



TEST REPORT

SCOPE: EMISSIONS, EFFICIENCY AND OUTPUT

FUEL: PELLET

TEST STANDARD: EPA (ASTM E2779-10)

MODEL: OSBURN 3000 PELLET STOVE

Notice to reader: Our Osburn 3000 pellet stove was tested as part of our Cambridge firebox. Therefore, the Cambridge is referenced throughout the attached test report.

TEST REPORT

The Intertek logo consists of the word "Intertek" in white, sans-serif font, centered within a dark blue rounded rectangle.

REPORT NUMBER: 102163747MTL-001

REPORT DATE: July 19th, 2016

**EVALUATION CENTER
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Lachine, Qc.**

RENDERED TO

**Stove Builder International Inc.
250, Copenhagen
St-Augustin-de-Desmaures, G3A 2H3
Canada**

PRODUCT EVALUATED:

Model Cambridge Pellet Stove

Report of Testing of Cambridge Pellet for compliance with the applicable requirements of the following criteria: ASTM E2779-10 Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters in conjunction with ASTM E2515-11.

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I. INTRODUCTION

Intertek Testing Services NA (Intertek) has conducted testing for Stove Builder International (SBI), on the Cambridge pellet stove to evaluate compliance to the amended Standards of Performance for New Residential Wood Heaters (40 CFR Part 60, subpart AAA).

A. GENERAL

Tests were conducted by Claude Pelland, the undersigned. Tests were conducted at the client facility in St-Augustin-de-Desmaures, Quebec located at 250 de Copenhague, St-Augustin-de-Desmaures, Quebec, G3A 2H3. The laboratory elevation is 213 feet above sea level.

Per §60.534 (a)(1)(i), ASTM E2779-10 was used for certification test conditions and the particulate matter emission values, CAN/CSA B415.1-2010 "Performance Testing of Solid-Fuel-Burning Heating Appliances" was used for determination of heat output, efficiency and CO emissions and ASTM E2515-11 "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel" to measure particulate matter emissions. This evaluation was conducted from June 6th to June 7th, 2016.

B. TEST UNIT DESCRIPTION

Information removed for production of Non-confidential Business Information version of report.

C. REPORT ORGANIZATION

This report includes summaries of all data necessary to determine compliance with the regulations. Raw data, calibration records, intermediate calculations, drawings, specifications and other supporting information are contained in appendices of this report.

II. SUMMARY OF TEST RESULTS

A. PRETEST INFORMATION

A sample was submitted to Intertek directly from the client. The sample was not independently selected for testing. The test unit was handed to the Intertek representative at client's facility in St-Augustin-de-Desmaures, Quebec. The unit was inspected upon receipt and found to be in good condition. The unit was set up following manufacturer's instructions without difficulty. Following assembly, the unit was placed on the test stand and instrumented with thermocouples in the specified locations.

Prior to beginning the emissions tests, the unit was operated for a minimum of 50 hours at medium burn rates to break-in the heater. (See data found in Appendix F) The fuel used for the break-in process was wood pellet of premium grade rated by the PFI and made by Energex. The unit was found to be operating satisfactory during this break-in.

Following the pre-burn break-in process the unit was allowed to cool. The unit's chimney system and laboratory dilution tunnel were cleaned using standard wire brush chimney equipment. On June 6th, 2016 the unit was ready for testing.

1. TEST STANDARD

From June 6th to June 7th, 2016, the Cambridge pellet stove particulate emission rates, burn-rates, heat outputs, efficiencies and CO emission rates were evaluated using all applicable sections of ASTM E2779-10, CSA B415.1-10 and ASTM E2515-11 standards.

2. DEVIATION FROM STANDARD METHOD

A deviation was implemented for the measurement of the first hour of particulate matter emissions. A third independent and complete sampling train was installed. During the development of ASTM WK47329, some labs observed that doing a filter switch on one of the sampling train ended most of the time in a deviation between the two filter trains. That is the rationale for using a third independent sampling train.

No other deviations from the standard were performed, however, only applicable sections of standards were used during all testing.

III. SUMMARY OF TEST RESULTS

RUN #1 (June 6th, 2016). Control board was set at speed 12 out of 12 for the first hour, at speed 5 out of 12 for the following two hours and at speed 1 out of 12 for the following hour. Four hours into the test, it became impossible to maintain the proportionality rate of the filters due to the build-up on the filters. This test was therefore invalid.

RUN #2 (June 7th, 2016). Control board was set at speed 12 out of 12 for the first hour, at speed 5 out of 12 for the following two hours and at speed 1 out of 12 for the following three hours. Combustion, exhaust and convection fan and fuel feed system settings can be found in Appendix H. Burn time was 360 minutes. Burn-rate was 0.959 kg/h. This test led to a 2.89 g/h emission rate.

IV. SUMMARY OF OTHER DATA

Table 1 - Emission rates and Efficiencies

Run No.	Test Date	Burn rate	Emission rate	Overall Efficiency ⁽¹⁾	Overall Efficiency ⁽¹⁾	CO rate	First hour emissions
		kg/h	g/h	% HHV	% LHV	g/h	g/h
1	June 6 th , 2016	-	-	-	-	-	-
2	June 7 th , 2016	0.96	2.89	69.8%	75.3%	41	2.88

Table 2 - Efficiencies per categories

Run No.	Burn rate	(DE) Overall Efficiency	(OE) Overall Efficiency
	-	% HHV	% LHV
2	High	71.5%	77.2%
2	Medium	66.2%	71.4%
2	Low	65.6%	70.8%

Table 3 – Test Facility Conditions

Run No.	Room temperature start	Room temperature end	Barometric pressure start	Barometric pressure end	Air Velocity before	Air Velocity after
	°F	°F	in. Hg.	in. Hg.	ft/min	ft/min
1	77	86	29.2	29.5	0	0
2	76	86	29.5	29.4	0	0

Table 4 - Flow measurements

Run No.	Burn time	Velocity	Volumetric Flow rate	Total temperature	Volume sampled		Particulate catch	
					Train 1	Train 2	Train 1	Train 2
	min	ft/s	dscf/min	R	dscf	dscf	mg	mg
1	240	7.78	144.71	570.13	48.350	44.361	-	-
2	360	10.86	207.41	558.42	38.215	34.888	9.3	7.7

Table 5 - Heat output rates

Run No.	Category	Burn rate	Average Total Output	Average Total Output	CO rate
		kg/h	kJ/h	BTU/h	g/h
2	High	0.51	30,900	29,300	22.6
2	Medium	1.04	13,900	13,200	50.1
2	Low	2.15	6,800	6,400	44.8

Table 6 - Dual train precision

Run No.	Sample ratios		Total emissions		First hour	Deviation	Deviation
	Train 1	Train 2	Train 1	Train 2	Train 3		
	-	-	g	g	g	%	g/kg
1	-	-	-	-		-	-
2	1953.90	2140.20	18.17	16.48	2.88 (16.6%)	4.88%	0.28

V. PROCESS DESCRIPTION

A. AIR SUPPLY SYSTEM

Primary combustion air enters on the bottom rear of the heater through a 3" pipe. This air is then split and fed through underneath the burn pot and to the glass air wash system. Combustion gases are then routed through the heat exchanger and to the exhaust at the rear of the heater.

Feed rate as well as combustion, exhaust and convection fans are controlled by an LCD touchscreen on the side of the heater. (See product drawings in Appendix D)

B. TEST FUEL PROPERTIES

Fuel used was a wood pellet of premium grade made by Energex. This pellet has been graded under a licensing agreement with the Pellet Fuels Institute (PFI). Its properties are as follows:

Energy content :	8650 TU/lb
Ash content :	0.615%
Moisture content :	4.75%
Density:	44.5 lb/ft ³ .

VI. SAMPLING SYSTEMS

The sampling procedure used was as specified in ASTM E2515-11.

A. SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel at a point 20 feet from the tunnel entrance. The tunnel has two elbows ahead of the sampling section. (See Figure 1) The sampling section is a continuous 15-foot section of 8-inches diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a Type “S” Pitot tube located 100 inches from the beginning of the sampling section. The dry bulb thermocouple is located six inches downstream from the Pitot tube. Tunnel samplers are located 48 inches downstream of the Pitot tube and 32 inches upstream from the end of this section. (See Figure 1.)

Stack gas samples are collected from the type “L” pellet vent section 8 feet $\pm$ 6 inches above the scale platform. (See Figure 2.)

B. DILUTION TUNNEL

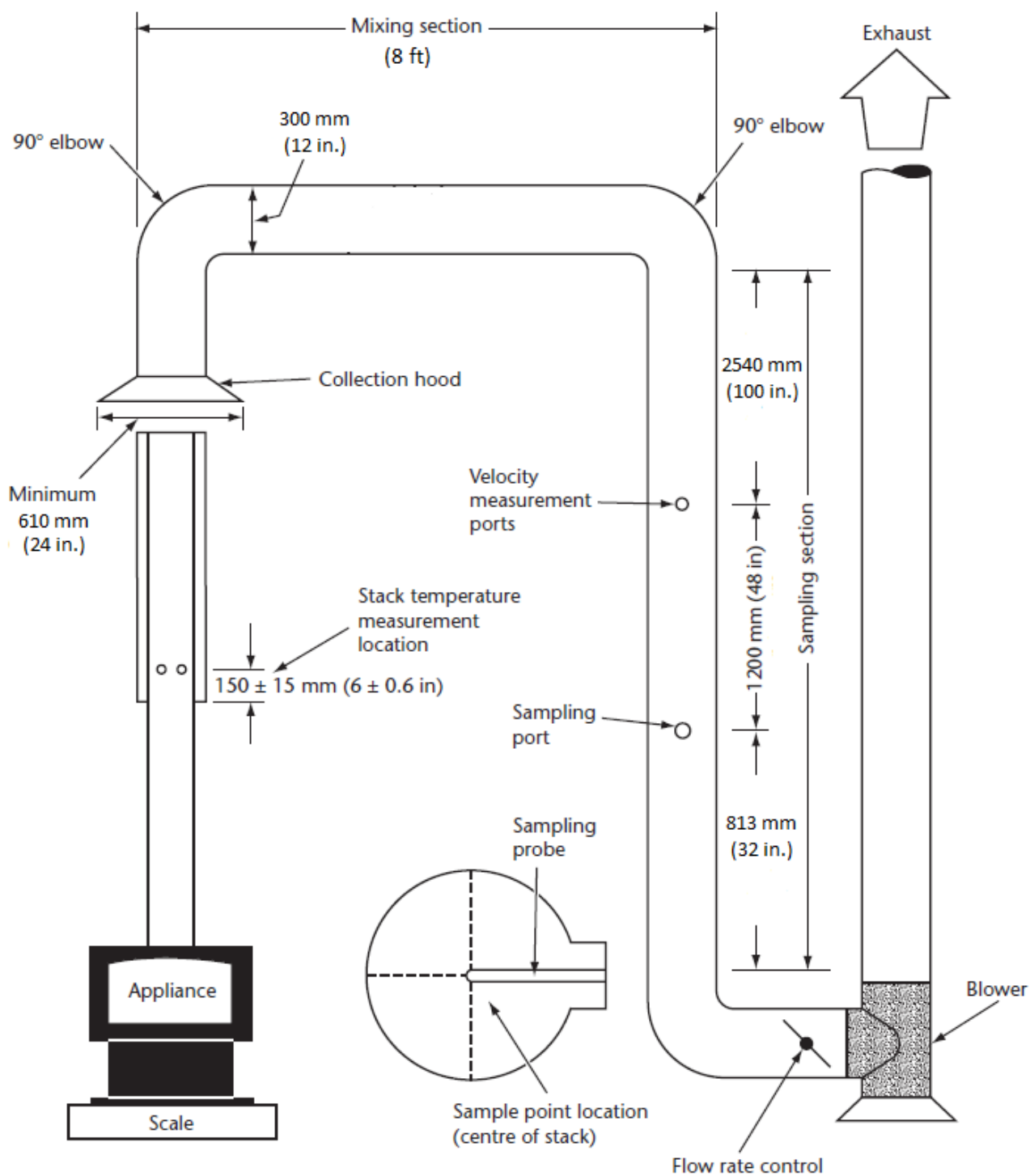
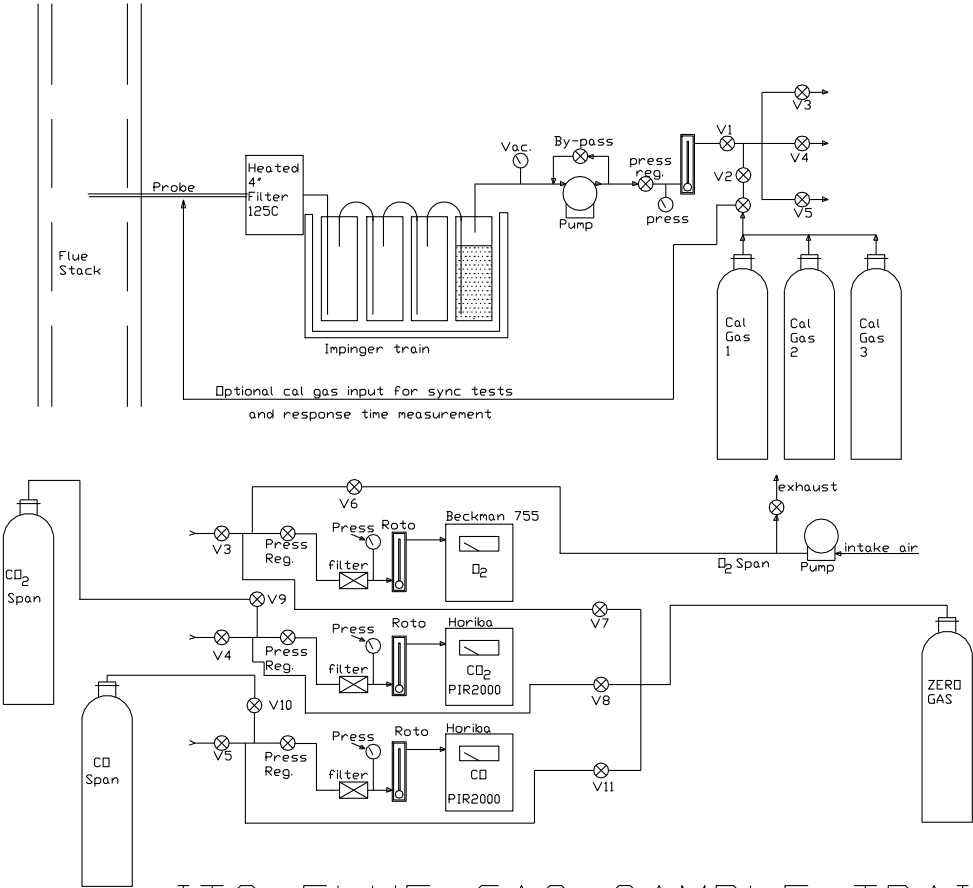


Figure 1- Dilution tunnel

C. STACK GAS SAMPLE TRAIN



ITS FLUE GAS SAMPLE TRAIN
FIGURE 2

D. DILUTION TUNNEL SAMPLE SYSTEMS

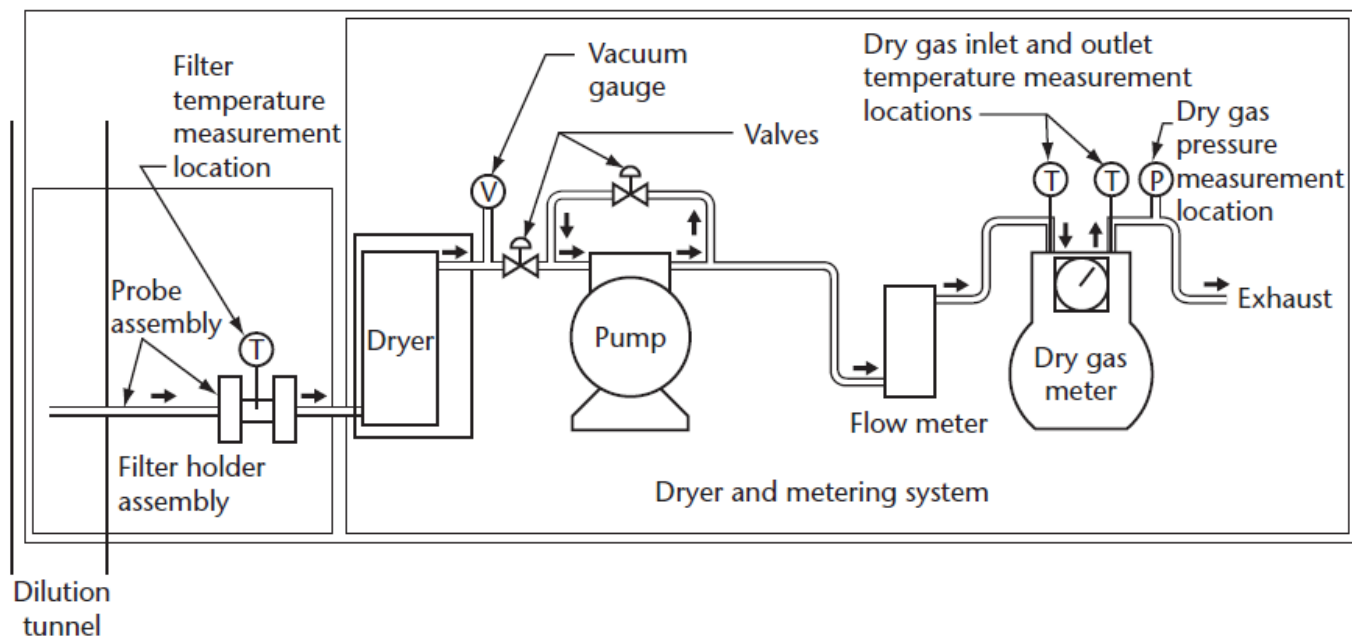


Figure 2 - Sampling trains

VII. SAMPLING METHODS

A. PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515-11. Sample filters used were Pall TX-40. The dryers used in the sample systems are filled with “Drierite” before each test run.

VIII. QUALITY ASSURANCE

A. INSTRUMENT CALIBRATION

1. DRY GAS METERS

At the conclusion of each test program the dry gas meters are checked against a standard dry gas meter. Three runs are made on each dry gas meter used during the test program. The average calibration factors obtained are then compared with the six-month calibration factor and, if within 5%, the six-month factor is used to calculate standard volumes. Results of this calibration are contained in Appendix E.

An integral part of the post test calibration procedure is a leak check of the pressure side by plugging the system exhaust and pressurizing the system to 10” W.C. The system is judged to be leak free if it retains the pressure for at least 10 minutes.

The standard dry gas meter is calibrated every 12 months using a Spirometer designed by the EPA Emissions Measurement Branch. The process involves sampling the train operation for 1 cubic foot of volume. With readings made to .001 ft³, the resolution is 0.1%, giving an accuracy higher than the ±2% required by the standard.

2. STACK SAMPLE ROTOMETER

The stack sample rotameter is checked by running three tests at each flow rate used during the test program. The flow rate is checked by running the rotameter in series with one of the dry gas meters for 10 minutes with the rotameter at a constant setting. The dry gas meter volume measured is then corrected to standard temperature and pressure conditions. The flow rate determined is then used to calculate actual sampled volumes.

3. GAS ANALYZERS

The continuous analyzers are zeroed and spanned before each test with appropriate gases. A mid-scale multi-component calibration gas is then analyzed. At the conclusion of a test, the instruments are checked again with zero, span and calibration gases. The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

At the conclusion of each unit test program, a five-point calibration check is made. This calibration check must meet accuracy requirements of the applicable standards. Consistent deviations between analyzer readings and calibration gas concentrations are used to correct data before computer processing. Data is also corrected for interferences as prescribed by the instrument manufacturer's instructions.

B. TEST METHOD PROCEDURES

1. LEAK CHECK PROCEDURES

Before and after each test, each sample train is tested for leaks. Leakage rates are measured and must not exceed 0.02 CFM or 4% of the sampling rate. Leak checks are performed checking the entire sampling train, not just the dry gas meters. Pre-test and post-test leak checks are conducted with a vacuum of 5 inches of mercury. Vacuum is monitored during each test and the highest vacuum reached is then used for the post test vacuum value. If leakage limits are not met, the test run is rejected. During these tests no vacuum were observed. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

2. TUNNEL VELOCITY/FLOW MEASUREMENT

The tunnel velocity is calculated from a center point Pitot tube signal multiplied by an adjustment factor. This factor is determined by a traverse of the tunnel as prescribed in EPA Method 1. Final tunnel velocities and flow rates are calculated from EPA Method 2, Equation 6.9 and 6.10. (Tunnel cross sectional area is the average from both lines of traverse.)

Pitot tubes are cleaned before each test and leak checks are conducted after each test.

3. PM SAMPLING PROPORTIONALITY (ASTM E2515-11)

Proportionality was calculated in accordance with ASTM E2515-11. The data and results are included in Appendix B.

