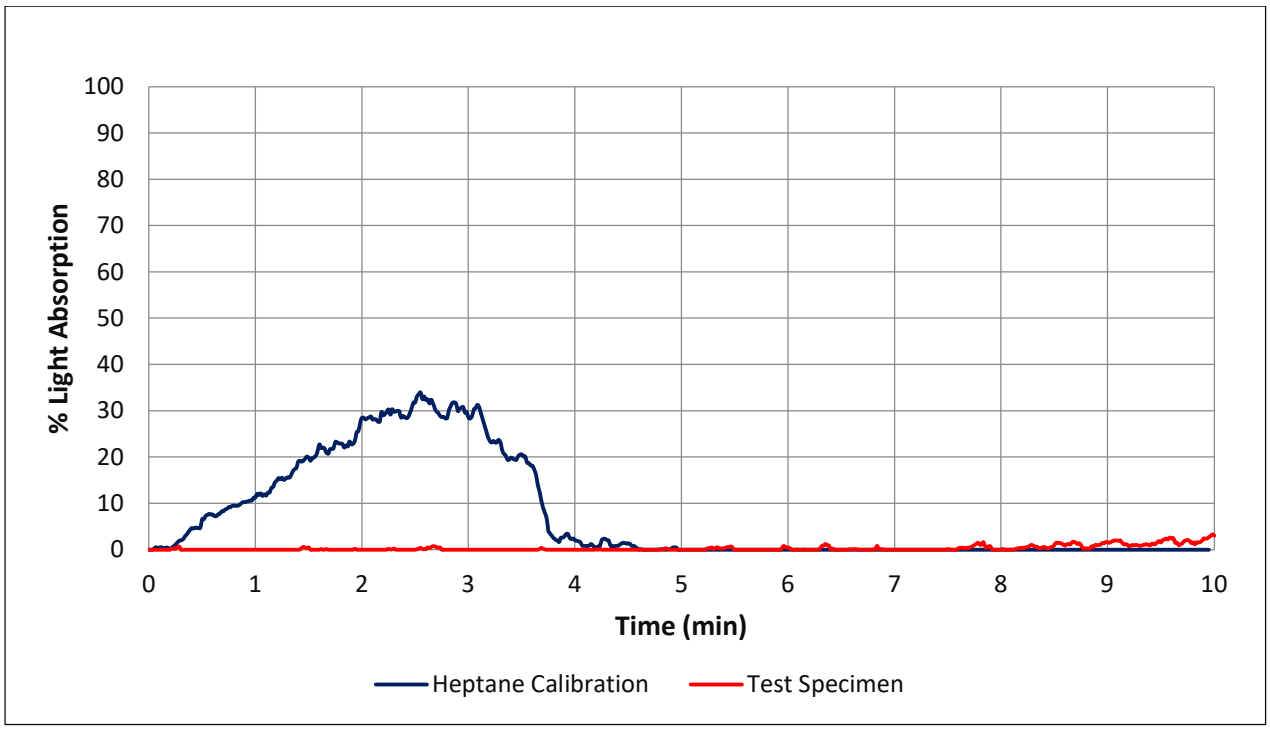
توماس بيل رايت انترناشيونال للاستشارات (فرع دبي)
P.O.Box: 26385
DUBAI - U.A.E.
Thomas Bell-Wright Int'l Consultants (Dubai Br.)

Report Revision Tracking		
Revision No.	**Date Issued**	**Notes & Amendments**
Rev. 00	22-May-23	This is the first issue of the report. No revisions are included.

12. APPENDIX 1 – GRAPHS



Graph 1: Flame Spread Index (FSI)



Graph 2: Smoke Developed Index (SDI)

13. APPENDIX 2 – PICTURES

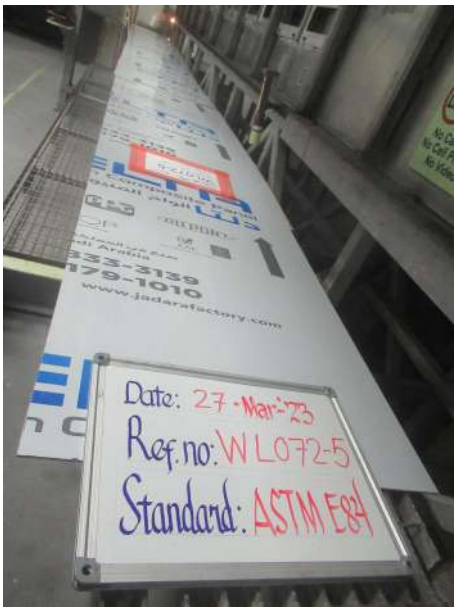


Photo 1: Specimen before the test.
(Fire Side)

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

Photo 3: Specimen after the test.
(As seen from the fire-end)

Photo 4: Specimen after the test.
(As seen from the exhaust-end)

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