TEST REPORT
REACTION TO FIRE TEST

Test Sponsor:

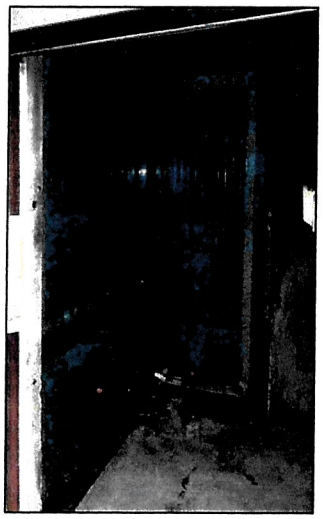
Mitrex Inc.
41 Racine Rd, Toronto,
Ontario, Canada M9W 2Z4
T: +1 416 497 7120
Website: www.mitrex.com

Test Material / Assembly:

'Mitrex A' Solar Panel

Test Standard

BS EN 13823:2020 Reaction to Fire Tests for Building Products — Building Products excluding Floorings exposed to the Thermal Attack by a Single Burning Item



THOMAS BELL-WRIGHT
INTERNATIONAL CONSULTANTS

Test Date: 21-Jul-22
Issue Date: 31-Aug-22
Test Reference No: WE022-1

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

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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

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.**

Table of Contents

1. INTRODUCTION

Determination of Reaction to fire performance of building products excluding floorings when exposed to thermal attack by a Single Burning Item (SBI) (a sand-box burner supplied with propane) in accordance with BS EN 13823:2020.

2. SPONSOR

Name: Mitrex Inc.
Address: 41 Racine Rd, Toronto,
Ontario, Canada M9W 2Z4
T: +1 416 497 7120
Website: www.mitrex.com

3. TESTING LABORATORY

Name: Thomas Bell-Wright International Consultants (TBWIC)
Address: Corner of 46th and 47th Streets,
Jebel Ali Industrial Area 1
Dubai, United Arab Emirates
T: +971 (0)4 821 5777
Website: www.bell-wright.com

4. DATE OF TEST

Sample received: 13-Jul-22
Test date: 21-Jul-22

The test was witnessed by:

Name	Company	Contact Number
Mr. Deepesh Srivastava	INTERTEK	+971 56 508 4965

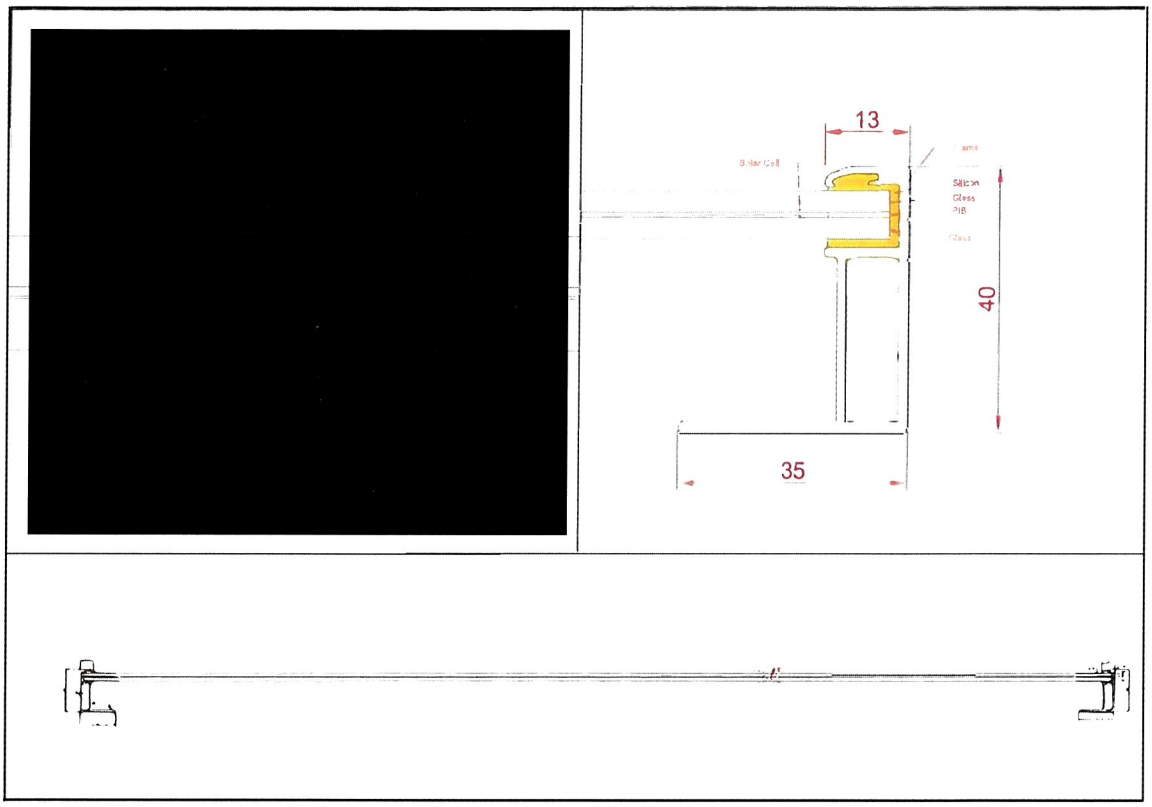
5. SPECIMEN DESCRIPTION

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.

