

Tested For: Rebecca Johnson
3M Company
3M Center Bldg 230-BE-16
Maplewood, MN 55144
USA

Phone: (651) 282-4485
Fax:
Mobile:
PO#: 3501090188
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Received: 1/26/2021
Completed: 2/23/2021
Code: A3
Test Report: 3-42295-3

Key Test: ASTM E1354

940

Client's Identification:

Lot No.: LA-D100-2874-7. Style: DP8610NS. Composition: 2K Acrylic Adhesive. Product End Use: Rail Applications for Structural Adhesive. Adhesive sandwiched between 2 pieces of IRC cement board. Adhesive thickness 0.01".

Test Category: Cone Specifier: Various LE 2017; V 03/20 PC: ME bb

TEST PERFORMED: ASTM E1354 - Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

APPROXIMATE ☒ THICKNESS ☐ DIAMETER OF MATERIAL (as measured by SGS North America): 14.4 mm

☒ Flat Specimen: 4" x 4"

☐ Cable Specimen: 4" lengths vertically grouped to form the 4" x 4" test specimens

HEAT FLUX: ☐ 35 kW/m²; ☒ 50 kW/m²; ☐ Other: _____ kW/m²

IGNITION MODE: ☒ External Spark; ☐ Non External

RETAINING WIRE GRID PLACED OVER FACE OF SPECIMEN: ☐ Yes; ☒ No

BRIEF DESCRIPTION OF TEST: A test specimen measuring 4" x 4" x 2" maximum thickness is mounted into the specimen holder. The specimen holder sits on a load cell. The opening of a "cone shaped" radiant heat source faces the test specimen. A pre-selected heat flux of anywhere from 0 to 100 kW/m² (most often 50 kW/m²) is radiated onto the surface of the specimen while a spark is introduced to ignite the off-gases. While the test specimen is subjected to the radiant heat, certain measurements are made in the exhaust system of the apparatus. Using the oxygen concentrations present during combustion, pressure flow rates, and thermocouple temperatures, the mass of oxygen consumed at any given time can be calculated. Heat release values are then determined using a defined formula based on the release rate of 13.1 MJ per kg oxygen consumed (hence the term oxygen consumption calorimetry). Simultaneously, the optical photometrics, or smoke obscuration measuring system, is gauging smoke release while the weigh cell is tracking specimen mass loss. The smoke value is reported as the specific extinction area [SEA].

The results contained in this report relate only to the item(s) tested. The test report shall not be reproduced except in full, without written approval from SGS North America.

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CATEGORY:

RESULTS

		<u>Specimen #1</u>	<u>Specimen #2</u>	<u>Specimen #3</u>	<u>AVERAGE</u>
Time to Ignition (Sustained Flaming)	[seconds]:	DNI	568	758	663
Test End (Code)	[code]:	6	1	1	N/A
Test End (Time*)	[seconds]:	1789	1151	1074	1338
Peak Heat Release Rate (HRR)	[kW/m ²]:	11.5	21.2	15.5	16.1
Average Heat Release Rate (Avg HRR):					
At 60 seconds	[kW/m ²]:	3.3	10.7	3.9	6.0
At 180 seconds	[kW/m ²]:	3.3	13.1	10.0	8.8
At 300 seconds	[kW/m ²]:	3.6	14.9	8.8	9.1
Average Mass Loss Rate	[g/m ² sec]:	2.6	3.3	3.1	3.0
Total Heat Release	[MJ/m ²]:	11.4	9.6	2.9	8.0
SEA:					
At 180 seconds	[m ² /kg]:	94	250	175	173
At test end	[m ² /kg]:	348	325	122	235
Effective Heat of Combustion	[MJ/kg]:	3.5	3.0	1.0	2.5
Caloric Content	[MJ/kg]:	0.6	0.5	0.2	0.4

* Includes 2 minutes of data collection after entry of test end code.

ABBREVIATION USED:

SEA = Visible smoke development of material (expressed as the Specific Extinction Area).

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TEST END CODES:

- 1 - Flaming/combustion ceased
- 2 - Average mass loss over a 1-minute period dropped below 150 g/m²
- 3 - Load cell returned to the pre-test value
- 4 - Oxygen returned to near pre-test value for 10 minutes
- 5 - Sixty minutes have elapsed
- 6 - No ignition after 30 minutes

ABBREVIATIONS WHICH MAY BE USED:

NR = Not recorded.
NA = Not available.
N/A = Not applicable.

