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MITREX INC
TEST REPORT

SCOPE OF WORK
ULC-S135:2004-(REAFFIRMED 2016), *STANDARD TEST METHOD FOR THE DETERMINATION OF COMBUSTIBILITY PARAMETERS OF BUILDING MATERIALS USING AN OXYGEN CONSUMPTION CALORIMETER (CONE CALORIMETER)* ON *MITREX BIPV PANEL*

REPORT NUMBER
105613557MID-001AR1

TEST DATE(S)
11/02/23

ISSUE DATE **[REVISED DATE]**
11/07/23 11/16/23

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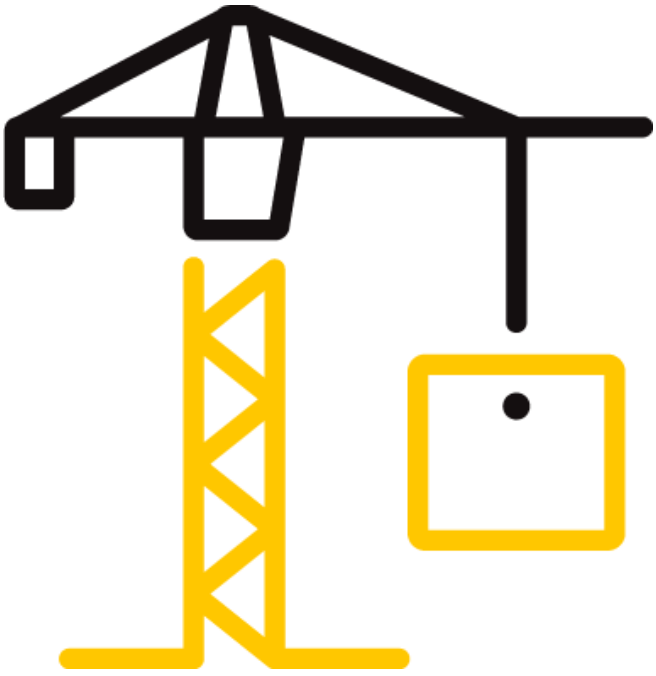

8431 Murphy Drive
Middleton, WI 53562
Telephone: 608-836-4400
Facsimile: 608-831-9279
www.intertek.com/building

TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

REPORT ISSUED TO

MITREX INC.
41 Racone Road
Etobicoke, ON M9W2Z4
Canada

SECTION 1

SCOPE

Intertek Testing Services NA, Inc. dba Intertek Building & Construction (B&C) was contracted by Mitrex Inc. to perform testing in accordance with ULC S135, *Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), and the National Building Code of Canada 2015 section 3.1.5.1,* on Mitrex BIPV Panel. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek Middleton, WI facility.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called “Shared Risk approach,” of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens (where required by Certification or Accreditation bodies), or other pertinent project documentation, will be retained for the entire test record retention period.

For INTERTEK B&C:

COMPLETED BY:	Bryan Bowman	**REVIEWED BY:**	Mark Crawford
TITLE:	Associate Engineer	**TITLE:**	Engineering Team Lead
SIGNATURE:		**SIGNATURE:**	
DATE:	11/16/23	**DATE:**	11/16/23

8431 Murphy Drive
Middleton, WI 53562
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SECTION 2
TEST METHOD(S)

The specimens were evaluated in accordance with the following:
ULC-S135:2004-(REAFFIRMED 2016), *Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)*

National Building Code of Canada 2015:

3.1.5.1. Noncombustible Materials
(See Note A-3.1.4.1.(1).)

1) Except as permitted by Sentences (2) to (4) and Articles 3.1.5.2. to 3.1.5.24., 3.1.13.4. and 3.2.2.16., a *building* or part of a *building* required to be of *noncombustible construction* shall be constructed with *noncombustible* materials. (See also Subsection 3.1.13. for the requirements regarding the *flame-spread rating* of interior finishes.)

2) Notwithstanding the definition of *noncombustible* materials stated in Article 1.4.1.2. of Division A, a material is permitted to be used in *noncombustible construction* provided that, when tested in accordance with ULC-S135, "Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)," at a heat flux of 50 kW/m^2,
a) its average total heat release is not more than 3 MJ/m^2,
b) its average total smoke extinction area is not more than 1.0 m^2, and
c) the test duration is extended beyond the time stipulated in the referenced standard until it is clear that there is no further release of heat or smoke.

3) If a material referred to in Sentence (2) consists of a number of discrete layers and testing reveals that the surface layer or layers protect the underlying layers such that complete combustion of the underlying layers does not occur, the test shall be repeated by removing the outer layers sequentially until all layers have been exposed during testing, or until complete combustion has occurred.

4) The acceptance criteria for a material tested in accordance with Sentence (3) shall be based on the cumulative emissions from all layers, which must not exceed the criteria stated in Clauses (2)(a) and (b).

SECTION 3
MATERIAL SOURCE
The specimens were received directly from the client. The Samples were received at the Evaluation Center on October 17, 2023 in good condition. Sample ID number is MID2310171546-001.

EQUIPMENT

EQUIPMENT			
DESCRIPTION - ASSET #:	Cone Calorimeter - 1199	VBU:	11/2/23
DESCRIPTION - ASSET #:	Scale - 1482	CALIBRATION DUE:	4/5/2024
DESCRIPTION - ASSET #:	Balance - 1396	CALIBRATION DUE:	4/5/2024
DESCRIPTION - ASSET #:	Caliper - 1543	CALIBRATION DUE:	1/13/2024
DESCRIPTION - ASSET #:	Room Temp/Humidity -1461	CALIBRATION DUE:	1/23/2024
DESCRIPTION - ASSET #:	Conditioning Chamber - 1462	CALIBRATION DUE:	1/30/2024
DESCRIPTION - ASSET #:	Flux Meter - 1553	CALIBRATION DUE:	10/10/2024

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SECTION 4

TEST PROCEDURE

The cone calorimeter test was run as written in ULC S135 section 8 – Procedure. Each layer of the product will be tested to confirm that complete combustion can occur. The testing will be extended beyond 900 seconds if signs of combustion are observed. Six specimens will be run if the total heat release for the first three specimens is not within 10% of the average.

SECTION 5

TEST SPECIMEN DESCRIPTION

Three samples were tested. First sample is the full panel consisting of Glass, Photovoltaic Cell, Solar interlayer/adhesive, and Aluminum Honeycomb. Second sample is Panel without the Top Glass and consists of Photovoltaic Cell, Solar interlayer/adhesive, and Aluminum Honeycomb. Third sample is of panel with laminating film only and consists of Solar interlayer/adhesive, and Aluminum Honeycomb. All of the specimens are about 100 x 100 mm. All of the specimens were conditioned to moisture equilibrium (constant mass) at an ambient temperature of 23 ± 3°C and a relative humidity of 50 ± 5%. Photos will be provided in section 8 of the samples.

SECTION 6

TEST CALCULATIONS

The cone calorimeter calculations were performed as written in ULC S135 section 10 – Calculations.

The glass did not contribute to the emission of heat or smoke. Yet, when cracking of the glass occurred the layer below released heat and smoke. The system without the glass and with the PV Cell and interlayer/adhesive provided the ability for complete smoke and total heat production. The system with laminating film only and without the PV Cell had smoke but no ignition but is redundant testing of the Solar interlayer/adhesive layer that was tested with the PV Cell. Therefore, the Total Heat Release Rate and smoke production for the system will be determined from the System without the glass but with the PV Cell and Solar interlayer/adhesive on aluminium Honeycomb to determine if it passed the National Building Code of Canada section 3.1.5.1 subsection 2.

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SECTION 7

TEST RESULTS

Full Panel

Specimen information

E	13.1 MJ/kg	Specimen number	1	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	160.25 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	09:54
Date of report	02/11/2023

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.501 kPa
Relative humidity	27%

Test conditions

Baseline ambient oxygen	20.808%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0599%
Mass at sustained flaming	160.0 g
Time to 70% mass loss	442 s

Test times

Time to ignition	442 s
Time to flameout	586 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.15 MJ/m²
THR (0-600)	2.32 MJ/m²
THR (0-1200)	-
Fuel load	0.11 MJ/kg

Test results (between 442 and 900 s)

Total heat release	2.0 MJ/m²
Total oxygen consumed	1.3 g
Mass lost	27.2 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	10.87 g/(s·m²)
Total smoke release	15.8 m²/m²
Total smoke production	0.1 m²
MARHE	4.1 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	3.19	35.27	455
Effective heat of comb. (MJ/kg)	53.75	58.41	463
Mass loss rate (g/(s·m²))	0.07	47.52	786
Specific extinction area (m²/kg)	432.39	628.77	479
Carbon monoxide yield (kg/kg)	0.1723	0.2508	479
Carbon dioxide yield (kg/kg)	4.30	10.05	479

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 930 s	0 s - 930 s
Heat release rate (kW/m²)	24.02	16.28	10.85	7.63	5.72	4.46	1.18	1.18
Effective heat of comb. (MJ/kg)	50.37	38.38	32.17	23.79	36.33	26.51	15.56	15.56
Mass loss rate (g/(s·m²))	0.62	0.46	0.38	0.37	0.16	0.19	0.09	0.09
Specific extinction area (m²/kg)	273.40	195.90	173.47	137.16	229.57	184.47	164.05	164.05
Carbon monoxide yield (kg/kg)	0.0824	0.0778	0.0754	0.0612	0.0994	0.0781	0.0607	0.0607
Carbon dioxide yield (kg/kg)	3.24	2.64	2.28	1.73	2.71	2.05	1.30	1.30

Smoke results

Total smoke release: non-flaming phase (0 s - 442 s)	7.1 m²/m²
Total smoke release: flaming phase (442 s - 900 s)	15.8 m²/m²
Total smoke release: whole test (0 s - 900 s)	22.9 m²/m²

The test results relate to the behaviour of the test specimens 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 of the product in use.

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Full Panel

Specimen information

E	13.1 MJ/kg	Specimen number	2	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	160.34 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	11:24
Date of report	02/11/2023

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.516 kPa
Relative humidity	27%

Test conditions

Baseline ambient oxygen	20.807%
Baseline oxygen	20.949%
Baseline carbon dioxide	0.0581%
Mass at sustained flaming	159.1 g
Time to 70% mass loss	456 s

Test times

Time to ignition	456 s
Time to flameout	601 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.16 MJ/m²
THR (0-600)	1.44 MJ/m²
THR (0-1200)	-
Fuel load	0.07 MJ/kg

Test results (between 456 and 900 s)

Total heat release	1.3 MJ/m²
Total oxygen consumed	0.9 g
Mass lost	11.7 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.14 g/(s·m²)
Total smoke release	7.6 m²/m²
Total smoke production	0.1 m²
MARHE	2.4 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	1.72	18.29	465
Effective heat of comb. (MJ/kg)	65.61	51.39	549
Mass loss rate (g/(s·m²))	0.02	24.09	551
Specific extinction area (m²/kg)	242.08	823.76	886
Carbon monoxide yield (kg/kg)	0.4792	0.1921	549
Carbon dioxide yield (kg/kg)	7.67	4.18	549

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 912 s	0 s - 912 s
Heat release rate (kW/m²)	12.44	9.80	6.90	4.74	3.46	2.59	0.51	0.51
Effective heat of comb. (MJ/kg)	-414.65	60.96	125.59	38.31	26.01	31.49	2.08	2.08
Mass loss rate (g/(s·m²))	-0.13	0.11	0.04	0.09	0.10	0.07	0.26	0.26
Specific extinction area (m²/kg)	-468.14	77.72	229.39	78.49	51.08	77.03	7.04	7.04
Carbon monoxide yield (kg/kg)	-1.0783	0.1902	0.4695	0.1752	0.1360	0.1882	0.0268	0.0268
Carbon dioxide yield (kg/kg)	-29.15	4.72	10.47	3.35	2.39	3.16	0.44	0.44

Smoke results

Total smoke release: non-flaming phase (0 s - 456 s)	6.5 m²/m²
Total smoke release: flaming phase (456 s - 900 s)	7.6 m²/m²
Total smoke release: whole test (0 s - 900 s)	14.1 m²/m²

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Full Panel

Specimen information

E	13.1 MJ/kg	Specimen number	3	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	160.13 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	11:47
Date of report	02/11/2023

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.473 kPa
Relative humidity	27%

Test conditions

Baseline ambient oxygen	20.807%
Baseline oxygen	20.949%
Baseline carbon dioxide	0.0566%
Mass at sustained flaming	159.3 g
Time to 70% mass loss	443 s