IX. RESULTS AND OBSERVATIONS

Stove Builder International Inc. model Cambridge pellet stove has been found to be in compliance with the applicable performance requirements of the following criteria:

Standards of Performance for New Residential Wood Heaters (40 CFR Part 60, subpart AAA)

This standard requires that the weighted average particulate emission rate for an appliance not equipped with a catalytic combustor not exceed 4.5 g/h. The unit as tested produced a weighted average emission rate of 2.89 g/h and therefore met this limit.

INTERTEK TESTING SERVICES NA

Reported by: _____
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Test Engineer

Reviewed by: _____
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APPENDIX A
Laboratory Operating Procedure



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Client: Stove Builder International inc.

Issued date: April 29, 2015

A. GAS ANALYSIS

1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.
2. Calibrate analyzers as follows:

NOTE : Prior to proceeding with calibration, make sure to use NIST traceable calibration gas bottles. Adjust flow meter if necessary at each instrument to required flow value.

- a) Using span gas, adjust span control to values specified on calibration gas label.
- b) Using nitrogene, adjust zero controls to provide a 0.00 analyzer readout.
- c) Repeat a) and b) until no further adjustment is required.
- d) Check readout vs. calibration gases (2) labels.

The CO₂ and CO analyzers are "ZEROED" on nitrogen. The O₂ analyzer is spanned on air and set for 20.9%. It is zeroed on nitrogen as well.

3. Check for response time synchronization.
 - a) With no fire in unit, allow reading to stabilize (O₂ should be 20.93, CO and CO₂ should equal O).
 - b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.
4. Set-up sample clean-up and water collection train as follows.
 - a) Load impingers as follows:
Impinger #1: 100 ml distilled water and 5 ml H₂SO₄
Impinger #2: 100 ml distilled water and 5 ml H₂SO₄
Impinger #3: Empty
Impinger #4: 200 – 300 grams silica gel (dry)



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- b) Place impingers in container and connect with "U TUBES". Grease carefully on bottom half of ball joint so that grease will not get into tubes.
- c) Connect filter to first impinger and sample line to last impinger.
- e. Leak check system as follows.
 - 1) Plug probe.
 - 2) Turn on sample system.
 - 3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
 - 4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
 - 5) Repeat leak check procedure until satisfactory results are obtained.
- f) Just prior to starting test, fill impinger container with water and ice and record ambient conditions on data form no. 192-t-9904.

B. Dilution tunnel sample train set-up

- 1. Filters and holders.
 - a) Clean probes and filter holder front housings carefully and desiccate for at least 24 hours prior to use.
 - b) Filters should be numbered and filter and probe combinations labeled prior to use.
 - c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights data form no. 192-p-9904. Note that probe and front half of front filter are to be weighed as a unit.
 - d) Carefully assemble filter holder units and connect to sampling systems. Check "DRIERITE" columns for adequate dry absorbent (blue).
- 2. Leak checking.
 - a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.



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- b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)
- c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM₁) and (DGM₂) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM₃, DGM₄). NOTE: If mark, system is leaking too much and all seals should be checked.
- d) Calculate leakage rate as follows.

1) System 1: $\frac{(DGM_3 - DGM_1)}{10} = CFM_1$

2) System 2: $\frac{(DGM_4 - DGM_2)}{10} = CFM_2$

If CFM₁ or CFM₂ is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM₁ or CFM₂ is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable.

- e) Once leakage check is satisfactory, unplug probe and set flow to appropriate rate for test. This should be done in the minimum amount of time necessary and with the probes in ambient air. Do not insert probes in tunnel until the start of the test run. When flow is established, replug probes to prevent contamination.



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TEST CONDUCT

A. FUEL LOAD

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7. This is the load weight on an as-fired basis.
2. Determine piece size to obtain the requested load configuration and meet the test load weight criteria. The load should consist of the following: **TO BE DETERMINED**
3. Weigh out test load and adjust weight by shortening all pieces equally if necessary.
4. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber should be within range. Contact project manager if you cannot find suitable pieces.

B. Unit start-up

1. Before lighting a fire, turn on dilution tunnel and set flow rate to 140 SCFM if burn rate is to be less than 3 kg/hr or to an appropriate rate from table provided in laboratory for higher burn rates. Record readings on data form no. 192-r-9904.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anemometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.



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C. Test run

1. When the 15 minutes high fire pre-burn period is completed, the test is to be started as follows:
 - a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
 - b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
 - c) Turn on probe sample systems and stack sampler.
 - d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
 - e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
 - f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must record at each interval the following readings on data form no. 192-v-9904:
 - 1) Rotometer readings.
 - 2) Tunnel pitot tube reading.
(Zero regularly between readings)
 - 3) Dry gas meter readings.
 - 4) Temperature readings.
 - 5) Draft reading
 - 6) Test load weight
 - 7) CO, CO₂ and O₂ readings
 - 8) Observations of any unusual or non-routine events.
 - g) During the test, any condition approaching unacceptable limits will be noted. The filter probes and housings are installed in small holders just outside the tunnel. If the filter temperature gets too high, you will have to increase the water flow through the cooling unit until acceptable temperatures are obtained. In between readings, check on other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.



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- h) When the fuel charge is consumed, it will signal end of test and shut down the sampling systems. When this occurs, remove filter holder and probes from tunnel and impingers from sample line.

III. POST TEST PROCEDURES

SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at two (2) hour intervals until weight change between weighings is less than 0.5 mg. Record all weights taken on data form no. 192-p-9904.

Calculation of results

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

Other tests

Fuel samples for each run should be tested for heating value and moisture content by ASTM D3286 and D4442 methods respectively.

GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

Data and Calculation Forms

Appendix B

Time	Ambiant	Flue	Firebox Top	Dilution Tunnel	Firebox Right	Firebox Back	Firebox Bottom	Firebox Left
min	°F	°F	°F	°F	°F	°F	°F	°F
0	79.62	224.03	91.27	96.85	137.16	332.50	86.50	97.50
1	80.12	237.18	91.58	98.85	142.80	360.99	86.94	99.25
2	81.29	242.29	92.97	101.09	147.57	377.91	85.78	101.02
3	80.25	242.95	93.56	103.84	150.74	378.62	85.48	102.90
4	78.94	249.06	93.34	106.54	153.20	391.28	84.13	106.54
5	80.33	256.15	93.97	109.51	156.71	409.39	84.78	107.75
6	79.89	260.49	95.56	112.49	160.51	418.38	85.12	109.51
7	81.15	265.41	95.79	115.58	163.90	429.02	85.83	111.14
8	79.04	269.78	96.20	118.80	166.82	440.59	85.90	113.96
9	78.06	269.42	96.88	122.00	168.06	434.67	85.13	115.34
10	77.78	273.24	96.13	124.95	170.42	441.49	86.14	117.76
11	78.44	280.37	96.84	128.35	174.23	463.41	86.94	119.13
12	77.97	283.76	97.88	131.41	176.67	469.14	87.84	121.25
13	77.42	285.63	98.59	134.40	179.28	471.10	87.19	123.58
14	77.61	287.79	98.63	137.52	181.04	472.75	87.48	125.08
15	77.17	287.92	99.11	140.34	182.31	468.06	86.93	127.17
16	77.27	289.34	99.12	143.11	183.04	465.75	86.63	129.52
17	77.83	292.32	100.36	145.77	185.09	477.85	88.61	132.13
18	77.21	293.04	99.33	148.17	186.45	481.81	87.30	133.55
19	77.07	290.18	98.89	150.67	186.39	464.98	89.82	133.22
20	77.35	291.08	99.21	152.81	187.40	458.21	91.42	134.29
21	77.59	296.78	99.02	154.74	190.75	476.49	93.26	136.62
22	78.24	301.07	99.32	156.68	192.65	489.20	93.31	137.48
23	78.50	303.04	99.13	158.63	194.43	492.05	93.58	139.82
24	78.76	301.87	99.14	160.62	195.38	483.70	94.76	140.86
25	79.22	304.21	98.98	162.55	197.07	487.97	95.48	141.47
26	79.56	305.15	100.12	164.38	198.54	490.47	96.30	143.11
27	80.59	306.25	99.61	166.35	199.44	490.42	96.69	145.15
28	80.66	309.33	99.84	168.15	200.60	499.95	97.11	146.71
29	80.25	310.69	99.97	169.62	201.87	503.88	95.95	147.00
30	80.15	310.63	100.56	171.12	202.86	503.13	93.65	150.42
31	80.82	312.78	109.77	172.33	203.38	506.62	93.03	150.29

32	79.57	313.52	113.31	173.70	203.89	509.64	91.92	149.59
33	79.19	312.66	93.32	174.85	204.29	504.05	90.95	150.62
34	78.40	312.91	113.43	175.92	204.24	502.57	91.29	151.22
35	77.93	315.22	114.85	176.86	205.54	512.18	92.19	151.20
36	79.01	316.43	116.22	178.06	205.26	520.49	91.49	152.11
37	78.44	317.04	117.19	179.00	206.81	522.89	91.78	152.25
38	79.25	317.87	117.84	179.91	207.16	524.85	91.50	153.27
39	78.16	318.60	117.60	180.84	207.90	530.10	91.98	155.23
40	77.76	318.89	117.89	181.56	207.80	527.13	90.91	156.04
41	78.15	319.32	118.13	182.32	208.40	524.86	90.74	155.44
42	77.35	321.55	118.62	183.17	209.44	533.90	92.25	154.88
43	78.32	321.41	118.13	183.98	210.21	533.41	90.98	156.11
44	78.99	322.60	118.48	184.91	210.80	533.27	92.46	158.03
45	77.74	322.10	118.51	185.47	210.55	527.39	91.59	156.86
46	77.53	322.75	118.24	186.22	211.74	530.83	90.75	158.57
47	79.23	323.18	118.61	187.11	211.64	533.20	91.54	158.23
48	77.88	324.07	118.88	187.56	211.83	533.26	91.06	157.92
49	77.53	326.71	119.14	188.11	212.77	542.71	91.62	158.04
50	77.67	326.98	118.95	188.90	213.39	540.68	91.88	158.44
51	77.60	328.14	119.43	189.49	213.92	546.40	91.22	161.51
52	77.85	328.13	119.27	190.27	214.80	545.90	91.37	160.41
53	77.59	329.15	119.64	190.82	215.18	546.61	92.26	160.62
54	77.26	329.01	120.16	191.91	215.55	543.90	92.68	160.56
55	77.65	328.72	119.98	192.41	215.48	542.24	90.45	161.37
56	77.60	332.13	120.30	193.20	215.04	548.73	90.76	161.69
57	77.59	336.70	121.67	193.67	215.87	559.38	90.62	161.67
58	77.30	339.47	121.08	194.19	217.26	568.12	91.71	161.65
59	77.25	338.02	121.15	194.64	216.72	552.52	90.90	161.73

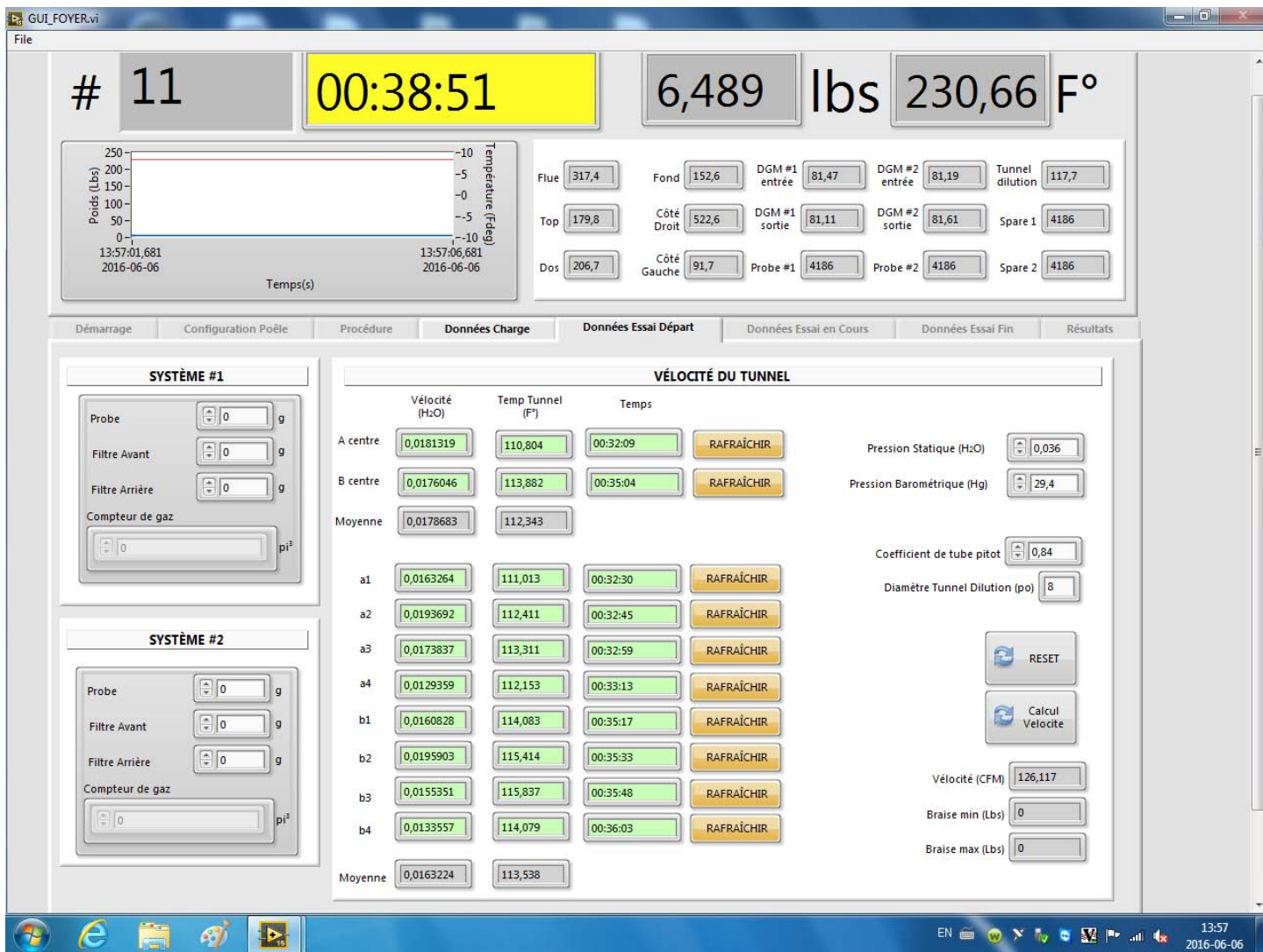
DGM Outlet 1	DGM Inlet 1	Probe 1	DGM Outlet 2	DGM Inlet 2	Probe 2	Probe 3	Draft	Dilution Tunnel	Scale
°F	°F	°F	°F	°F	°F	°F	"H ₂ O	"H ₂ O	lb
81.19	81.26	N/A	80.36	81.98	N/A	N/A	0.018	0.022	9.27
81.17	81.24	N/A	80.37	81.95	N/A	N/A	0.016	0.022	9.17
81.18	81.24	N/A	80.38	81.92	N/A	N/A	0.020	0.022	9.11
81.18	81.20	N/A	80.40	81.88	N/A	N/A	0.019	0.022	9.07
81.20	81.19	N/A	80.43	81.86	N/A	N/A	0.016	0.022	9.00
81.20	81.14	N/A	80.44	81.81	N/A	N/A	0.020	0.021	8.90
81.22	81.11	N/A	80.48	81.79	N/A	N/A	0.017	0.022	8.87
81.24	81.08	N/A	80.50	81.77	N/A	N/A	0.017	0.022	8.79
81.25	81.05	N/A	80.53	81.76	N/A	N/A	0.020	0.022	8.71
81.26	81.01	N/A	80.55	81.73	N/A	N/A	0.019	0.022	8.66
81.27	80.99	N/A	80.58	81.72	N/A	N/A	0.020	0.021	8.61
81.28	80.97	N/A	80.60	81.71	N/A	N/A	0.018	0.022	8.51
81.29	80.97	N/A	80.63	81.70	N/A	N/A	0.019	0.022	8.43
81.30	80.96	N/A	80.67	81.69	N/A	N/A	0.017	0.021	8.38
81.31	80.95	N/A	80.70	81.69	N/A	N/A	0.019	0.022	8.30
81.31	80.96	N/A	80.74	81.70	N/A	N/A	0.017	0.021	8.26
81.32	80.94	N/A	80.77	81.70	N/A	N/A	0.018	0.022	8.18
81.31	80.92	N/A	80.79	81.71	N/A	N/A	0.021	0.021	8.10
81.33	80.91	N/A	80.83	81.70	N/A	N/A	0.021	0.022	8.03
81.37	80.91	N/A	80.87	81.73	N/A	N/A	0.021	0.022	8.00
81.38	80.90	N/A	80.88	81.72	N/A	N/A	0.018	0.022	7.93
81.39	80.89	N/A	80.92	81.71	N/A	N/A	0.020	0.022	7.82
81.41	80.90	N/A	80.94	81.72	N/A	N/A	0.022	0.022	7.74
81.41	80.92	N/A	80.96	81.72	N/A	N/A	0.019	0.022	7.64
81.43	80.92	N/A	80.98	81.69	N/A	N/A	0.021	0.021	7.59
81.43	80.94	N/A	81.00	81.68	N/A	N/A	0.020	0.021	7.48
81.43	80.94	N/A	81.02	81.68	N/A	N/A	0.019	0.021	7.40
81.45	80.95	N/A	81.03	81.68	N/A	N/A	0.022	0.021	7.32
81.44	80.95	N/A	81.06	81.70	N/A	N/A	0.021	0.021	7.22
81.46	80.96	N/A	81.10	81.71	N/A	N/A	0.018	0.022	7.17
81.45	80.94	N/A	81.12	81.71	N/A	N/A	0.022	0.022	7.07
81.46	80.95	N/A	81.14	81.70	N/A	N/A	0.021	0.018	7.00

81.48	80.98	N/A	81.16	81.70	N/A	N/A	0.018	0.017	6.91
81.49	81.01	N/A	81.17	81.67	N/A	N/A	0.022	0.002	6.86
81.48	81.03	N/A	81.16	81.63	N/A	N/A	0.021	0.018	6.78
81.49	81.07	N/A	81.17	81.61	N/A	N/A	0.018	0.014	6.72
81.48	81.09	N/A	81.18	81.61	N/A	N/A	0.020	0.017	6.62
81.48	81.11	N/A	81.19	81.61	N/A	N/A	0.021	0.018	6.55
81.48	81.13	N/A	81.20	81.63	N/A	N/A	0.020	0.018	6.48
81.49	81.13	N/A	81.22	81.62	N/A	N/A	0.018	0.018	6.41
81.49	81.14	N/A	81.24	81.64	N/A	N/A	0.020	0.018	6.35
81.49	81.11	N/A	81.25	81.65	N/A	N/A	0.020	0.018	6.28
81.51	81.11	N/A	81.29	81.69	N/A	N/A	0.021	0.018	6.17
81.51	81.10	N/A	81.29	81.70	N/A	N/A	0.019	0.017	6.12
81.53	81.11	N/A	81.33	81.73	N/A	N/A	0.023	0.018	6.02
81.56	81.13	N/A	81.36	81.77	N/A	N/A	0.022	0.017	5.94
81.56	81.13	N/A	81.38	81.78	N/A	N/A	0.019	0.017	5.85
81.57	81.14	N/A	81.40	81.81	N/A	N/A	0.019	0.017	5.79
81.57	81.14	N/A	81.41	81.81	N/A	N/A	0.023	0.017	5.72
81.58	81.16	N/A	81.44	81.84	N/A	N/A	0.021	0.018	5.63
81.58	81.17	N/A	81.45	81.86	N/A	N/A	0.023	0.017	5.54
81.58	81.17	N/A	81.46	81.87	N/A	N/A	0.019	0.018	5.45
81.60	81.20	N/A	81.48	81.87	N/A	N/A	0.019	0.018	5.37
81.60	81.21	N/A	81.49	81.88	N/A	N/A	0.020	0.018	5.31
81.62	81.23	N/A	81.51	81.89	N/A	N/A	0.019	0.017	5.19
81.64	81.23	N/A	81.51	81.89	N/A	N/A	0.020	0.018	5.11
81.67	81.25	N/A	81.52	81.92	N/A	N/A	0.023	0.018	5.04
81.69	81.28	80.65	81.54	81.93	79.37	79.56	0.023	0.017	4.96
81.70	81.28	80.93	81.54	81.94	79.48	79.65	0.019	0.018	4.87
81.71	81.32	81.22	81.57	81.96	79.54	79.73	0.023	0.017	4.79

