

# 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 [REVISED DATE]

01/08/19 NA

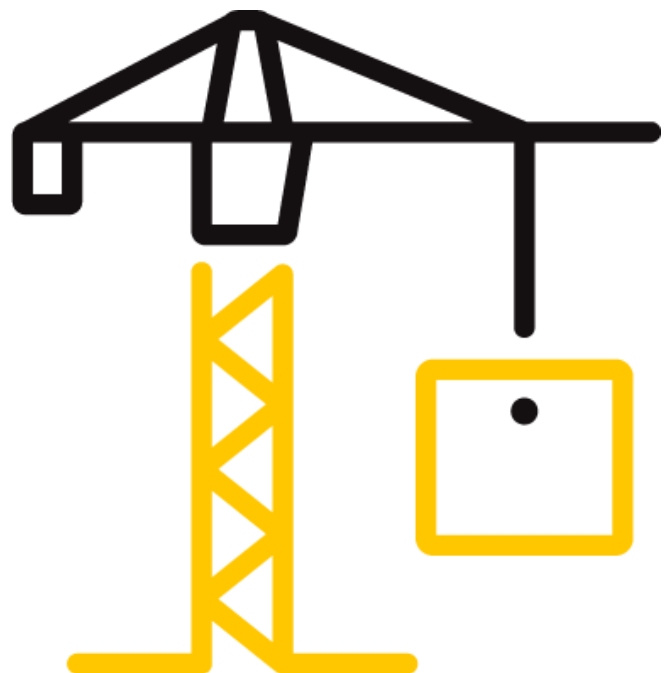
## PAGES

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 ± 3°C and a relative humidity of 50 ± 5%.

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**SECTION 8**  
**TEST RESULTS**

Specimen information		Specimen number		Conditioned?	
E	13.1 MJ/kg	1	1	Yes	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		Pre-test conditions		Test times	
Standard used	ULC S135	Ambient temperature	22°C	Time to ignition	19 s
Date of test	08/01/2019	Ambient pressure	98.416 kPa	Time to flameout	80 s
Time of test	10:16	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)	4.41 MJ/m <sup>2</sup>
Duct diameter	0.114 m	Baseline oxygen	20.950%	THR (0-600)	5.15 MJ/m <sup>2</sup>
O <sub>2</sub> delay time	15 s	Baseline carbon dioxide	0.0485%	THR (0-1200)	-
CO <sub>2</sub> delay time	15 s	Mass at sustained flaming	99.8 g	Fuel load	0.48 MJ/kg
CO delay time	15 s				
OD corr. factor	1.0055				

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	34	
Total oxygen consumed	4.1 g	Effective heat of comb. (MJ/kg)	3.54	77.33	55	
Mass lost	13.3 g	Mass loss rate (g/s)	0.015	0.198	180	
Average specific MLR	2.30 g/(s·m <sup>2</sup> )	Specific extinction area (m <sup>2</sup> /kg)	-132.42	3933.10	357	
Total smoke release	26.5 m <sup>2</sup> /m <sup>2</sup>	Carbon monoxide yield (kg/kg)	0.0920	11.6454	133	
Total smoke production	0.2 m <sup>2</sup>	Carbon dioxide yield (kg/kg)	0.32	41.15	95	
MAHRE	41.1 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 - 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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Specimen information		Specimen number		Conditioned?	
E	13.1 MJ/kg	2		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 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	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/m <sup>2</sup>
Duct diameter	0.114 m	Baseline oxygen	20.950%	THR (0-600)	4.90 MJ/m <sup>2</sup>
O <sub>2</sub> delay time	15 s	Baseline carbon dioxide	0.0476%	THR (0-1200)	-
CO <sub>2</sub> 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/m <sup>2</sup>	Heat release rate (kW/m <sup>2</sup> )	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·m <sup>2</sup> )	Specific extinction area (m <sup>2</sup> /kg)	-25.16	3530.19	845
Total smoke release	63.5 m <sup>2</sup> /m <sup>2</sup>	Carbon monoxide yield (kg/kg)	0.0999	757.5276	601
Total smoke production	0.6 m <sup>2</sup>	Carbon dioxide yield (kg/kg)	0.34	1614.92	601
MAHRE	43.4 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 - 914 s	0 s - 914 s
Heat release rate (kW/m <sup>2</sup> )	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 (m <sup>2</sup> /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 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: flaming phase (18 s - 900 s)	63.5 m <sup>2</sup> /m <sup>2</sup>
Total smoke release: whole test (0 s - 900 s)	67.4 m <sup>2</sup> /m <sup>2</sup>

