

# VIPEQ CANADA TEST REPORT

## SCOPE OF WORK

ULC-S135:1992, STANDARD TEST METHOD FOR THE DETERMINATION OF COMBUSTIBILITY PARAMETERS OF BUILDING MATERIALS USING AN OXYGEN CONSUMPTION CALORIMETER (CONE CALORIMETER) ON CORKSHEILD

## REPORT NUMBER

103749915MID-001

## TEST DATE(S)

01/08/19

## ISSUE DATE

01/08/19

## [REVISED DATE]

NA

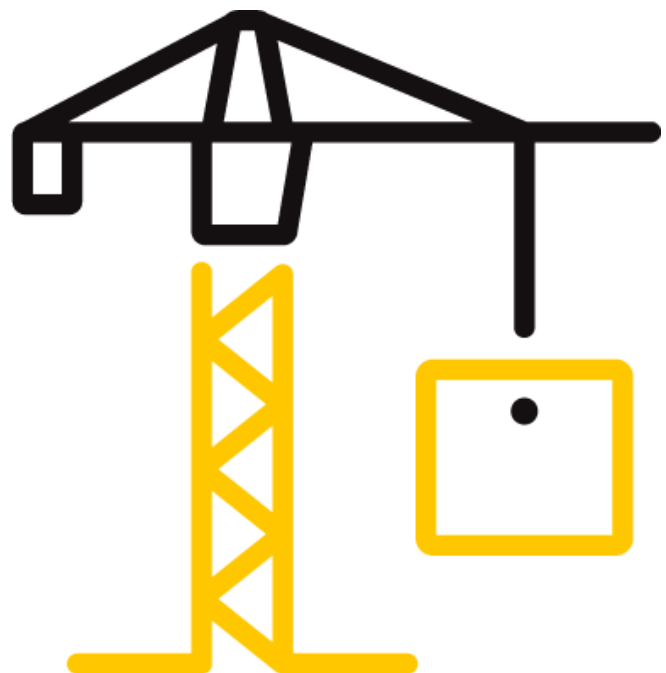
## PAGES

126

## DOCUMENT CONTROL NUMBER

GFT-OP-10c (AUGUST 27, 2018)

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## TEST REPORT FOR VIPEQ

Report No.: 103749915MID-001

Date: 01/08/19

### REPORT ISSUED TO

#### VIPEQ CANADA

7301 E Danbro Crescent  
Mississauga, ON L5N 6P8  
Canada

### SECTION 1

#### SCOPE

Intertek Building & Construction (B&C) was contracted by Vipeq Canada 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)*, on Painted Plywood with Metal. Results obtained are tested values and were secured by using the designated test method. Testing was conducted at Intertek test facility in Middleton, WI.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. 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, or other pertinent project documentation, will be retained for the entire test record retention period.

For INTERTEK B&C:

<b>COMPLETED BY:</b>	Bryan Bowman
<b>TITLE:</b>	Chemist
<b>SIGNATURE:</b>	
<b>DATE:</b>	01/08/19

<b>REVIEWED BY:</b>	Mark Crawford
<b>TITLE:</b>	Engineering Team Lead
<b>SIGNATURE:</b>	
<b>DATE:</b>	01/08/19

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### SECTION 2

#### TEST METHOD(S)

The specimens were evaluated in accordance with the following:

**ULC-S135:1992**, *Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)*

### SECTION 3

#### MATERIAL SOURCE

The specimens were provided by the client. Samples were received at the Evaluation Center on December 19, 2018 in good condition. Sample ID is MID1812191254-001