Time	Ambiant	Flue	Dilution Tunnel	Firebox Top	Firebox Back	Firebox Right	Firebox Left	Firebox Bottom
min	°F	°F	°F	°F	°F	°F	°F	°F
0	77.47	340.47	121.89	195.10	553.95	217.12	162.30	90.99
10	77.21	338.76	122.30	195.74	529.28	217.97	162.00	94.99
20	77.67	345.46	123.92	193.84	553.69	220.65	160.74	95.51
30	77.67	339.80	122.93	192.79	529.88	218.56	160.75	95.94
40	77.39	337.20	123.05	191.84	529.92	217.22	159.59	94.99
50	77.50	348.66	124.63	192.06	543.81	222.12	160.54	97.15
60	77.72	349.63	124.63	192.09	549.97	224.72	162.12	98.50
70	77.92	283.03	119.13	188.95	391.86	195.65	155.16	88.46
80	77.91	247.51	112.30	168.22	339.33	168.45	138.00	84.92
90	77.37	226.44	108.10	151.43	306.07	153.94	125.57	82.87
100	78.12	222.12	106.26	138.71	300.47	148.24	117.25	83.81
110	78.18	212.56	105.03	132.05	282.80	144.56	113.39	84.46
120	80.74	209.50	105.37	128.50	275.46	142.71	112.46	86.02
130	78.83	212.69	105.98	127.50	288.50	143.20	110.72	83.31
140	77.12	217.44	106.79	126.34	298.79	143.30	109.24	82.58
150	80.98	202.79	104.72	126.49	262.34	139.98	110.54	86.43
160	78.76	214.47	106.18	125.55	289.06	143.11	110.17	83.23
170	77.42	212.19	105.88	125.32	283.78	141.08	108.83	81.57
180	77.91	209.80	104.90	124.08	275.91	141.48	108.44	84.93
190	79.35	183.39	100.45	123.92	230.37	131.96	108.49	81.22
200	79.38	168.36	96.96	116.80	208.98	120.85	102.37	77.53
210	79.78	165.62	97.42	112.26	204.83	119.74	101.09	84.14
220	79.93	167.14	97.56	112.45	209.02	121.52	102.67	85.07
230	80.38	162.07	96.79	111.71	197.70	119.68	102.85	85.01
240	80.42	162.48	97.69	110.78	195.74	120.08	102.73	85.19

DGM Outlet 1	DGM Inlet 1	Probe 1	DGM Outlet 2	DGM Inlet 2	Probe 2	Probe 3	Draft	Dilution Tunnel	Scale
°F	°F	°F	°F	°F	°F	°F	"H ₂ O	"H ₂ O	lb
81.73	81.34	81.33	81.59	81.98	79.56	79.76	0.023	0.017	4.72
85.19	82.98	89.27	84.95	83.25	89.31	89.22	0.022	0.017	27.49
87.79	84.12	89.47	87.55	83.99	88.95	88.07	0.022	0.020	26.67
87.45	84.44	86.44	87.29	85.16	88.89	87.84	0.022	0.019	25.90
86.54	85.65	86.67	87.47	86.41	88.95	87.77	0.023	0.016	25.11
87.27	86.65	86.63	88.43	87.48	88.94	88.77	0.022	0.018	24.26
87.83	87.33	87.01	88.00	88.12	88.04	89.25	0.019	0.020	23.42
88.81	88.02	86.81	88.76	88.72	86.84	N/A	0.021	0.018	22.91
89.03	88.18	85.53	89.17	88.16	85.31	N/A	0.019	0.018	22.51
89.33	88.36	84.91	89.50	88.75	84.54	N/A	0.018	0.020	22.13
89.58	88.52	84.92	89.72	89.06	83.92	N/A	0.018	0.019	21.73
89.65	88.68	85.36	89.82	89.10	84.05	N/A	0.014	0.021	21.38
89.49	88.80	88.40	89.98	89.14	86.42	N/A	0.015	0.017	20.97
89.88	89.17	89.42	89.95	89.15	87.45	N/A	0.016	0.020	20.65
89.75	89.14	87.82	89.20	89.39	87.18	N/A	0.017	0.017	20.29
89.70	89.09	85.32	89.99	89.35	84.29	N/A	0.016	0.017	19.94
89.77	89.10	85.37	89.87	89.37	84.24	N/A	0.017	0.018	19.57
89.75	89.14	85.30	89.55	89.44	84.18	N/A	0.017	0.017	19.24
89.06	89.53	84.62	89.20	89.02	83.81	N/A	0.016	0.016	18.89
89.93	89.56	84.15	89.27	88.93	83.26	N/A	0.014	0.017	18.60
89.87	89.63	83.31	89.16	89.11	82.65	N/A	0.014	0.018	18.44
89.93	89.48	83.28	89.52	89.29	82.51	N/A	0.013	0.017	18.16
89.79	89.39	83.25	89.47	89.13	82.46	N/A	0.013	0.015	17.91
87.87	88.95	81.95	88.75	88.50	80.90	N/A	0.013	0.016	17.72
85.46	86.33	80.81	88.94	87.07	N/A	N/A	0.015	0.015	17.53

Date/heure	Time	O ₂	CO	CO ₂ IR	CO
YYYY-MM-DD HH:MM:SS	min	%	ppm	%	%
2016-06-06 13:31:56	0	15.30	369	5.58	0.04
2016-06-06 13:41:56	10	15.22	590	5.51	0.06
2016-06-06 13:51:56	20	15.93	377	5.30	0.04
2016-06-06 14:01:56	30	14.89	334	5.43	0.03
2016-06-06 14:11:56	40	15.83	471	5.70	0.05
2016-06-06 14:21:56	50	14.96	418	5.96	0.04
2016-06-06 14:31:56	60	18.48	573	3.46	0.06
2016-06-06 14:41:56	70	18.29	522	2.67	0.05
2016-06-06 14:51:56	80	18.88	582	2.25	0.06
2016-06-06 15:01:56	90	19.06	632	2.32	0.06
2016-06-06 15:11:56	100	19.22	726	2.01	0.07
2016-06-06 15:21:56	110	18.11	599	1.97	0.06
2016-06-06 15:31:56	120	18.54	548	2.20	0.05
2016-06-06 15:41:56	130	18.84	713	2.22	0.07
2016-06-06 15:51:56	140	18.59	965	1.87	0.10
2016-06-06 16:01:56	150	18.60	1023	2.15	0.10
2016-06-06 16:11:56	160	19.19	992	1.85	0.10
2016-06-06 16:21:56	170	19.00	694	2.03	0.07
2016-06-06 16:31:56	180	19.85	667	1.63	0.07
2016-06-06 16:41:56	190	19.81	678	1.12	0.07
2016-06-06 16:51:56	200	19.22	663	1.23	0.07
2016-06-06 17:01:56	210	19.76	794	1.09	0.08
2016-06-06 17:11:56	220	19.71	739	1.07	0.07
2016-06-06 17:21:56	230	20.51	793	1.07	0.08



Time	Ambiant	Flue	Firebox Top	Dilution Tunnel	Firebox Right	Firebox Back	Firebox Bottom	Firebox Left	DGM Outlet 1
min	°F	°F	°F	°F	°F	°F	°F	°F	°F
0	78.20	269.29	104.81	117.54	167.91	415.36	82.57	113.49	80.99
1	77.57	275.95	105.66	120.07	171.82	432.32	83.12	116.01	81.01
2	78.15	281.54	106.45	122.78	174.11	443.54	82.28	117.57	81.05
3	77.43	285.71	106.75	125.51	177.87	452.21	82.55	119.33	81.09
4	77.18	287.17	106.85	128.47	180.46	452.60	83.04	121.29	81.14
5	76.98	287.59	107.29	131.15	181.69	447.12	81.73	123.05	81.19
6	76.69	293.09	107.95	133.81	184.49	454.77	83.26	125.38	81.22
7	76.83	297.29	108.46	136.56	186.94	462.20	85.47	126.36	81.27
8	77.20	298.35	108.40	139.09	188.95	461.97	87.56	128.35	81.30
9	78.13	300.79	109.52	141.69	190.60	462.69	88.68	129.60	81.36
10	78.55	309.47	110.51	144.22	195.08	483.98	90.53	131.76	81.42
11	78.39	311.18	110.61	146.68	197.54	482.58	90.56	134.61	81.47
12	78.61	318.05	110.92	149.25	201.33	500.42	90.05	136.47	81.50
13	78.60	320.52	111.53	151.99	203.93	497.47	90.88	138.74	81.53
14	78.67	325.45	112.66	154.65	206.58	506.65	91.03	140.81	81.53
15	78.70	325.95	112.92	157.15	207.72	505.14	91.11	142.97	81.54
16	78.85	325.43	113.65	159.54	208.73	496.19	90.27	144.62	81.54
17	79.14	326.71	114.50	161.60	210.07	490.95	90.29	145.81	81.53
18	79.20	326.26	114.27	163.82	210.68	493.21	91.68	148.60	81.52
19	79.06	328.58	114.62	165.63	211.74	492.82	91.25	149.61	81.51
20	79.55	330.38	114.87	167.45	212.75	500.94	92.79	151.32	81.49
21	79.64	335.16	115.86	169.12	215.13	517.54	91.67	151.93	81.48
22	79.43	330.72	115.32	170.97	216.01	505.57	90.52	152.96	81.45
23	79.39	334.66	116.20	172.53	216.33	511.14	92.54	154.78	81.43
24	79.74	338.77	116.76	174.05	218.02	521.59	91.56	155.65	81.41
25	79.85	338.46	116.92	175.65	218.70	518.60	93.54	156.94	81.40
26	80.02	341.59	117.60	177.01	220.20	528.61	92.30	157.79	81.38
27	79.77	343.54	117.44	178.13	223.95	532.14	92.87	159.46	81.37
28	79.41	343.90	116.14	179.33	225.25	530.53	92.16	160.07	81.36
29	79.07	343.96	116.26	180.41	225.34	528.65	92.72	160.30	81.37
30	80.70	344.13	116.27	181.30	224.92	531.01	89.67	161.37	81.36
31	78.83	343.61	116.39	182.02	224.91	527.28	91.69	161.45	81.36

32	78.62	348.86	115.19	182.76	226.47	544.73	91.07	161.14	81.35
33	78.56	347.74	112.98	183.55	227.40	540.80	90.13	161.42	81.35
34	78.26	344.97	106.52	184.52	226.89	524.18	89.37	161.72	81.34
35	78.86	346.70	102.58	185.21	226.67	531.61	88.64	162.01	81.34
36	78.29	347.80	107.80	185.62	226.94	541.47	89.41	164.20	81.34
37	77.51	350.66	110.03	186.32	228.41	550.13	90.08	163.89	81.34
38	78.11	348.27	110.01	187.00	227.54	535.48	88.14	163.99	81.32
39	78.14	349.31	110.07	187.76	227.68	537.15	88.12	163.82	81.32
40	77.79	349.29	109.39	188.07	227.89	534.56	87.58	163.47	81.32
41	77.77	348.14	109.58	188.63	227.39	528.68	87.73	163.63	81.33
42	77.76	349.33	111.26	188.73	227.54	531.37	88.14	163.64	81.33
43	77.54	350.96	111.73	189.10	228.06	536.31	88.61	164.82	81.33
44	77.75	351.44	112.16	189.14	228.68	538.14	87.91	165.70	81.33
45	77.21	355.00	112.28	189.50	229.76	548.85	88.12	165.13	81.35
46	77.23	356.21	112.30	189.76	230.17	545.52	86.81	164.96	81.36
47	77.06	356.31	112.41	190.07	231.25	554.87	86.85	165.49	81.39
48	78.18	357.11	112.16	190.36	231.85	561.01	88.64	166.42	81.43
49	77.05	358.24	112.41	190.42	232.40	559.92	86.91	166.44	81.47
50	76.86	359.29	112.41	190.61	231.97	555.36	87.61	167.17	81.51
51	76.94	358.84	112.86	191.16	232.22	548.48	86.70	167.04	81.54
52	77.00	360.22	112.50	191.39	233.10	560.21	87.64	170.17	81.56
53	76.57	357.37	112.78	191.61	233.38	555.86	86.97	170.42	81.59
54	77.06	356.39	112.50	192.26	232.50	556.69	87.31	168.85	81.61
55	76.84	357.92	112.75	192.36	232.84	563.76	87.91	168.81	81.64
56	76.74	359.32	112.37	192.82	233.53	567.98	87.55	169.16	81.67
57	76.65	357.69	112.34	193.41	232.75	558.26	87.43	168.72	81.69
58	76.65	357.41	112.17	193.74	232.03	546.84	86.65	169.00	81.72
59	76.56	360.91	112.52	193.73	232.93	560.92	86.53	172.22	81.73

DGM Inlet 1	Probe 1	DGM Outlet 2	DGM Inlet 2	Probe 2	Draft	Dilution Tunnel	Scale
°F	°F	°F	°F	°F	"H ₂ O	"H ₂ O	lb
79.95	N/A	81.47	80.95	N/A	0.018	0.027	8.59
79.95	N/A	81.51	80.99	N/A	0.017	0.026	8.55
79.97	N/A	81.57	81.04	N/A	0.020	0.027	8.47
79.98	N/A	81.62	81.06	N/A	0.020	0.026	8.40
80.00	N/A	81.67	81.08	N/A	0.020	0.026	8.35
80.03	N/A	81.71	81.08	N/A	0.019	0.027	8.28
80.07	N/A	81.71	81.09	N/A	0.018	0.026	8.22
80.11	N/A	81.71	81.10	N/A	0.019	0.025	8.16
80.14	N/A	81.67	81.09	N/A	0.018	0.026	8.10
80.17	N/A	81.64	81.09	N/A	0.020	0.025	8.00
80.21	N/A	81.61	81.10	N/A	0.022	0.024	7.91
80.25	N/A	81.58	81.10	N/A	0.022	0.024	7.84
80.29	N/A	81.57	81.10	N/A	0.018	0.027	7.73
80.34	N/A	81.57	81.10	N/A	0.021	0.027	7.64
80.39	N/A	81.59	81.12	N/A	0.020	0.027	7.55
80.44	N/A	81.61	81.12	N/A	0.021	0.024	7.47
80.49	N/A	81.64	81.12	N/A	0.022	0.026	7.40
80.54	N/A	81.68	81.14	N/A	0.019	0.027	7.32
80.60	N/A	81.68	81.14	N/A	0.020	0.023	7.24
80.65	N/A	81.70	81.14	N/A	0.019	0.025	7.16
80.69	N/A	81.70	81.15	N/A	0.020	0.025	7.08
80.74	N/A	81.72	81.17	N/A	0.023	0.024	6.98
80.81	N/A	81.73	81.19	N/A	0.019	0.024	6.92
80.87	N/A	81.73	81.21	N/A	0.022	0.024	6.83
80.94	N/A	81.74	81.22	N/A	0.019	0.025	6.74
81.00	N/A	81.76	81.25	N/A	0.023	0.024	6.66
81.07	N/A	81.78	81.26	N/A	0.021	0.024	6.56
81.13	N/A	81.82	81.26	N/A	0.020	0.025	6.51
81.17	N/A	81.82	81.26	N/A	0.022	0.026	6.40
81.23	N/A	81.85	81.27	N/A	0.023	0.024	6.35
81.27	N/A	81.86	81.25	N/A	0.021	0.024	6.29
81.29	N/A	81.87	81.26	N/A	0.021	0.024	6.21

81.30	N/A	81.89	81.28	N/A	0.021	0.020	6.12
81.29	N/A	81.90	81.30	N/A	0.021	0.019	6.08
81.28	N/A	81.93	81.34	N/A	0.021	0.020	6.02
81.28	N/A	81.97	81.39	N/A	0.023	0.031	5.91
81.26	N/A	81.98	81.42	N/A	0.019	0.033	5.86
81.26	N/A	82.01	81.46	N/A	0.019	0.032	5.78
81.24	N/A	82.03	81.48	N/A	0.020	0.031	5.73
81.23	N/A	82.05	81.50	N/A	0.022	0.031	5.65
81.22	N/A	82.06	81.53	N/A	0.021	0.032	5.59
81.21	N/A	82.08	81.54	N/A	0.020	0.035	5.51
81.20	N/A	82.11	81.56	N/A	0.023	0.036	5.44
81.21	N/A	82.13	81.57	N/A	0.021	0.034	5.37
81.19	N/A	82.15	81.57	N/A	0.023	0.035	5.26
81.19	N/A	82.17	81.59	N/A	0.020	0.038	5.19
81.16	N/A	82.19	81.60	N/A	0.022	0.034	5.09
81.15	N/A	82.20	81.61	N/A	0.022	0.035	5.00
81.14	N/A	82.20	81.63	N/A	0.022	0.033	4.93
81.12	N/A	82.20	81.64	N/A	0.023	0.037	4.85
81.10	N/A	82.20	81.66	N/A	0.020	0.035	4.75
81.09	N/A	82.21	81.68	N/A	0.023	0.036	4.66
81.07	N/A	82.22	81.72	N/A	0.021	0.037	4.58
81.07	N/A	82.23	81.76	N/A	0.022	0.036	4.51
81.04	N/A	82.24	81.80	N/A	0.022	0.034	4.44
81.03	N/A	82.26	81.84	N/A	0.022	0.035	4.32
81.03	N/A	82.28	81.87	N/A	0.024	0.037	4.24
81.04	N/A	82.32	81.91	N/A	0.020	0.035	4.15
81.05	N/A	82.34	81.93	N/A	0.020	0.038	4.08
81.04	N/A	82.37	81.94	N/A	0.024	0.036	3.98

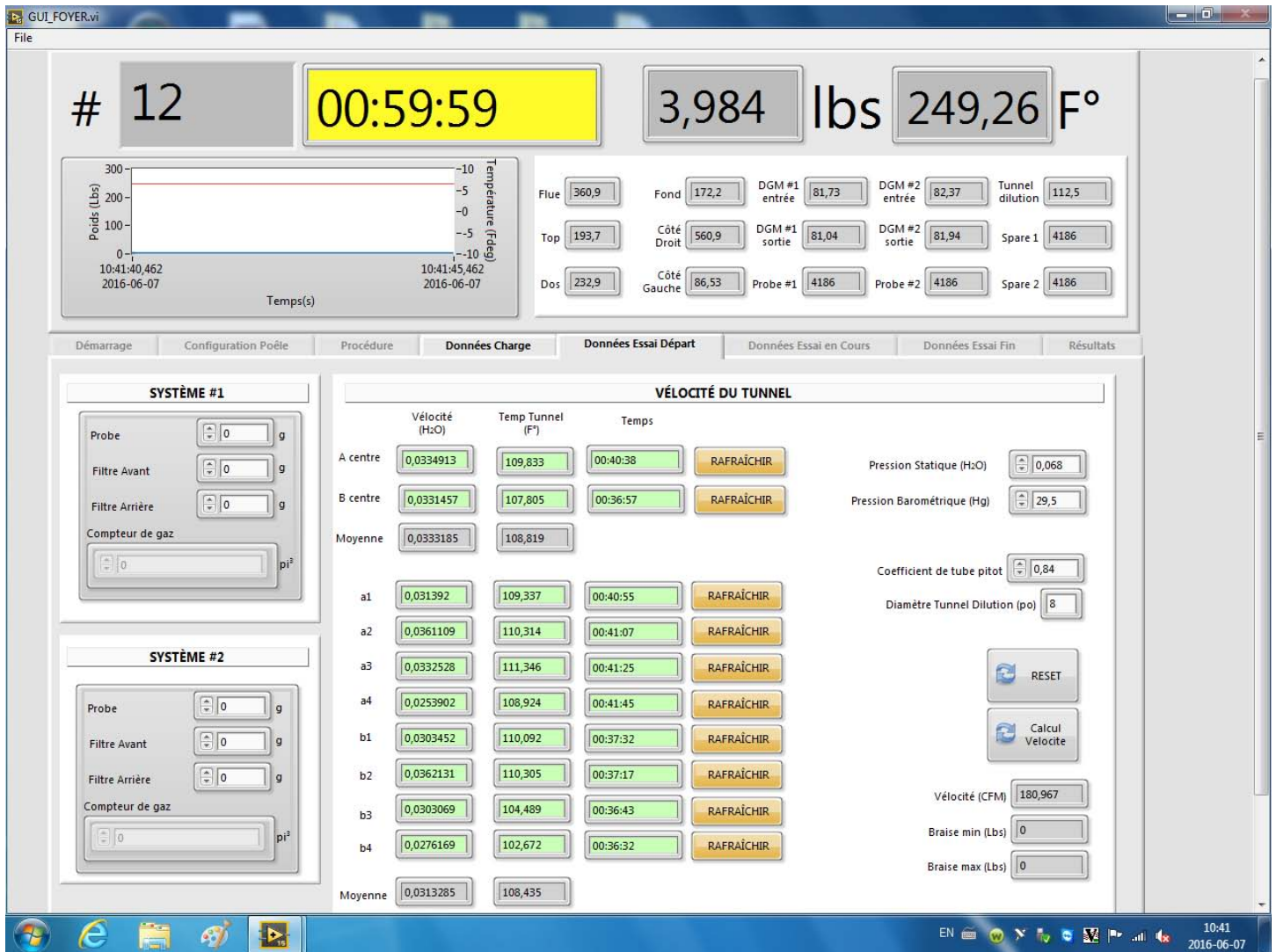
Time	Ambient	Flue	Dilution Tunnel	Firebox Top	Firebox Back	Firebox Right	Firebox Left	Firebox Bottom	DGM Inlet 1
min	°F	°F	°F	°F	°F	°F	°F	°F	°F
0	76.53	359.73	112.08	193.84	561.11	233.44	171.65	85.92	81.75
10	79.89	355.50	112.70	195.20	566.52	233.83	174.97	98.12	82.89
20	78.14	355.46	112.08	197.00	543.22	235.04	174.51	90.25	84.37
30	77.83	352.82	112.13	196.59	540.83	233.02	172.11	91.02	85.57
40	77.02	355.39	111.89	196.07	536.11	234.61	170.65	90.04	86.45
50	77.58	363.70	112.48	195.24	578.32	236.89	170.78	90.51	87.13
60	76.86	361.19	112.82	197.31	560.56	235.91	174.70	90.11	87.56
70	77.10	306.62	107.11	191.92	423.31	210.64	165.87	88.59	87.96
80	82.05	261.17	102.76	175.07	350.35	183.42	150.62	90.36	88.24
90	80.59	243.02	99.83	157.31	328.51	167.39	135.53	80.93	88.57
100	80.88	226.87	98.95	144.24	300.92	155.72	124.84	78.35	89.06
110	78.73	212.64	97.31	135.08	271.55	146.58	116.92	77.42	89.25
120	77.44	207.64	96.65	129.69	269.73	143.71	112.98	77.14	88.97
130	78.68	213.25	96.92	128.60	281.07	146.41	113.25	79.70	88.76
140	77.34	216.84	97.61	127.09	288.89	147.04	112.11	79.50	88.78
150	82.31	208.13	97.61	126.86	266.40	144.70	111.99	79.78	88.92
160	78.63	214.52	97.47	125.59	283.93	145.54	110.77	77.89	88.81
170	76.86	206.45	97.67	125.19	265.84	142.10	110.11	77.42	88.84
180	79.92	210.62	98.05	125.31	273.85	143.70	110.63	78.52	88.97
190	78.25	187.67	95.29	123.86	236.62	134.20	108.57	76.90	88.97
200	78.06	166.46	92.64	117.16	197.18	121.41	102.82	75.14	89.02
210	77.13	160.21	92.16	110.15	189.80	117.12	98.61	74.82	88.99
220	78.27	156.26	91.50	105.89	181.81	114.86	96.45	76.46	88.95
230	82.28	155.51	91.66	103.20	179.67	114.52	94.90	78.63	88.77
240	78.65	156.63	92.81	102.41	181.38	114.43	94.49	76.19	89.20
250	78.98	158.05	93.01	103.03	184.02	116.72	95.98	81.71	88.24
260	80.55	158.38	91.76	105.70	184.46	118.09	98.85	82.79	87.43
270	80.88	162.28	91.59	106.66	187.47	120.17	100.30	83.57	87.46
280	81.42	164.86	92.15	108.72	191.97	121.85	101.97	84.10	87.55
290	81.87	160.05	91.74	109.43	182.73	119.53	102.22	84.18	86.62
300	81.65	164.61	92.35	109.77	191.22	122.77	102.70	84.80	86.84
310	82.04	165.13	92.74	110.71	190.72	123.23	103.68	85.04	86.07