REMARKS:

- ☒ None.
- ☐ Test specimens are thermally thin, containing little mass and fuel. The small amount of fuel results in a very short burning time, e.g. the specimen under test never reaches a steady state burning condition. The small mass results in extremely small mass loss rates nearing the limit of the instrument's capability to measure. This results in high variability in reported results calculated with mass in the denominator, specifically SEA and Effective Heat of Combustion.
- ☐ Specimen/s _____ exhibited intumescent behavior (swelling as a result of heat exposure) of approximately _____ mm above the top of the specimen holder frame which did not interfere with the burner.
- ☐ Specimen/s _____ exhibited intumescent behavior (swelling as a result of heat exposure) which interfered with the burner. The distance of the heating surface of the cone heater to the face of the specimen was increased to 60 mm as per the instructions in ASTM E1354.
- ☐ Other (describe): _____

ACCEPTANCE CRITERIA: None cited.

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CONCLUSION: Not applicable.

CERTIFICATION: I certify that the above results were obtained after testing specimens in accordance with the procedures and equipment specified above.

AUTHORIZED SIGNATURE
SGS NORTH AMERICA
/jab 196

MAR 19 2021

Bobby Brown

Enclosure: Graphs

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ASTM E1354 Test Report

Test Report Number : 3-42295-3-A3
Client : 3M COMPANY
Specimen ID : LA-D100-2874-7
Composition : 2K ACRYLIC ADHESIVE
Specimen Color : YELLOW
Specimens Tested : 3

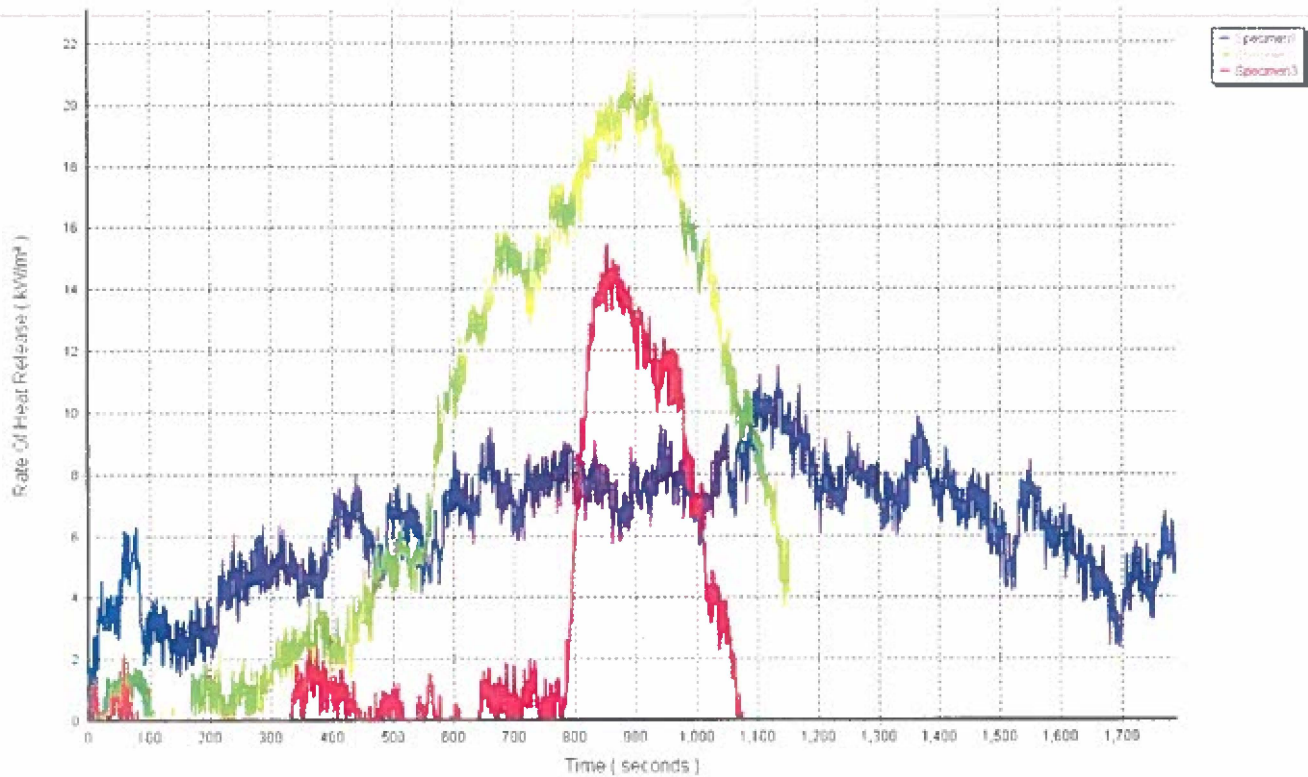
Test Date : 02/23/21
Operator : JR
Heat Flux : 50 kW/m²
Calibration Constant : 0.053
Test Orientation : Horizontal
Retaining Wire Grid Used : No