### SECTION 4

#### EQUIPMENT

EQUIPMENT			
DESCRIPTION - ASSET #:	Cone Calorimeter - 1199	CALIBRATION DUE:	VBU
DESCRIPTION - ASSET #:	Scale - 1482	CALIBRATION DUE:	4/4/2019
DESCRIPTION - ASSET #:	Flow Meter - 1270	CALIBRATION DUE:	11/11/2019
DESCRIPTION - ASSET #:	Heat Flux Transducer - 1405	CALIBRATION DUE:	10/8/2019
DESCRIPTION - ASSET #:	Balance - 1396	CALIBRATION DUE:	4/4/2019
DESCRIPTION - ASSET #:	Caliper - 1248	CALIBRATION DUE:	4/3/2019
DESCRIPTION - ASSET #:	Room Temp/Humidity - 1456	CALIBRATION DUE:	3/28/2019
DESCRIPTION - ASSET #:	Conditioning Chamber - 1451	CALIBRATION DUE:	12/4/2019

### SECTION 5

#### TEST PROCEDURE

The cone calorimeter test was run as written in ULC S135 section 8 – Procedure.

### SECTION 6

#### TEST CALCULATIONS

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

### SECTION 7

#### TEST SPECIMEN DESCRIPTION

The samples were prepared and cut by the client into 100 x 100 mm samples. The samples are a tan colored rough surface coated on an inflammable substrate. Specimens were conditioned to moisture equilibrium (constant mass) at an ambient temperature of  $23 \pm 3^{\circ}\text{C}$  and a relative humidity of  $50 \pm 5\%$ .

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### SECTION 8

#### TEST RESULTS

##### Specimen information

E	13.1 MJ/kg	Specimen number	1	Conditioned?	Yes
Thickness	12 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	100.32 g	Edge frame used?	Yes	RH	50%
Surface area	88.4 cm <sup>2</sup>	Grid used?	No		
Heat flux	50 kW/m <sup>2</sup>	Fixed to substrate?	Yes		
Separation	25 mm	Substrate	0.5 inch Ca Silicate		
Orientation	Horizontal	Manufacturer			
		Sponsor			

##### Test

Standard used	ULC S135
Date of test	08/01/2019
Time of test	10:16
Date of report	08/01/2019

##### Pre-test conditions

Ambient temperature	22°C
Ambient pressure	98.416 kPa
Relative humidity	27%

##### Test times

Time to ignition	19 s
Time to flameout	80 s
End of test criterion	User entered
End of test time	900 s
(for calculations)	

##### Apparatus specifications

C-factor	0.04381
Duct diameter	0.114 m
O <sub>2</sub> delay time	15 s
CO <sub>2</sub> delay time	15 s
CO delay time	15 s
OD corr. factor	1.0055

##### Initial conditions

Baseline ambient oxygen	20.797%
Baseline oxygen	20.950%
Baseline carbon dioxide	0.0485%
Mass at sustained flaming	99.8 g

##### Heat Release Results

THR (0-300)	4.41 MJ/m <sup>2</sup>
THR (0-600)	5.15 MJ/m <sup>2</sup>
THR (0-1200)	-
Fuel load	0.48 MJ/kg

##### Test results (between 19 and 900 s)

		Mean	Peak	at time (s)
Total heat release	5.5 MJ/m <sup>2</sup>	Heat release rate (kW/m <sup>2</sup> )	6.04	75.00
Total oxygen consumed	4.1 g	Effective heat of comb. (MJ/kg)	3.54	77.33
Mass lost	13.3 g	Mass loss rate (g/s)	0.015	0.198
Average specific MLR	2.30 g/(s·m <sup>2</sup> )	Specific extinction area (m <sup>2</sup> /kg)	-132.42	3933.10
Total smoke release	26.5 m <sup>2</sup> /m <sup>2</sup>	Carbon monoxide yield (kg/kg)	0.0920	11.6454
Total smoke production	0.2 m <sup>2</sup>	Carbon dioxide yield (kg/kg)	0.32	41.15
MAHRE	41.1 kW/m <sup>2</sup>			95