320	81.64	159.17	92.26	110.12	180.64	120.24	103.17	84.80	86.46
330	81.87	159.69	92.51	109.30	185.11	120.41	102.76	84.85	86.64
340	82.01	170.91	93.61	109.93	202.47	125.64	103.53	85.59	86.84
350	82.04	164.71	93.75	111.84	193.17	123.85	104.51	85.49	87.91
360	82.36	164.03	93.90	112.42	190.57	123.47	105.01	85.88	87.03

DGM Outlet 1	Probe 1	DGM Inlet 2	DGM Outlet 2	Probe 2	Probe 3	Draft	Tunnel	Scale	Scale zeroed
°F	°F	°F	°F	°F	°F	"H ₂ O	"H ₂ O	lb	lb
81.04	81.25	82.38	81.94	79.06	80.55	0.024	0.035	20.99	13.32
86.04	83.33	83.67	83.94	81.12	82.88	0.021	0.034	20.18	12.51
86.17	83.66	84.97	84.40	81.37	84.31	0.023	0.038	19.38	11.71
86.19	84.05	86.04	84.74	81.43	85.09	0.022	0.035	18.60	10.93
86.76	83.99	86.85	84.86	81.35	85.14	0.020	0.035	17.78	10.12
87.53	83.87	87.46	85.17	81.26	84.96	0.021	0.038	16.90	9.23
88.04	83.96	88.00	85.57	81.30	84.67	0.023	0.038	16.03	8.37
88.48	83.82	88.56	85.88	81.30	N/A	0.022	0.038	15.50	7.84
88.96	83.32	88.57	85.92	80.98	N/A	0.017	0.037	14.97	7.30
89.22	82.79	88.72	86.08	80.72	N/A	0.019	0.038	14.57	6.90
89.67	81.87	88.71	86.11	80.51	N/A	0.016	0.036	14.19	6.52
89.87	81.75	88.79	86.14	80.40	N/A	0.015	0.031	13.83	6.16
89.88	82.14	88.94	86.33	80.32	N/A	0.015	0.043	13.44	5.77
89.49	82.47	89.26	86.78	80.27	N/A	0.014	0.039	13.01	5.34
89.50	82.39	89.22	86.88	80.32	N/A	0.016	0.034	12.64	4.97
89.79	82.51	89.19	86.94	80.44	N/A	0.014	0.033	12.31	4.64
89.75	82.55	89.27	87.26	80.49	N/A	0.014	0.037	11.92	4.26
89.57	82.40	89.43	87.61	80.30	N/A	0.017	0.036	11.65	3.99
89.65	82.60	89.72	88.30	80.38	N/A	0.016	0.035	11.23	3.56
89.61	82.65	89.97	88.97	80.40	N/A	0.015	0.036	10.98	3.31
89.62	81.98	89.15	89.34	80.15	N/A	0.016	0.036	10.78	3.12
89.84	83.32	89.25	89.49	80.62	N/A	0.013	0.033	10.59	2.93
89.88	84.22	89.43	89.75	81.08	N/A	0.014	0.029	10.36	2.69
89.91	84.48	89.56	89.62	81.23	N/A	0.014	0.035	10.19	2.52
89.93	84.60	89.91	88.96	81.00	N/A	0.014	0.026	9.96	2.29
88.14	85.35	88.26	88.81	81.30	N/A	0.015	0.028	9.74	2.07
87.66	85.87	87.14	88.08	81.43	N/A	0.013	0.036	9.53	1.86
87.11	86.39	87.58	87.63	81.56	N/A	0.015	0.040	9.34	1.68
86.68	86.91	86.91	87.34	81.69	N/A	0.014	0.041	9.15	1.49
86.49	86.72	87.00	87.15	81.82	N/A	0.012	0.038	8.99	1.32
86.50	86.65	87.16	87.28	81.95	N/A	0.015	0.044	8.78	1.12
86.53	85.77	87.32	87.47	82.08	N/A	0.016	0.041	8.59	0.92

86.76	85.18	87.36	87.64	81.26	N/A	0.014	0.043	8.43	0.77
86.87	84.84	87.52	87.77	80.76	N/A	0.016	0.040	8.27	0.60
87.03	85.67	87.50	87.83	81.11	N/A	0.014	0.041	8.04	0.38
87.16	85.01	87.46	87.78	81.16	N/A	0.012	0.039	7.87	0.20
87.10	85.97	87.37	87.79	81.34	N/A	0.014	0.042	7.67	0.00

Date/time	Time	O ₂	CO	CO ₂ IR	CO
YYYY-MM-DD HH:MM:SS	min	%	ppm	%	%
2016-06-07 09:55:36	0	15.37	559	5.90	0.06
2016-06-07 10:05:36	10	14.84	378	5.79	0.04
2016-06-07 10:15:36	20	14.96	454	5.81	0.05
2016-06-07 10:25:36	30	14.99	340	5.88	0.03
2016-06-07 10:35:36	40	14.31	453	6.20	0.05
2016-06-07 10:45:36	50	15.57	631	5.92	0.06
2016-06-07 10:55:36	60	17.26	604	3.72	0.06
2016-06-07 11:05:36	70	18.52	823	2.64	0.08
2016-06-07 11:15:36	80	18.99	867	2.47	0.09
2016-06-07 11:25:36	90	18.74	873	2.30	0.09
2016-06-07 11:35:36	100	18.54	940	1.89	0.09
2016-06-07 11:45:36	110	17.87	780	2.01	0.08
2016-06-07 11:55:36	120	19.00	882	2.15	0.09
2016-06-07 12:05:36	130	19.34	877	2.22	0.09
2016-06-07 12:15:36	140	18.91	919	2.02	0.09
2016-06-07 12:25:36	150	18.94	1013	2.12	0.10
2016-06-07 12:35:36	160	18.05	822	1.93	0.08
2016-06-07 12:45:36	170	18.86	947	1.94	0.09
2016-06-07 12:55:36	180	19.81	1015	1.65	0.10
2016-06-07 13:05:36	190	19.54	869	1.11	0.09
2016-06-07 13:15:36	200	20.19	667	1.09	0.07
2016-06-07 13:25:36	210	20.05	827	1.09	0.08
2016-06-07 13:35:36	220	19.64	879	1.04	0.09
2016-06-07 13:35:36	230	20.04	773	1.18	0.08
2016-06-07 13:45:36	240	19.97	932	1.19	0.09
2016-06-07 13:55:36	250	19.80	839	1.34	0.08
2016-06-07 14:05:36	260	19.96	946	0.91	0.09
2016-06-07 14:15:36	270	20.02	827	1.00	0.08
2016-06-07 14:25:36	280	19.80	1063	1.17	0.11
2016-06-07 14:35:36	290	20.00	837	1.15	0.08
2016-06-07 14:45:36	300	19.88	901	0.94	0.09
2016-06-07 14:55:36	310	20.01	767	0.99	0.08
2016-06-07 15:05:36	320	19.65	833	1.22	0.08
2016-06-07 15:15:36	330	19.99	767	1.23	0.08
2016-06-07 15:25:36	340	19.91	829	1.14	0.08
2016-06-07 15:35:36	350	19.83	1018	0.99	0.10
2016-06-07 15:45:36	360	19.85	789	1.31	0.08



EN

10:41

2016-06-07

VERSION: 2.4 2010-04-15

Manufacturer: SBI
 Model: Cambridge
 Date: 2016-06-07
 Run: 2
 Control #: QC20160606
 Test Duration: 360
 Output Category: Integrated

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
 Weight Units lb (kg or lb)

Default Fuel Values
 HHV (kJ/kg) 19 810 19 887
 %C 48.73 50
 %H 6.87 6.6
 %O 43.9 42.9
 %Ash 0.5 0.5

Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 13.32
 Burn Rate (dry kg/h): 0.96
 Total Particulate Emissions: 17.33 g

Fuel Data
 Energex P.
 HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages		0.08	2.29	18.68	220.71	79.58
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO ₂	O ₂	Flue Gas	Room Temp
0	13.32	0.06	5.90	15.37	359.7	76.5
10	12.51	0.04	5.79	14.84	355.5	79.9
20	11.71	0.05	5.81	14.96	355.5	78.1
30	10.93	0.03	5.88	14.99	352.8	77.8
40	10.12	0.05	6.20	14.31	355.4	77.0
50	9.23	0.06	5.92	15.57	363.7	77.6
60	8.37	0.06	3.72	17.26	361.2	76.9
70	7.84	0.08	2.64	18.52	306.6	77.1
80	7.30	0.09	2.47	18.99	261.2	82.0
90	6.90	0.09	2.30	18.74	243.0	80.6
100	6.52	0.09	1.89	18.54	226.9	80.9
110	6.16	0.08	2.01	17.87	212.6	78.7
120	5.77	0.09	2.15	19.00	207.6	77.4
130	5.34	0.09	2.22	19.34	213.3	78.7
140	4.97	0.09	2.02	18.91	216.8	77.3
150	4.64	0.10	2.12	18.94	208.1	82.3
160	4.26	0.08	1.93	18.05	214.5	78.6
170	3.99	0.09	1.94	18.86	206.4	76.9
180	3.56	0.10	1.65	19.81	210.6	79.9
190	3.31	0.09	1.11	19.54	187.7	78.3
200	3.12	0.07	1.09	20.19	166.5	78.1
210	2.93	0.08	1.09	20.05	160.2	77.1
220	2.69	0.09	1.04	19.64	156.3	78.3
230	2.52	0.08	1.18	20.04	155.5	82.3
240	2.29	0.09	1.19	19.97	156.6	78.7

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

250	2.07	0.08	1.34	19.80	158.1	79.0
260	1.86	0.09	0.91	19.96	158.4	80.5
270	1.68	0.08	1.00	20.02	162.3	80.9
280	1.49	0.11	1.17	19.80	164.9	81.4
290	1.32	0.08	1.15	20.00	160.1	81.9
300	1.12	0.09	0.94	19.88	164.6	81.7
310	0.92	0.08	0.99	20.01	165.1	82.0
320	0.77	0.08	1.22	19.65	159.2	81.6
330	0.60	0.08	1.23	19.99	159.7	81.9
340	0.38	0.08	1.14	19.91	170.9	82.0
350	0.20	0.10	0.99	19.83	164.7	82.0
360	0.00	0.08	1.31	19.85	164.0	82.4

Manufacturer: SBI																				
Model: Cambridge																				
Date: 06-07-16																				
Run: 2																				
Control #: QC20160606																				
Test Duration: 360 min																				
		HHV	LHV																	
Eff		69.65%	75.18%																	
Comb Eff		99.35%	99.35%																	
HT Eff		70.10%	75.67%																	
Output		13 481	kJ/h																	
Burn Rate		0.96	kg/h																	
Grams CO		247	g																	
Input		19 356	kJ/h																	
MC wet		4.50																		
Averages		0.08	2.29	10.63	20.78	18.45	104.84	26.43	99.1%	69.2%	68.6%	70.84	2.12	64.96	2.02	64.96	117018	4.06	6.87	2.74
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Fuel Properties			
Elapsed	Weight	%	%	Excess	Total	Calc. %	Flue	Room	Eff	Transfer	Eff	Fuel	Now	Consumed	Now	Consumed	Total	Carbon	Hydrogen	Oxygen
Time	Remaining (kg)	CO [e]	CO ₂ [d]	Air EA	O ₂	O ₂ [g]	Gas (°C)	Temp (°C)	%	%	%	Ratio	Wt	x	Wt _{dn}	y	Input	/12= [a]	/1= [b]	/16= [c]
0	6.04	0.06	5.90	229.6%	20.54	14.61	182.1	24.7	99.9%	74.8%	74.7%	19.9	6.04	0.00	5.77	0.00	0	4.06	6.87	2.74
10	5.68	0.04	5.79	236.8%	20.55	14.74	179.7	26.6	100.2%	74.9%	75.1%	20.4	5.68	6.07	5.42	6.07	10539	4.06	6.87	2.74
20	5.31	0.05	5.81	235.2%	20.55	14.72	179.7	25.6	100.1%	74.9%	74.9%	20.3	5.31	12.08	5.08	12.08	6885	4.06	6.87	2.74
30	4.96	0.03	5.88	231.9%	20.55	14.65	178.2	25.5	100.2%	75.2%	75.4%	20.1	4.96	17.93	4.74	17.93	6962	4.06	6.87	2.74
40	4.59	0.05	6.20	214.3%	20.52	14.30	179.7	25.0	100.1%	75.8%	75.8%	19.0	4.59	24.07	4.38	24.07	7410	4.06	6.87	2.74
50	4.19	0.06	5.92	228.1%	20.54	14.59	184.3	25.3	99.8%	74.6%	74.5%	19.8	4.19	30.69	4.00	30.69	7624	4.06	6.87	2.74
60	3.80	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	3.80	37.20	3.63	37.20	6090	4.06	6.87	2.74
70	3.56	0.08	2.64	621.1%	20.76	18.08	152.6	25.1	99.4%	62.6%	62.2%	43.6	3.56	41.18	3.40	41.18	4661	4.06	6.87	2.74
80	3.31	0.09	2.47	667.8%	20.77	18.26	127.3	27.8	99.2%	67.6%	67.0%	46.5	3.31	45.22	3.16	45.22	4068	4.06	6.87	2.74
90	3.13	0.09	2.30	722.3%	20.78	18.44	117.2	27.0	99.2%	68.3%	67.7%	49.8	3.13	48.18	2.99	48.18	3379	4.06	6.87	2.74
100	2.96	0.09	1.89	889.4%	20.81	18.87	108.3	27.2	98.8%	66.4%	65.6%	60.0	2.96	51.04	2.83	51.04	3252	4.06	6.87	2.74
110	2.79	0.08	2.01	840.1%	20.80	18.75	100.4	26.0	99.5%	69.8%	69.4%	57.0	2.79	53.78	2.67	53.78	3271	4.06	6.87	2.74
120	2.62	0.09	2.15	777.1%	20.79	18.60	97.6	25.2	99.1%	71.8%	71.1%	53.1	2.62	56.67	2.50	56.67	3542	4.06	6.87	2.74
130	2.42	0.09	2.22	750.6%	20.79	18.52	100.7	25.9	99.1%	71.7%	71.1%	51.5	2.42	59.88	2.32	59.88	3499	4.06	6.87	2.74
140	2.25	0.09	2.02	829.5%	20.80	18.73	102.7	25.2	98.9%	69.0%	68.3%	56.3	2.25	62.70	2.15	62.70	3080	4.06	6.87	2.74
150	2.10	0.10	2.12	783.7%	20.79	18.62	97.9	28.0	98.6%	72.2%	71.2%	53.5	2.10	65.19	2.01	65.19	3105	4.06	6.87	2.74
160	1.93	0.08	1.93	875.6%	20.81	18.83	101.4	25.9	99.3%	68.6%	68.1%	59.2	1.93	68.05	1.84	68.05	2841	4.06	6.87	2.74
170	1.81	0.09	1.94	864.8%	20.80	18.82	96.9	24.9	98.8%	69.8%	69.0%	58.5	1.81	70.08	1.73	70.08	3036	4.06	6.87	2.74
180	1.62	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	1.62	73.28	1.54	73.28	2940	4.06	6.87	2.74
190	1.50	0.09	1.11	1540.1%	20.86	19.71	86.5	25.7	98.7%	60.3%	59.5%	100.1	1.50	75.14	1.44	75.14	1938	4.06	6.87	2.74
200	1.41	0.07	1.09	1597.1%	20.86	19.74	74.7	25.6	100.1%	65.8%	65.9%	103.9	1.41	76.61	1.35	76.61	1681	4.06	6.87	2.74
210	1.33	0.08	1.09	1573.9%	20.86	19.73	71.2	25.1	99.0%	67.4%	66.7%	102.3	1.33	78.04	1.27	78.04	1866	4.06	6.87	2.74
220	1.22	0.09	1.04	1640.4%	20.86	19.78	69.0	25.7	98.5%	67.9%	66.9%	106.3	1.22	79.83	1.16	79.83	1777	4.06	6.87	2.74
230	1.14	0.08	1.18	1461.3%	20.86	19.64	68.6	27.9	99.4%	71.8%	71.4%	95.3	1.14	81.10	1.09	81.10	1722	4.06	6.87	2.74
240	1.04	0.09	1.19	1429.8%	20.85	19.62	69.2	25.9	98.3%	70.7%	69.6%	93.2	1.04	82.79	0.99	82.79	1936	4.06	6.87	2.74
250	0.94	0.08	1.34	1278.6%	20.84	19.46	70.0	26.1	99.0%	72.7%	72.0%	84.0	0.94	84.43	0.90	84.43	1869	4.06	6.87	2.74
260	0.85	0.09	0.91	1854.0%	20.87	19.92	70.2	27.0	97.8%	64.7%	63.3%	119.5	0.85	86.01	0.81	86.01	1736	4.06	6.87	2.74
270	0.76	0.08	1.00	1713.1%	20.87	19.83	72.4	27.2	98.9%	65.9%	65.1%	110.9	0.76	87.42	0.73	87.42	1647	4.06	6.87	2.74
280	0.67	0.11	1.17	1438.1%	20.85	19.63	73.8	27.5	97.5%	68.9%	67.2%	93.6	0.67	88.85	0.64	88.85	1547	4.06	6.87	2.74
290	0.60	0.08	1.15	1491.2%	20.86	19.67	71.1	27.7	98.9%	70.0%	69.2%	97.1	0.60	90.08	0.57	90.08	1612	4.06	6.87	2.74
300	0.51	0.09	0.94	1805.7%	20.87	19.89	73.7	27.6	98.3%	63.8%	62.7%	116.6	0.51	91.63	0.48	91.63	1742	4.06	6.87	2.74
310	0.42	0.08	0.99	1740.3%	20.87	19.84	74.0	27.8	99.4%	65.1%	64.6%	112.7	0.42	93.08	0.40	93.08	1520	4.06	6.87	2.74
320	0.35	0.08	1.22	1406.2%	20.85	19.59	70.6	27.6	99.0%	71.3%	70.6%	91.9	0.35	94.24	0.33	94.24	1409	4.06	6.87	2.74
330	0.27	0.08	1.23	1402.3%	20.85	19.58	70.9	27.7	99.4%	71.4%	71.0%	91.7	0.27	95.51	0.26	95.51	1703	4.06	6.87	2.74
340	0.17	0.08	1.14	1505.2%	20.86	19.68	77.2	27.8	99.0%	66.8%	66.1%	98.0	0.17	97.18	0.16	97.18	1725	4.06	6.87	2.74
350	0.09	0.10	0.99	1698.0%	20.87	19.83	73.7	27.8	97.4%	65.3%	63.6%	109.7	0.09	98.48	0.09	98.48	2522	4.06	6.87	2.74
360	0.00	0.08	1.31	1313.4%	20.85	19.50	73.3	28.0	99.3%	71.6%	71.1%	86.2	0.00	100.00	0.00	100.00	882	4.06	6.87	2.74