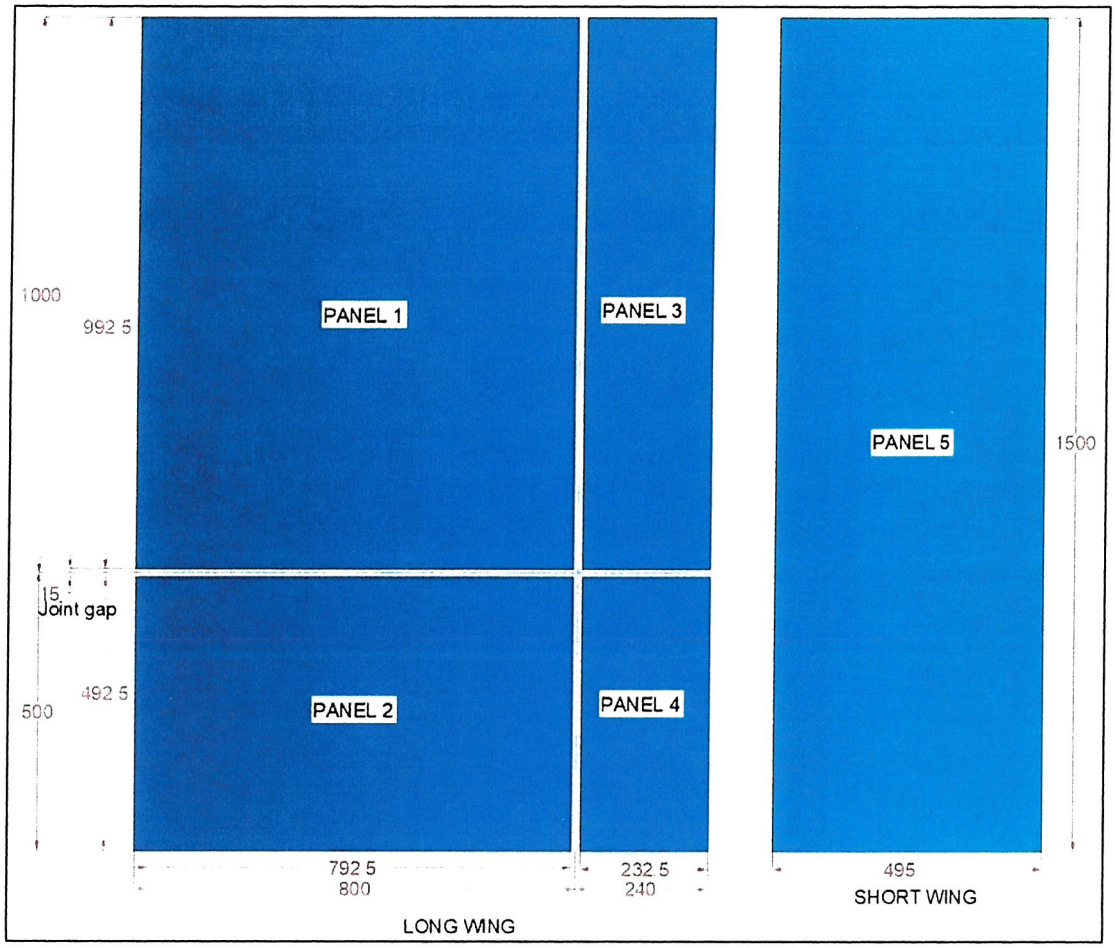
Product Description		Solar Panel - Frame Glass Module*	
Product Reference		Mitrex A*	
Manufacturer		Mitrex Inc.*	
Thickness of the Solar panel		7.1mm (measured by TBWIC)	
Area Weight		16.4 kg/m²* (stated)	
Product Details	**Top Glass (Fire side)**	Material	Glass with ceramic texturing*
		Manufacturer	DN New Energy: Xiamen, China*
		Thickness	[redacted]
		Area Weight	
		Density	
	Glue	Material	Ethyl Vinyl Acetate (EVA) film*
		Manufacturer	Lushan*
		Thickness	[redacted]
		Area Weight	
		Density	
	Solar Cell	Material	Aluminium backing surface with monocrystalline Silicon solar cells*
		Manufacturer	United Renewable Energy: Ningbo, China*
		Thickness	[redacted]
		Area Weight	
		Density	
	Bottom Glass	Material	Glass*
		Manufacturer	DN New Energy: Xiamen, China*
		Thickness	[redacted]
		Area Weight	
		Density	
	PIB	Material	Polyisobutene (Butyl Sealant Tape)*
		Manufacturer	Tonsan, Toronto, Canada*
		Reference	Tremco 440*
		Thickness	[redacted]
		Area Weight	
		Density	