	Specimen			Average
	1	2	3	
Test Duration (seconds)	1789	1151	1074	1338
Time to Sustained Ignition (seconds)	DNI	568	758	663
Peak Rate of Heat Release (kW/m ²)	11.5	21.2	15.5	16.1
Time of Peak RHR (s)	1134	888	852	958
Average RHR - 60 seconds (kW/m ²)	3.3	10.7	3.9	6.0
Average RHR - 180 seconds (kW/m ²)	3.3	13.1	10.0	8.8
Average RHR - 300 seconds (kW/m ²)	3.6	14.9	8.8	9.1
Total Heat Released (MJ/m ²)	11.4	9.6	2.9	8.0
Initial Mass (g)	197.6	197.2	186.9	193.9
Final Mass (g)	164.8	164.9	157.8	162.5
Mass at Sustained Flaming (g)	n/a	177.3	163.4	170.4
Mass Loss (g/m ²)	3278.0	3220.0	2893.0	3130.3
Average Mass Loss Rate (g/m ² -s)	2.6	3.3	3.1	3.0
Avg Effective Heat of Combustion (MJ/kg)	3.5	3.0	1.0	2.5
Caloric Content (MJ/kg)	0.6	0.5	0.2	0.4
Avg Specific Extinction Area (m ² /kg)	348	235	122	235
Avg SEA @ 180 seconds (m ² /kg)	94	250	175	173
Thickness (mm)	14.4	14.4	14.4	14.4
Exhaust Flow rate (m ³ /s)	0.027	0.027	0.027	0.027