Test times

Time to ignition	443 s
Time to flameout	556 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.41 MJ/m²
THR (0-600)	2.58 MJ/m²
THR (0-1200)	-
Fuel load	0.12 MJ/kg

Test results (between 443 and 900 s)

Total heat release	2.2 MJ/m²
Total oxygen consumed	1.5 g
Mass lost	33.4 g/m²
Av. specific MLR ($\dot{m}''_{A,10\text{-}90}$)	13.37 g/(s·m²)
Total smoke release	3.2 m²/m²
Total smoke production	0.0 m²
MARHE	4.6 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	4.86	34.38	455
Effective heat of comb. (MJ/kg)	66.42	77.64	487
Mass loss rate (g/(s·m²))	0.07	32.59	871
Specific extinction area (m²/kg)	-178.87	4022.27	878
Carbon monoxide yield (kg/kg)	0.1545	3.6986	474
Carbon dioxide yield (kg/kg)	4.52	159.46	474

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 923 s	0 s - 923 s
Heat release rate (kW/m²)	26.28	16.92	11.65	8.93	7.25	6.15	2.62	2.62
Effective heat of comb. (MJ/kg)	18.03	29.62	35.57	27.73	27.33	39.01	19.51	19.51
Mass loss rate (g/(s·m²))	1.34	0.55	0.34	0.32	0.26	0.16	0.14	0.14
Specific extinction area (m²/kg)	1.43	-3.74	-17.20	-33.74	-45.34	-84.37	-105.34	-105.34
Carbon monoxide yield (kg/kg)	0.0279	0.0627	0.0827	0.0665	0.0655	0.0931	0.0462	0.0462
Carbon dioxide yield (kg/kg)	1.13	2.06	2.46	1.91	1.87	2.63	1.40	1.40

Smoke results

Total smoke release: non-flaming phase (0 s - 443 s)	3.1 m²/m²
Total smoke release: flaming phase (443 s - 900 s)	3.2 m²/m²
Total smoke release: whole test (0 s - 900 s)	6.3 m²/m²

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Full Panel

Specimen information

E	13.1 MJ/kg	Specimen number	4	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	160.55 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	12:11
Date of report	02/11/2023

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.441 kPa
Relative humidity	27%

Test conditions

Baseline ambient oxygen	20.807%
Baseline oxygen	20.949%
Baseline carbon dioxide	0.0569%
Mass at sustained flaming	158.2 g
Time to 70% mass loss	544 s

Test times

Time to ignition	544 s
Time to flameout	578 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.47 MJ/m²
THR (0-600)	1.12 MJ/m²
THR (0-1200)	-
Fuel load	0.04 MJ/kg

Test results (between 544 and 900 s)

Total heat release	0.7 MJ/m²
Total oxygen consumed	0.5 g
Mass lost	39.8 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.68 g/(s·m²)
Total smoke release	19.2 m²/m²
Total smoke production	0.2 m²
MARHE	5.2 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	1.89	11.05	565
Effective heat of comb. (MJ/kg)	16.89	17.10	897
Mass loss rate (g/(s·m²))	0.09	35.58	554
Specific extinction area (m²/kg)	471.99	506.82	631
Carbon monoxide yield (kg/kg)	0.1184	0.1333	631
Carbon dioxide yield (kg/kg)	0.59	0.68	565

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 935 s	0 s - 935 s
Heat release rate (kW/m²)	5.53	3.66	2.72	2.29	2.05	-	1.58	1.58
Effective heat of comb. (MJ/kg)	1785.92	-80.14	19.62	23.47	52.35	-	5.23	5.23
Mass loss rate (g/(s·m²))	-0.01	-0.09	0.15	0.10	0.04	-	0.31	0.31
Specific extinction area (m²/kg)	31176.93	-2057.56	570.71	672.76	1505.45	-	180.27	180.27
Carbon monoxide yield (kg/kg)	8.7732	-0.5496	0.1578	0.1873	0.3983	-	0.0315	0.0315
Carbon dioxide yield (kg/kg)	112.42	-4.50	0.95	0.97	1.97	-	0.17	0.17

Smoke results

Total smoke release: non-flaming phase (0 s - 544 s)	33.8 m²/m²
Total smoke release: flaming phase (544 s - 900 s)	19.2 m²/m²
Total smoke release: whole test (0 s - 900 s)	53.0 m²/m²

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Specimen information

E	13.1 MJ/kg	Specimen number	5	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	159.84 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	12:32
Date of report	02/11/2023

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.424 kPa
Relative humidity	27%

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Test conditions

Baseline ambient oxygen	20.806%
Baseline oxygen	20.948%
Baseline carbon dioxide	0.0567%
Mass at sustained flaming	no ignition
Time to 70% mass loss	121 s

Heat Release Results

THR (0-300)	0.07 MJ/m²
THR (0-600)	0.36 MJ/m²
THR (0-1200)	-
Fuel load	0.02 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.4 MJ/m²
Total oxygen consumed	0.4 g
Mass lost	140.1 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.42 g/(s·m²)
Total smoke release	36.9 m²/m²
Total smoke production	0.3 m²
MARHE	7.1 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	0.18	7.24	0
Effective heat of comb. (MJ/kg)	1.16	52.14	620
Mass loss rate (g/(s·m²))	0.16	31.88	62
Specific extinction area (m²/kg)	170.01	1883.83	466
Carbon monoxide yield (kg/kg)	0.0481	0.4166	620
Carbon dioxide yield (kg/kg)	0.25	4.12	620

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 923 s	0 s - 923 s
Heat release rate (kW/m²)	0.73	0.13	-0.12	-0.26	-0.38	-0.36	0.16	0.16
Effective heat of comb. (MJ/kg)	1.41	0.18	-0.34	-1.55	-0.91	-2.08	1.05	1.05
Mass loss rate (g/(s·m²))	0.35	0.74	0.33	0.17	0.39	0.17	0.16	0.16
Specific extinction area (m²/kg)	-32.68	-23.25	-52.68	-103.34	-43.25	-88.44	162.51	162.51
Carbon monoxide yield (kg/kg)	0.0030	0.0016	0.0009	0.0026	0.0006	0.0002	0.0471	0.0471
Carbon dioxide yield (kg/kg)	0.26	0.13	0.18	0.27	0.09	0.19	0.25	0.25

Smoke results

Total smoke release: whole test (0 s - 900 s) 36.9 m²/m²

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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Full Panel

Specimen information

E	13.1 MJ/kg	Specimen number	6	Conditioned?	Yes
Thickness	22.5 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	159.2 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	02/11/2023
Time of test	12:55
Date of report	02/11/2023

Apparatus specifications

C-factor	0.04483
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	99.384 kPa
Relative humidity	27%

Test conditions

Baseline ambient oxygen	20.808%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0575%
Mass at sustained flaming	158.8 g
Time to 70% mass loss	448 s

Test times

Time to ignition	448 s
Time to flameout	612 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.12 MJ/m²
THR (0-600)	1.89 MJ/m²
THR (0-1200)	-
Fuel load	0.10 MJ/kg

Test results (between 448 and 900 s)

Total heat release	1.9 MJ/m²
Total oxygen consumed	1.2 g
Mass lost	21.7 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.28 g/(s·m²)
Total smoke release	3.8 m²/m²
Total smoke production	0.0 m²
MARHE	3.1 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	4.08	23.53	458
Effective heat of comb. (MJ/kg)	85.10	65.53	531
Mass loss rate (g/(s·m²))	0.03	35.41	554
Specific extinction area (m²/kg)	-146.88	1452.63	646
Carbon monoxide yield (kg/kg)	0.3570	2.2522	858
Carbon dioxide yield (kg/kg)	5.28	25.72	858

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 962 s	0 s - 962 s
Heat release rate (kW/m²)	15.46	12.51	9.49	7.32	5.90	4.98	2.09	2.09
Effective heat of comb. (MJ/kg)	49.52	-54.29	48.12	12813.46	81.56	27.36	20.87	20.87
Mass loss rate (g/(s·m²))	0.22	-0.20	0.18	-0.01	0.04	0.17	0.11	0.11
Specific extinction area (m²/kg)	-0.85	18.83	-14.21	-7681.90	-65.48	-32.35	-41.35	-41.35
Carbon monoxide yield (kg/kg)	0.1379	-0.1739	0.1755	49.2770	0.3251	0.1115	0.0860	0.0860
Carbon dioxide yield (kg/kg)	3.10	-3.56	3.22	841.79	5.28	1.73	1.15	1.15

Smoke results

Total smoke release: non-flaming phase (0 s - 448 s)	6.6 m²/m²
Total smoke release: flaming phase (448 s - 900 s)	3.8 m²/m²
Total smoke release: whole test (0 s - 900 s)	10.4 m²/m²

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Middleton, WI 53562
Telephone: 608-836-4400
Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	1	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	81.62 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	08:16
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.895 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.797%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0561%
Mass at sustained flaming	81.4 g
Time to 70% mass loss	260 s

Test times

Time to ignition	254 s
Time to flameout	298 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	2.16 MJ/m²
THR (0-600)	2.19 MJ/m²
THR (0-1200)	-
Fuel load	0.21 MJ/kg

Test results (between 254 and 900 s)

Total heat release	1.9 MJ/m²
Total oxygen consumed	1.2 g
Mass lost	56.0 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	11.20 g/(s·m²)
Total smoke release	19.4 m²/m²
Total smoke production	0.2 m²
MARHE	7.3 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	1.27	87.17	265
Effective heat of comb. (MJ/kg)	14.65	23.37	277
Mass loss rate (g/(s·m²))	0.09	97.48	260
Specific extinction area (m²/kg)	229.48	4776.61	269
Carbon monoxide yield (kg/kg)	0.0264	4.8016	268
Carbon dioxide yield (kg/kg)	1.77	215.43	268

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 955 s	0 s - 955 s
Heat release rate (kW/m²)	31.42	15.19	9.45	6.73	5.11	3.93	0.90	0.90
Effective heat of comb. (MJ/kg)	34.50	32.56	25.02	28.03	27.30	24.43	10.69	10.69
Mass loss rate (g/(s·m²))	0.89	0.49	0.41	0.28	0.19	0.19	0.07	0.07
Specific extinction area (m²/kg)	241.93	260.32	219.54	262.70	264.75	261.25	302.40	302.40
Carbon monoxide yield (kg/kg)	0.0669	0.0827	0.0714	0.0804	0.0750	0.0683	0.0363	0.0363
Carbon dioxide yield (kg/kg)	2.25	2.27	1.84	2.13	2.17	2.03	1.55	1.55

Smoke results

Total smoke release: non-flaming phase (0 s - 254 s)	13.1 m²/m²
Total smoke release: flaming phase (254 s - 900 s)	19.4 m²/m²
Total smoke release: whole test (0 s - 900 s)	32.5 m²/m²

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Middleton, WI 53562
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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	2	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	80.87 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	08:45
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.918 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.797%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0563%
Mass at sustained flaming	80.3 g
Time to 70% mass loss	265 s

Test times

Time to ignition	265 s
Time to flameout	319 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	1.96 MJ/m²
THR (0-600)	2.40 MJ/m²
THR (0-1200)	-
Fuel load	0.24 MJ/kg

Test results (between 265 and 900 s)

Total heat release	2.2 MJ/m²
Total oxygen consumed	1.4 g
Mass lost	63.8 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	1.31 g/(s·m²)
Total smoke release	20.8 m²/m²
Total smoke production	0.2 m²
MARHE	7.2 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	2.93	73.11	279
Effective heat of comb. (MJ/kg)	29.17	74.45	276
Mass loss rate (g/(s·m²))	0.10	28.97	804
Specific extinction area (m²/kg)	106.09	1285.53	283
Carbon monoxide yield (kg/kg)	0.0758	171.1735	281
Carbon dioxide yield (kg/kg)	1.47	6495.30	281

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 963 s	0 s - 963 s
Heat release rate (kW/m²)	35.35	17.77	11.52	8.52	6.88	5.70	2.05	2.05
Effective heat of comb. (MJ/kg)	46.45	32.54	31.81	35.62	30.72	32.19	18.75	18.75
Mass loss rate (g/(s·m²))	0.84	0.55	0.37	0.27	0.24	0.17	0.11	0.11
Specific extinction area (m²/kg)	386.92	287.67	262.27	248.42	191.08	186.16	60.37	60.37
Carbon monoxide yield (kg/kg)	0.0877	0.0814	0.0856	0.0949	0.0800	0.0825	0.0639	0.0639
Carbon dioxide yield (kg/kg)	2.77	1.98	1.94	2.13	1.78	1.83	0.83	0.83