	Sealant	Material	Silicone*
		Reference	1527 silicone sealant*
		Manufacturer	Tonsan/HB Fuller, China*
		Thickness	[redacted]
		Area Weight	
		Dry Density	
Metal Frame		Material	Aluminium Anodized Frame*
		Grade & Spec	TZ0831 frame for Glass Module*
		Manufacturer	Tinze: Jingyin, China*
		Thickness	[redacted]
		Area Weight	
		Density	
Exposed Face		Indicative tests on both sides and complete test on worst performing side, i.e., Glass with ceramic texturing.	
Type of joint		1. Vertical Joints: Having 15mm joint gap at 200 mm from the corner line, measured when the wings are mounted. 2. Horizontal Joints: Having 15mm joint gap at 500 mm from the bottom edge of the specimen. Refer to Drawing No.1 for more details.	
Specimen Dimensions		Small Wing: Panel 5 - 495 x 1500 mm (w x h) (Measured) Long Wing: Panel 3 - 232.5 x 992.5 mm (w x h) (Measured) Panel 1 - 792.5 x 992.5 mm (w x h) (Measured) Panel 4 - 232.5 x 492.5 mm (w x h) (Measured) Panel 2 - 792.5 x 492.5 mm (w x h) (Measured) Refer to Drawing No.2 for more information/details.	
Specimen Placement/ Mounting		Each individual solar panel was fixed onto frames. The panels were fixed to each other using GI plates on the rear of the panels. An approximate 10mm gap was maintained from the Aluminium framing to allow for a minimum 40mm gap between the rear face of the solar panel and of the backing board to ensure airflow on the rear of the panels. Refer to Drawing No. 3 for more details.	

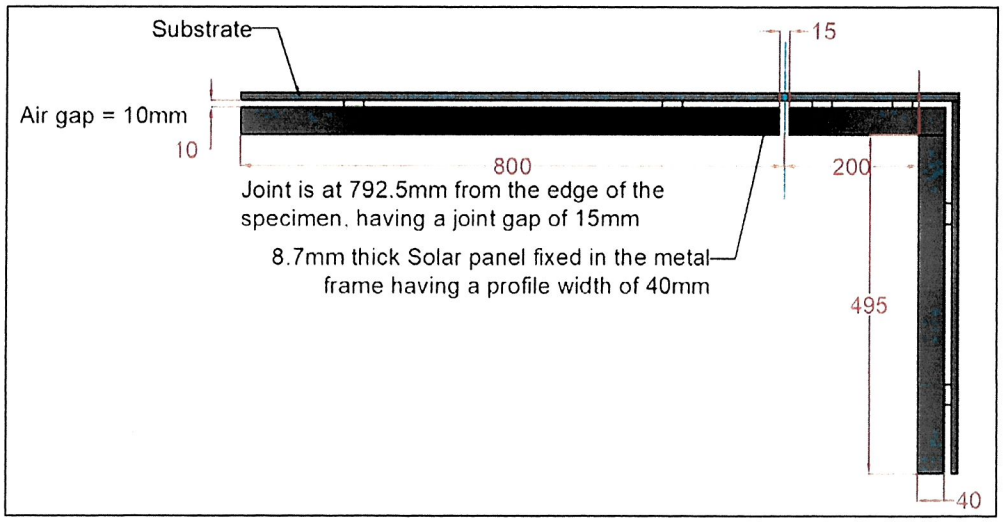
6. SPECIMEN DRAWING



Drawing 1: Cross-sectional view of the panels.
All dimensions are in millimeters (mm).



Drawing 2: Dimensions of the long and short wing of the test specimen.
All dimensions are in millimeters (mm).



Drawing 3: Top view of the mounted specimen with airgap.
All dimensions are in millimeters (mm).

7. SPECIMEN VERIFICATION

TBWIC Testing Laboratory has not been involved in the selection or design of the specimen. However, the samples were selected, marked, and signed by a representative from Intertek Certification (Certification Body) on 21-Jun-22 as shown below. 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.

8. METHOD OF TEST

8.1. Test Procedure

The test was performed in accordance with the requirements of BS EN 13823:2020 "Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by the single burning item".

8.2. Conditioning

After delivery on 13-Jul-22, the specimens were conditioned to constant weight at 21 to 25 °C and 45 to 55% relative humidity as per BS EN 13238:2010 "Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates".

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.