##### Test averages

from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 916 s	0 s - 916 s
Heat release rate (kW/m <sup>2</sup> )	53.37	31.97	22.62	17.65	14.75	12.58	5.89	5.89
Effective heat of comb. (MJ/kg)	12.81	8.49	6.23	5.27	4.77	4.35	3.45	3.45
Mass loss rate (g/s)	0.037	0.033	0.032	0.029	0.027	0.026	0.015	0.015
Specific extinction area (m <sup>2</sup> /kg)	5.16	1.92	-10.19	-21.70	-30.36	-39.66	-131.04	-131.04
Carbon monoxide yield (kg/kg)	0.0374	0.0498	0.0535	0.0578	0.0612	0.0648	0.0889	0.0889
Carbon dioxide yield (kg/kg)	0.90	0.59	0.45	0.39	0.36	0.34	0.31	0.31

##### Smoke results

Total smoke release: non-flaming phase (0 s - 19 s)	2.1 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: flaming phase (19 s - 900 s)	26.5 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: whole test (0 s - 900 s)	28.6 m <sup>2</sup> /m <sup>2</sup>

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# TEST REPORT FOR VIEPQ

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Specimen information									
E	13.1 MJ/kg	Specimen number	2	Conditioned?	Yes				
Thickness	12 mm	Nominal duct flow rate	24 l/s	Temperature	23°C				
Initial mass	99.28 g	Edge frame used?	Yes	RH	50%				
Surface area	88.4 cm²	Grid used?	No						
Heat flux	50 kW/m²	Fixed to substrate?	Yes						
Separation	25 mm	Substrate	0.5 inch Ca Silicate						
Orientation	Horizontal	Manufacturer							
		Sponsor							
Test			Pre-test conditions			Test times			
Standard used	ULC S135	Ambient temperature	22°C	Time to ignition	18 s				
Date of test	08/01/2019	Ambient pressure	98.428 kPa	Time to flameout	79 s				
Time of test	10:36	Relative humidity	27%	End of test criterion	User entered				
Date of report	08/01/2019				End of test time	900 s			
					(for calculations)				
Apparatus specifications			Initial conditions			Heat Release Results			
C-factor	0.04381	Baseline ambient oxygen	20.797%	THR (0-300)	4.40 MJ/m²				
Duct diameter	0.114 m	Baseline oxygen	20.950%	THR (0-600)	4.90 MJ/m²				
O2 delay time	15 s	Baseline carbon dioxide	0.0476%	THR (0-1200)	-				
CO2 delay time	15 s	Mass at sustained flaming	99.4 g	Fuel load	0.49 MJ/kg				
CO delay time	15 s								
OD corr. factor	1.0055								
Test results (between 18 and 900 s)									
				Mean	Peak	at time (s)			
Total heat release	5.5 MJ/m²	Heat release rate (kW/m²)	6.07	81.83	34				
Total oxygen consumed	4.1 g	Effective heat of comb. (MJ/kg)	3.67	69.33	718				
Mass lost	12.9 g	Mass loss rate (g/s)	0.015	0.168	52				
Average specific MLR	2.20 g/(s·m²)	Specific extinction area (m²/kg)	-25.16	3530.19	845				
Total smoke release	63.5 m²/m²	Carbon monoxide yield (kg/kg)	0.0999	757.5276	601				
Total smoke production	0.6 m²	Carbon dioxide yield (kg/kg)	0.34	1614.92	601				
MAHRE	43.4 kW/m²								
Test averages									
from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 914 s	0 s - 914 s	
Heat release rate (kW/m²)	55.51	31.96	22.31	17.59	14.61	12.49	5.94	5.94	
Effective heat of comb. (MJ/kg)	13.27	8.31	6.23	5.41	4.91	4.47	3.75	3.75	
Mass loss rate (g/s)	0.037	0.034	0.032	0.029	0.026	0.025	0.014	0.014	
Specific extinction area (m²/kg)	30.47	40.44	26.74	15.87	9.74	8.15	-25.97	-25.97	
Carbon monoxide yield (kg/kg)	0.0399	0.0497	0.0554	0.0611	0.0656	0.0694	0.1012	0.1012	
Carbon dioxide yield (kg/kg)	0.94	0.59	0.46	0.41	0.38	0.36	0.35	0.35	
Smoke results									
Total smoke release: non-flaming phase (0 s - 18 s)			3.9 m²/m²						
Total smoke release: flaming phase (18 s - 900 s)			63.5 m²/m²						
Total smoke release: whole test (0 s - 900 s)			67.4 m²/m²						