Moisture Content M_{Cwb}: 4.5

η Efficiency:	99.35%	Moisture of Wood (wet basis):	4.5	Dry kg :	5.77
al Input (kJ):	116 136 110 149 (Btu)	Initial Dry Weight W _{t_{do}} (kg):	5.77	CA:	48.73
Output (kJ):	80 887 76 717 (Btu)	Moisture Content Dry	4.71	HY:	6.87
Efficiency:	69.65%			OX:	43.785
otal CO (g):	247.08				

Load Weight (kg):	6.04				
Fuel Heating	HHV	LHV	HHV	LHV	
Value in kJ/kg - CV:	20 119	18 638	Btu/lb	8655.4	8018.1

20119.00	4.50	79.18	21.00	0.58	2.02	-0.02	0.06	39.24	470.74	2.08	-0.46	1941.50	35.47	2.62	377.99	3110.92	2346.53	2283.15	2257.56	2983.04	2732.57	299.58	4565.40
Calorific Value	Mw Moisture Fuel Burnt	Mass Balance (moles/100 mole dry flue gas)					kg Wood per 100 mole dfp	Moles per kg of Dry Wood						Moisture Present	Stack Temp K	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp K	CO ₂
		[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O			CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O		
20119.00	4.50	79.43	21.07	1.46	5.06	-0.02	0.15	40.58	100.52	0.38	-0.11	546.33	34.77	2.62	455.22	6365.65	4746.85	4605.21	4556.42	6223.74	5507.45	297.89	258.32
20119.00	4.50	79.43	21.07	1.43	4.95	-0.02	0.14	40.72	103.68	0.27	-0.13	558.64	34.82	2.62	452.87	6193.98	4619.30	4481.58	4434.08	6054.86	5359.64	299.75	252.23
20119.00	4.50	79.43	21.07	1.44	4.97	-0.02	0.14	40.66	102.99	0.32	-0.12	555.88	34.80	2.62	452.85	6230.37	4647.40	4509.08	4461.24	6088.33	5392.61	298.78	253.34
20119.00	4.50	79.44	21.07	1.45	5.02	-0.02	0.14	40.75	101.52	0.24	-0.13	550.57	34.82	2.62	451.39	6174.46	4607.29	4470.55	4423.04	6030.23	5346.65	298.61	251.63
20119.00	4.50	79.45	21.08	1.53	5.30	-0.02	0.15	40.67	93.81	0.30	-0.11	521.20	34.78	2.62	452.81	6252.36	4664.46	4525.79	4477.74	6108.41	5412.64	298.16	254.28
20119.00	4.50	79.43	21.07	1.47	5.08	-0.01	0.15	40.53	99.87	0.43	-0.10	543.72	34.76	2.62	457.43	6437.69	4797.77	4653.91	4604.76	6300.31	5565.48	298.47	260.89
20119.00	4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32
20119.00	4.50	79.20	21.01	0.67	2.32	-0.02	0.07	39.87	273.04	1.24	-0.26	1196.25	35.08	2.62	425.72	5105.23	3830.45	3721.98	3681.33	4939.96	4453.04	298.20	203.57
20119.00	4.50	79.19	21.00	0.63	2.18	-0.02	0.06	39.73	293.68	1.39	-0.27	1273.87	35.10	2.62	400.47	3951.69	2979.24	2898.38	2865.99	3792.49	3468.81	300.95	157.02
20119.00	4.50	79.18	21.00	0.58	2.04	-0.02	0.06	39.65	317.81	1.50	-0.29	1364.82	35.15	2.62	390.39	3569.32	2697.28	2625.64	2595.97	3411.68	3142.87	300.14	141.51
20119.00	4.50	79.15	20.99	0.48	1.70	-0.02	0.05	39.25	391.93	1.95	-0.35	1643.78	35.26	2.62	381.41	3197.57	2420.98	2357.80	2330.92	3046.24	2822.62	300.30	125.52
20119.00	4.50	79.16	21.00	0.51	1.79	-0.02	0.05	39.69	370.28	1.54	-0.37	1563.16	35.31	2.62	373.51	2923.18	2217.61	2160.81	2135.95	2775.23	2587.14	299.11	116.02
20119.00	4.50	79.17	21.00	0.55	1.91	-0.02	0.05	39.55	342.10	1.62	-0.31	1456.32	35.19	2.62	370.73	2838.50	2155.02	2100.22	2075.97	2691.24	2514.72	298.39	112.27
20119.00	4.50	79.17	21.00	0.56	1.97	-0.02	0.06	39.60	330.39	1.56	-0.30	1412.19	35.17	2.62	373.85	2938.02	2228.72	2171.60	2146.62	2789.65	2600.04	299.08	116.34
20119.00	4.50	79.15	21.00	0.52	1.81	-0.02	0.05	39.39	365.34	1.79	-0.33	1543.69	35.22	2.62	375.84	3046.96	2310.73	2251.35	2225.49	2894.47	2695.48	298.34	120.03
20119.00	4.50	79.16	21.00	0.54	1.90	-0.02	0.05	39.27	344.89	1.88	-0.28	1466.10	35.13	2.62	371.00	2746.12	2083.52	2030.21	2006.84	2606.62	2430.79	301.10	107.83
20119.00	4.50	79.15	21.00	0.49	1.72	-0.02	0.05	39.55	385.97	1.68	-0.38	1622.06	35.31	2.62	374.55	2967.42	2250.68	2192.92	2167.71	2818.29	2625.54	299.06	117.36
20119.00	4.50	79.15	20.99	0.50	1.74	-0.02	0.05	39.28	380.96	1.92	-0.33	1602.39	35.23	2.62	370.06	2824.05	2144.50	2090.09	2065.93	2676.53	2502.63	298.07	110.92
20119.00	4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67	2707.79	2525.06	299.77	110.82
20119.00	4.50	79.10	20.98	0.29	1.03	-0.02	0.03	38.51	683.63	3.01	-0.66	2743.87	35.88	2.62	359.63	2375.99	1808.09	1763.14	1742.57	2243.51	2111.44	298.85	91.49
20119.00	4.50	79.10	20.98	0.28	1.00	-0.02	0.03	39.25	710.84	2.40	-0.79	2848.61	36.15	2.62	347.85	1911.11	1458.14	1422.82	1406.02	1796.19	1704.18	298.74	75.02
20119.00	4.50	79.10	20.98	0.28	1.01	-0.02	0.03	38.63	699.20	2.93	-0.70	2803.03	35.96	2.62	344.38	1793.51	1369.62	1336.73	1320.89	1683.02	1601.17	298.22	69.28
20119.00	4.50	79.09	20.98	0.27	0.98	-0.02	0.03	38.32	728.88	3.24	-0.70	2914.36	35.96	2.62	342.18	1682.71	1285.45	1254.70	1239.80	1578.07	1502.94	298.85	64.48
20119.00	4.50	79.11	20.98	0.30	1.09	-0.02	0.03	38.98	648.67	2.55	-0.67	2613.04	35.91	2.62	341.77	1581.17	1207.39	1178.39	1164.43	1483.90	1411.49	301.08	61.63
20119.00	4.50	79.10	20.98	0.31	1.11	-0.02	0.03	38.43	633.55	3.01	-0.58	2554.49	35.72	2.62	342.39	1682.54	1285.20	1254.42	1239.54	1578.17	1502.59	299.07	64.66
20119.00	4.50	79.11	20.98	0.35	1.23	-0.02	0.03	38.97	566.10	2.44	-0.56	2301.06	35.67	2.62	343.18	1706.87	1303.50	1272.22	1257.14	1601.61	1523.89	299.25	66.53
20119.00	4.50	79.08	20.98	0.24	0.87	-0.02	0.02	37.70	825.02	3.92	-0.76	3275.95	36.08	2.62	343.36	1680.82	1283.31	1252.44	1237.61	1577.82	1500.18	300.12	63.36
20119.00	4.50	79.09	20.98	0.26	0.94	-0.02	0.03	38.44	762.20	3.18	-0.76	3040.56	36.09	2.62	345.53	1759.27	1342.51	1310.04	1294.57	1653.00	1569.12	300.31	67.63
20119.00	4.50	79.09	20.98	0.31	1.10	-0.02	0.03	37.94	636.52	3.45	-0.52	2564.42	35.61	2.62	346.96	1804.53	1376.52	1343.10	1327.26	1696.68	1608.68	300.61	68.46
20119.00	4.50	79.10	20.98	0.30	1.07	-0.02	0.03	38.70	661.76	2.82	-0.65	2661.75	35.87	2.62	344.29	1689.32	1289.33	1258.20	1243.32	1586.84	1507.04	300.86	65.37
20119.00	4.50	79.08	20.98	0.25	0.89	-0.02	0.02	37.98	803.53	3.64	-0.76	3195.47	36.09	2.62	346.82	1794.06	1368.53	1335.31	1319.56	1686.82	1599.35	300.74	68.14
20119.00	4.50	79.09	20.98	0.26	0.93	-0.02	0.03	38.67	775.07	3.00	-0.81	3089.76	36.18	2.62	347.11	1797.37	1370.91	1337.59	1321.82	1690.27	1602.07	300.95	69.51
20119.00	4.50	79.11	20.98	0.32	1.12	-0.02	0.03	38.83	623.49	2.65	-0.62	2517.49	35.80	2.62	343.80	1674.85	1278.45	1247.63	1232.87	1572.86	1494.39	300.73	65.03
20119.00	4.50	79.11	20.98	0.32	1.13	-0.02	0.03	39.07	622.08	2.44	-0.65	2512.81	35.86	2.62	344.09	1681.46	1283.38	1252.41	1237.60	1579.33	1500.11	300.85	65.69
20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.71	668.15	2.81	-0.67	2685.93	35.89	2.62	350.32	1925.32	1467.47	1431.55	1414.73	1812.86	1714.53	300.93	74.53
20119.00	4.50	79.08	20.98	0.26	0.94	-0.02	0.03	37.64	753.77	3.87	-0.65	3006.59	35.86	2.62	346.88	1788.14	1363.93	1330.81	1315.11	1681.43	1593.95	300.95	67.30
20119.00	4.50	79.11	20.98	0.34	1.20	-0.02	0.03	39.10	581.93	2.35	-0.59	2361.22	35.75	2.62	346.50	1766.41	1347.42	1314.71	1299.20	1660.87	1574.67	301.13	69.06

SUMS						AVERAGE	SUMS						
30804.82	21861.04	125812.87	-15032.63	61273.95	4523.49	6319.16	35249.30	750.73	34498.6	81768.6	750.7	247.1	-31.4
Energy Losses (kJ/kg of Dry Fuel)						Total Loss Rate							
Flue Gas Constituent							Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
477.16	110.56	2489.29	-94.82	1720.50	129.52	5090.53	0.00	0	0.00	0	0	0.00	0.00
478.95	76.43	2477.07	-114.88	1717.57	129.13	5016.50	2627.69	-20	2648.05	7911	-20	3.90	-1.07
478.66	91.35	2479.91	-107.11	1717.86	129.22	5043.23	1725.75	-6	1731.38	5159	-6	3.04	-0.65
467.75	67.74	2435.18	-115.71	1717.21	129.10	4952.90	1713.83	-17	1730.52	5248	-17	2.28	-0.71
437.56	85.44	2333.78	-96.54	1717.39	129.27	4861.19	1790.52	-4	1794.87	5620	-4	3.06	-0.63
479.16	124.25	2503.72	-87.68	1721.73	129.67	5131.74	1944.55	13	1931.22	5679	13	4.58	-0.59
876.87	188.68	3939.67	-179.77	1730.66	129.58	6944.02	2102.06	2	2099.90	3988	2	5.56	-0.97
1045.87	356.41	4403.80	-231.23	1698.61	126.76	7603.78	1761.42	28	1733.20	2899	28	8.06	-0.96
874.95	398.74	3650.90	-240.87	1665.14	124.18	6630.05	1340.66	31	1309.35	2728	31	7.90	-0.87
857.24	429.82	3543.02	-261.14	1655.84	123.33	6489.62	1089.91	28	1062.08	2289	28	7.08	-0.79
948.84	557.09	3831.51	-309.32	1649.65	122.49	6925.78	1119.33	39	1079.86	2132	39	8.83	-0.90
821.15	439.21	3338.83	-331.79	1643.70	121.88	6148.99	999.67	17	982.58	2271	17	7.01	-0.97
737.23	462.57	3023.28	-280.52	1635.81	121.69	5812.32	1023.41	32	991.80	2519	32	8.00	-0.89
736.34	446.10	3031.44	-271.29	1637.84	121.91	5818.68	1011.99	30	982.03	2487	30	7.62	-0.85
844.19	511.23	3435.46	-291.88	1643.35	122.16	6384.53	977.41	33	944.30	2103	33	7.68	-0.80
718.58	534.76	2942.22	-251.45	1629.83	121.47	5803.24	895.76	43	852.50	2210	43	8.11	-0.70
868.70	480.40	3516.16	-335.57	1645.45	121.98	6414.47	905.75	20	885.68	1935	20	6.66	-0.85
816.96	546.57	3310.44	-297.99	1637.20	121.65	6245.76	942.54	37	905.49	2094	37	8.10	-0.81
974.38	681.29	3883.50	-336.03	1641.95	121.71	7077.62	1034.10	50	984.25	1905	50	9.78	-0.88
1236.06	858.42	4781.37	-589.94	1653.58	120.63	8151.61	785.18	25	759.69	1153	25	8.13	-1.02
1036.50	683.15	4005.20	-708.46	1651.14	119.56	6862.10	573.34	-2	575.62	1108	-2	5.62	-1.06
957.64	833.29	3702.50	-622.86	1638.67	119.29	6697.82	621.20	19	601.94	1245	19	7.61	-1.04
936.94	920.66	3613.23	-625.30	1635.40	119.04	6664.45	588.71	26	562.88	1189	26	8.01	-0.99
783.20	725.61	3042.69	-599.25	1629.46	118.80	5762.15	493.28	11	482.64	1229	11	6.12	-0.92
814.24	855.55	3166.38	-518.20	1624.46	119.04	6126.13	589.46	32	557.27	1346	32	8.11	-0.89
737.91	693.69	2892.76	-495.46	1622.90	119.09	5637.42	523.80	18	505.58	1346	18	6.35	-0.83
1058.76	1113.93	4054.34	-674.90	1640.36	119.03	7374.88	636.30	38	598.74	1100	38	9.47	-1.04
1023.27	903.89	3936.21	-680.97	1643.46	119.21	7012.70	574.04	18	556.03	1073	18	7.29	-1.00
876.19	979.99	3403.66	-465.71	1622.88	119.31	6604.78	507.98	39	468.71	1039	39	7.42	-0.64
853.23	800.60	3309.42	-583.87	1631.32	119.05	6195.11	496.35	17	479.18	1116	17	6.32	-0.84
1099.65	1035.13	4216.63	-680.32	1644.48	119.29	7503.00	649.75	30	619.33	1093	30	8.83	-1.06
1062.55	851.94	4084.12	-723.29	1648.97	119.30	7113.09	537.49	10	527.97	983	10	6.34	-0.98
797.10	753.52	3103.74	-550.44	1627.46	119.02	5915.41	414.23	14	400.17	995	14	5.20	-0.69
798.37	692.51	3109.86	-576.36	1630.31	119.03	5839.40	494.29	10	484.63	1209	10	5.77	-0.88
980.49	800.64	3799.87	-593.41	1639.72	119.59	6821.44	584.96	18	567.43	1140	18	6.76	-0.91
1028.09	1100.42	3954.01	-578.96	1633.93	119.28	7324.07	918.01	65	853.15	1604	65	13.58	-1.30
784.11	669.50	3067.70	-529.35	1628.17	119.23	5808.43	254.59	6	248.54	627	6	2.89	-0.42

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 360
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	69.6%	75.2%
Combustion Efficiency	99.4%	99.4%
Heat Transfer Efficiency	70%	75.7%

Output Rate (kJ/h)	13 481	12 788	(Btu/h)
Burn Rate (kg/h)	0.96	2.12	(lb/h)
Input (kJ/h)	19 356	18 361	(Btu/h)

Test Load Weight (dry kg)	5.77	12.72	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	247		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.21	3.05
g/kg Dry Fuel	3.00	42.80
g/h	2.89	41.18
lb/MM Btu Output	0.50	7.10

Air/Fuel Ratio (A/F)	38.54
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VERSION:

2.4

2010-04-15

ASTM E2779 Calculation Sheet																		
Manufacturer:	SBI	Eng: Claude Pelland																
Model:	Cambridge																	
Date:	2016-06-07																	
Run:	2	Dry kilograms: 6.04																
Control #:	QC20160606																	
Test Duration:	360.0																	
Start		End																
Barometer (in.Hg):		29.5	29.4			Pitot type	Type S											
Dry Bulb (F):						0.84												
Humidity (%):		74	59															
moisture content of wood (wet basis):		13.32																
Average:		0.00	0.00	0.00	0.00	220.71	79.58	98.42	87.56		88.07	83.95	87.94		87.01	80.95	0.04	0.016
Actual	Elapsed	Weight	*	*	*	*1	*2	*3	*	*	*	*	*	*	*	*	*	*
	Time	Remaining				Flue	Room	Tunnel	DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Draft
Time	Minutes	Lbs.	CO	CO2	O2	Gas	Temp	Dry Bulb	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft
10:56:00	0.0	13.32	0.00	0.00	0.00	359.73	76.53	112.08	881.025	81.75	81.04	81.25	1046.966	82.38	81.94	79.06	0.035	0.024
11:06:00	10.00	12.51	0.00	0.00	0.00	355.50	79.89	112.70	882.109	82.89	86.04	83.33	1047.946	83.67	83.94	81.12	0.034	0.021
11:16:00	20.00	11.71	0.00	0.00	0.00	355.46	78.14	112.08	883.260	84.37	86.17	83.66	1048.970	84.97	84.40	81.37	0.038	0.023
11:26:00	30.00	10.93	0.00	0.00	0.00	352.82	77.83	112.13	884.391	85.57	86.19	84.05	1049.998	86.04	84.74	81.43	0.035	0.022
11:36:00	40.00	10.12	0.00	0.00	0.00	355.39	77.02	111.89	885.511	86.45	86.76	83.99	1051.010	86.85	84.86	81.35	0.035	0.020
11:46:00	50.00	9.23	0.00	0.00	0.00	363.70	77.58	112.48	886.610	87.13	87.53	83.87	1052.040	87.46	85.17	81.26	0.038	0.021
11:56:00	60.00	8.37	0.00	0.00	0.00	361.19	76.86	112.82	887.703	87.56	88.04	83.96	1053.046	88.00	85.57	81.30	0.038	0.023
12:06:00	70.00	7.84	0.00	0.00	0.00	306.62	77.10	107.11	888.792	87.96	88.48	83.82	1054.048	88.56	85.88	81.30	0.038	0.022
12:16:00	80.00	7.30	0.00	0.00	0.00	261.17	82.05	102.76	889.860	88.24	88.96	83.32	1055.052	88.57	85.92	80.98	0.037	0.017
12:26:00	90.00	6.90	0.00	0.00	0.00	243.02	80.59	99.83	890.926	88.57	89.22	82.79	1056.056	88.72	86.08	80.72	0.038	0.019
12:36:00	100.00	6.52	0.00	0.00	0.00	226.87	80.88	98.95	891.998	89.06	89.67	81.87	1057.058	88.71	86.11	80.51	0.036	0.016
12:46:00	110.00	6.16	0.00	0.00	0.00	212.64	78.73	97.31	893.053	89.25	89.87	81.75	1058.061	88.79	86.14	80.40	0.031	0.015
12:56:00	120.00	5.77	0.00	0.00	0.00	207.64	77.44	96.65	894.112	88.97	89.88	82.14	1059.061	88.94	86.33	80.32	0.036	0.015
13:06:00	130.00	5.34	0.00	0.00	0.00	213.25	78.68	96.92	895.156	88.76	89.49	82.47	1060.059	89.26	86.78	80.27	0.039	0.014
13:16:00	140.00	4.97	0.00	0.00	0.00	216.84	77.34	97.61	896.205	88.78	89.50	82.39	1061.055	89.22	86.88	80.32	0.034	0.016
13:26:00	150.00	4.64	0.00	0.00	0.00	208.13	82.31	97.61	897.247	88.92	89.79	82.51	1062.049	89.19	86.94	80.44	0.033	0.014
13:36:00	160.00	4.26	0.00	0.00	0.00	214.52	78.63	97.47	898.280	88.81	89.75	82.55	1063.039	89.27	87.26	80.49	0.037	0.014
13:46:00	170.00	3.99	0.00	0.00	0.00	206.45	76.86	97.67	899.302	88.84	89.57	82.40	1064.016	89.43	87.61	80.30	0.036	0.017
13:56:00	180.00	3.56	0.00	0.00	0.00	210.62	79.92	98.05	900.324	88.97	89.65	82.60	1064.992	89.72	88.30	80.38	0.035	0.016
14:06:00	190.00	3.31	0.00	0.00	0.00	187.67	78.25	95.29	901.336	88.97	89.61	82.65	1065.965	89.97	88.97	80.40	0.036	0.015
14:16:00	200.00	3.12	0.00	0.00	0.00	166.46	78.06	92.64	902.343	89.02	89.62	81.98	1066.930	89.15	89.34	80.15	0.034	0.016
14:26:00	210.00	2.93	0.00	0.00	0.00	160.21	77.13	92.16	903.347	88.99	89.84	83.32	1067.891	89.25	89.49	80.62	0.033	0.013
14:36:00	220.00	2.69	0.00	0.00	0.00	156.26	78.27	91.50	904.345	88.95	89.88	84.22	1068.850	89.43	89.75	81.08	0.029	0.014
14:46:00	230.00	2.52	0.00	0.00	0.00	155.51	82.28	91.66	905.300	88.77	89.91	84.48	1069.794	89.56	89.62	81.23	0.035	0.014
14:56:00	240.00	2.29	0.00	0.00	0.00	156.63	78.65	92.81	906.339	89.20	89.93	84.60	1070.720	89.91	88.96	81.00	0.026	0.014
15:06:00	250.00	2.07	0.00	0.00	0.00	158.05	78.98	93.01	907.395	88.24	88.14	85.35	1071.845	88.26	88.81	81.30	0.035	0.015
15:16:00	260.00	1.86	0.00	0.00	0.00	158.38	80.55	91.76	908.600	87.43	87.66	85.87	1072.912	87.14	88.08	81.43	0.036	0.013
15:26:00	270.00	1.68	0.00	0.00	0.00	162.28	80.88	91.59	909.868	87.46	87.11	86.39	1073.968	87.58	87.63	81.56	0.040	0.015
15:36:00	280.00	1.49	0.00	0.00	0.00	164.86	81.42	92.15	911.118	87.55	86.68	86.91	1075.054	86.91	87.34	81.69	0.041	0.014
15:46:00	290.00	1.32	0.00	0.00	0.00	160.05	81.87	91.74	912.329	86.62	86.49	86.72	1076.129	87.00	87.15	81.82	0.038	0.012
15:56:00	300.00	1.12	0.00	0.00	0.00	164.61	81.65	92.35	913.595	86.84	86.50	86.65	1077.187	87.16	87.28	81.95	0.044	0.015
16:06:00	310.00	0.92	0.00	0.00	0.00	165.13	82.04	92.74	914.840	86.07	86.53	85.77	1078.255	87.32	87.47	82.08	0.041	0.016
16:16:00	320.00	0.77	0.00	0.00	0.00	159.17	81.64	92.26	916.085	86.46	86.76	85.18	1079.323	87.36	87.64	81.26	0.043	0.014
16:26:00	330.00	0.60	0.00	0.00	0.00	159.69	81.87	92.51	917.335	86.64	86.87	84.84	1080.395	87.52	87.77	80.76	0.040	0.016
16:36:00	340.00	0.38	0.00	0.00	0.00	170.91	82.01	93.61	918.575	86.84	87.03	85.67	1081.460	87.50	87.83	81.11	0.041	0.014
16:46:00	350.00	0.20	0.00	0.00	0.00	164.71	82.04	93.75	919.814	87.91	87.16	85.01	1082.531	87.46	87.78	81.16	0.039	0.012
16:56:00	360.00	0.00	0.00	0.00	0.00	164.03	82.36	93.90	921.067	87.03	87.10	85.97	1083.608	87.37	87.79	81.34	0.042	0.014