9. OBSERVATION

Test Data and Observation

Observations			
Occurrence of sustained flames reaching the far edge of long wing specimen at any height between 500-1000mm at any time during the test - LFS	Nil	Nil	Nil
Flaming droplets/particles within the first 600s	Nil	Nil	Nil
Burning droplets/particles ≥10 s within the first 600s	Nil	Nil	Nil
End of test, s	1560	1560	1560

10. SUMMARY OF RESULTS

The test specimen has been evaluated in accordance with BS EN 13823:2020 Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item.

Deviations: No deviations from the test method.

Two indicative tests were conducted on both sides, as product was asymmetric. According to the test results the Glass with ceramic texturing had performed the worst, hence it was considered as the representative of both sides.

The indicative test results are:

TEST PARAMETERS	TEST RESULTS	
	Specimen 1 Glass with ceramic texturing	**Specimen 2** Rear side- without texturing
$FIGRA_{0.2MJ}$ (W/s)	10	8
$FIGRA_{0.4MJ}$ (W/s)	10	8
THR_{600s}, MJ	0.1	0.1
SMOGRA, m^2/s^2 Note 1	0	0
TSP_{600s}, m^2 Note 1	2	3
Occurrence of sustained flames reaching the far edge of long wing specimen at any height between 500-1000mm at any time during the test - LFS	Nil	Nil
Flaming droplets/particles ≥ 10s within the first 600s	Nil	Nil
Burning droplets/particles ≤10 s within the first 600s	Nil	Nil

The complete test results for the Glass with ceramic texturing side are:

TEST PARAMETERS	TEST RESULTS			Average
	Specimen 1	**Specimen 2**	**Specimen 3**	
$FIGRA_{0.2MJ}$ (W/s)	10	0	0	3
$FIGRA_{0.4MJ}$ (W/s)	10	0	0	3
THR_{600s}, MJ	0.1	0.1	0.2	0.1
SMOGRA, m^2/s^2 Note 1	0	0	0	0
TSP_{600s}, m^2 Note 1	3	2	2	2
Occurrence of sustained flames reaching the far edge of long wing specimen at any height between 500-1000mm at any time during the test - LFS	Nil	Nil	Nil	Nil

Flaming droplets/particles ≥ 10s within the first 600s	Nil	Nil	Nil	Nil
Burning droplets/particles ≤10 s within the first 600s	Nil	Nil	Nil	Nil

Note 1: *Corrected value as per ANNEX A, Clause A.6.1.2 of BS EN 13823:2020.*

11. LIMITATION

"The test results relate to the behavior of the test specimens of a product under the particular conditions of the test; they are not intended to be sole criterion for assessing the potential fire hazard of the product in use"- Clause 10q, BS EN 13823:2020.

Results are valid for the tested configuration only.

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

Prepared by:

Malak Megly
Junior Fire Testing Engineer

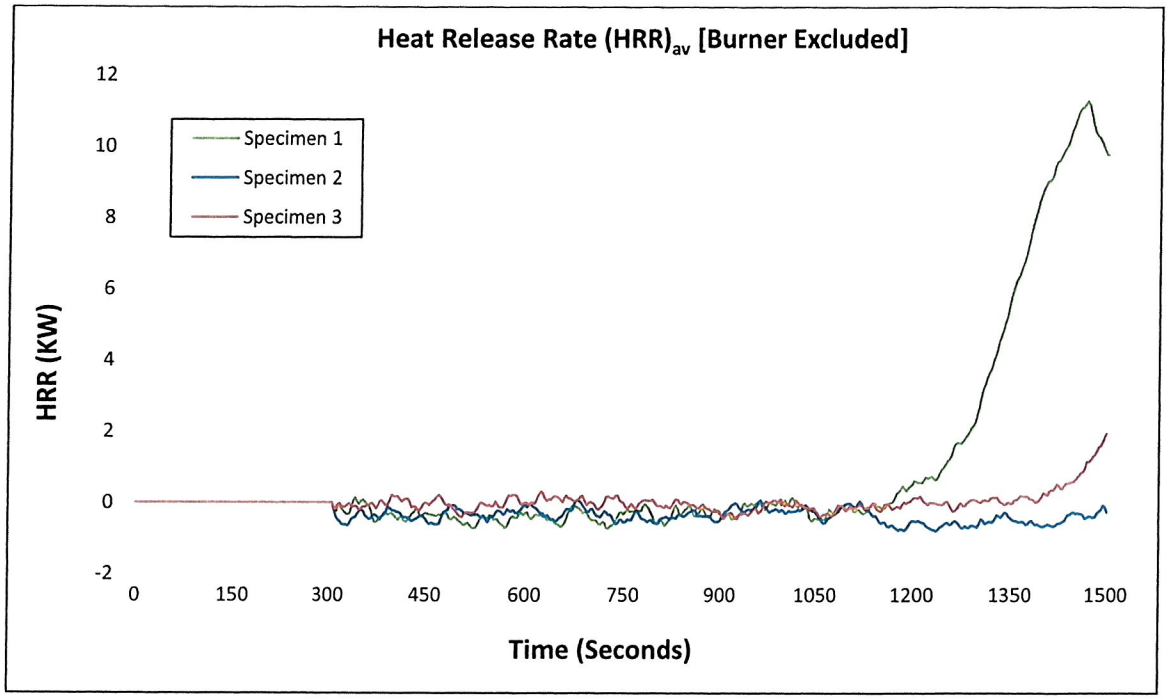
Reviewed and Authorized by:

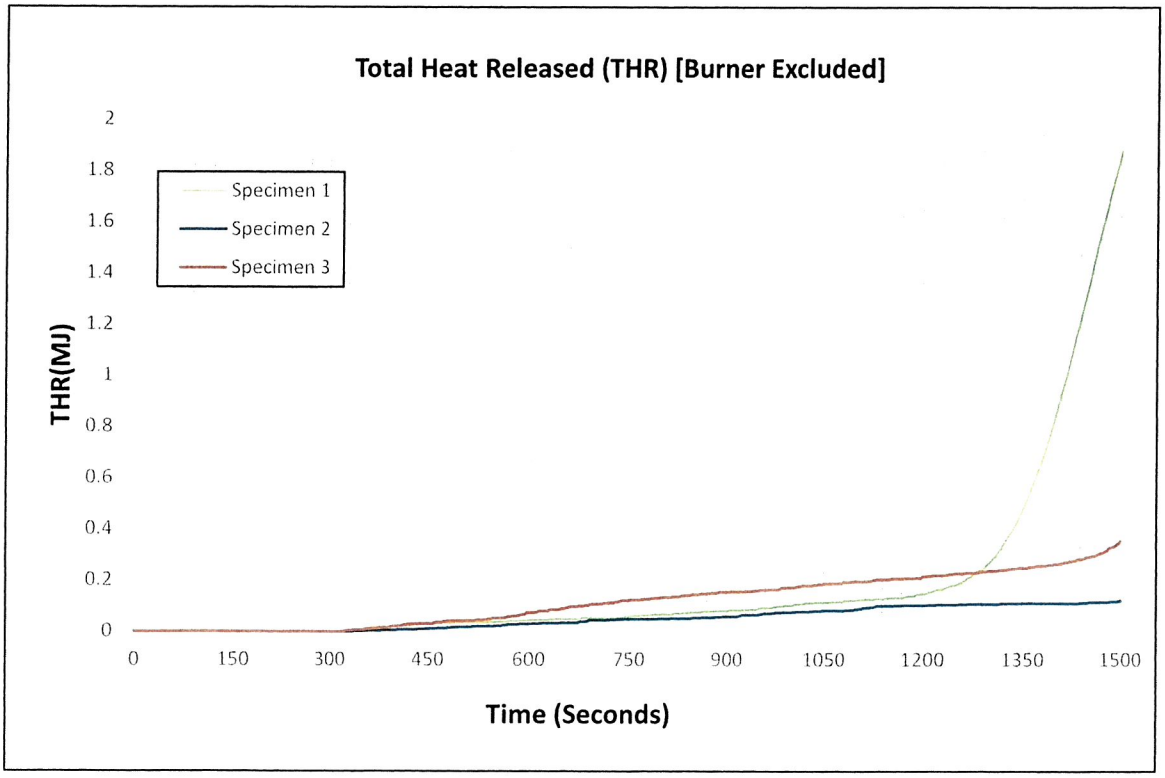
Suketa Tyagi
Manager – Reaction to Fire

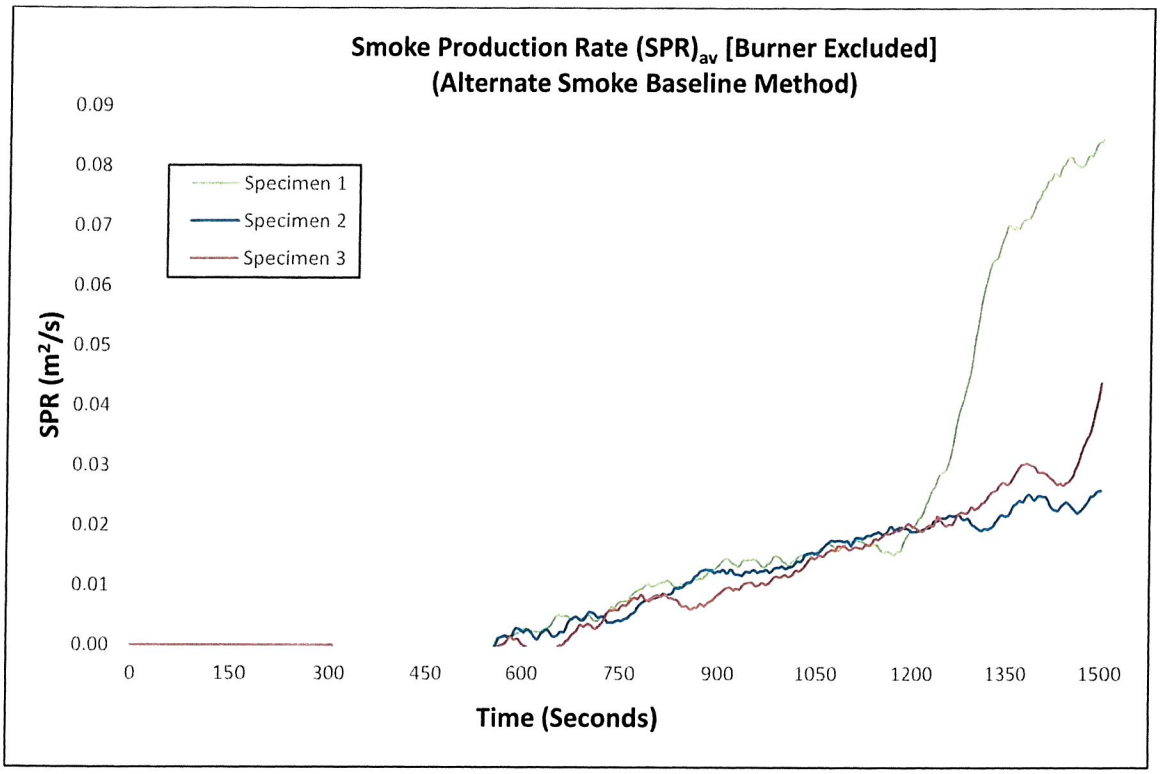
P.O.Box: 26385
DUBAI - U.A.E.
Thomas Bell-Wright Int'l Consultants (Dubai Br.)