Smoke results

Total smoke release: non-flaming phase (0 s - 265 s)	5.4 m²/m²
Total smoke release: flaming phase (265 s - 900 s)	20.8 m²/m²
Total smoke release: whole test (0 s - 900 s)	26.1 m²/m²

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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Cladding Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	3	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	81.03 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	09:05
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.942 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.797%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0536%
Mass at sustained flaming	80.6 g
Time to 70% mass loss	301 s

Test times

Time to ignition	301 s
Time to flameout	359 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.38 MJ/m²
THR (0-600)	2.58 MJ/m²
THR (0-1200)	-
Fuel load	0.30 MJ/kg

Test results (between 301 and 900 s)

Total heat release	2.7 MJ/m²
Total oxygen consumed	1.8 g
Mass lost	56.6 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	45.32 g/(s·m²)
Total smoke release	5.7 m²/m²
Total smoke production	0.1 m²
MARHE	5.8 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	4.57	61.87	314
Effective heat of comb. (MJ/kg)	48.31	76.48	314
Mass loss rate (g/(s·m²))	0.10	41.75	309
Specific extinction area (m²/kg)	-124.05	1734.26	303
Carbon monoxide yield (kg/kg)	0.1876	12.4376	798
Carbon dioxide yield (kg/kg)	3.13	274.31	798

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 1018 s	0 s - 1018 s
Heat release rate (kW/m²)	28.58	15.67	10.98	8.85	7.30	6.30	3.28	3.28
Effective heat of comb. (MJ/kg)	36.62	40.07	42.24	38.78	38.68	54.51	41.17	41.17
Mass loss rate (g/(s·m²))	0.78	0.42	0.25	0.23	0.19	0.11	0.07	0.07
Specific extinction area (m²/kg)	52.63	92.39	67.17	29.89	26.76	14.10	-33.39	-33.39
Carbon monoxide yield (kg/kg)	0.0822	0.1299	0.1536	0.1474	0.1551	0.2208	0.2003	0.2003
Carbon dioxide yield (kg/kg)	2.36	2.65	2.81	2.60	2.59	3.65	2.66	2.66

Smoke results

Total smoke release: non-flaming phase (0 s - 301 s)	8.2 m²/m²
Total smoke release: flaming phase (301 s - 900 s)	5.7 m²/m²
Total smoke release: whole test (0 s - 900 s)	13.9 m²/m²

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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	4	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	81.87 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	09:47
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.963 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.799%
Baseline oxygen	20.952%
Baseline carbon dioxide	0.0554%
Mass at sustained flaming	81.2 g
Time to 70% mass loss	280 s

Test times

Time to ignition	280 s
Time to flameout	344 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.77 MJ/m²
THR (0-600)	1.81 MJ/m²
THR (0-1200)	-
Fuel load	0.18 MJ/kg

Test results (between 280 and 900 s)

Total heat release	1.7 MJ/m²
Total oxygen consumed	1.1 g
Mass lost	57.4 g/m²
Av. specific MLR ($\dot{m}_{4,10\text{-}90}$)	1.58 g/(s·m²)
Total smoke release	5.6 m²/m²
Total smoke production	0.0 m²
MARHE	6.9 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	1.41	41.00	301
Effective heat of comb. (MJ/kg)	15.28	40.55	330
Mass loss rate (g/(s·m²))	0.10	25.12	312
Specific extinction area (m²/kg)	-259.82	3350.36	280
Carbon monoxide yield (kg/kg)	0.0682	0.3121	380
Carbon dioxide yield (kg/kg)	1.67	9.81	822

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 954 s	0 s - 954 s
Heat release rate (kW/m²)	26.61	13.65	8.88	6.10	4.28	3.40	0.80	0.80
Effective heat of comb. (MJ/kg)	23.30	33.43	26.35	26.73	27.98	26.63	5.57	5.57
Mass loss rate (g/(s·m²))	1.11	0.40	0.30	0.23	0.17	0.15	0.14	0.14
Specific extinction area (m²/kg)	42.52	94.88	48.65	26.85	-15.85	-62.89	-104.28	-104.28
Carbon monoxide yield (kg/kg)	0.0463	0.0951	0.0864	0.0983	0.1113	0.1125	0.0438	0.0438
Carbon dioxide yield (kg/kg)	1.47	2.26	1.82	1.99	2.30	2.30	0.61	0.61

Smoke results

Total smoke release: non-flaming phase (0 s - 280 s)	8.1 m²/m²
Total smoke release: flaming phase (280 s - 900 s)	5.6 m²/m²
Total smoke release: whole test (0 s - 900 s)	13.7 m²/m²

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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	5	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	82.25 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	10:09
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.846 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.798%
Baseline oxygen	20.951%
Baseline carbon dioxide	0.0552%
Mass at sustained flaming	80.8 g
Time to 70% mass loss	298 s

Test times

Time to ignition	298 s
Time to flameout	356 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.12 MJ/m²
THR (0-600)	2.06 MJ/m²
THR (0-1200)	-
Fuel load	0.23 MJ/kg

Test results (between 298 and 900 s)

Total heat release	2.1 MJ/m²
Total oxygen consumed	1.4 g
Mass lost	75.9 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	1.27 g/(s·m²)
Total smoke release	12.4 m²/m²
Total smoke production	0.1 m²
MARHE	5.6 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	3.12	62.97	312
Effective heat of comb. (MJ/kg)	24.72	48.05	324
Mass loss rate (g/(s·m²))	0.11	28.97	469
Specific extinction area (m²/kg)	113.18	3641.31	797
Carbon monoxide yield (kg/kg)	0.0917	1.4035	642
Carbon dioxide yield (kg/kg)	1.69	21.03	349

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 912 s	0 s - 912 s
Heat release rate (kW/m²)	31.89	16.42	10.67	7.86	6.11	4.94	2.01	2.01
Effective heat of comb. (MJ/kg)	49.35	25.21	32.75	26.73	27.53	22.26	6.89	6.89
Mass loss rate (g/(s·m²))	0.71	0.61	0.34	0.30	0.21	0.21	0.27	0.27
Specific extinction area (m²/kg)	95.62	89.84	124.24	104.70	101.29	91.32	87.61	87.61
Carbon monoxide yield (kg/kg)	0.0915	0.0702	0.1059	0.0923	0.1005	0.0880	0.0418	0.0418
Carbon dioxide yield (kg/kg)	3.06	1.68	2.23	1.87	1.99	1.64	0.47	0.47

Smoke results

Total smoke release: non-flaming phase (0 s - 298 s)	15.1 m²/m²
Total smoke release: flaming phase (298 s - 900 s)	12.4 m²/m²
Total smoke release: whole test (0 s - 900 s)	27.5 m²/m²

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Middleton, WI 53562
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Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Panel without the top glass

Specimen information

E	13.1 MJ/kg	Specimen number	6	Conditioned?	Yes
Thickness	19.4 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	84.33 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	03/11/2023
Time of test	11:56
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04476
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	21°C
Ambient pressure	98.935 kPa
Relative humidity	29%

Test conditions

Baseline ambient oxygen	20.798%
Baseline oxygen	20.951%
Baseline carbon dioxide	0.0536%
Mass at sustained flaming	82.6 g
Time to 70% mass loss	295 s

Test times

Time to ignition	295 s
Time to flameout	369 s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.22 MJ/m²
THR (0-600)	2.05 MJ/m²
THR (0-1200)	-
Fuel load	0.20 MJ/kg

Test results (between 295 and 900 s)

Total heat release	1.9 MJ/m²
Total oxygen consumed	1.2 g
Mass lost	59.1 g/m²
Av. specific MLR ($\dot{m}_{4,10\text{-}90}$)	1.28 g/(s·m²)
Total smoke release	15.2 m²/m²
Total smoke production	0.1 m²
MARHE	7.5 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	2.20	43.62	320
Effective heat of comb. (MJ/kg)	22.49	45.13	322
Mass loss rate (g/(s·m²))	0.10	24.41	774
Specific extinction area (m²/kg)	178.27	302.08	322
Carbon monoxide yield (kg/kg)	0.0930	0.8774	367
Carbon dioxide yield (kg/kg)	2.39	14.97	367

Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 922 s	0 s - 922 s
Heat release rate (kW/m²)	28.02	15.57	10.20	7.55	5.84	4.66	1.44	1.44
Effective heat of comb. (MJ/kg)	30.25	33.62	29.97	20.83	46.17	21.23	4.90	4.90
Mass loss rate (g/(s·m²))	0.98	0.47	0.37	0.36	0.15	0.22	0.30	0.30
Specific extinction area (m²/kg)	155.53	191.42	192.61	136.64	313.77	140.53	48.04	48.04
Carbon monoxide yield (kg/kg)	0.0554	0.0920	0.0971	0.0736	0.1752	0.0824	0.0295	0.0295
Carbon dioxide yield (kg/kg)	1.89	2.34	2.13	1.57	3.69	1.79	0.59	0.59

Smoke results

Total smoke release: non-flaming phase (0 s - 295 s)	5.5 m²/m²
Total smoke release: flaming phase (295 s - 900 s)	15.2 m²/m²
Total smoke release: whole test (0 s - 900 s)	20.7 m²/m²

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Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	1	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	79.6 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	09:02
Date of report	06/11/2023

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.811 kPa
Relative humidity	32%

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Test conditions

Baseline ambient oxygen	20.770%
Baseline oxygen	20.952%
Baseline carbon dioxide	0.0571%
Mass at sustained flaming	no ignition
Time to 70% mass loss	444 s

Heat Release Results

THR (0-300)	0.15 MJ/m²
THR (0-600)	0.46 MJ/m²
THR (0-1200)	-
Fuel load	0.05 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.5 MJ/m²
Total oxygen consumed	0.4 g
Mass lost	71.6 g/m²
Av. specific MLR ($\dot{m}_{4,10\text{-}90}$)	0.13 g/(s·m²)
Total smoke release	76.3 m²/m²
Total smoke production	0.7 m²
MARHE	1.4 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	0.07	4.55	178
Effective heat of comb. (MJ/kg)	0.88	62.59	431
Mass loss rate (g/(s·m²))	0.08	28.09	759
Specific extinction area (m²/kg)	1014.06	4996.28	431
Carbon monoxide yield (kg/kg)	0.1561	2.8992	689
Carbon dioxide yield (kg/kg)	-0.05	3.86	429

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 910 s	0 s - 910 s
Heat release rate (kW/m²)	0.43	-0.20	0.12	0.28	0.09	0.11	0.07	0.07
Effective heat of comb. (MJ/kg)	-0.60	0.71	-0.70	-8.08	129.45	1.64	0.92	0.92
Mass loss rate (g/(s·m²))	-0.80	-0.34	-0.18	-0.04	-0.02	0.07	0.08	0.08
Specific extinction area (m²/kg)	1.62	-18.99	-318.46	-2612.98	121604.17	1171.47	1097.80	1097.80
Carbon monoxide yield (kg/kg)	0.0046	0.0025	-0.0357	-0.2492	11.1415	0.1093	0.1689	0.1689
Carbon dioxide yield (kg/kg)	-0.05	0.08	0.12	0.19	-22.66	-0.24	-0.04	-0.04

Smoke results

Total smoke release: whole test (0 s - 900 s) 76.3 m²/m²

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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	2	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	81.44 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	09:24
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.83 kPa
Relative humidity	32%

Test conditions

Baseline ambient oxygen	20.768%
Baseline oxygen	20.949%
Baseline carbon dioxide	0.0567%
Mass at sustained flaming	no ignition
Time to 70% mass loss	3 s

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.42 MJ/m²
THR (0-600)	1.05 MJ/m²
THR (0-1200)	-
Fuel load	0.14 MJ/kg

Test results (between 0 and 900 s)

Total heat release	1.3 MJ/m²
Total oxygen consumed	0.9 g
Mass lost	190.5 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.44 g/(s·m²)
Total smoke release	66.4 m²/m²
Total smoke production	0.6 m²
MARHE	4.4 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	1.40	5.31	31
Effective heat of comb. (MJ/kg)	6.62	39.00	106
Mass loss rate (g/(s·m²))	0.22	88.16	2
Specific extinction area (m²/kg)	329.41	4135.78	106
Carbon monoxide yield (kg/kg)	0.0872	1.1220	105
Carbon dioxide yield (kg/kg)	0.16	1.76	8