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Specimen information			
E	13.1 MJ/kg	Specimen number	3
Thickness	12 mm	Nominal duct flow rate	24 l/s
Initial mass	96.86 g	Edge frame used?	Yes
Surface area	88.4 cm <sup>2</sup>	Grid used?	No
Heat flux	50 kW/m <sup>2</sup>	Fixed to substrate?	Yes
Separation	25 mm	Substrate	0.5 inch Ca Silicate
Orientation	Horizontal	Manufacturer	
		Sponsor	

Test		Pre-test conditions		Test times	
Standard used	ULC S135	Ambient temperature	22°C	Time to ignition	22 s
Date of test	08/01/2019	Ambient pressure	98.424 kPa	Time to flameout	77 s
Time of test	10:56	Relative humidity	27%	End of test criterion	User entered
Date of report	08/01/2019			End of test time	900 s
				(for calculations)	

Apparatus specifications		Initial conditions		Heat Release Results	
C-factor	0.04381	Baseline ambient oxygen	20.795%	THR (0-300)	4.47 MJ/m <sup>2</sup>
Duct diameter	0.114 m	Baseline oxygen	20.948%	THR (0-600)	5.25 MJ/m <sup>2</sup>
O2 delay time	15 s	Baseline carbon dioxide	0.0474%	THR (0-1200)	-
CO2 delay time	15 s	Mass at sustained flaming	96.6 g	Fuel load	0.54 MJ/kg
CO delay time	15 s				
OD corr. factor	1.0055				

Test results (between 22 and 900 s)					
			Mean	Peak	at time (s)
Total heat release	5.9 MJ/m <sup>2</sup>	Heat release rate (kW/m <sup>2</sup> )	6.65	84.56	40
Total oxygen consumed	4.3 g	Effective heat of comb. (MJ/kg)	4.30	73.29	256
Mass lost	12.0 g	Mass loss rate (g/s)	0.014	0.204	149
Average specific MLR	2.00 g/(s·m <sup>2</sup> )	Specific extinction area (m <sup>2</sup> /kg)	-14.64	2309.47	256
Total smoke release	68.7 m <sup>2</sup> /m <sup>2</sup>	Carbon monoxide yield (kg/kg)	0.0946	10.2716	632
Total smoke production	0.6 m <sup>2</sup>	Carbon dioxide yield (kg/kg)	0.36	15.54	632
MAHRE	42.5 kW/m <sup>2</sup>				

Test averages								
from ignition to ignition plus...	1 min	2 min	3 min	4 min	5 min	6 min	0 s - 1074 s	0 s - 1074 s
Heat release rate (kW/m <sup>2</sup> )	56.95	33.08	23.47	18.26	15.00	12.98	5.50	5.50
Effective heat of comb. (MJ/kg)	13.81	8.72	6.68	5.87	5.30	4.89	4.14	4.14
Mass loss rate (g/s)	0.036	0.034	0.031	0.027	0.025	0.023	0.012	0.012
Specific extinction area (m <sup>2</sup> /kg)	37.82	37.46	22.11	17.64	14.29	13.06	-24.08	-24.08
Carbon monoxide yield (kg/kg)	0.0428	0.0531	0.0582	0.0636	0.0674	0.0696	0.0949	0.0949
Carbon dioxide yield (kg/kg)	0.99	0.64	0.50	0.45	0.42	0.39	0.36	0.36

Smoke results	
Total smoke release: non-flaming phase (0 s - 22 s)	6.7 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: flaming phase (22 s - 900 s)	68.7 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: whole test (0 s - 900 s)	75.4 m <sup>2</sup> /m <sup>2</sup>

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### Summary Results




Heat flux	50 kW/m <sup>2</sup>	Surface area	88.4 cm <sup>2</sup>
Orientation	Horizontal	Retainer frame used?	Yes