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Specimen information		Specimen number		Conditioned?	
E	13.1 MJ/kg	3		Yes	
Thickness	12 mm	Nominal duct flow rate	24 l/s	Temperature	23°C
Initial mass	96.86 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		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>
O <sub>2</sub> delay time	15 s	Baseline carbon dioxide	0.0474%	THR (0-1200)	-
CO <sub>2</sub> 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 q/(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> )	EHC(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:

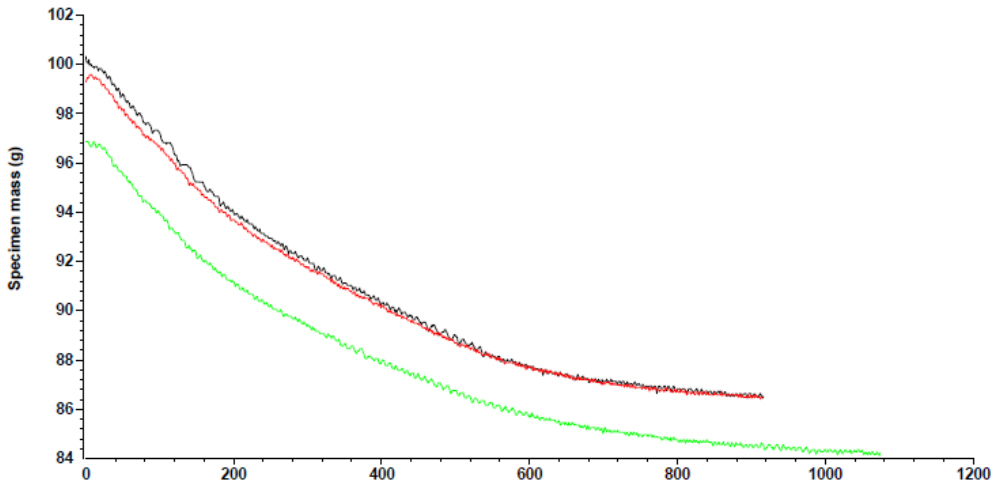
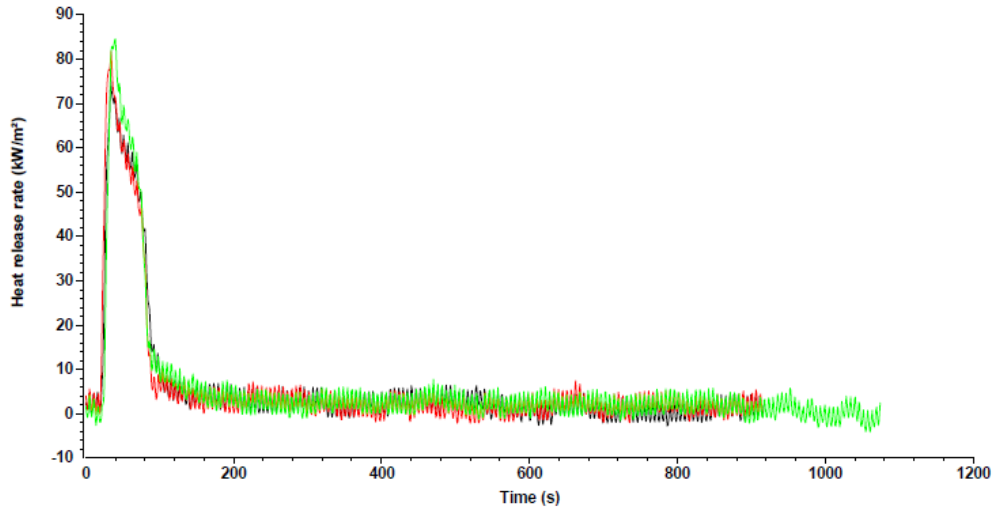
Ignition with orange flames.