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 912 s	0 s - 912 s
Heat release rate (kW/m²)	1.86	1.69	1.43	1.39	1.40	1.62	1.40	1.40
Effective heat of comb. (MJ/kg)	1.00	1.55	2.18	2.08	2.69	3.71	6.77	6.77
Mass loss rate (g/(s·m²))	1.91	1.16	0.71	0.69	0.55	0.46	0.21	0.21
Specific extinction area (m²/kg)	4.69	64.33	176.69	141.99	167.29	269.38	332.08	332.08
Carbon monoxide yield (kg/kg)	0.0034	0.0120	0.0237	0.0231	0.0309	0.0486	0.0884	0.0884
Carbon dioxide yield (kg/kg)	0.09	0.09	0.09	0.06	0.07	0.08	0.16	0.16

Smoke results

Total smoke release: whole test (0 s - 900 s) 66.4 m²/m²

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Report No.: 105613557MID-001AR1
Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	3	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	80.45 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	09:49
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.851 kPa
Relative humidity	32%

Test conditions

Baseline ambient oxygen	20.767%
Baseline oxygen	20.948%
Baseline carbon dioxide	0.0577%
Mass at sustained flaming	no ignition
Time to 70% mass loss	231 s

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.20 MJ/m²
THR (0-600)	0.33 MJ/m²
THR (0-1200)	-
Fuel load	0.05 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.4 MJ/m²
Total oxygen consumed	0.4 g
Mass lost	79.1 g/m²
Av. specific MLR ($\dot{m}_{4,10\text{-}90}$)	0.20 g/(s·m²)
Total smoke release	78.0 m²/m²
Total smoke production	0.7 m²
MARHE	6.7 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	-0.03	6.90	109
Effective heat of comb. (MJ/kg)	-0.34	12.88	657
Mass loss rate (g/(s·m²))	0.09	34.76	137
Specific extinction area (m²/kg)	954.94	4955.72	196
Carbon monoxide yield (kg/kg)	0.2420	6.5474	607
Carbon dioxide yield (kg/kg)	0.57	26.56	607

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 911 s	0 s - 911 s
Heat release rate (kW/m²)	-0.17	-0.22	-0.28	0.00	0.09	0.08	-0.02	-0.02
Effective heat of comb. (MJ/kg)	0.32	-189.50	-2.44	0.02	0.46	0.64	-0.27	-0.27
Mass loss rate (g/(s·m²))	-0.40	0.05	0.15	0.15	0.19	0.15	0.10	0.10
Specific extinction area (m²/kg)	-57.57	17113.90	505.01	629.77	438.03	631.03	955.79	955.79
Carbon monoxide yield (kg/kg)	-0.0026	2.2886	0.0926	0.0948	0.0767	0.1177	0.2423	0.2423
Carbon dioxide yield (kg/kg)	-0.15	23.56	0.12	0.14	0.22	0.32	0.58	0.58

Smoke results

Total smoke release: whole test (0 s - 900 s) 78.0 m²/m²

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Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	4	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	79.43 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	10:19
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.879 kPa
Relative humidity	32%

Test conditions

Baseline ambient oxygen	20.770%
Baseline oxygen	20.952%
Baseline carbon dioxide	0.0573%
Mass at sustained flaming	no ignition
Time to 70% mass loss	178 s

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.22 MJ/m²
THR (0-600)	0.60 MJ/m²
THR (0-1200)	-
Fuel load	0.08 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.7 MJ/m²
Total oxygen consumed	0.5 g
Mass lost	130.2 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.25 g/(s·m²)
Total smoke release	53.7 m²/m²
Total smoke production	0.5 m²
MARHE	7.9 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	0.62	10.09	3
Effective heat of comb. (MJ/kg)	4.31	47.55	604
Mass loss rate (g/(s·m²))	0.15	27.63	231
Specific extinction area (m²/kg)	373.63	2303.80	436
Carbon monoxide yield (kg/kg)	0.0922	1.0707	604
Carbon dioxide yield (kg/kg)	-0.00	4.72	604

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 923 s	0 s - 923 s
Heat release rate (kW/m²)	0.80	0.17	0.45	0.45	0.51	0.40	0.59	0.59
Effective heat of comb. (MJ/kg)	1.99	0.33	0.97	1.89	1.64	1.39	3.84	3.84
Mass loss rate (g/(s·m²))	0.38	0.55	0.48	0.24	0.31	0.28	0.14	0.14
Specific extinction area (m²/kg)	-30.87	-41.72	21.51	184.80	164.40	161.19	337.25	337.25
Carbon monoxide yield (kg/kg)	0.0036	-0.0010	0.0119	0.0311	0.0289	0.0309	0.0845	0.0845
Carbon dioxide yield (kg/kg)	0.21	0.03	0.03	0.02	-0.00	0.01	-0.02	-0.02

Smoke results

Total smoke release: whole test (0 s - 900 s) 53.7 m²/m²

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Telephone: 608-836-4400
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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	5	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	79.94 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	11:16
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.868 kPa
Relative humidity	32%

Test conditions

Baseline ambient oxygen	20.767%
Baseline oxygen	20.948%
Baseline carbon dioxide	0.0558%
Mass at sustained flaming	no ignition
Time to 70% mass loss	207 s

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.39 MJ/m²
THR (0-600)	0.58 MJ/m²
THR (0-1200)	-
Fuel load	0.06 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.6 MJ/m²
Total oxygen consumed	0.4 g
Mass lost	115.6 g/m²
Av. specific MLR ($\dot{m}_{4,10\text{-}90}$)	0.26 g/(s·m²)
Total smoke release	90.9 m²/m²
Total smoke production	0.8 m²
MARHE	1.5 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	0.21	8.67	205
Effective heat of comb. (MJ/kg)	1.63	54.05	55
Mass loss rate (g/(s·m²))	0.13	37.98	291
Specific extinction area (m²/kg)	775.02	2465.32	159
Carbon monoxide yield (kg/kg)	0.1363	0.5480	497
Carbon dioxide yield (kg/kg)	-0.11	2.95	55

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 936 s	0 s - 936 s
Heat release rate (kW/m²)	0.35	1.11	1.19	1.40	1.22	1.32	0.16	0.16
Effective heat of comb. (MJ/kg)	0.60	9.76	9.24	4.19	4.47	5.11	1.61	1.61
Mass loss rate (g/(s·m²))	0.56	0.15	0.15	0.33	0.27	0.27	0.11	0.11
Specific extinction area (m²/kg)	53.37	549.77	904.01	354.27	416.88	633.60	948.65	948.65
Carbon monoxide yield (kg/kg)	0.0003	0.0851	0.1215	0.0495	0.0619	0.0922	0.1686	0.1686
Carbon dioxide yield (kg/kg)	0.05	0.32	0.37	0.22	0.20	0.16	-0.16	-0.16

Smoke results

Total smoke release: whole test (0 s - 900 s) 90.9 m²/m²

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Middleton, WI 53562
Telephone: 608-836-4400
Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.

Report No.: 105613557MID-001AR1
Date: 11/07/23

Laminating film only

Specimen information

E	13.1 MJ/kg	Specimen number	6	Conditioned?	Yes
Thickness	19.2 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	79.81 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm²	Grid used?	No		
Heat flux	50 kW/m²	Manufacturer			
Separation	25 mm	Sponsor			
Orientation	Horizontal				

Test

Standard used	ULC S135
Date of test	06/11/2023
Time of test	11:38
Date of report	06/11/2023

Apparatus specifications

C-factor	0.04452
Duct diameter	0.114 m
O2 delay time	13 s
CO2 delay time	13 s
CO delay time	13 s
OD corr. factor	1.0000

Pre-test conditions

Ambient temperature	22°C
Ambient pressure	97.888 kPa
Relative humidity	32%

Test conditions

Baseline ambient oxygen	20.769%
Baseline oxygen	20.951%
Baseline carbon dioxide	0.0540%
Mass at sustained flaming	no ignition
Time to 70% mass loss	239 s

Test times

Time to ignition	not recorded
Time to flameout	s
End of test criterion	User entered
End of test time (for calculations)	900 s

Heat Release Results

THR (0-300)	0.24 MJ/m²
THR (0-600)	0.73 MJ/m²
THR (0-1200)	-
Fuel load	0.09 MJ/kg

Test results (between 0 and 900 s)

Total heat release	0.8 MJ/m²
Total oxygen consumed	0.5 g
Mass lost	150.7 g/m²
Av. specific MLR ($\dot{m}_{A,10\text{-}90}$)	0.46 g/(s·m²)
Total smoke release	90.4 m²/m²
Total smoke production	0.8 m²
MARHE	1.3 kW/m²

	Mean	Peak	at time (s)
Heat release rate (kW/m²)	0.81	3.87	438
Effective heat of comb. (MJ/kg)	4.86	23.62	199
Mass loss rate (g/(s·m²))	0.14	49.82	1
Specific extinction area (m²/kg)	592.47	4390.55	199
Carbon monoxide yield (kg/kg)	0.0889	0.4564	199
Carbon dioxide yield (kg/kg)	-0.06	1.03	507

Test averages

between time 0 min and...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 1129 s	0 s - 1129 s
Heat release rate (kW/m²)	0.18	0.33	0.65	0.73	0.75	0.89	0.61	0.61
Effective heat of comb. (MJ/kg)	0.80	0.65	1.16	1.64	2.14	2.30	4.69	4.69
Mass loss rate (g/(s·m²))	-0.08	0.36	0.41	0.36	0.30	0.32	0.11	0.11
Specific extinction area (m²/kg)	47.01	24.63	129.09	247.15	275.64	315.38	636.10	636.10
Carbon monoxide yield (kg/kg)	-0.0031	0.0016	0.0129	0.0236	0.0294	0.0356	0.0904	0.0904
Carbon dioxide yield (kg/kg)	0.22	0.04	0.03	0.02	0.02	-0.00	-0.17	-0.17

Smoke results

Total smoke release: whole test (0 s - 900 s) 90.4 m²/m²

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Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Summary Results for the Full test assembly:

Test averages

Test	t(ig) (s)	t(fo) (s)	t(end) (s)	HRR(peak) (kW/m²)	tpeak (s)	THR (MJ/m²)	HRR(60) (kW/m²)	HRR(180) (kW/m²)	HRR(300) (kW/m²)
Mean	**388.8**	**488.8**	**900**	**21.63**	**399.7**	**1.41**	**14.08**	**6.92**	**4.00**
1	442	586	900	35.27	455	2.00	24.02	10.85	5.72
2	456	601	900	18.29	465	1.28	12.44	6.90	3.46
3	443	556	900	34.38	455	2.23	26.28	11.65	7.25
4	544	578	900	11.05	565	0.67	5.53	2.72	2.05
5	0		900	7.24	0	0.43	0.73	-0.12	-0.38
6	448	612	900	23.53	458	1.86	15.46	9.49	5.90

Test	Flux (kW/m²)	t (mm)	Area (cm²)	m(i) (g)	m(s) (g)	m(f) (g)	Δm (g/m²)	MLR(av) (g/s·m²)	$\dot{m}_{4,10\text{-}90}$ (g/s·m²)
Mean		**22.5**		**160.1**	**159.2**	**158.8**	**45.6**	**0.08**	**4.29**
1	50	22.5	88.4	160.25	160.0	159.7	27.2	0.07	10.87
2	50	22.5	88.4	160.34	159.1	159.0	11.7	0.02	0.14
3	50	22.5	88.4	160.13	159.3	159.0	33.4	0.07	13.37
4	50	22.5	88.4	160.55	158.2	157.9	39.8	0.09	0.68
5	50	22.5	88.4	159.84	159.8	158.6	140.1	0.16	0.42
6	50	22.5	88.4	159.2	158.8	158.6	21.7	0.03	0.28

Test	THR(0-300) (MJ/m²)	THR(0-600) (MJ/m²)	THR(0-1200) (MJ/m²)	EHC(av) (MJ/kg)	SPR(av) (m²/s)	SEA(av) (m²/kg)	Fuel load (MJ/kg)	MARHE (kW/m²)
Mean	**0.23**	**1.62**	**-**	**48.15**	**0.0001**	**165.12**	**0.08**	**4.41**
1	0.15	2.32	-	53.75	0.0002	432.39	0.11	4.08
2	0.16	1.44	-	65.61	0.0001	242.08	0.07	2.41
3	0.41	2.58	-	66.42	-0.0001	-178.87	0.12	4.57
4	0.47	1.12	-	16.89	0.0005	471.99	0.04	5.18
5	0.07	0.36	-	1.16	0.0002	170.01	0.02	7.06
6	0.12	1.89	-	85.10	-0.0001	-146.88	0.10	3.15

Test	Date	Specimen #	Line colour	Filename
1	02/11/2023	1		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-1.csv
2	02/11/2023	2		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-2.csv
3	02/11/2023	3		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-3.csv
4	02/11/2023	4		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-4.csv
5	02/11/2023	5		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-5.csv
6	02/11/2023	6		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex Full Panel-6.csv

The test results relate to the behaviour of the test specimens 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 of the product in use.