#### Test averages

Test	t(ig) (s)	t(fo) (s)	t(end) (s)	HRR(peak) (kW/m <sup>2</sup> )	tpeak (s)	THR (MJ/m <sup>2</sup> )	HRR(60) (kW/m <sup>2</sup> )	HRR(180) (kW/m <sup>2</sup> )	HRR(300) (kW/m <sup>2</sup> )
<b>Mean</b>	<b>19.7</b>	<b>78.7</b>	<b>900</b>	<b>80.47</b>	<b>36</b>	<b>5.60</b>	<b>55.28</b>	<b>22.80</b>	<b>14.78</b>
1	19	80	900	75.00	34	5.47	53.37	22.62	14.75
2	18	79	900	81.83	34	5.46	55.51	22.31	14.61
3	22	77	900	84.56	40	5.87	56.95	23.47	15.00

Test	Flux (kW/m <sup>2</sup> )	t (mm)	Area (cm <sup>2</sup> )	m(i) (g)	m(s) (g)	m(f) (g)	Δm (g)	Ave MLR (g/s·m <sup>2</sup> )	EHF(av) (MJ/kg)
<b>Mean</b>		<b>12</b>		<b>98.8</b>	<b>98.6</b>	<b>85.9</b>	<b>12.7</b>	<b>2.2</b>	<b>3.84</b>
1	50	12	88.4	100.32	99.8	86.5	13.3	2.3	3.54
2	50	12	88.4	99.28	99.4	86.5	12.9	2.2	3.67
3	50	12	88.4	96.86	96.6	84.6	12.0	2.0	4.30

Test	THR(0-300) (MJ/m <sup>2</sup> )	THR(0-600) (MJ/m <sup>2</sup> )	THR(0-1200) (MJ/m <sup>2</sup> )	SPR(av) (m <sup>2</sup> /s)	SEA(av) (m <sup>2</sup> /kg)	Fuel load (MJ/kg)	MARHE (kW/m <sup>2</sup> )
<b>Mean</b>	<b>4.42</b>	<b>5.10</b>	-	<b>-0.0009</b>	<b>-57.41</b>	<b>0.50</b>	<b>42.33</b>
1	4.41	5.15	-	-0.0020	-132.42	0.48	41.13
2	4.40	4.90	-	-0.0004	-25.16	0.49	43.36
3	4.47	5.25	-	-0.0002	-14.64	0.54	42.51

Test	Date	Specimen #	Line colour	Filename
1	08/01/2019	1		C:\CC5\Data\Vipeq Canada\103749915\103749915 Vipeq Corksheild ULCS135-1.csv
2	08/01/2019	2		C:\CC5\Data\Vipeq Canada\103749915\103749915 Vipeq Corksheild ULCS135-2.csv
3	08/01/2019	3		C:\CC5\Data\Vipeq Canada\103749915\103749915 Vipeq Corksheild ULCS135-3.csv