250.00	907.40	88.24	88.14	1071.85	88.2633739	88.81002	93.00547	5.38	5.71	0.035	10.54771	548.2	548.5	96.64	112.23	1.007	1.069	250	0.1866
260.00	908.60	87.43	87.66	1072.91	87.1439116	88.0813	91.76188	6.15	5.43	0.036	10.74379	547.5	547.6	108.28	104.62	1.150	1.015	260	0.1903
270.00	909.87	87.46	87.11	1073.97	87.5806936	87.63025	91.59321	6.48	5.37	0.040	11.33193	547.3	547.6	108.10	98.14	1.211	1.005	270	0.2007
280.00	911.12	87.55	86.68	1075.05	86.9076854	87.33769	92.14626	6.39	5.53	0.041	11.46356	547.1	547.1	105.51	100.04	1.194	1.034	280	0.2030
290.00	912.33	86.62	86.49	1076.13	87.0039814	87.14717	91.73936	6.19	5.48	0.038	11.05213	546.6	547.1	106.16	102.66	1.158	1.024	290	0.1958
300.00	913.60	86.84	86.50	1077.19	87.1635902	87.27828	92.34846	6.47	5.39	0.044	11.87369	546.7	547.2	103.37	94.10	1.210	1.007	300	0.2102
310.00	914.84	86.07	86.53	1078.26	87.315682	87.46999	92.74193	6.37	5.44	0.041	11.42890	546.3	547.4	105.83	98.69	1.191	1.017	310	0.2023
320.00	916.09	86.46	86.76	1079.32	87.3593117	87.63732	92.26013	6.37	5.44	0.043	11.67599	546.6	547.5	103.39	96.48	1.190	1.016	320	0.2067
330.00	917.34	86.64	86.87	1080.40	87.5173638	87.7743	92.50608	6.39	5.45	0.040	11.25974	546.8	547.6	107.63	100.42	1.195	1.020	330	0.1993
340.00	918.58	86.84	87.03	1081.46	87.4964159	87.83423	93.60671	6.34	5.42	0.041	11.40732	546.9	547.7	105.53	98.66	1.185	1.013	340	0.2017
350.00	919.81	87.91	87.16	1082.53	87.4592606	87.78239	93.74987	6.32	5.45	0.039	11.11270	547.5	547.6	108.03	101.89	1.183	1.019	350	0.1965
360.00	921.07	87.03	87.10	1083.61	87.3736967	87.78699	93.90344	6.40	5.48	0.042	11.53333	547.1	547.6	105.48	98.76	1.197	1.025	360	0.2039

Intertek Testing Services										
Manufacturer: SBI					RESULTS					
Model: Cambridge										
Date: 6-7-16					Average emission rate:(gr/hr)			2.888		
Run: 2										
Project #: QC20160606					Burn Rate (Dry kg/hr):			0.959		
Test Duration: 360 (minutes)										
PRESSURE FACTOR: 0.98429					BAROMETRIC PRESSURE					
					Average:			29.45		
TEMPERATURE FACTORS					Start:			29.5		
DGM #1: 0.96383					End:			29.4		
DGM #2: 0.96443										
					DRY GAS METER VALUES					
VOLUMES SAMPLED					DGM #1		Final:		921.067	
DGM #1: 38.21534							Initial:		881.025	
DGM #2: 34.88779										
					DGM #2		Final:		1083.608	
TOTAL TUNNEL VOLUME (scf): 74668							Initial:		1046.966	
SAMPLE RATIOS					TEMPERATURES (DEG. RANKIN)					
Sample Train 1: 1953.863							DGM #1:		547.815	
Sample Train 2: 2140.220							DGM #2:		547.475	
TOTAL EMISSIONS					CALIBRATION FACTORS					
Sample Train 1 (g): 18.17							DGM #1:		1.0060	
Sample Train 2 (g): 16.48							DGM #2:		1.0030	
EMISSION RATES					TUNNEL FLOW RATE: 207.410					
Sample Train 1 (g/hr): 3.03										
Sample Train 2 (g/hr): 2.75					PARTICULATE CATCH (mg)					
					Total Sample Train 1:			9.30		
					Total Sample Train 2:			7.7		
					Filter and seal Sample Train 1:			8.1		
MAX Allowed 7.50%					Filter and seal Sample Train 2:			7.7		
					Probe Sample Train 1:			1.2		
DEVIATION: 4.88%					Probe Sample Train 2:			0		
Train 1 Train 2					Room Particulate Correction					
Cs	0.000243358	0.000220708	Mr	0	Milligram Catch (mg)					
Cr	0	0	Vmr	46.5264	Total Volume Sampled (dscf)					
Et	18.17	16.48	Rotometer (glass) at 100							
Et	AVERAGE	17.33	flow rate is 0.12924 cfm							
					Grams Emissions					
Deviation (g/kg)										
Train #1 3.009										
Train #2 2.729										
Deviation 0.280										

ASTM E2779 Calculation Sheet

Manufacturer:	SBI	Tech:
Model:	Cambridge	
Date:	2016-06-07	
Run:	2	
Control #: QC20160606		Dry kilograms:
Test Duration: 60.0		

Barometer (in. Hg):	Start	End
	29.5	29.4
Dry Bulb (F):		
Humidity (%):	74	59

[illegible]

Moisture content of wood (wet basis):

Actual Time		Elapsed Time		Average Weight Remaining		4.96	
		Minutes	Seconds	Lbs.	Oz.	*	*
10:56:00	0.0		4.96				0.00
11:06:00	10.00		4.15				0.00
11:16:00	20.00		3.35				0.00
11:26:00	30.00		2.57				0.00
11:36:00	40.00		1.75				0.00
11:46:00	50.00		0.87				0.00
11:56:00	60.00		0.00				0.00

Intertek Testing Services							
Manufacturer: SBI				RESULTS			
Model: Cambridge							
Date: 6-7-16				Average emission rate:(gr/hr)		2.883	
Run: 2							
Project #: QC20160606				Burn Rate (Dry kg/hr):		2.141	
Test Duration: 60 (minutes)							
PRESSURE FACTOR				0.98429	BAROMETRIC PRESSURE		
				Average:		29.45	
TEMPERATURE FACTORS				Start:		29.5	
DGM #3:				0.97100	End:		29.4
				DRY GAS METER VALUES			
VOLUMES SAMPLED				DGM #3	Final:	540.103	
		DGM #3:	6.79474		Initial:	532.900	
TOTAL TUNNEL VOLUME (scf):				12243			
SAMPLE RATIOS				TEMPERATURES (DEG. RANKIN)			
		Sample Train 3:	1801.866	DGM #3:		543.770	
TOTAL EMISSIONS				CALIBRATION FACTORS			
		Sample Train 3 (g):	2.88	DGM #3:		0.9870	
EMISSION RATES				TUNNEL FLOW RATE:		204.054	
		Sample Train 3 (g/hr):	2.88	PARTICULATE CATCH (mg)			
				Total Sample Train 3:		1.60	
				Filter and seal Sample Train 3:		1.2	
		MAX Allowed	7.50%	Probe Sample Train 3:		0.4	
DEVIATION:		0.00%					

VERSION: 2.4
 2010-04-15
 Manufacturer: SBI
 Model: Cambridge
 Date: 2016-06-07
 Run: 2
 Control #: QC20160606
 Test Duration: 60
 Output Category: Integrated
 Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 4.96
 Burn Rate (dry kg/h): 2.15
 Total Particulate Emissions: 17.33 g

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
 Weight Units lb (kg or lb)

Default Fuel Values
 HHV (kJ/kg) D. Fir 19 810 Oak 19 887
 %C 48.73 50
 %H 6.87 6.6
 %O 43.9 42.9
 %Ash 0.5 0.5

Fuel Data
 Energex P.
 HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages		0.05	5.60	15.33	357.68	77.69
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	4.96	0.06	5.90	15.37	359.7	76.5
10	4.15	0.04	5.79	14.84	355.5	79.9
20	3.35	0.05	5.81	14.96	355.5	78.1
30	2.57	0.03	5.88	14.99	352.8	77.8
40	1.75	0.05	6.20	14.31	355.4	77.0
50	0.87	0.06	5.92	15.57	363.7	77.6
60	0.00	0.06	3.72	17.26	361.2	76.9

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 60 min

	HHV	LHV
Eff	71.49%	77.17%
Comb Eff	99.50%	99.50%
HT Eff	71.85%	77.56%
Output	30 912	kJ/h
Burn Rate	2.15	kg/h
Grams CO	23	g
Input	43 239	kJ/h
MC wet	4.50	
Averages	0.05	5.60

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
 CO_{2-ult} 19.63
 F₀
 1.060

Overall Heating Efficiency: 71.49%
 Combustion Efficiency: 99.50%
 Heat Transfer Efficiency: 71.85%

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M _d)	29.49
Dry Moles Exhaust Gas (N):	658.74
Air Fuel Ratio (A/F)	18.92

%HC
 0.8

Combustion Efficiency:
 Total Input (kJ):
 Total Output (kJ):
 Efficiency:
 Total CO (g):

Heat Output: 29 323 Btu/h 30 912 kJ/h
 Heat Input: 41 017 Btu/h 43 239 kJ/h
 Burn Duration: 1.00 h
 Burn Rate: 4.74 lb/h 2.149 kg/h
 Stack Temp: 357.3 Deg. F 180.7 Deg. C

INPUT DATA				Oxygen Calculation				Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Fuel Properties			
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)	%	%	%	Fuel Ratio	Now	Consumed	Now	Consumed	Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value
0	2.25	0.06	5.90	229.6%	20.54	14.61	182.1	24.7	99.9%	74.8%	74.7%	19.9	2.25	0.00	2.15	0.00	0	4.06	6.87	2.74	20119.00
10	1.88	0.04	5.79	236.8%	20.55	14.74	179.7	26.6	100.2%	74.9%	75.1%	20.4	1.88	16.33	1.80	16.33	10548	4.06	6.87	2.74	20119.00
20	1.52	0.05	5.81	235.2%	20.55	14.72	179.7	25.6	100.1%	74.9%	74.9%	20.3	1.52	32.46	1.45	32.46	6887	4.06	6.87	2.74	20119.00
30	1.17	0.03	5.88	231.9%	20.55	14.65	178.2	25.5	100.2%	75.2%	75.4%	20.1	1.17	48.19	1.11	48.19	6974	4.06	6.87	2.74	20119.00
40	0.79	0.05	6.20	214.3%	20.52	14.30	179.7	25.0	100.1%	75.8%	75.8%	19.0	0.79	64.72	0.76	64.72	7410	4.06	6.87	2.74	20119.00
50	0.39	0.06	5.92	228.1%	20.54	14.59	184.3	25.3	99.8%	74.6%	74.5%	19.8	0.39	82.46	0.38	82.46	11420	4.06	6.87	2.74	20119.00
60	0.00	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	0.00	100.00	0.00	100.00	3792	4.06	6.87	2.74	20119.00

Moisture Content M_{CWB} : 4.5

99.50%
43 239 41 010 (Btu)
30 912 29 318 (Btu)
71.49%
22.63

Moisture of Wood (wet basis): 4.5
Initial Dry Weight W_{tdo} (kg): 2.15
Moisture Content Dry 4.71

Dry kg : 2.15
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 2.25

Fuel Heating Value in kJ/kg - CV: HHV 20 119 LHV 18 638

HHV 8655.4 LHV 8018.1

4.50	79.41	21.06	1.39	4.80	-0.02	0.14	40.62	112.34	0.37	-0.13	591.06	34.82	2.62	454.09	6292.56	4692.80	4552.88	4504.63	6151.27	5444.91	298.53	1789.01	3696.11
Mw	Mass Balance					kg Wood per	Moles per kg of Dry Wood							Stack	Heat Content Change - Ambient to Stack Temperature						Room		
Moisture	(moles/100 mole dry flue gas)					100 mole dflp								Temp	Flue Gas Constituent						Temp		
Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O	Present	K	CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O	K	CO ₂	O ₂
4.50	79.43	21.07	1.46	5.06	-0.02	0.15	40.58	100.52	0.38	-0.11	546.33	34.77	2.62	455.22	6365.65	4746.85	4605.21	4556.42	6223.74	5507.45	297.89	258.32	477.16
4.50	79.43	21.07	1.43	4.95	-0.02	0.14	40.72	103.68	0.27	-0.13	558.64	34.82	2.62	452.87	6193.98	4619.30	4481.58	4434.08	6054.86	5359.64	299.75	252.23	478.95
4.50	79.43	21.07	1.44	4.97	-0.02	0.14	40.66	102.99	0.32	-0.12	555.88	34.80	2.62	452.85	6230.37	4647.40	4509.08	4461.24	6088.33	5392.61	298.78	253.34	478.66
4.50	79.44	21.07	1.45	5.02	-0.02	0.14	40.75	101.52	0.24	-0.13	550.57	34.82	2.62	451.39	6174.46	4607.29	4470.55	4423.04	6030.23	5346.65	298.61	251.63	467.75
4.50	79.45	21.08	1.53	5.30	-0.02	0.15	40.67	93.81	0.30	-0.11	521.20	34.78	2.62	452.81	6252.36	4664.46	4525.79	4477.74	6108.41	5412.64	298.16	254.28	437.56
4.50	79.43	21.07	1.47	5.08	-0.01	0.15	40.53	99.87	0.43	-0.10	543.72	34.76	2.62	457.43	6437.69	4797.77	4653.91	4604.76	6300.31	5565.48	298.47	260.89	479.16
4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32	876.87

SUMS					AVERAGE	SUMS						
744.44	18658.62	-796.50	12042.93	905.50	5291.44	12085.54	-25.77	12111.3	34946.0	-25.8	22.6	-4.6
Energy Losses (kJ/kg of Dry Fuel)					Total Loss Rate	Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
Flue Gas Constituent											CO	HC
CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC								
110.56	2489.29	-94.82	1720.50	129.52	5090.53	0.00	0	0.00	0	0	0.00	0.00
76.43	2477.07	-114.88	1717.57	129.13	5016.50	2630.13	-20	2650.51	7918	-20	3.90	-1.08
91.35	2479.91	-107.11	1717.86	129.22	5043.23	1726.34	-6	1731.98	5161	-6	3.05	-0.65
67.74	2435.18	-115.71	1717.21	129.10	4952.90	1716.88	-17	1733.61	5257	-17	2.29	-0.72
85.44	2333.78	-96.54	1717.39	129.27	4861.19	1790.41	-4	1794.75	5620	-4	3.06	-0.63
124.25	2503.72	-87.68	1721.73	129.67	5131.74	2912.91	20	2892.95	8507	20	6.87	-0.89
188.68	3939.67	-179.77	1730.66	129.58	6944.02	1308.86	1	1307.51	2483	1	3.46	-0.60

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 60
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	71.5%	77.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	72%	77.6%

Output Rate (kJ/h)	30 912	29 323	(Btu/h)
Burn Rate (kg/h)	2.15	4.74	(lb/h)
Input (kJ/h)	43 239	41 017	(Btu/h)

Test Load Weight (dry kg)	2.15	4.74	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	23		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.56	0.73
g/kg Dry Fuel	8.06	10.53
g/h	17.33	22.63
lb/MM Btu Output	1.30	1.70

Air/Fuel Ratio (A/F)	18.92
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VERSION:

2.4

2010-04-15

VERSION: 2.4

2010-04-15

Manufacturer: SBI

Model: Cambridge

Date: 2016-06-07

Run: 2

Control #: QC20160606

Test Duration: 180

Output Category: Integrated

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19 810	19 887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 3.56
 Burn Rate (dry kg/h): 0.51
 Total Particulate Emissions: 17.33 g

Fuel Data

Energetex P.