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Test Report # 3-42295-3-A3

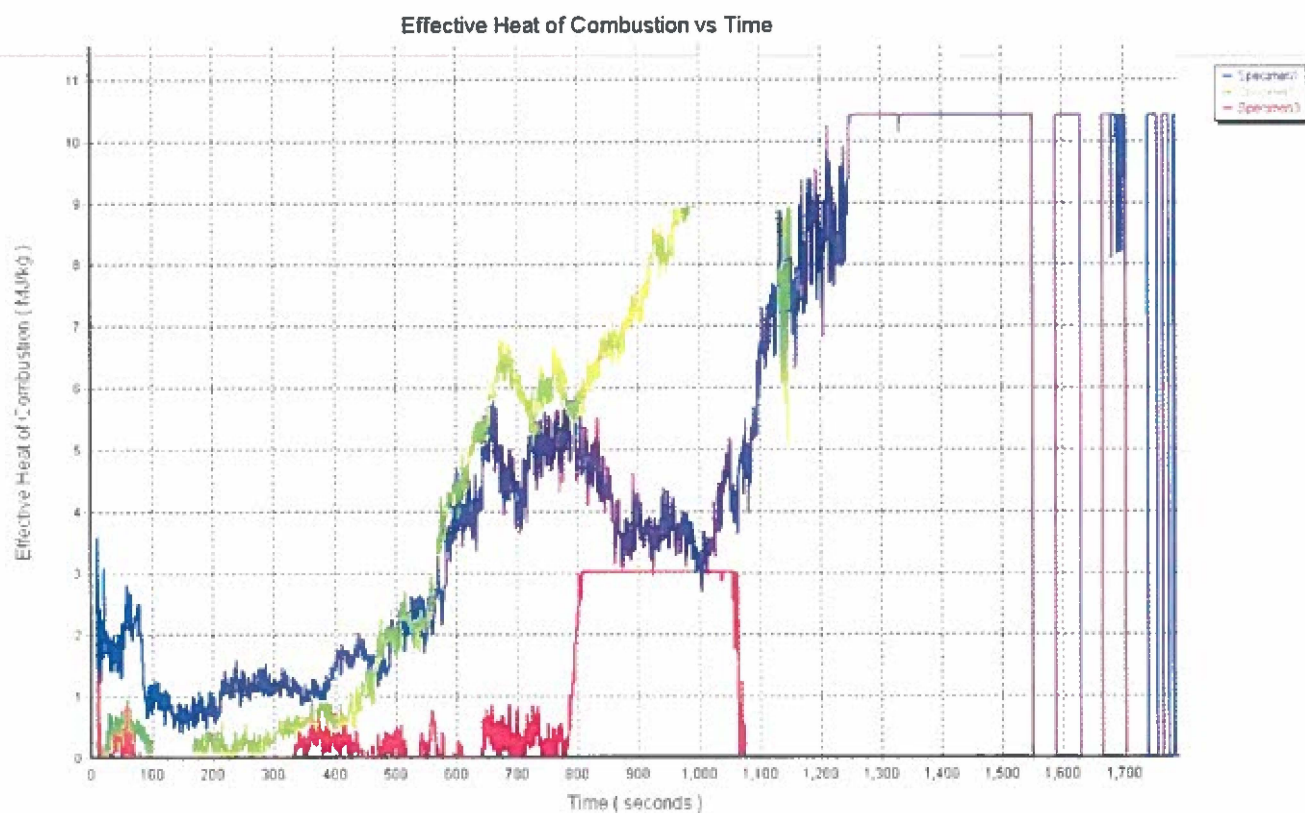
Program ASTM E1354 (version 4.32)