### General Observations:

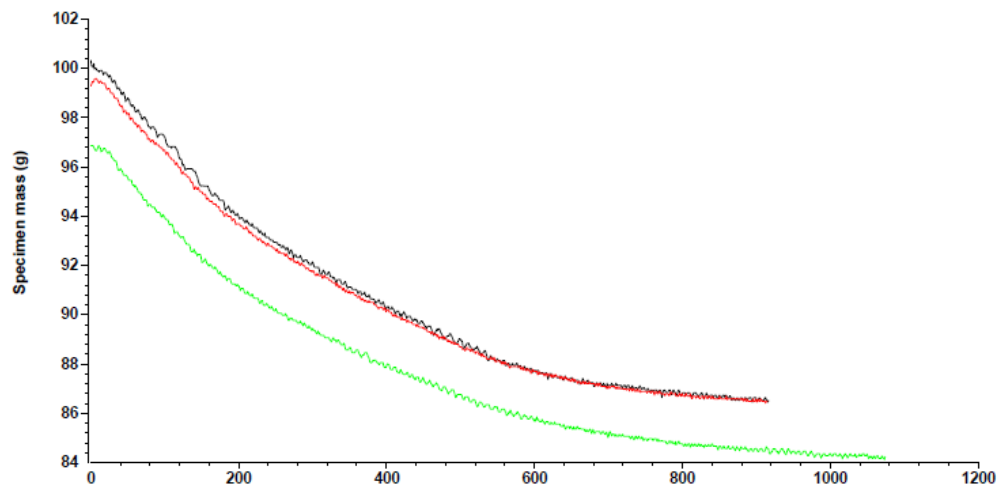
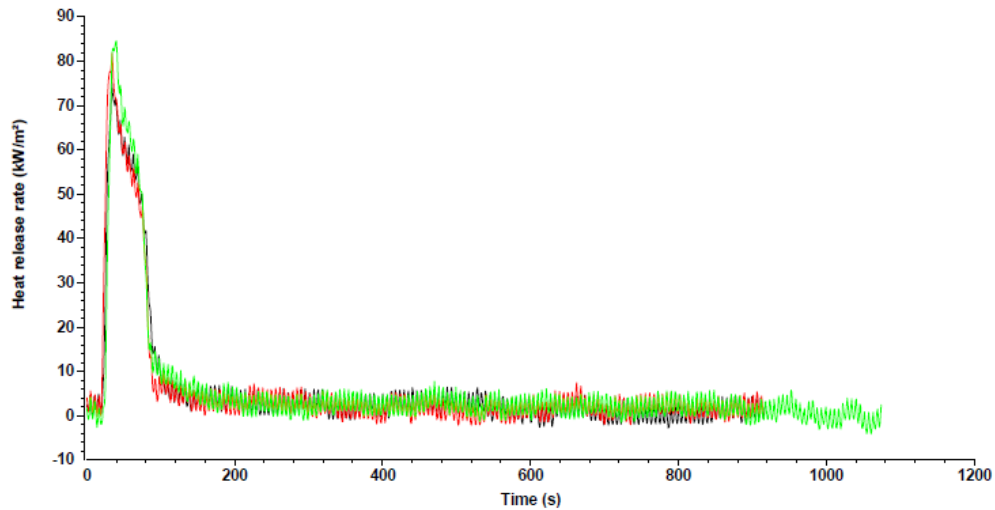
Ignition with orange flames.