HHV	20 119	kJ/kg
%C	48.73	
%H	6.87	
%O	43.785	
%Ash	0.615	

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages 0.09 1.14 19.89 165.54 80.52

Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO ₂	O ₂	Flue Gas Temp. (°F)	Room Temp
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Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

0	3.56	0.10	1.65	19.81	210.6	79.9
10	3.31	0.09	1.11	19.54	187.7	78.3
20	3.12	0.07	1.09	20.19	166.5	78.1
30	2.93	0.08	1.09	20.05	160.2	77.1
40	2.69	0.09	1.04	19.64	156.3	78.3
50	2.52	0.08	1.18	20.04	155.5	82.3
60	2.29	0.09	1.19	19.97	156.6	78.7
70	2.07	0.08	1.34	19.80	158.1	79.0
80	1.86	0.09	0.91	19.96	158.4	80.5
90	1.68	0.08	1.00	20.02	162.3	80.9
100	1.49	0.11	1.17	19.80	164.9	81.4
110	1.32	0.08	1.15	20.00	160.1	81.9
120	1.12	0.09	0.94	19.88	164.6	81.7
130	0.92	0.08	0.99	20.01	165.1	82.0
140	0.77	0.08	1.22	19.65	159.2	81.6
150	0.60	0.08	1.23	19.99	159.7	81.9
160	0.38	0.08	1.14	19.91	170.9	82.0
170	0.20	0.10	0.99	19.83	164.7	82.0
180	0.00	0.08	1.31	19.85	164.0	82.4

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 180 min

	HHV	LHV
Eff	65.58%	70.80%
Comb Eff	98.69%	98.69%
HT Eff	66.46%	71.74%
Output	6 785	kJ/h
Burn Rate	0.51	kg/h
Grams CO	134	g
Input	10 345	kJ/h
MC wet	4.50	
Averages	0.09	1.14

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
CO_{2-ult} 19.63
F₀
1.034

Overall Heating Efficiency:	65.58%	Air Fuel Ratio (A/F)		
Combustion Efficiency:	98.69%	Dry Molecular Weight (M _d)	28.97	
Heat Transfer Efficiency:	66.46%	Dry Moles Exhaust Gas (N _r):	2093.17	%HC
		Air Fuel Ratio (A/F)	60.13	0.8

Heat Output:	6 436 Btu/h	6 785 kJ/h
Heat Input:	9 813 Btu/h	10 345 kJ/h

Burn Duration: 3.00 h

Burn Rate: 1.13 lb/h 0.514 kg/h

Stack Temp: 163.0 Deg. F 72.8 Deg. C

INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %	Air Fuel Ratio	Wet Wt Now Wt	% Wet Consumed x	Dry Wt. Now Wt _{din}	% Dry Comsumed y	Total Input	Carbon /12= [a]
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)										
0	1.62	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	1.62	0.00	1.54	0.00	0	4.06
10	1.50	0.09	1.11	1540.1%	20.86	19.71	86.5	25.7	98.7%	60.3%	59.5%	100.1	1.50	6.97	1.44	6.97	3020	4.06
20	1.41	0.07	1.09	1597.1%	20.86	19.74	74.7	25.6	100.1%	65.8%	65.9%	103.9	1.41	12.49	1.35	12.49	1681	4.06
30	1.33	0.08	1.09	1573.9%	20.86	19.73	71.2	25.1	99.0%	67.4%	66.7%	102.3	1.33	17.81	1.27	17.81	1866	4.06
40	1.22	0.09	1.04	1640.4%	20.86	19.78	69.0	25.7	98.5%	67.9%	66.9%	106.3	1.22	24.51	1.16	24.51	1777	4.06
50	1.14	0.08	1.18	1461.3%	20.86	19.64	68.6	27.9	99.4%	71.8%	71.4%	95.3	1.14	29.26	1.09	29.26	1722	4.06
60	1.04	0.09	1.19	1429.8%	20.85	19.62	69.2	25.9	98.3%	70.7%	69.6%	93.2	1.04	35.61	0.99	35.61	1936	4.06
70	0.94	0.08	1.34	1278.6%	20.84	19.46	70.0	26.1	99.0%	72.7%	72.0%	84.0	0.94	41.73	0.90	41.73	1869	4.06
80	0.85	0.09	0.91	1854.0%	20.87	19.92	70.2	27.0	97.8%	64.7%	63.3%	119.5	0.85	47.66	0.81	47.66	1736	4.06
90	0.76	0.08	1.00	1713.1%	20.87	19.83	72.4	27.2	98.9%	65.9%	65.1%	110.9	0.76	52.92	0.73	52.92	1647	4.06
100	0.67	0.11	1.17	1438.1%	20.85	19.63	73.8	27.5	97.5%	68.9%	67.2%	93.6	0.67	58.27	0.64	58.27	1547	4.06
110	0.60	0.08	1.15	1491.2%	20.86	19.67	71.1	27.7	98.9%	70.0%	69.2%	97.1	0.60	62.89	0.57	62.89	1612	4.06
120	0.51	0.09	0.94	1805.7%	20.87	19.89	73.7	27.6	98.3%	63.8%	62.7%	116.6	0.51	68.66	0.48	68.66	1742	4.06
130	0.42	0.08	0.99	1740.3%	20.87	19.84	74.0	27.8	99.4%	65.1%	64.6%	112.7	0.42	74.12	0.40	74.12	1520	4.06
140	0.35	0.08	1.22	1406.2%	20.85	19.59	70.6	27.6	99.0%	71.3%	70.6%	91.9	0.35	78.46	0.33	78.46	1409	4.06
150	0.27	0.08	1.23	1402.3%	20.85	19.58	70.9	27.7	99.4%	71.4%	71.0%	91.7	0.27	83.20	0.26	83.20	1703	4.06
160	0.17	0.08	1.14	1505.2%	20.86	19.68	77.2	27.8	99.0%	66.8%	66.1%	98.0	0.17	89.43	0.16	89.43	1725	4.06
170	0.09	0.10	0.99	1698.0%	20.87	19.83	73.7	27.8	97.4%	65.3%	63.6%	109.7	0.09	94.32	0.09	94.32	2522	4.06
180	0.00	0.08	1.31	1313.4%	20.85	19.50	73.3	28.0	99.3%	71.6%	71.1%	86.2	0.00	100.00	0.00	100.00	882	4.06

Combustion Efficiency: 98.69%
Total Input (kJ): 31 035 29 435 (Btu)
Total Output (kJ): 20 354 19 305 (Btu)
Efficiency: 65.58%
Total CO (g): 134.36

Moisture of Wood (wet basis): 4.5
Initial Dry Weight W_{td} (kg): 1.54
Moisture Content Dry 4.71

Dry kg : 1.54
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 1.62
Fuel Heating HHV LHV
Value in kJ/kg - CV: 20 119 18 638 Btu/lb 8655.4 8018.1

6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.56	675.51	2.95	-0.66	2713.33	35.88	2.62	347.34	1839.38	1402.81	1368.69	1352.56
Fuel Properties			Mw	Mass Balance					kg Wood per								Stack	Heat Content Change - Ambient to Stack			
Hydrogen	Oxygen	Calorific	Moisture	(moles/100 mole dry flue gas)					100 mole dfp	Moles per kg of Dry Wood						Moisture	Temp	Flue Gas Constituent			
/1= [b]	/16= [c]	Value	Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O	Present	K	CO ₂	O ₂	CO	N ₂
6.87	2.74	20119.00	4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67
6.87	2.74	20119.00	4.50	79.10	20.98	0.29	1.03	-0.02	0.03	38.51	683.63	3.01	-0.66	2743.87	35.88	2.62	359.63	2375.99	1808.09	1763.14	1742.57
6.87	2.74	20119.00	4.50	79.10	20.98	0.28	1.00	-0.02	0.03	39.25	710.84	2.40	-0.79	2848.61	36.15	2.62	347.85	1911.11	1458.14	1422.82	1406.02
6.87	2.74	20119.00	4.50	79.10	20.98	0.28	1.01	-0.02	0.03	38.63	699.20	2.93	-0.70	2803.03	35.96	2.62	344.38	1793.51	1369.62	1336.73	1320.89
6.87	2.74	20119.00	4.50	79.09	20.98	0.27	0.98	-0.02	0.03	38.32	728.88	3.24	-0.70	2914.36	35.96	2.62	342.18	1682.71	1285.45	1254.70	1239.80
6.87	2.74	20119.00	4.50	79.11	20.98	0.30	1.09	-0.02	0.03	38.98	648.67	2.55	-0.67	2613.04	35.91	2.62	341.77	1581.17	1207.39	1178.39	1164.43
6.87	2.74	20119.00	4.50	79.10	20.98	0.31	1.11	-0.02	0.03	38.43	633.55	3.01	-0.58	2554.49	35.72	2.62	342.39	1682.54	1285.20	1254.42	1239.54
6.87	2.74	20119.00	4.50	79.11	20.98	0.35	1.23	-0.02	0.03	38.97	566.10	2.44	-0.56	2301.06	35.67	2.62	343.18	1706.87	1303.50	1272.22	1257.14
6.87	2.74	20119.00	4.50	79.08	20.98	0.24	0.87	-0.02	0.02	37.70	825.02	3.92	-0.76	3275.95	36.08	2.62	343.36	1680.82	1283.31	1252.44	1237.61
6.87	2.74	20119.00	4.50	79.09	20.98	0.26	0.94	-0.02	0.03	38.44	762.20	3.18	-0.76	3040.56	36.09	2.62	345.53	1759.27	1342.51	1310.04	1294.57
6.87	2.74	20119.00	4.50	79.09	20.98	0.31	1.10	-0.02	0.03	37.94	636.52	3.45	-0.52	2564.42	35.61	2.62	346.96	1804.53	1376.52	1343.10	1327.26
6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.07	-0.02	0.03	38.70	661.76	2.82	-0.65	2661.75	35.87	2.62	344.29	1689.32	1289.33	1258.20	1243.32
6.87	2.74	20119.00	4.50	79.08	20.98	0.25	0.89	-0.02	0.02	37.98	803.53	3.64	-0.76	3195.47	36.09	2.62	346.82	1794.06	1368.53	1335.31	1319.56
6.87	2.74	20119.00	4.50	79.09	20.98	0.26	0.93	-0.02	0.03	38.67	775.07	3.00	-0.81	3089.76	36.18	2.62	347.11	1797.37	1370.91	1337.59	1321.82
6.87	2.74	20119.00	4.50	79.11	20.98	0.32	1.12	-0.02	0.03	38.83	623.49	2.65	-0.62	2517.49	35.80	2.62	343.80	1674.85	1278.45	1247.63	1232.87
6.87	2.74	20119.00	4.50	79.11	20.98	0.32	1.13	-0.02	0.03	39.07	622.08	2.44	-0.65	2512.81	35.86	2.62	344.09	1681.46	1283.38	1252.41	1237.60
6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.71	668.15	2.81	-0.67	2685.93	35.89	2.62	350.32	1925.32	1467.47	1431.55	1414.73
6.87	2.74	20119.00	4.50	79.08	20.98	0.26	0.94	-0.02	0.03	37.64	753.77	3.87	-0.65	3006.59	35.86	2.62	346.88	1788.14	1363.93	1330.81	1315.11
6.87	2.74	20119.00	4.50	79.11	20.98	0.34	1.20	-0.02	0.03	39.10	581.93	2.35	-0.59	2361.22	35.75	2.62	346.50	1766.41	1347.42	1314.71	1299.20

			SUMS							AVERAGE	SUMS						
1730.06	1639.31	300.11	1348.00	17838.67	15953.65	69127.20	-11133.06	31088.62	2268.49	6657.45	10681.38	407.67	10273.7	21235.6	407.7	134.4	-17.1
Temperature		Room Temp	Energy Losses (kJ/kg of Dry Fuel)							Total Loss Rate							
			Flue Gas Constituent								Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
CH ₄	H ₂ O	K	CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC		Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	CO	HC
2707.79	2525.06	299.77	110.82	974.38	681.23	3883.50	-336.03	1641.95	121.71	7077.57	0.00	0	0.00	0	0	0.00	0.00
2243.51	2111.44	298.85	91.49	1236.06	858.42	4781.37	-589.94	1653.58	120.63	8151.61	1223.59	40	1183.87	1796	40	12.67	-1.59
1796.19	1704.18	298.74	75.02	1036.50	683.15	4005.20	-708.46	1651.14	119.56	6862.10	573.34	-2	575.62	1108	-2	5.62	-1.06
1683.02	1601.17	298.22	69.28	957.64	833.29	3702.50	-622.86	1638.67	119.29	6697.82	621.20	19	601.94	1245	19	7.61	-1.04
1578.07	1502.94	298.85	64.48	936.94	920.66	3613.23	-625.30	1635.40	119.04	6664.45	588.71	26	562.88	1189	26	8.01	-0.99
1483.90	1411.49	301.08	61.63	783.20	725.61	3042.69	-599.25	1629.46	118.80	5762.15	493.28	11	482.64	1229	11	6.12	-0.92
1578.17	1502.59	299.07	64.66	814.24	855.55	3166.38	-518.20	1624.46	119.04	6126.13	589.46	32	557.27	1346	32	8.11	-0.89
1601.61	1523.89	299.25	66.53	737.91	693.69	2892.76	-495.46	1622.90	119.09	5637.42	523.80	18	505.58	1346	18	6.35	-0.83
1577.82	1500.18	300.12	63.36	1058.76	1113.93	4054.34	-674.90	1640.36	119.03	7374.88	636.30	38	598.74	1100	38	9.47	-1.04
1653.00	1569.12	300.31	67.63	1023.27	903.89	3936.21	-680.97	1643.46	119.21	7012.70	574.04	18	556.03	1073	18	7.29	-1.00
1696.68	1608.68	300.61	68.46	876.19	979.99	3403.66	-465.71	1622.88	119.31	6604.78	507.98	39	468.71	1039	39	7.42	-0.64
1586.84	1507.04	300.86	65.37	853.23	800.60	3309.42	-583.87	1631.32	119.05	6195.11	496.35	17	479.18	1116	17	6.32	-0.84
1686.82	1599.35	300.74	68.14	1099.65	1035.13	4216.63	-680.32	1644.48	119.29	7503.00	649.75	30	619.33	1093	30	8.83	-1.06
1690.27	1602.07	300.95	69.51	1062.55	851.94	4084.12	-723.29	1648.97	119.30	7113.09	537.49	10	527.97	983	10	6.34	-0.98
1572.86	1494.39	300.73	65.03	797.10	753.52	3103.74	-550.44	1627.46	119.02	5915.41	414.23	14	400.17	995	14	5.20	-0.69
1579.33	1500.11	300.85	65.69	798.37	692.51	3109.86	-576.36	1630.31	119.03	5839.40	494.29	10	484.63	1209	10	5.77	-0.88
1812.86	1714.53	300.93	74.53	980.49	800.64	3799.87	-593.41	1639.72	119.59	6821.44	584.96	18	567.43	1140	18	6.76	-0.91
1681.43	1593.95	300.95	67.30	1028.09	1100.42	3954.01	-578.96	1633.93	119.28	7324.07	918.01	65	853.15	1604	65	13.58	-1.30
1660.87	1574.67	301.13	69.06	784.11	669.50	3067.70	-529.35	1628.17	119.23	5808.43	254.59	6	248.54	627	6	2.89	-0.42

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 180
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	65.6%	70.8%
Combustion Efficiency	98.7%	98.7%
Heat Transfer Efficiency	66%	71.7%

Output Rate (kJ/h)	6 785	6 436	(Btu/h)
Burn Rate (kg/h)	0.51	1.13	(lb/h)
Input (kJ/h)	10 345	9 813	(Btu/h)

Test Load Weight (dry kg)	1.54	3.40	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	134		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.85	6.60
g/kg Dry Fuel	11.23	87.10
g/h	5.78	44.79
lb/MM Btu Output	1.98	15.34

Air/Fuel Ratio (A/F)	60.13
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VERSION:

2.4

2010-04-15

VERSION: 2.4
 2010-04-15
 Manufacturer: SBI
 Model: Cambridge
 Date: 2016-06-07
 Run: 2
 Control #: QC20160606
 Test Duration: 120
 Output Category: Integrated
 Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 4.81
 Burn Rate (dry kg/h): 1.04
 Total Particulate Emissions: 17.33 g

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
 Weight Units lb (kg or lb)

Default Fuel Values
 HHV (kJ/kg)
 %C
 %H
 %O
 %Ash
 D. Fir
 Oak

Fuel Data
 Energex P.
 HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

Averages		0.09	2.24	18.68	237.61	79.03
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	4.81	0.06	3.72	17.26	361.2	76.9
10	4.28	0.08	2.64	18.52	306.6	77.1
20	3.74	0.09	2.47	18.99	261.2	82.0
30	3.34	0.09	2.30	18.74	243.0	80.6
40	2.96	0.09	1.89	18.54	226.9	80.9
50	2.60	0.08	2.01	17.87	212.6	78.7
60	2.21	0.09	2.15	19.00	207.6	77.4
70	1.78	0.09	2.22	19.34	213.3	78.7
80	1.41	0.09	2.02	18.91	216.8	77.3
90	1.08	0.10	2.12	18.94	208.1	82.3
100	0.70	0.08	1.93	18.05	214.5	78.6
110	0.43	0.09	1.94	18.86	206.4	76.9
120	0.00	0.10	1.65	19.81	210.6	79.9

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 120 min

	HHV	LHV
Eff	66.17%	71.43%
Comb Eff	99.03%	99.03%
HT Eff	66.82%	72.13%
Output	13 873	kJ/h
Burn Rate	1.04	kg/h
Grams CO	100	g
Input	20 966	kJ/h
MC wet	4.50	
Averages	0.09	2.24

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
 CO_{2-ult} 19.63
 F₀
 1.050

Overall Heating Efficiency: 66.17%
 Combustion Efficiency: 99.03%
 Heat Transfer Efficiency: 66.82%

Heat Output: 13 160 Btu/h
 Heat Input: 19 888 Btu/h

Burn Duration: 2.00 h

Burn Rate: 2.30 lb/h 1.042 kg/h

Stack Temp: 227.3 Deg. F 108.5 Deg. C

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M _d)	29.10
Dry Moles Exhaust Gas (N):	1360.96
Air Fuel Ratio (A/F)	39.09

%HC
 0.8

Combustion Efficiency:
 Total Input (kJ):
 Total Output (kJ):
 Efficiency:
 Total CO (g):

	Averages	0.09	2.24	7.74	20.79	18.51	114.23	26.13	99.1%	68.4%	67.8%	52.96	1.02	53.08	0.98	53.08	43806	4.06	6.87	2.74	20119.00
INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %	Air Fuel Ratio	Wet Wt Now Wt	% Wet Consumed x	Dry Wt. Now Wt _{dry}	% Dry Consumed y	Total Input	Fuel Properties			
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)										Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value
0	2.18	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	2.18	0.00	2.08	0.00	0	4.06	6.87	2.74	20119.00
10	1.94	0.08	2.64	621.1%	20.76	18.08	152.6	25.1	99.4%	62.6%	62.2%	43.6	1.94	11.02	1.85	11.02	6974	4.06	6.87	2.74	20119.00
20	1.70	0.09	2.47	667.8%	20.77	18.26	127.3	27.8	99.2%	67.6%	67.0%	46.5	1.70	22.25	1.62	22.25	4097	4.06	6.87	2.74	20119.00
30	1.52	0.09	2.30	722.3%	20.78	18.44	117.2	27.0	99.2%	68.3%	67.7%	49.8	1.52	30.56	1.45	30.56	3400	4.06	6.87	2.74	20119.00
40	1.34	0.09	1.89	889.4%	20.81	18.87	108.3	27.2	98.8%	66.4%	65.6%	60.0	1.34	38.46	1.28	38.46	3226	4.06	6.87	2.74	20119.00
50	1.18	0.08	2.01	840.1%	20.80	18.75	100.4	26.0	99.5%	69.8%	69.4%	57.0	1.18	45.95	1.13	45.95	3269	4.06	6.87	2.74	20119.00
60	1.00	0.09	2.15	777.1%	20.79	18.60	97.6	25.2	99.1%	71.8%	71.1%	53.1	1.00	54.05	0.96	54.05	3574	4.06	6.87	2.74	20119.00
70	0.81	0.09	2.22	750.6%	20.79	18.52	100.7	25.9	99.1%	71.7%	71.1%	51.5	0.81	62.99	0.77	62.99	3487	4.06	6.87	2.74	20119.00
80	0.64	0.09	2.02	829.5%	20.80	18.73	102.7	25.2	98.9%	69.0%	68.3%	56.3	0.64	70.69	0.61	70.69	3051	4.06	6.87	2.74	20119.00
90	0.49	0.10	2.12	783.7%	20.79	18.62	97.9	28.0	98.6%	72.2%	71.2%	53.5	0.49	77.55	0.47	77.55	3095	4.06	6.87	2.74	20119.00
100	0.32	0.08	1.93	875.6%	20.81	18.83	101.4	25.9	99.3%	68.6%	68.1%	59.2	0.32	85.45	0.30	85.45	2833	4.06	6.87	2.74	20119.00
110	0.20	0.09	1.94	864.8%	20.80	18.82	96.9	24.9	98.8%	69.8%	69.0%	58.5	0.20	91.06	0.19	91.06	4925	4.06	6.87	2.74	20119.00
120	0.00	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	0.00	100.00	0.00	100.00	1874	4.06	6.87	2.74	20119.00

Moisture Content M_{CWB} : 4.5

99.03%
41 932
27 746
66.17%
100.28

Moisture of Wood (wet basis): 4.5
Initial Dry Weight W_{tdo} (kg): 2.08
Moisture Content Dry 4.71

Dry kg : 2.08
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 2.18
Fuel Heating HHV LHV
Value in kJ/kg - CV: 20 119 18 638