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### Graphs



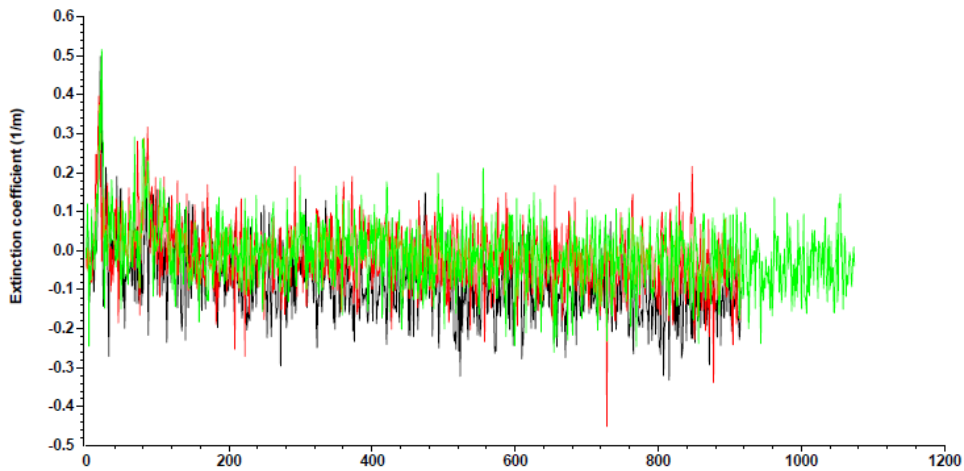
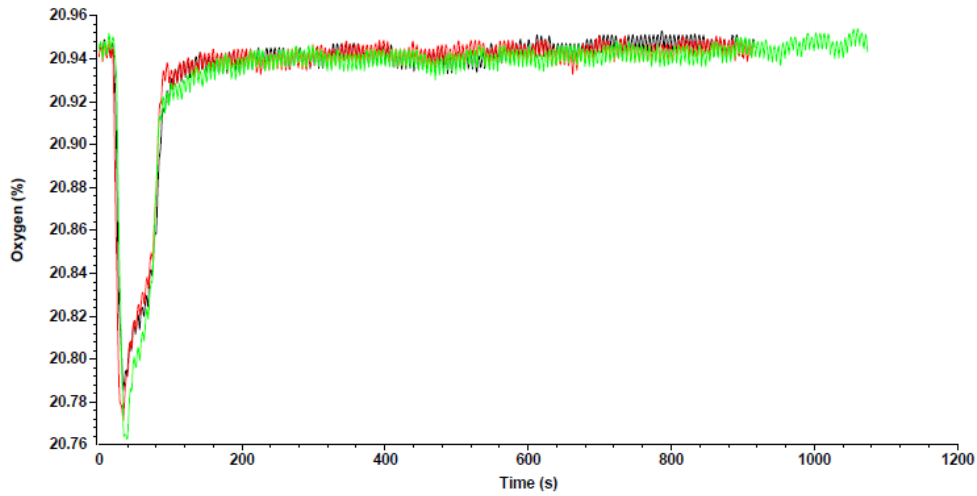
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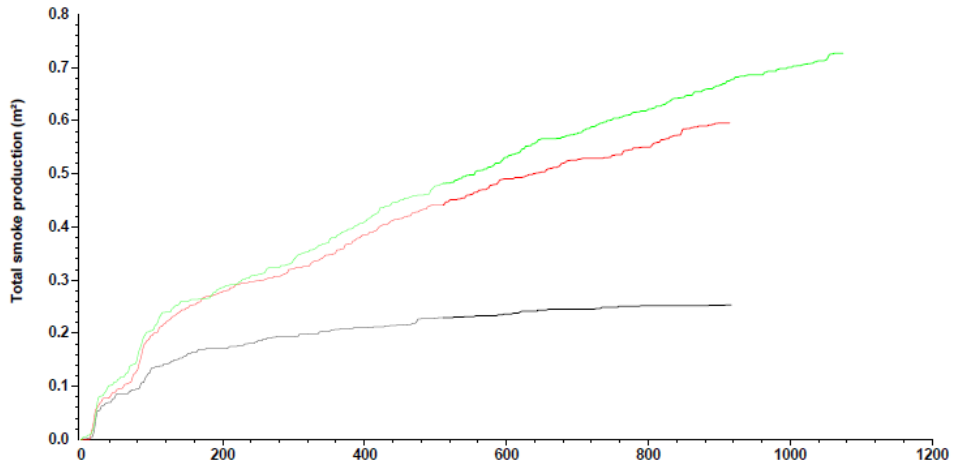
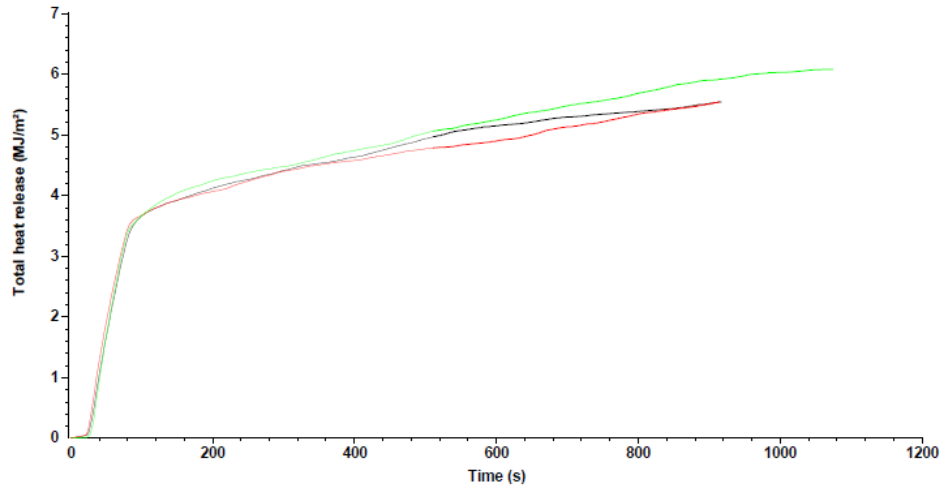