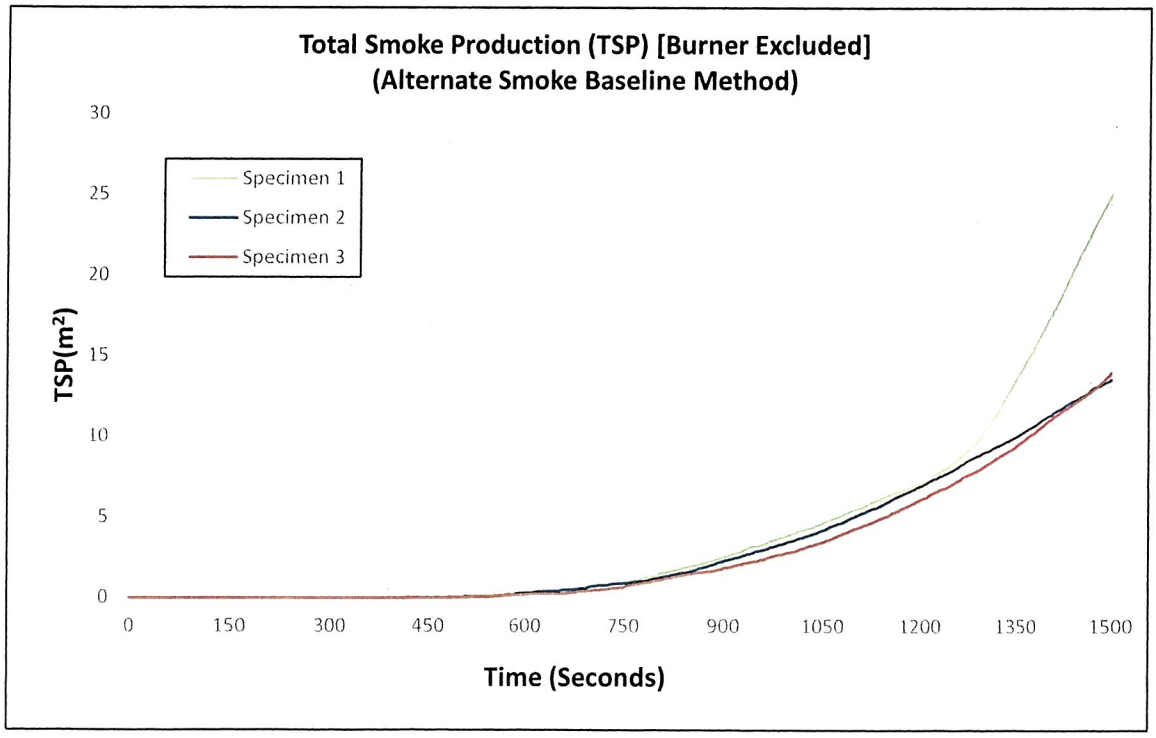
Report Revision Tracking		
Revision No.	**Date Issued**	**Notes & Amendments**
Rev. 00	31-Aug-22	This is the first issue of the report. No revisions are included.