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### Graphs



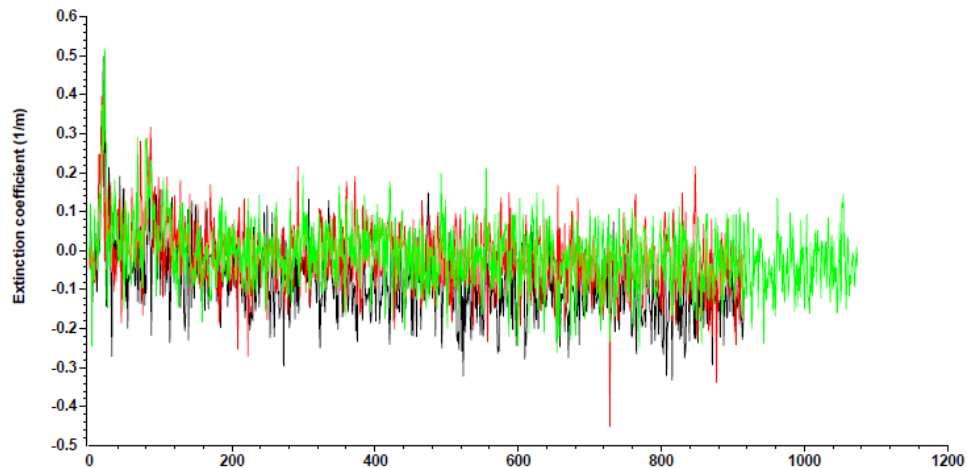
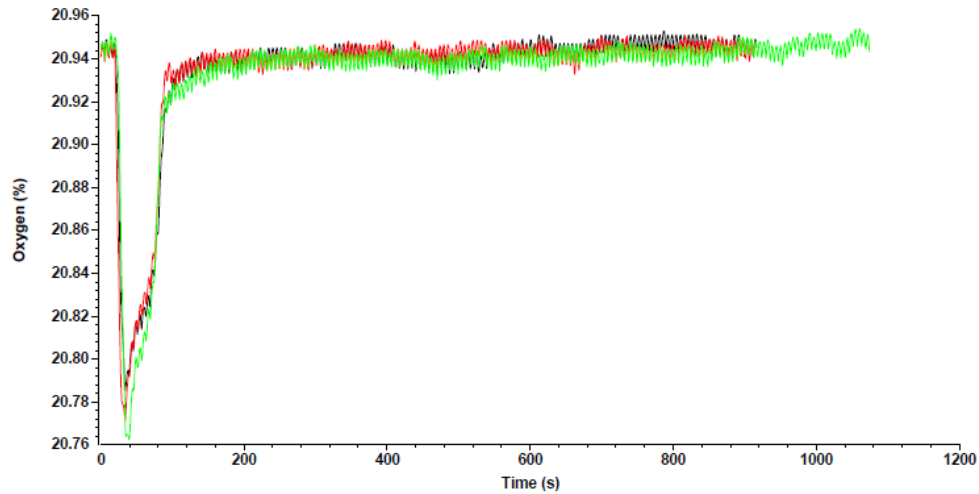
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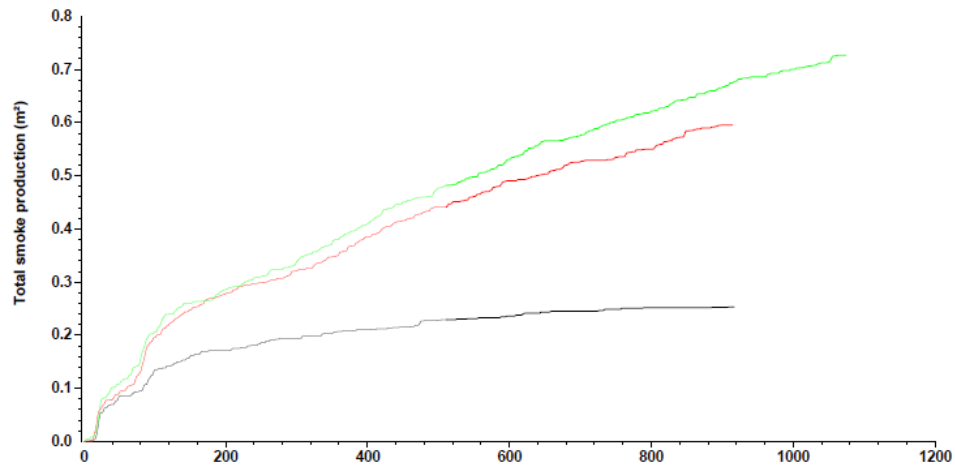
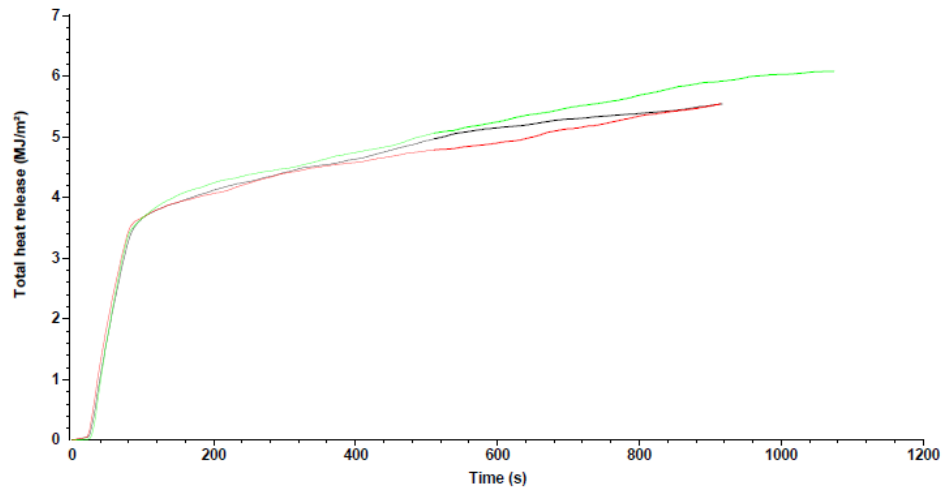