General Observations for the full Assembly:

Cracking of the glass occurred at about 60 seconds. White smoke at observed at about 100 seconds. Specimen 5 had no ignition. The ignitor was returned in less than 4 seconds for specimens that had an ignition time of less than 60 seconds. Except for specimen 5, ignition occurred with orange flames and black smoke.

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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Summary results for the panel without the glass

Test averages

Test	t(ig) (s)	t(fo) (s)	t(end) (s)	HRR(peak) (kW/m²)	tpeak (s)	THR (MJ/m²)	HRR(60) (kW/m²)	HRR(180) (kW/m²)	HRR(300) (kW/m²)
Mean	**282.2**	**340.8**	**900**	**61.62**	**298.5**	**2.09**	**30.31**	**10.28**	**5.92**
1	254	298	900	87.17	265	1.91	31.42	9.45	5.11
2	265	319	900	73.11	279	2.22	35.35	11.52	6.88
3	301	359	900	61.87	314	2.74	28.58	10.98	7.30
4	280	344	900	41.00	301	1.68	26.61	8.88	4.28
5	298	356	900	62.97	312	2.10	31.89	10.67	6.11
6	295	369	900	43.62	320	1.90	28.02	10.20	5.84

Test	Flux (kW/m²)	t (mm)	Area (cm²)	m(i) (g)	m(s) (g)	m(f) (g)	Δm (g/m²)	MLR(av) (g/s·m²)	$\dot{m}_{4,10\text{-}90}$ (g/s·m²)
Mean		**19.4**		**82.0**	**81.2**	**80.6**	**61.5**	**0.10**	**10.32**
1	50	19.4	88.4	81.62	81.4	80.9	56.0	0.09	11.20
2	50	19.4	88.4	80.87	80.3	79.8	63.8	0.10	1.31
3	50	19.4	88.4	81.03	80.6	80.1	56.6	0.10	45.32
4	50	19.4	88.4	81.87	81.2	80.7	57.4	0.10	1.58
5	50	19.4	88.4	82.25	80.8	80.1	75.9	0.11	1.27
6	50	19.4	88.4	84.33	82.6	82.1	59.1	0.10	1.28

Test	THR(0-300) (MJ/m²)	THR(0-600) (MJ/m²)	THR(0-1200) (MJ/m²)	EHC(av) (MJ/kg)	SPR(av) (m²/s)	SEA(av) (m²/kg)	Fuel load (MJ/kg)	MARHE (kW/m²)
Mean	**0.93**	**2.18**	**-**	**25.77**	**0.0000**	**40.53**	**0.23**	**6.73**
1	2.16	2.19	-	14.65	0.0002	229.48	0.21	7.29
2	1.96	2.40	-	29.17	0.0001	106.09	0.24	7.23
3	0.38	2.58	-	48.31	-0.0001	-124.05	0.30	5.82
4	0.77	1.81	-	15.28	-0.0002	-259.82	0.18	6.92
5	0.12	2.06	-	24.72	0.0001	113.18	0.23	5.59
6	0.22	2.05	-	22.49	0.0002	178.27	0.20	7.53

Test	Date	Specimen #	Line colour	Filename
1	03/11/2023	1		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-1.csv
2	03/11/2023	2		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-2.csv
3	03/11/2023	3		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-3.csv
4	03/11/2023	4		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-4.csv
5	03/11/2023	5		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-5.csv
6	03/11/2023	6		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Glass-6.csv

The test results relate to the behaviour of the test specimens 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 of the product in use.

General Observations for the panel without the glass:

White smoke at about 140 seconds. Ignition with orange flames and black smoke. The ignitor was returned in less than 4 seconds for specimens that had an ignition time of less than 60 seconds.

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Middleton, WI 53562
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Facsimile: 608-831-9279
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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Summary results for the laminating film only on aluminium honeycomb

Test	t(ig) (s)	t(fo) (s)	t(end) (s)	HRR(peak) (kW/m²)	tpeak (s)	THR (MJ/m²)	HRR(60) (kW/m²)	HRR(180) (kW/m²)	HRR(300) (kW/m²)
Mean	**0**	**0**	**900**	**6.57**	**160.7**	**0.72**	**0.58**	**0.59**	**0.68**
1	0		900	4.55	178	0.48	0.43	0.12	0.09
2	0		900	5.31	31	1.27	1.86	1.43	1.40
3	0		900	6.90	109	0.41	-0.17	-0.28	0.09
4	0		900	10.09	3	0.75	0.80	0.45	0.51
5	0		900	8.67	205	0.58	0.35	1.19	1.22
6	0		900	3.87	438	0.81	0.18	0.65	0.75

Test	Flux (kW/m²)	t (mm)	Area (cm²)	m(i) (g)	m(s) (g)	m(f) (g)	Δm (g/m²)	MLR(av) (g/s·m²)	$\dot{m}_{4,10\text{-}90}$ (g/s·m²)
Mean		**19.2**		**80.1**	**80.1**	**79.0**	**122.9**	**0.13**	**0.29**
1	50	19.2	88.4	79.6	79.6	79.0	71.6	0.08	0.13
2	50	19.2	88.4	81.44	81.4	79.8	190.5	0.22	0.44
3	50	19.2	88.4	80.45	80.5	79.8	79.1	0.09	0.20
4	50	19.2	88.4	79.43	79.4	78.3	130.2	0.15	0.25
5	50	19.2	88.4	79.94	79.9	78.9	115.6	0.13	0.26
6	50	19.2	88.4	79.81	79.8	78.5	150.7	0.14	0.46

Test	THR(0-300) (MJ/m²)	THR(0-600) (MJ/m²)	THR(0-1200) (MJ/m²)	EHC(av) (MJ/kg)	SPR(av) (m²/s)	SEA(av) (m²/kg)	Fuel load (MJ/kg)	MARHE (kW/m²)
Mean	**0.27**	**0.63**	**-**	**2.99**	**0.0007**	**673.25**	**0.08**	**3.86**
1	0.15	0.46	-	0.88	0.0007	1014.06	0.05	1.44
2	0.42	1.05	-	6.62	0.0006	329.41	0.14	4.37
3	0.20	0.33	-	-0.34	0.0007	954.94	0.05	6.66
4	0.22	0.60	-	4.31	0.0005	373.63	0.08	7.92
5	0.39	0.58	-	1.63	0.0009	775.02	0.06	1.53
6	0.24	0.73	-	4.86	0.0009	592.47	0.09	1.27

Test	Date	Specimen #	Line colour	Filename
1	06/11/2023	1		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Panel with Film-1.csv
2	06/11/2023	2		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Panel with Film-2.csv
3	06/11/2023	3		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Panel with Film-3.csv
4	06/11/2023	4		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Panel with Film-4.csv
5	06/11/2023	5		C:\CC5\Data\Mitrex Inc (Intertek Canada)\105613557 Mitex No Panel with Film-5a.csv

General Observations for laminating film only on aluminium honeycomb:

White smoke with browning of interlayer/adhesive. No Ignition.

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TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

Test Results Summary:

TOTAL SMOKE PRODUCTION (m^2)			
Sample	**Full Panel (with glass)**	**PV cell and interlayer/adhesive (No Glass)**	**Laminating film only (Solar interlayer/adhesive**
1	0.1	0.2	0.7
2	0.1	0.2	0.6
3	0.1	0.1	0.7
4	0.2	0.0	0.5
5	0.3	0.1	0.8
6	0.0	0.1	0.8
Average	0.13	0.12	0.68

TOTAL HEAT RELEASE (MJ/m^2)			
Sample	**Full Panel (with glass)**	**PV cell and interlayer/adhesive (No Glass)**	**Laminating film only (Solar interlayer/adhesive**
1	2.00	1.91	0.48
2	1.28	2.22	1.27
3	2.23	2.74	0.41
4	0.67	1.68	0.75
5	0.43	2.10	0.58
6	1.86	1.90	0.81
Average	1.41	2.09	0.72

The full panel sample was not used in the calculation of the system total heat release because the glass did not prevent the release of the smoke or combustion after the glass cracked provided heat and smoke from material that will be tested without the glass. A sample without the glass but with the interlayer/adhesive and PV cell was provided in leu of removing the glass as this could not be done safely.

The system with only the Laminating film only (Solar interlayer/adhesive and without the PV Cell) had smoke but no ignition but is redundant testing of the Solar interlayer/adhesive layer that was tested with the PV Cell.

Therefore, the Total Heat Release Rate and Smoke product for the system will be determined from the system without the glass (Photovoltaic Cell, Solar interlayer/adhesive, and Aluminium Honeycomb) to be 2.09 MJ/m^2, and the Total Smoke Productions is 0.1 m^2.

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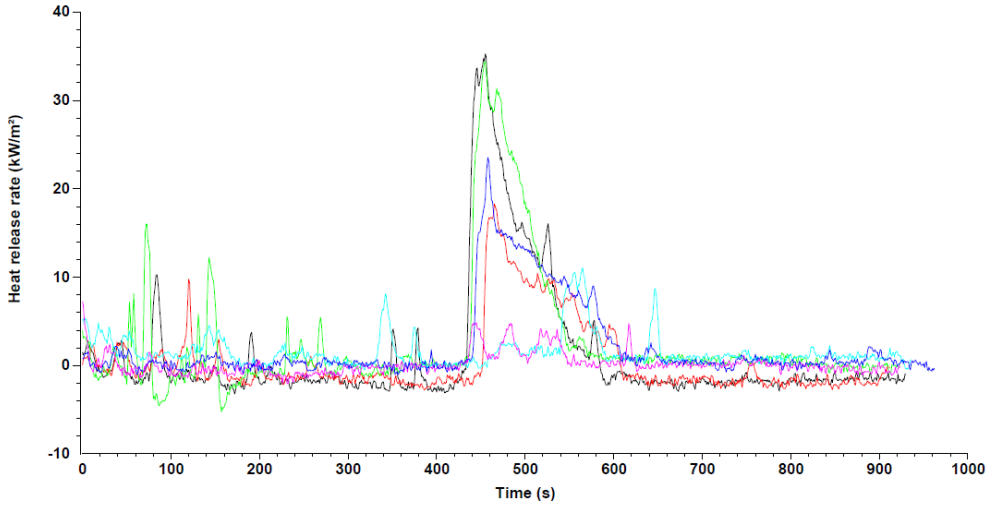
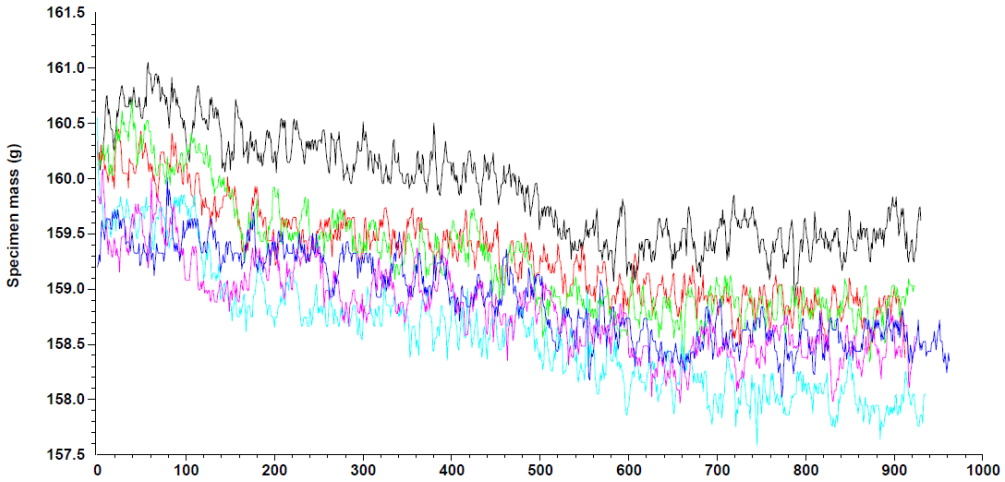
TEST REPORT FOR MITREX INC.
Report No.: 105613557MID-001AR1
Date: 11/07/23

The following eight graphs are for the full test assembly:





The test results relate to the behaviour of the test specimens 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 of the product in use.