Rate of Heat Release vs Time



Test : ASTM E1354
Test Report # 3-42295-3-A3

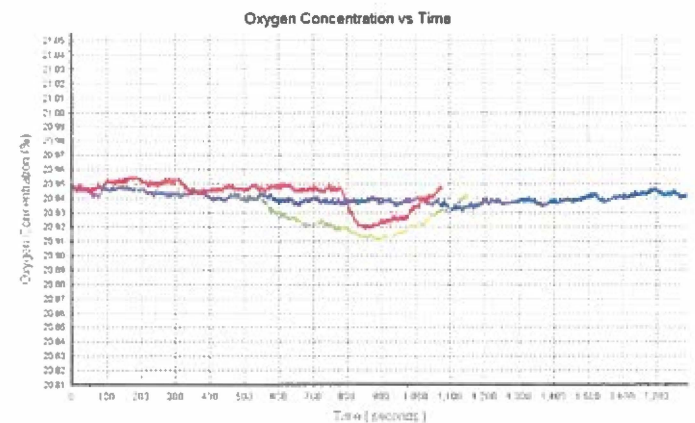
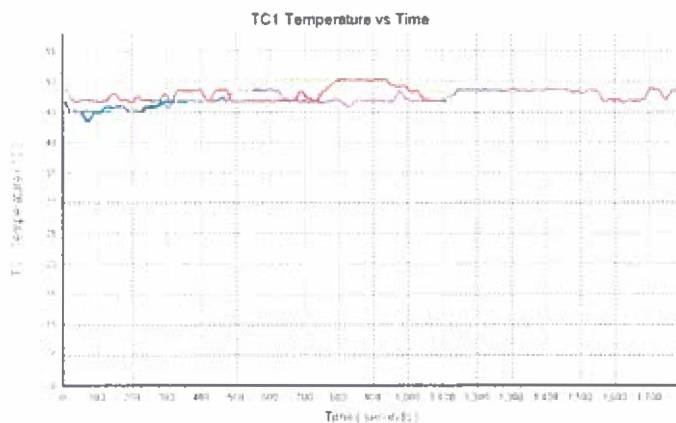
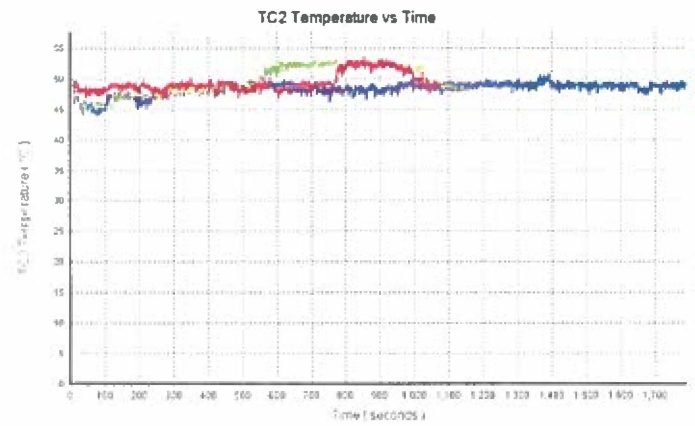
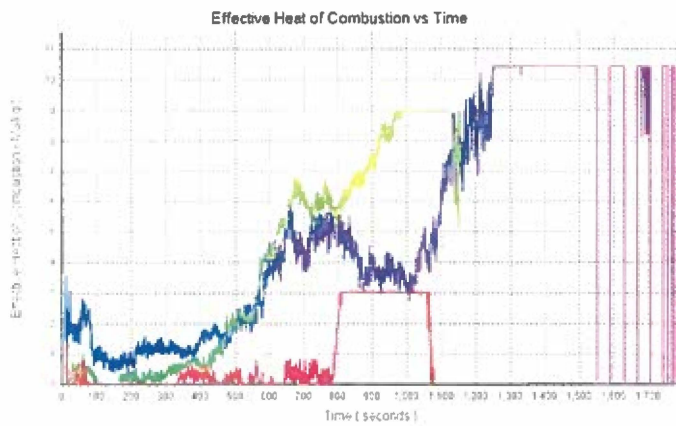
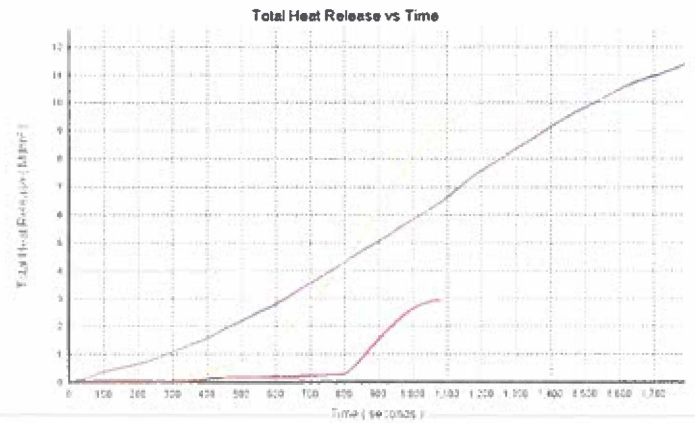
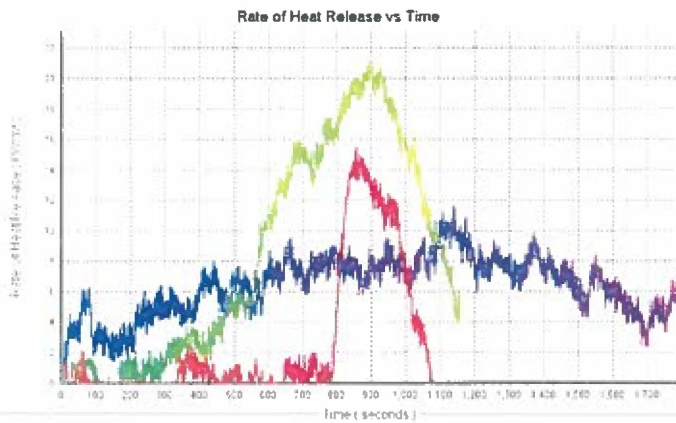
Program: ASTM E1354 (version 4.32)



Test : Cone Calorimeter

Test Report # 3-42295-3-A3

Program: ASTM E1354 (version 4.32)



Test : Cone Calorimeter

Test Report # 3-42295-3-A3

Program ASTM E1354 (version 4.32)