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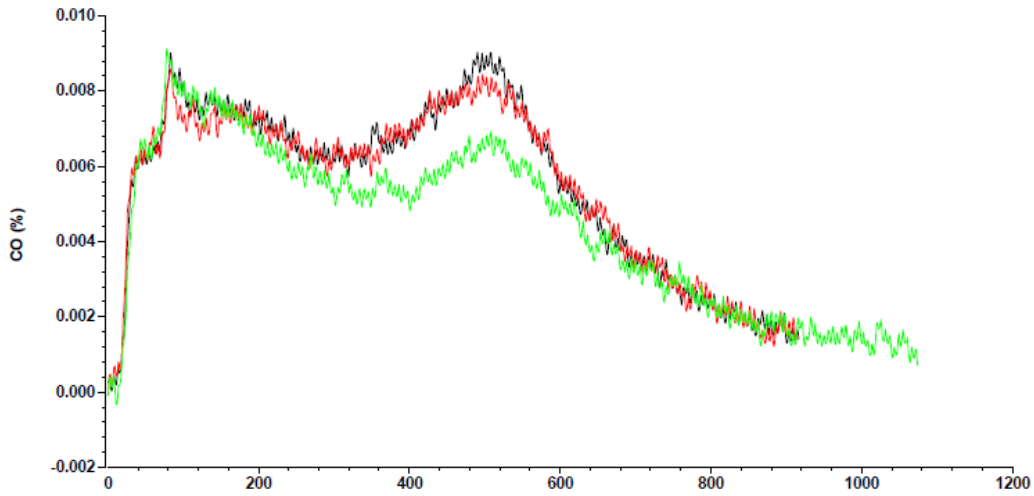
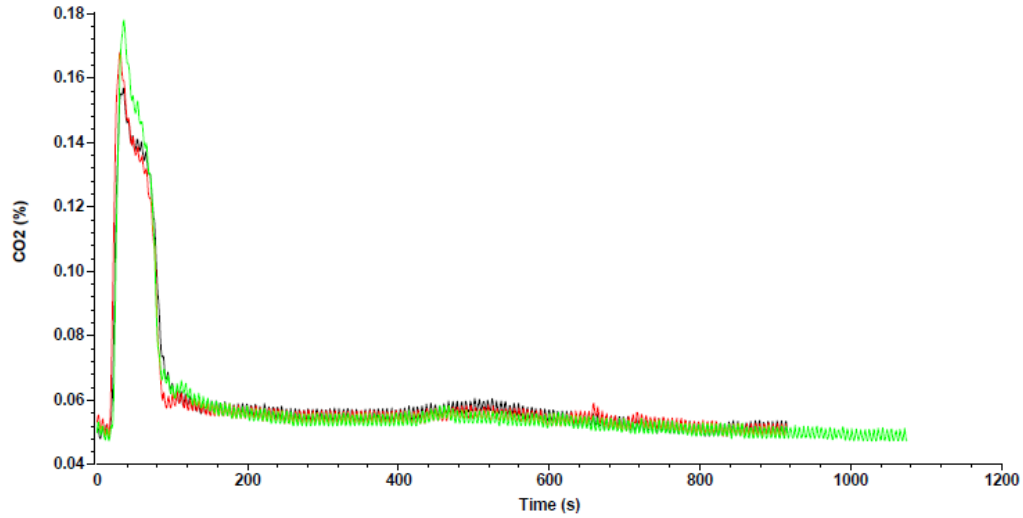


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**SECTION 9**

**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