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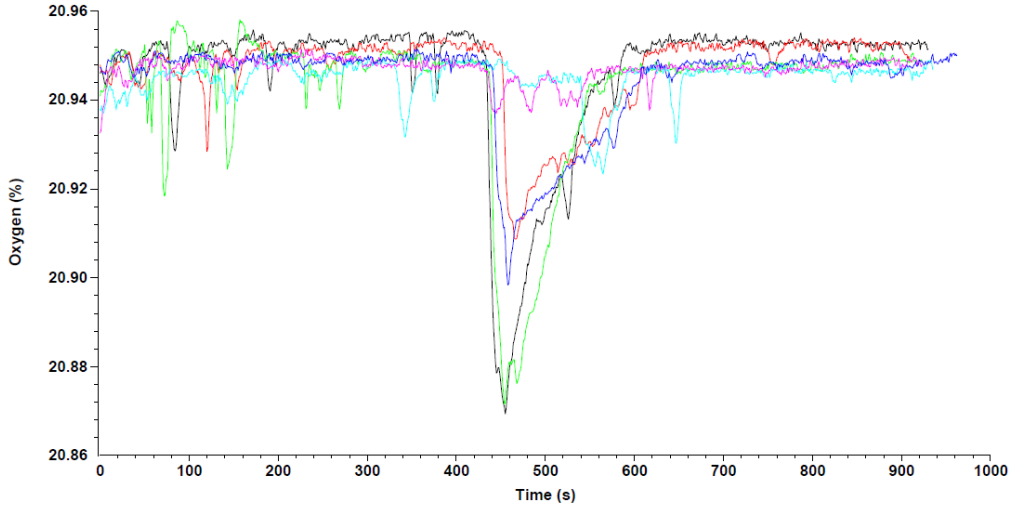

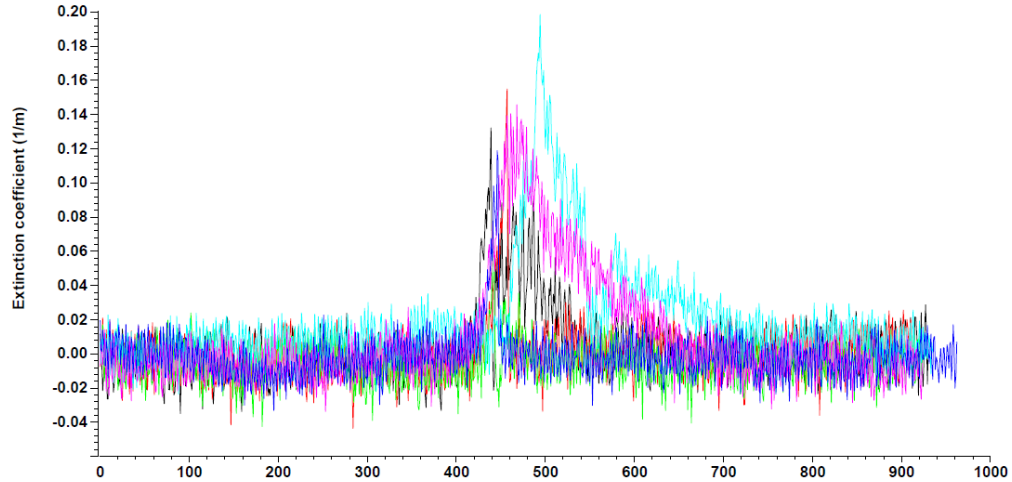

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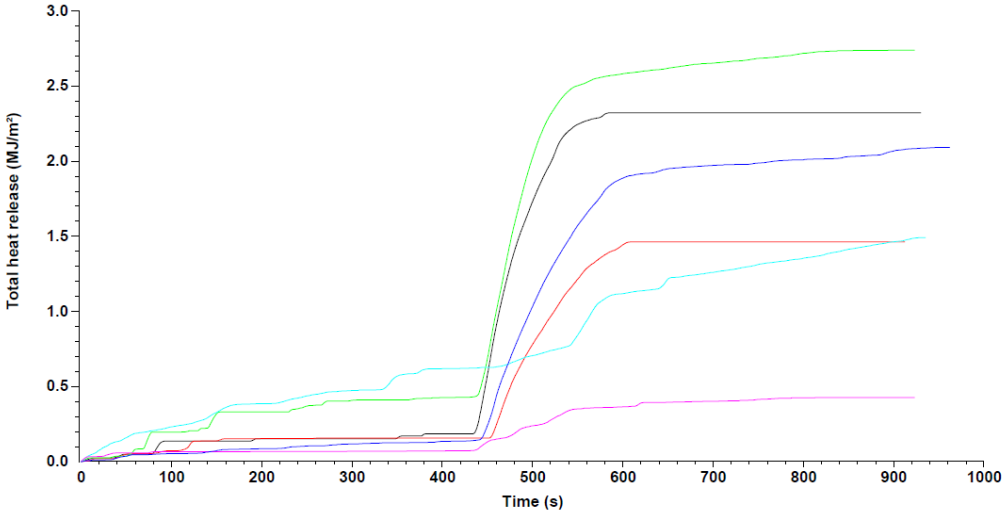

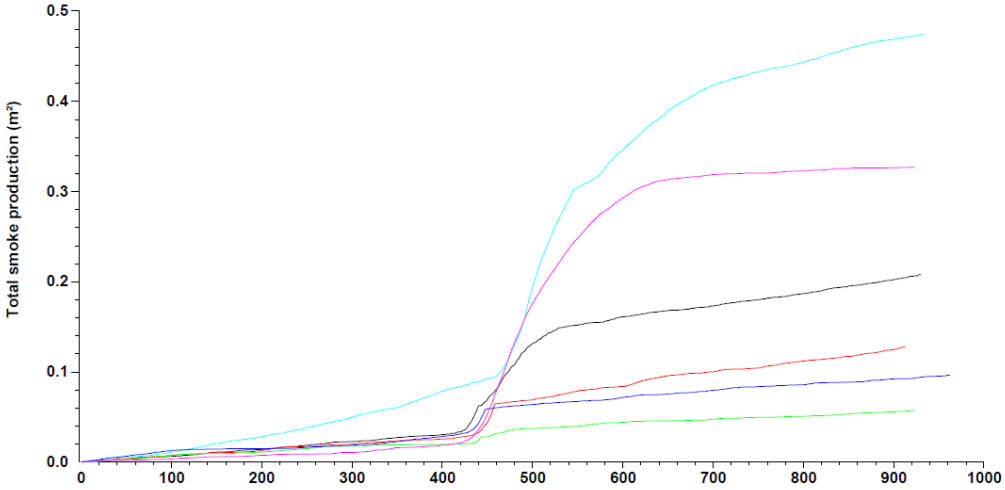

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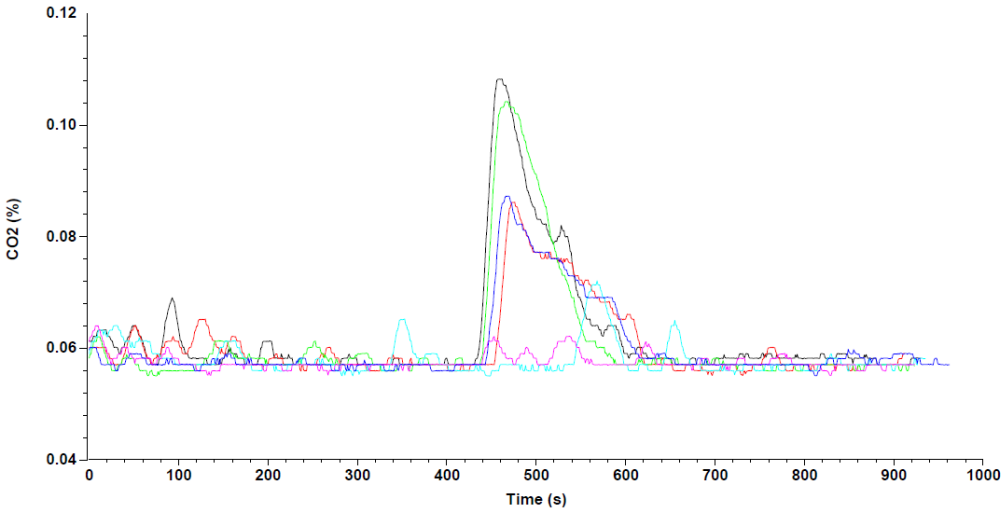

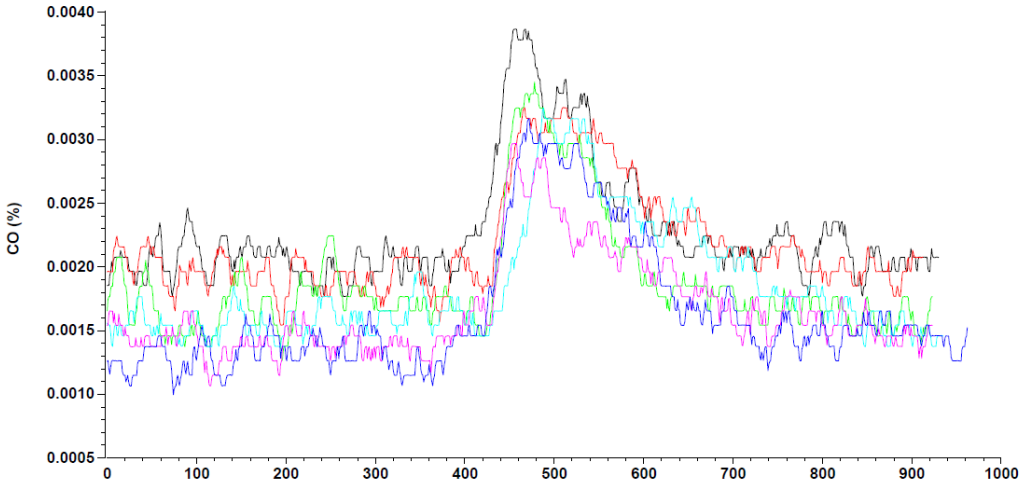

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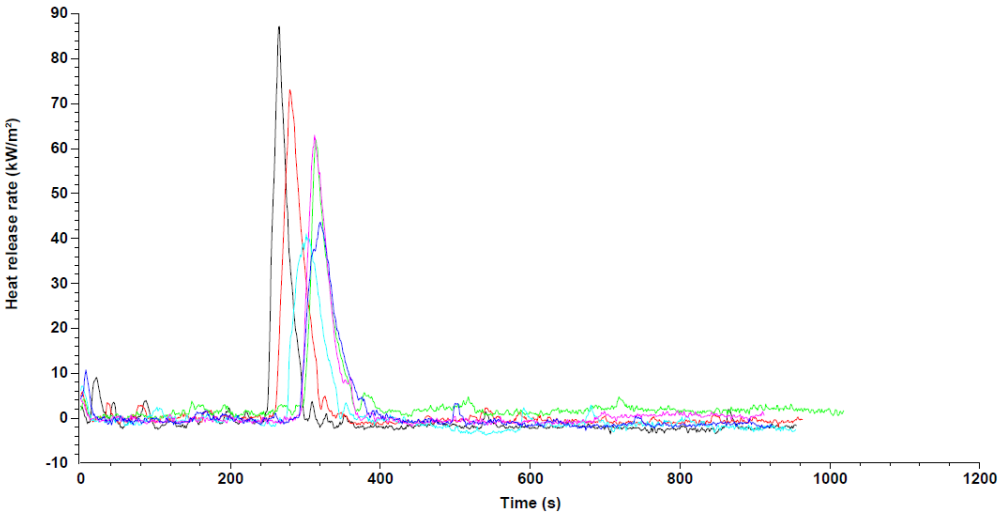
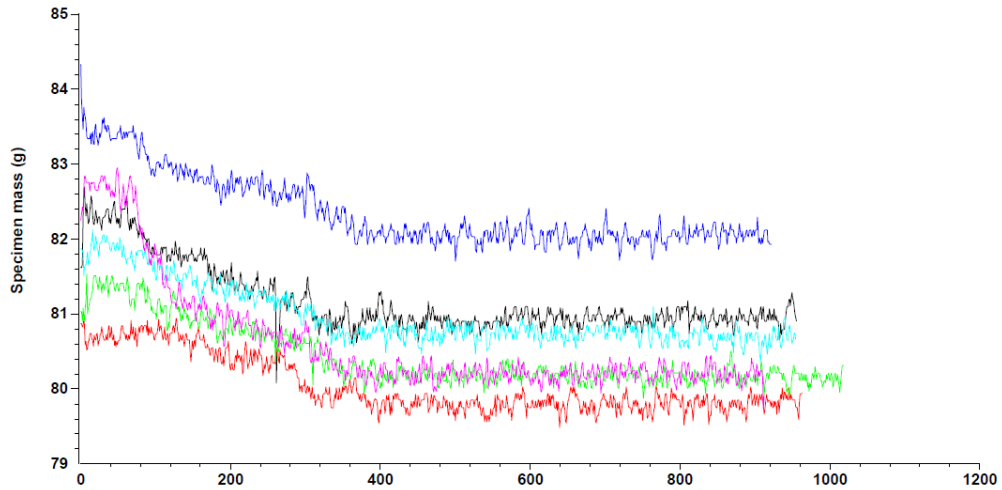
The following eight graphs are for the Panel without the top glass:





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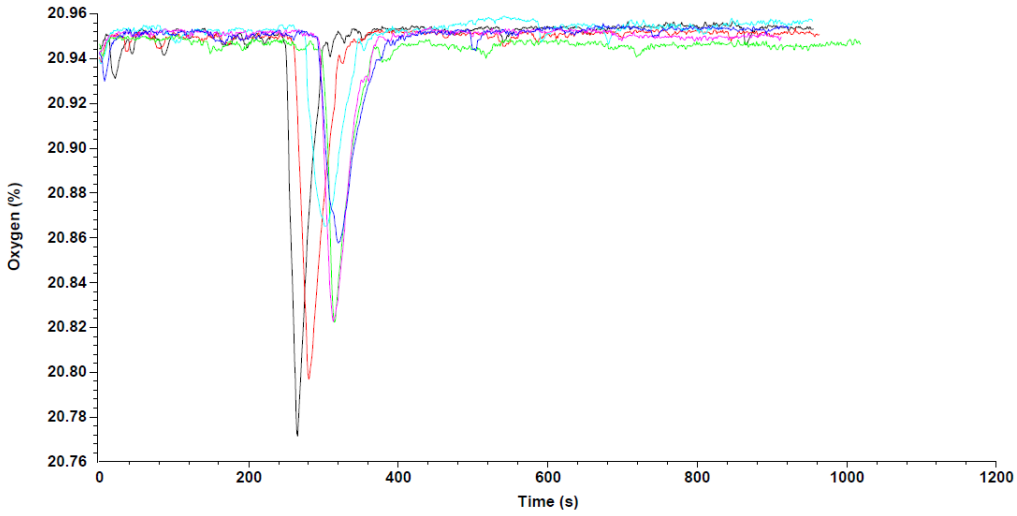

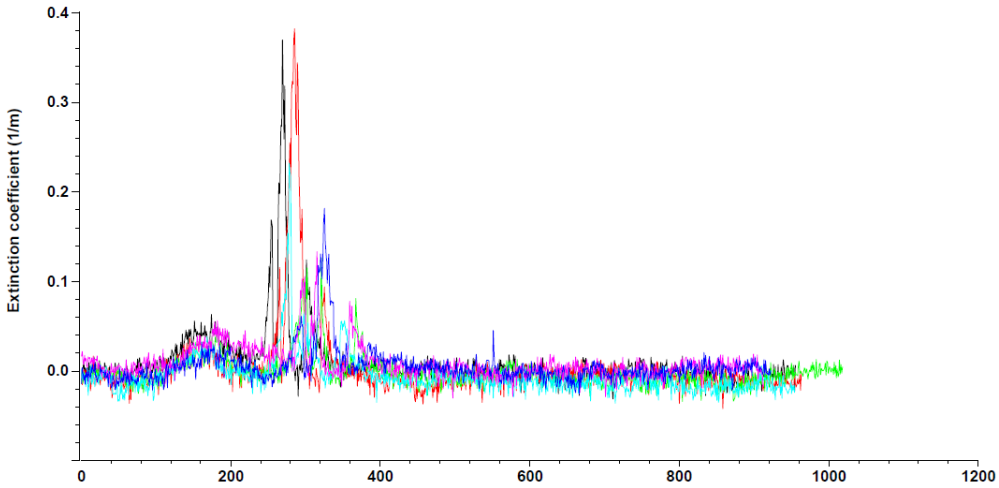

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

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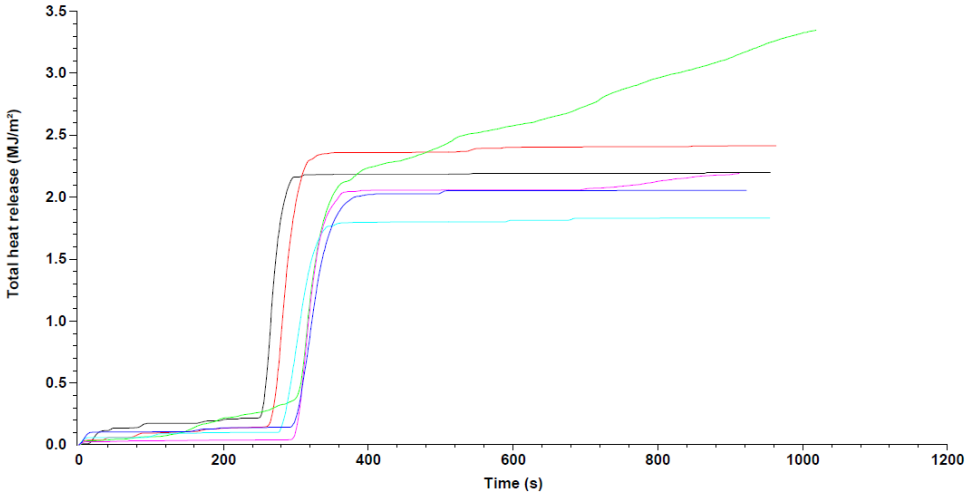

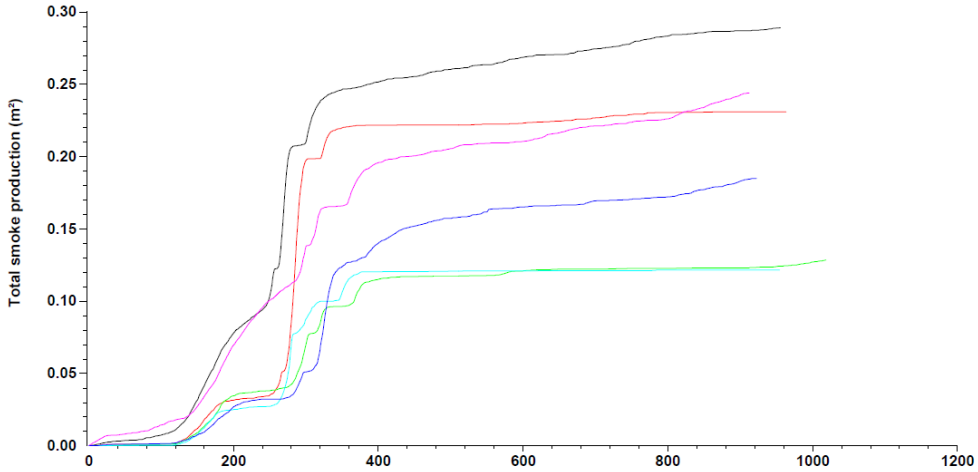

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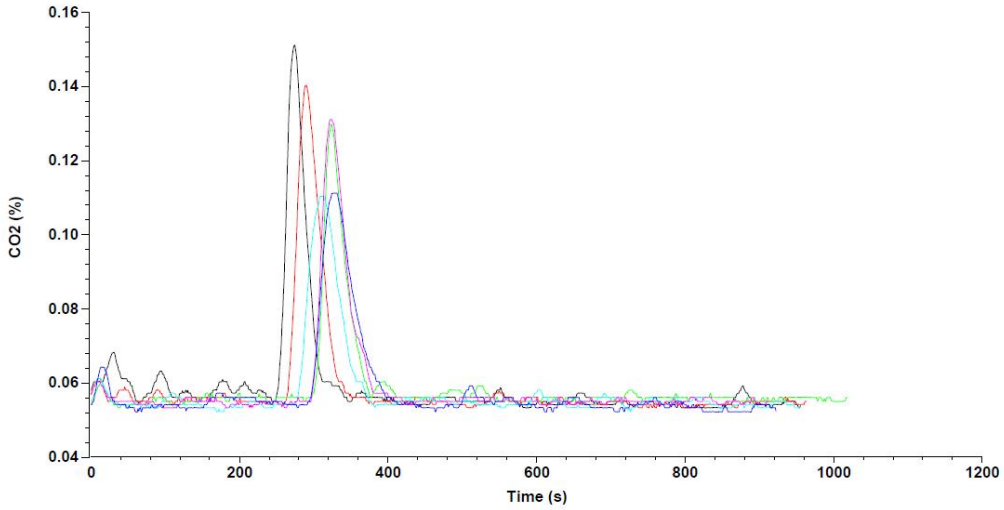