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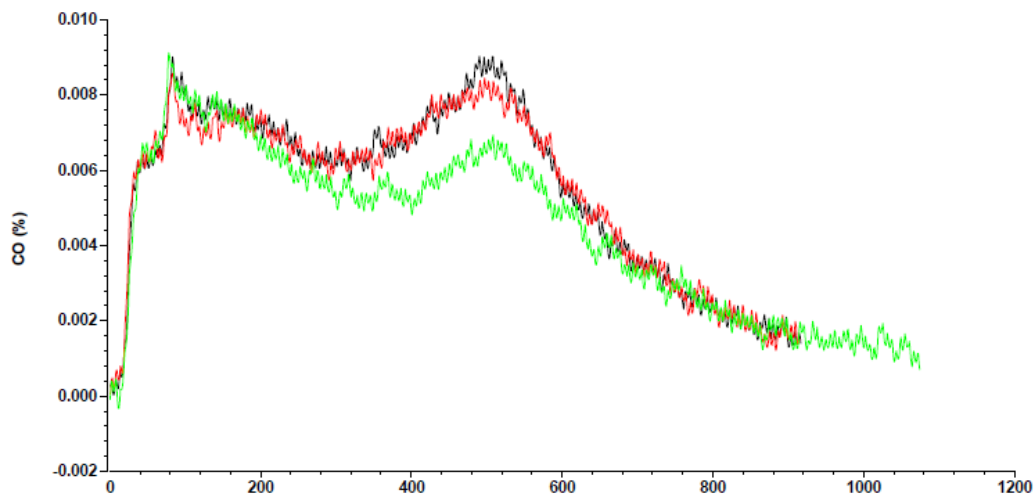
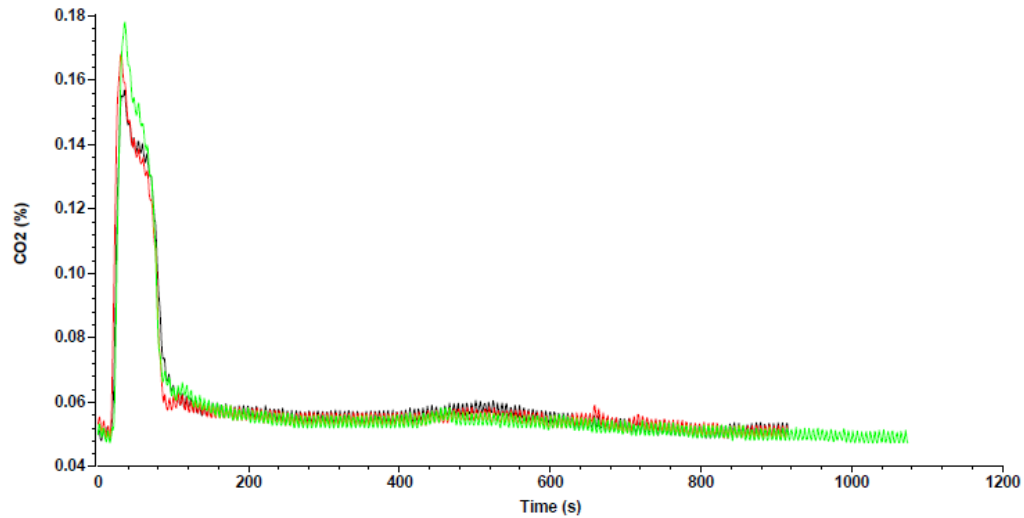


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Total Quality. Assured.

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[www.intertek.com/building](http://www.intertek.com/building)

### SECTION 9

#### CONCLUSION

There is no pass fail requirements for the ULC S135. There were no deviations to the standard.

### SECTION 10

#### REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	01/08/19	12	Original Report Issue