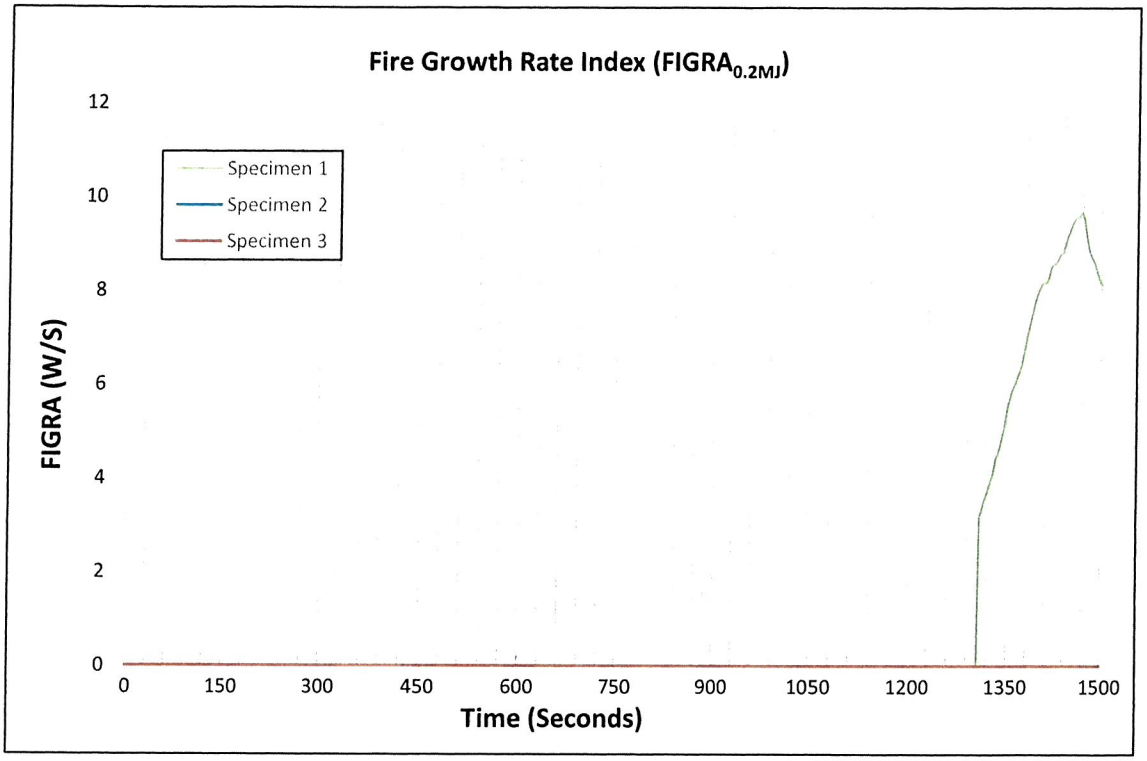
12. APPENDIX 1 - GRAPHS

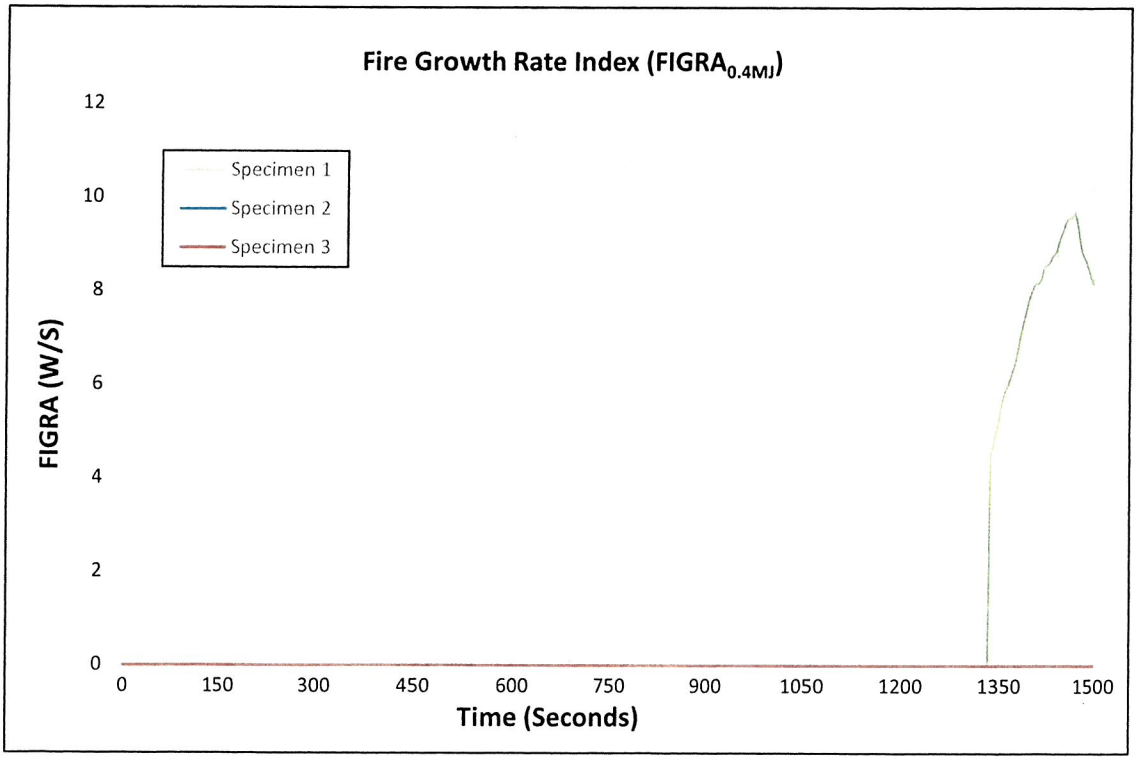


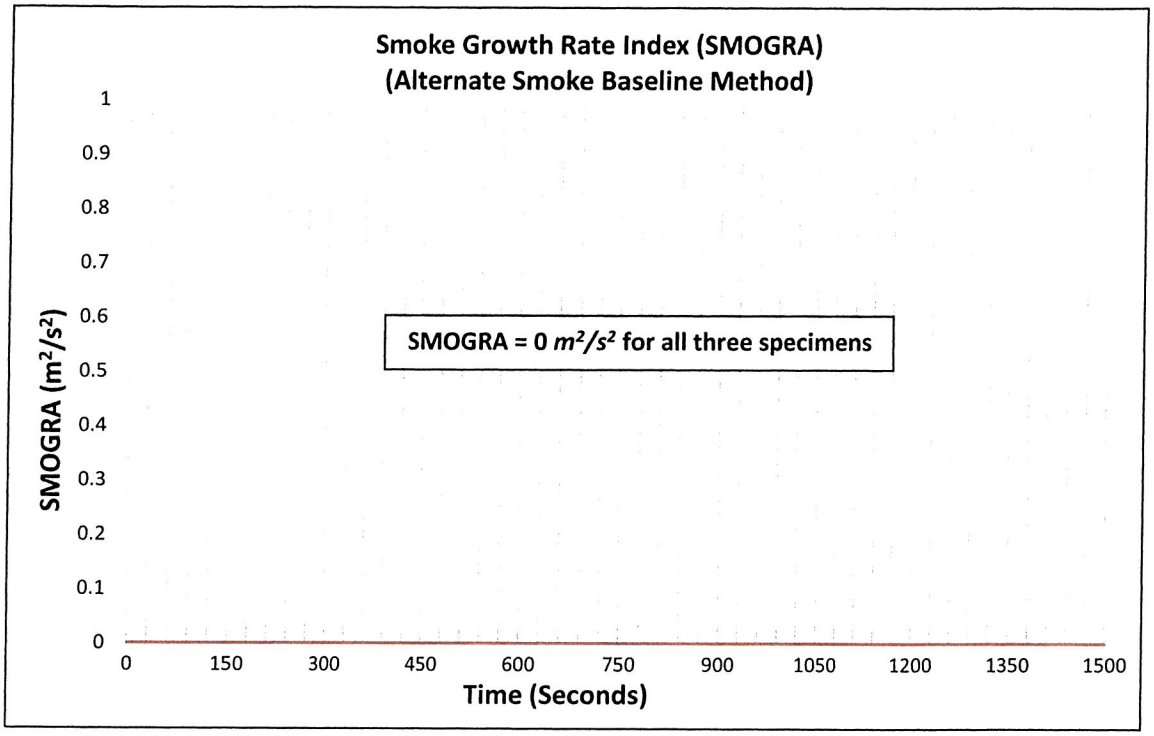



Smoke Production Rate (SPR)av [Burner Excluded]
(Alternate Smoke Baseline Method)
SPR (m²/s)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Specimen 1
Specimen 2
Specimen 3
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (Seconds)


Total Smoke Production (TSP) [Burner Excluded]
(Alternate Smoke Baseline Method)
TSP(m²)
30
25
20
15
10
5
0
Specimen 1
Specimen 2
Specimen 3
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (Seconds)


Fire Growth Rate Index (FIGRA0.2MJ)
Specimen 1
Specimen 2
Specimen 3
FIGRA (W/S)
0
2
4
6
8
10
12
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (Seconds)


Fire Growth Rate Index (FIGRA0.4MJ)
Specimen 1
Specimen 2
Specimen 3
FIGRA (W/S)
0
2
4
6
8
10
12
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (Seconds)


Smoke Growth Rate Index (SMOGRA)
(Alternate Smoke Baseline Method)
SMOGRA (m²/s²)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SMOGRA = 0 m²/s² for all three specimens
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (Seconds)

13. APPENDIX 2 - PHOTOGRAPHS

Sample 1

Sample 2

Sample 3

Specimen before the test

Sample 1

Sample 2

Sample 3

Specimen after the test

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