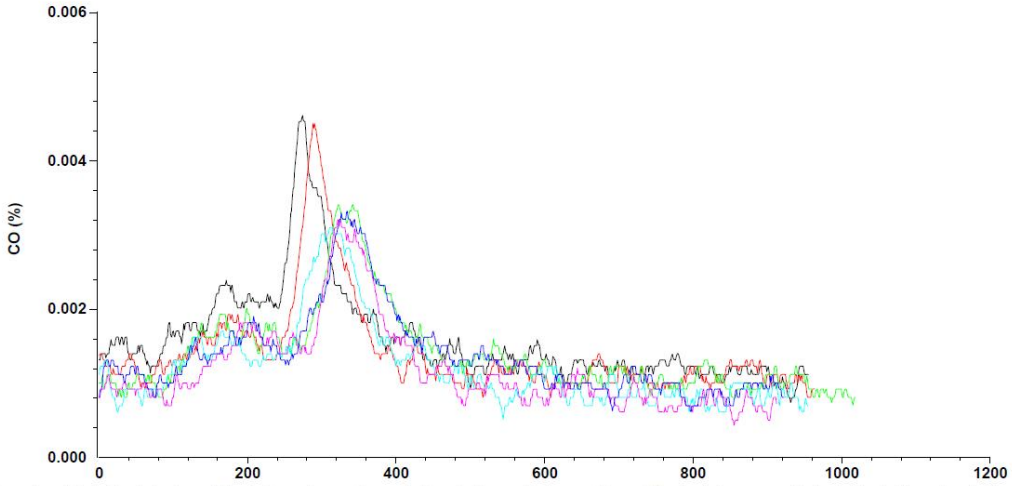

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Middleton, WI 53562
Telephone: 608-836-4400
Facsimile: 608-831-9279
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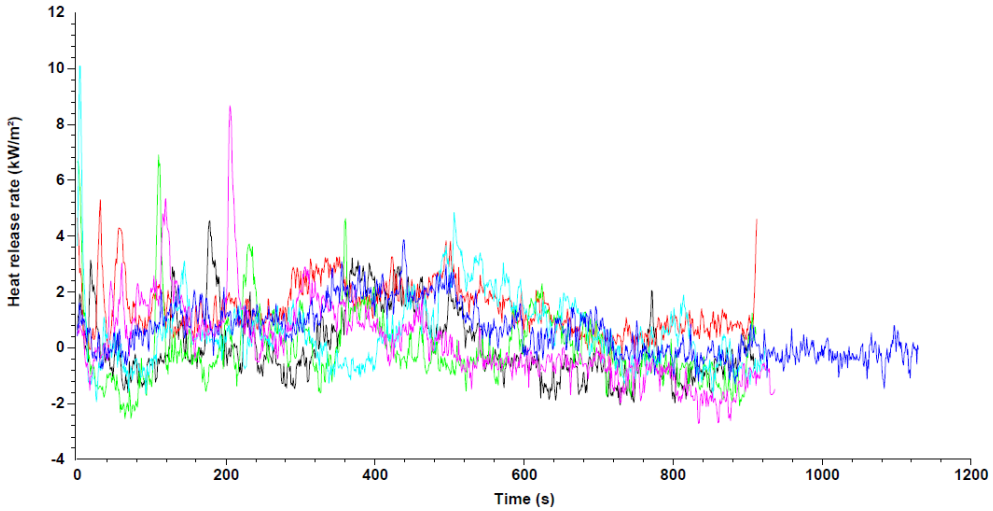
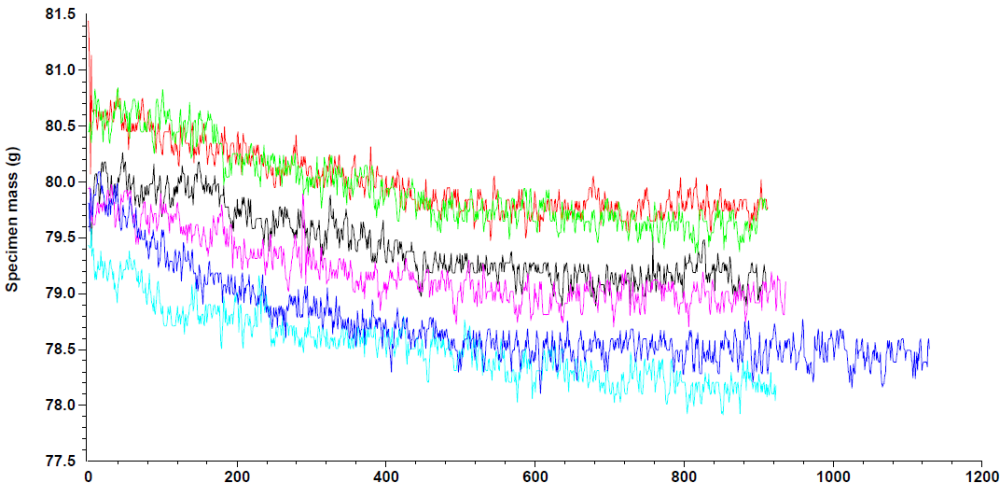
Date: 11/07/23

The following eight graphs are for Solar interlayer/adhesive only on aluminum honeycomb:





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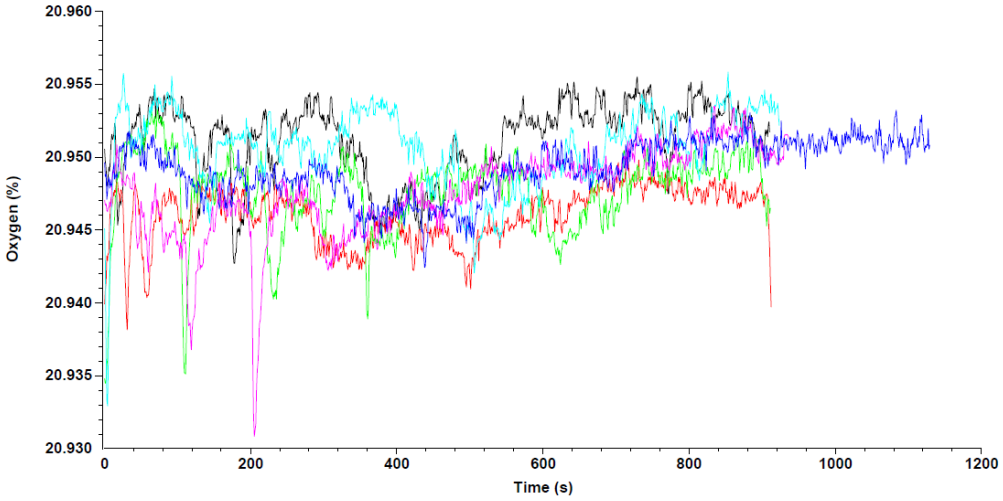

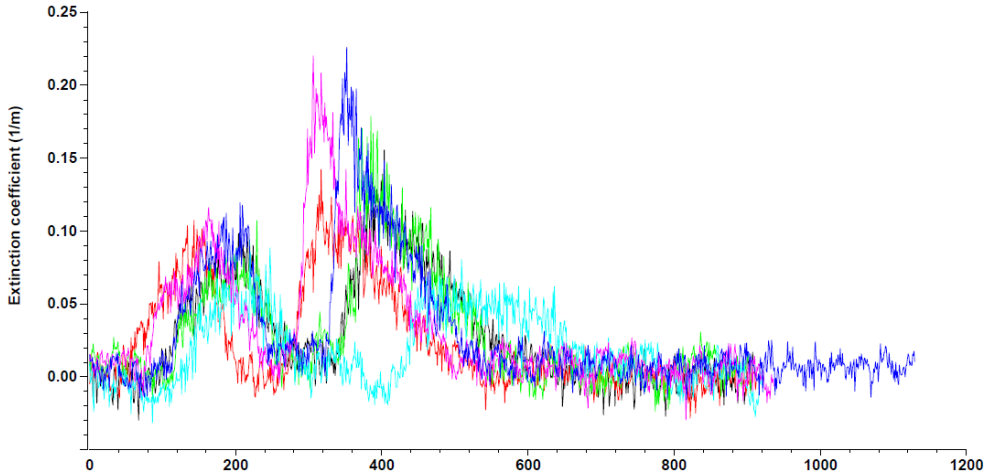

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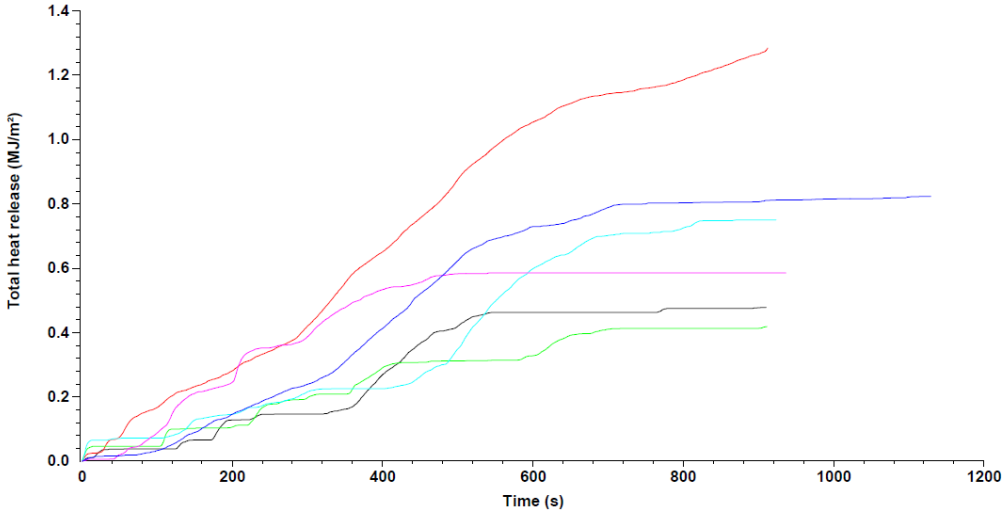

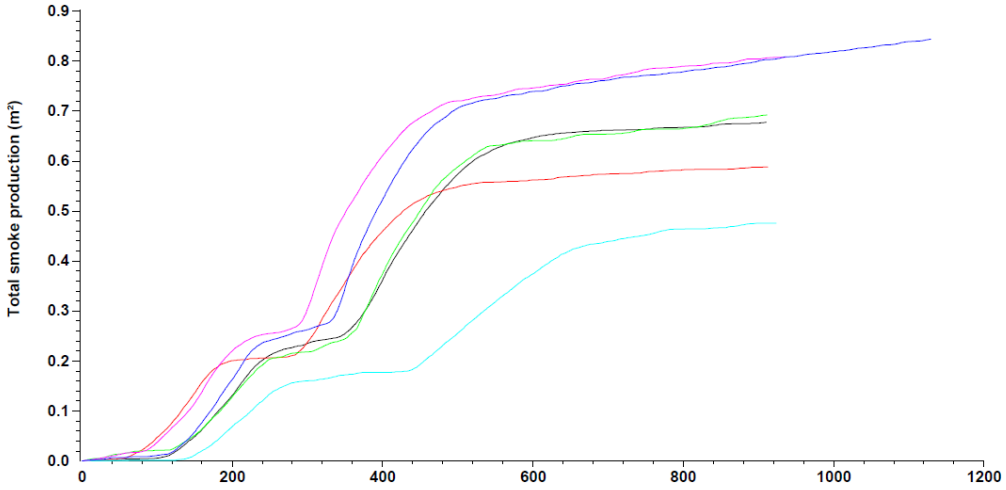

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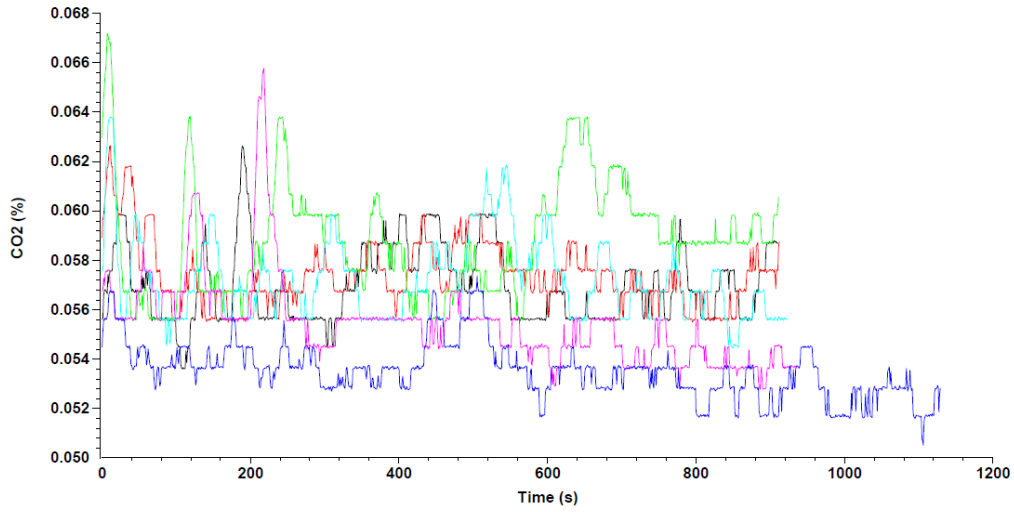

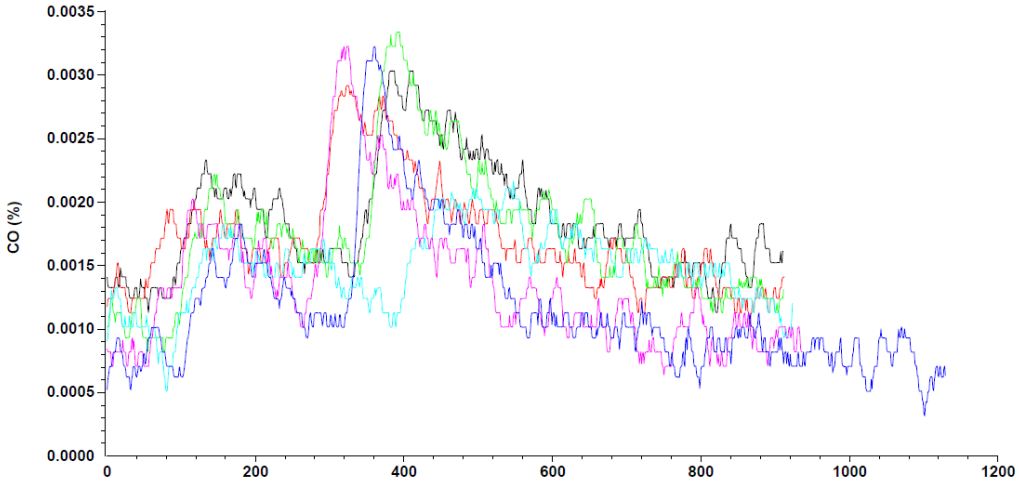

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SECTION 9

CONCLUSION

There are no pass/fail criteria for the ULC S135. There were no deviations to the standard.

The system average total heat release was not more than 3 MJ/m^2 (2.1 MJ/m^2), and the combined average total smoke extinction area was not more than 1.0 m^2 (0.1 m^2) for all layers of the material. Therefore, the material meets the criteria as listed in the National Building Code of Canada 2015 for section 3.1.5.1.

SECTION 10

REVISION LOG

REVISION #	DATE	SECTION	REVISION
0	11/07/23	n/a	Original Report Issue
1	11/10/23	all	Change reference to Adhesive Only to Solar interlayer/adhesive