HHV HHV
Btu/lb 8655.4 8018.1

4.50	79.17	21.00	0.57	1.98	-0.02	0.06	39.55	340.81	1.63	-0.31	1451.43	35.19	2.62	387.38	3488.78	2634.58	2564.16	2535.27	3338.71	3069.13	299.28	1797.53	11121.30
Mw	Mass Balance					kg Wood per 100 mole dtp	Moles per kg of Dry Wood							Stack	Heat Content Change - Ambient to Stack Temperature						Room		
Moisture	(moles/100 mole dry flue gas)													Temp	Flue Gas Constituent						Temp		
Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O	Moisture Present	K	CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O	K	CO ₂	O ₂
4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32	876.87
4.50	79.20	21.01	0.67	2.32	-0.02	0.07	39.87	273.04	1.24	-0.26	1196.25	35.08	2.62	425.72	5105.23	3830.45	3721.98	3681.33	4939.96	4453.04	298.20	203.57	1045.87
4.50	79.19	21.00	0.63	2.18	-0.02	0.06	39.73	293.68	1.39	-0.27	1273.87	35.10	2.62	400.47	3951.69	2979.24	2898.39	2865.99	3792.49	3468.81	300.95	157.02	874.95
4.50	79.18	21.00	0.58	2.04	-0.02	0.06	39.65	317.81	1.50	-0.29	1364.82	35.15	2.62	390.39	3569.32	2697.28	2625.64	2595.97	3411.68	3142.87	300.14	141.51	857.24
4.50	79.15	20.99	0.48	1.70	-0.02	0.05	39.25	391.93	1.95	-0.35	1643.78	35.26	2.62	381.41	3197.57	2420.98	2357.80	2330.92	3046.24	2822.62	300.30	125.52	948.84
4.50	79.16	21.00	0.51	1.79	-0.02	0.05	39.69	370.28	1.54	-0.37	1563.16	35.31	2.62	373.51	2923.18	2217.61	2160.81	2135.95	2775.23	2587.14	299.11	116.02	821.15
4.50	79.17	21.00	0.55	1.91	-0.02	0.05	39.55	342.10	1.62	-0.31	1456.32	35.19	2.62	370.73	2838.50	2155.02	2100.22	2075.97	2691.24	2514.72	298.39	112.27	737.23
4.50	79.17	21.00	0.56	1.97	-0.02	0.06	39.60	330.39	1.56	-0.30	1412.19	35.17	2.62	373.85	2938.02	2228.72	2171.60	2146.62	2789.65	2600.04	299.08	116.34	736.34
4.50	79.15	21.00	0.52	1.81	-0.02	0.05	39.39	365.34	1.79	-0.33	1543.69	35.22	2.62	375.84	3046.96	2310.73	2251.35	2225.49	2894.47	2695.48	298.34	120.03	844.19
4.50	79.16	21.00	0.54	1.90	-0.02	0.05	39.27	344.89	1.88	-0.28	1466.10	35.13	2.62	371.00	2746.12	2083.52	2030.21	2006.84	2606.62	2430.79	301.10	107.83	718.58
4.50	79.15	21.00	0.49	1.72	-0.02	0.05	39.55	385.97	1.68	-0.38	1622.06	35.31	2.62	374.55	2967.42	2250.68	2192.92	2167.71	2818.29	2625.54	299.06	117.36	868.70
4.50	79.15	20.99	0.50	1.74	-0.02	0.05	39.28	380.96	1.92	-0.33	1602.39	35.23	2.62	370.06	2824.05	2144.50	2090.09	2065.93	2676.53	2502.63	298.07	110.92	816.96
4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67	2707.79	2525.06	299.77	110.82	974.38

SUMS					AVERAGE	SUMS						
6032.82	45850.23	-3618.86	21515.02	1600.79	6484.52	14185.91	407.56	13778.4	29620.2	407.6	100.3	-10.9
Energy Losses (kJ/kg of Dry Fuel)					Total Loss Rate							
Flue Gas Constituent						Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
188.65	3939.67	-179.77	1730.66	129.58	6943.99	0.00	0	0.00	0	0	0.00	0.00
356.41	4403.80	-231.23	1698.61	126.76	7603.78	2635.79	42	2593.56	4338	42	12.07	-1.43
398.74	3650.90	-240.87	1665.14	124.18	6630.05	1350.23	32	1318.69	2747	32	7.95	-0.88
429.82	3543.02	-261.14	1655.84	123.33	6489.62	1096.67	28	1068.66	2303	28	7.12	-0.79
557.09	3831.51	-309.32	1649.65	122.49	6925.78	1110.36	39	1071.20	2115	39	8.76	-0.89
439.21	3338.83	-331.79	1643.70	121.88	6148.99	999.14	17	982.06	2270	17	7.01	-0.97
462.57	3023.28	-280.52	1635.81	121.69	5812.32	1032.58	32	1000.70	2542	32	8.07	-0.89
446.10	3031.44	-271.29	1637.84	121.91	5818.68	1008.50	30	978.64	2479	30	7.59	-0.84
511.23	3435.46	-291.88	1643.35	122.16	6384.53	968.25	33	935.46	2083	33	7.61	-0.79
534.76	2942.22	-251.45	1629.83	121.47	5803.24	892.67	43	849.56	2202	43	8.08	-0.69
480.40	3516.16	-335.57	1645.45	121.98	6414.47	903.31	20	883.29	1930	20	6.64	-0.85
546.57	3310.44	-297.99	1637.20	121.65	6245.76	1529.06	60	1468.97	3396	60	13.14	-1.31
681.29	3883.50	-336.03	1641.95	121.71	7077.62	659.35	32	627.56	1215	32	6.23	-0.56

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 120
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	66.2%	71.4%
Combustion Efficiency	99.0%	99.0%
Heat Transfer Efficiency	67%	72.1%

Output Rate (kJ/h)	13 873	13 160	(Btu/h)
Burn Rate (kg/h)	1.04	2.30	(lb/h)
Input (kJ/h)	20 966	19 888	(Btu/h)

Test Load Weight (dry kg)	2.08	4.59	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	100		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.62	3.61
g/kg Dry Fuel	8.31	48.12
g/h	8.67	50.14
lb/MM Btu Output	1.45	8.40

Air/Fuel Ratio (A/F)	39.09
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VERSION:

2.4

2010-04-15



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Cambridge & Osburn 3000

Project #: G102163734 Sample ID #: QC20160608

Date: 2016-06-07 Engineer: Claude Pelland Run #: 2 Sample Train #: 2C

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #: SBI-213

Front Filter #	11	Tare:	0.0850	Preliminary Wt :	0.0861	
Rear Filter #	12	Tare:	0.0848	Preliminary Wt :	0.0847	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :	May 27th, 2016 / 8:00			Preliminary Wt :	0.1708	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:07	12.9	72.8	0.0860	100mg= 0.0999 10g= 10.0001	
				0.0848		
2016-06-10	9:13	1.0	71.7	0.0862	100mg= 0.1000 10g= 10.0001	
				0.0848		
Probe #:	21	Tare:	139.5479	Preliminary Wt :	139.5484	
Date/Time in dessicator :	May 27th, 2016 / 8:00					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-10	9:05	1.0	71.7	139.5491	200 g = 200.0001	
2016-06-13	8:36	0.2	71.6	139.5482	200 g = 199.9998	
2016-06-14	8:34	0.9	72.3	139.5483	200 g = 199.9998	

Date: _____

Engineer Signature: _____



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Cambridge & Osburn 3000

Project #: G102163734 Sample ID #: QC20160608

Date: 2016-06-07 Engineer: Claude Pelland Run #: 2 Sample Train #: 2D

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #: SBI-213

Front Filter #	13	Tare:	0.0851	Preliminary Wt :	0.0886	
Rear Filter #	14	Tare:	0.0848	Preliminary Wt :	0.0850	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :		May 27th, 2016 / 8:00		Preliminary Wt :	0.1736	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:09	12.9	72.8	0.0885	100mg= 0.0999 10g= 10.0001	
				0.0849		
2016-06-10	9:15	1.0	71.7	0.0883	100mg= 0.1000 10g= 10.0001	
				0.0849		
Probe #:	27	Tare:	136.8187	Preliminary Wt :	136.8193	
Date/Time in dessicator :		May 27th, 2016 / 8:00				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:01	12.9	72.8	136.8193	200 g = 200.0003	
2016-06-10	9:07	1.0	71.7	136.8199	200 g = 200.0001	
2016-06-13	8:37	0.2	71.6	136.8191	200 g = 199.9998	
2016-06-14	8:35	0.9	72.3	136.8191	200 g = 199.9998	

Date: _____

Engineer Signature: _____



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Cambridge & Osburn 3000

Project #: G102163734 Sample ID #: QC20160608

Date: 2016-06-07 Engineer: Claude Pelland Run #: 2 Sample Train #: 2E

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #: SBI-213

Front Filter #	15	Tare:	0.0849	Preliminary Wt :	0.0880	
Rear Filter #	16	Tare:	0.0855	Preliminary Wt :	0.0855	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :	May 27th, 2016 / 8:00			Preliminary Wt :	0.1735	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:11	12.9	72.8	0.0878	100mg= 0.0999 10g= 10.0001	
				0.0856		
2016-06-10	9:17	1.0	71.7	0.0878	100mg= 0.1000 10g= 10.0001	
				0.0856		
Probe #:	38	Tare:	136.2318	Preliminary Wt :	136.2326	
Date/Time in dessicator :	May 27th, 2016 / 8:00					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:02	12.9	72.8	136.2315	200 g = 200.0003	
2016-06-10	9:08	1.0	71.7	136.2317	200 g = 200.0001	

Date: _____

Engineer Signature: _____

General information

Project:	Cambridge (G102163734)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Calibration

[illegible]

Filters weights

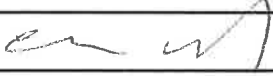
General information

Project:	Cambridge (G102163734)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)		Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-05-31	15:42	1	0.0852	6.4	72.1	N/A
2016-05-31	15:43	2	0.0857	6.4	72.1	N/A
2016-05-31	15:44	3	0.0856	6.4	72.1	N/A
2016-05-31	15:44	4	0.0860	6.4	72.1	N/A
2016-05-31	15:45	5	0.0853	6.4	72.1	N/A
2016-05-31	15:46	6	0.0859	6.4	72.1	N/A
2016-05-31	15:46	7	0.0851	6.4	72.1	N/A
2016-05-31	15:47	8	0.0846	6.4	72.1	N/A
2016-05-31	15:48	9	0.0858	6.4	72.1	N/A
2016-05-31	15:49	10	0.0835	6.4	72.1	N/A
2016-05-31	15:49	11	0.0850	6.4	72.1	N/A
2016-05-31	15:50	12	0.0848	6.4	72.1	N/A
2016-05-31	15:50	13	0.0851	6.4	72.1	N/A
2016-05-31	15:51	14	0.0848	6.4	72.1	N/A
2016-05-31	15:52	15	0.0850	6.4	72.1	N/A
2016-05-31	15:52	16	0.0856	6.4	72.1	N/A
2016-05-31	15:53	17	0.0862	6.4	72.1	N/A
2016-05-31	15:53	18	0.0864	6.4	72.1	N/A
2016-05-31	15:54	19	0.0855	6.4	72.1	N/A
2016-05-31	15:54	20	0.0858	6.4	72.1	N/A
2016-05-31	15:55	21	0.0857	6.4	72.1	N/A
2016-05-31	15:56	22	0.0857	6.4	72.1	N/A
2016-05-31	15:56	23	0.0840	6.4	72.1	N/A
2016-05-31	15:57	24	0.0841	6.4	72.1	N/A

Filters weights

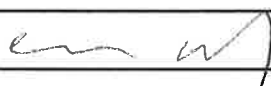
General information

Project:	Cambridge (G102163734)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)		Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-06-01	15:23	1	0.0851	5.9	72.7	1A
2016-06-01	15:24	2	0.0857	5.9	72.7	1A
2016-06-01	15:25	3	0.0856	5.9	72.7	1B
2016-06-01	15:26	4	0.0861	5.9	72.7	1B
2016-06-01	15:26	5	0.0853	5.9	72.7	1C
2016-06-01	15:27	6	0.0858	5.9	72.7	1C
2016-06-01	15:28	7	0.0850	5.9	72.7	2A
2016-06-01	15:28	8	0.0845	5.9	72.7	2A
2016-06-01	15:29	9	0.0858	5.9	72.7	2B
2016-06-01	15:29	10	0.0835	5.9	72.7	2B
2016-06-01	15:30	11	0.0850	5.9	72.7	2C
2016-06-01	15:31	12	0.0848	5.9	72.7	2C
2016-06-01	15:31	13	0.0851	5.9	72.7	2D
2016-06-01	15:32	14	0.0848	5.9	72.7	2D
2016-06-01	15:32	15	0.0849	5.9	72.7	2E
2016-06-01	15:33	16	0.0855	5.9	72.7	2E
2016-06-01	15:33	17	0.0862	5.9	72.7	N/A
2016-06-01	15:34	18	0.0863	5.9	72.7	N/A
2016-06-01	15:34	19	0.0856	5.9	72.7	N/A
2016-06-01	15:35	20	0.0858	5.9	72.7	N/A
2016-06-01	15:36	21	0.0857	5.9	72.7	N/A
2016-06-01	15:36	22	0.0857	5.9	72.7	N/A
2016-06-01	01:37	23	0.0839	5.9	72.7	N/A
2016-06-01	15:38	24	0.0843	5.9	72.7	N/A

Probe weights

General information

Project:	Cambridge (G102163734)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)		Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-05-31	15:26	17	139.7113	6.4	72.1	N/A
2016-05-31	15:29	18	147.1246	6.4	72.1	N/A
2016-05-31	15:30	19	140.1275	6.4	72.1	N/A
2016-05-31	15:31	20	139.1366	6.4	72.1	N/A
2016-05-31	15:32	31	137.0215	6.4	72.1	N/A
2016-05-31	15:33	21	139.5482	6.4	72.1	N/A
2016-05-31	15:34	27	136.8190	6.4	72.1	N/A
2016-05-31	15:35	38	136.2319	6.4	72.1	N/A
2016-05-31	15:36	32	135.9698	6.4	72.1	N/A
2016-05-31	15:37	-	136.6445	6.4	72.1	N/A
2016-05-31	15:38	28	136.1844	6.4	72.1	N/A
2016-05-31	15:39	34	108.4486	6.4	72.1	N/A
2016-05-31	15:39	35	107.8573	6.4	72.1	N/A
2016-05-31	15:40	37	108.3886	6.4	72.1	N/A
2016-05-31	15:41	36	108.5195	6.4	72.1	N/A
2016-06-02	14:52	17	139.7113	6.8	72.4	1A
2016-06-02	14:53	18	147.7246	6.8	72.4	1B
2016-06-02	14:54	19	147.1273	6.8	72.4	1C
2016-06-02	14:55	20	139.1364	6.8	72.4	2A
2016-06-02	14:56	31	137.0211	6.8	72.4	2B
2016-06-02	14:57	21	139.5479	6.8	72.4	2C
2016-06-02	14:58	27	136.8187	6.8	72.4	2D
2016-06-02	14:59	38	136.2318	6.8	72.4	2E
2016-06-02	15:00	32	135.9696	6.8	72.4	N/A



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Cambridge & Osburn 3000

Project #: G102163734 Sample ID #: QC20160608

Date: 2016-06-07 Engineer: Claude Pelland Run #: 2 Sample Train #: 2A

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #: SBI-213

Front Filter #	7	Tare:	0.0850	Preliminary Wt :	0.0902	
Rear Filter #	8	Tare:	0.0845	Preliminary Wt :	0.0846	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :	May 27th, 2016 / 8:00			Preliminary Wt :	0.1748	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:03	12.9	72.8	0.0899	100mg= 0.0999 10g= 10.0001	
				0.0845		
2016-06-10	9:10	1.0	71.7	0.0897	100mg= 0.1000 10g= 10.0001	
				0.0846		
Probe #:	20	Tare:	139.1364	Preliminary Wt :	139.1381	
Date/Time in dessicator :	May 27th, 2016 / 8:00					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-10	9:02	1.0	71.7	139.1379	200 g = 200.0001	
2016-06-13	8:34	0.2	71.6	139.1370	200 g = 199.9998	
2016-06-14	8:32	0.9	72.3	139.1372	200 g = 199.9998	

Date: _____

Engineer Signature: _____



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Cambridge & Osburn 3000

Project #: G102163734 Sample ID #: QC20160608

Date: 2016-06-07 Engineer: Claude Pelland Run #: 2 Sample Train #: 2B

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #: SBI-213

Front Filter #	9	Tare:	0.0858	Preliminary Wt :	0.0906	
Rear Filter #	10	Tare:	0.0835	Preliminary Wt :	0.0936	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :	May 27th, 2016 / 8:00			Preliminary Wt :	0.1842	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-09	18:05	12.9	72.8	0.0905	100mg= 0.0999 10g= 10.0001	
				0.0835		
2016-06-10	9:12	1.0	71.7	0.0905	100mg= 0.1000 10g= 10.0001	
				0.0835		
Probe #:	31	Tare:	137.0211	Preliminary Wt :	137.0218	
Date/Time in dessicator :	May 27th, 2016 / 8:00					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-06-10	9:03	1.0	71.7	137.0216	200 g = 200.0001	
2016-06-13	8:35	0.2	71.6	137.0212	200 g = 199.9998	
2016-06-14	8:33	0.9	72.3	137.0211	200 g = 199.9998	

Date: _____

Engineer Signature: _____



Avis

Rapport de données horaires pour le 07 juin 2016

Toutes les heures sont exprimées en heure normale locale (HNL). Pour convertir l'heure locale en heure avancée, ajoutez 1 heure s'il y a lieu.

QUEBEC INTL A QUEBEC

Latitude :	46°47'28,000" N	Longitude :	71°23'36,000" O
Altitude :	74,40 m	Identification Climat :	7016293
Identification OMM :		Identification TC :	YQB

	<u>Temp.</u> °C 	<u>Point de rosée</u> °C 	<u>Hum. rel.</u> % 	<u>Dir. du vent</u> 10's deg	<u>Vit. du vent</u> km/h 	<u>Visibilité</u> km 	<u>Pression à la station</u> kPa 	<u>Hmdx</u>	<u>Refr. éolien</u>	<u>Météo</u>
HEURE										
00:00 ±	15,4	13,1	86	30	4	24,1	98,96			<u>ND</u>
01:00 ±	14,8	12,9	88	30	4	24,1	98,93			Généralement nuageux
02:00 ±	14,6	12,1	85	29	3	24,1	98,88			<u>ND</u>
03:00 ±	12,6	11,2	91	25	6	24,1	98,89			<u>ND</u>
04:00 ±	14,0	11,9	87	25	5	48,3	98,92			Généralement nuageux
05:00 ±	14,2	12,1	87	5	3	48,3	98,93			<u>ND</u>
06:00 ±	15,9	12,7	81	1	5	48,3	98,92			<u>ND</u>
07:00 ±	17,1	12,3	73	36	1	48,3	98,91			Nuageux

	<u>Temp.</u> °C 	<u>Point de rosée</u> °C 	<u>Hum. rel.</u> % 	<u>Dir. du vent</u> 10's deg	<u>Vit. du vent</u> km/h 	<u>Visibilité</u> km 	<u>Pression à la station</u> kPa 	<u>Hmdx</u>	<u>Refr. éolien</u>	<u>Météo</u>
08:00 ‡	18,1	12,2	68	22	21	48,3	98,87			<u>ND</u>
09:00 ‡	17,7	13,1	74	22	18	48,3	98,89			<u>ND</u>
10:00 ‡	17,3	12,7	74	22	19	48,3	98,90			Nuageux
11:00 ‡	17,4	12,8	74	20	15	48,3	98,87			<u>ND</u>
12:00 ‡	18,9	14,0	73	20	14	48,3	98,81			<u>ND</u>
13:00 ‡	20,5	13,3	63	23	16	48,3	98,71			Généralement dégagé
14:00 ‡	22,1	13,6	58	21	22	48,3	98,66	25		<u>ND</u>
15:00 ‡	21,2	13,0	59	20	23	48,3	98,64			Orages
16:00 ‡	16,6	12,2	75	26	20	32,2	98,68			Averses de pluie
17:00 ‡	17,1	11,7	70	24	14	48,3	98,67			<u>ND</u>
18:00 ‡	16,3	12,9	80	26	11	48,3	98,65			<u>ND</u>
19:00 ‡	15,1	12,5	84	18	4	48,3	98,64			Généralement nuageux
20:00 ‡	14,2	12,3	88	16	5	24,1	98,67			<u>ND</u>
21:00 ‡	13,9	12,1	89	31	6	24,1	98,66			<u>ND</u>
22:00 ‡	12,6	11,0	90	36	2	24,1	98,62			Généralement dégagé
23:00 ‡	12,3	11,2	93	9	3	24,1	98,60			<u>ND</u>

Légende

- E = Valeur estimatif
- M = Données manquantes

- ND = Non disponible
- ‡ = Ces données journalières n'ont subi qu'un contrôle de qualité préliminaire



Gouvernement
du Canada

Government
of Canada

Accueil → Environnement et ressources naturelles → Météo, climat et catastrophes naturelles
→ Conditions météorologiques et climatiques passées → Données historiques

i ▶ Avis

Rapport de données horaires pour le 06 juin 2016

Toutes les heures sont exprimées en heure normale locale (HNL). Pour convertir l'heure locale en heure avancée, ajoutez 1 heure s'il y a lieu.

QUEBEC INTL A
QUEBEC

<u>Latitude</u> :	46°47'28,000" N	<u>Longitude</u> :	71°23'36,000" O
<u>Altitude</u> :	74,40 m	<u>Identification Climat</u> :	7016293
<u>Identification OMM</u> :		<u>Identification TC</u> :	YQB

	<u>Temp.</u> °C 	<u>Point de rosée</u> °C 	<u>Hum. rel.</u> % 	<u>Dir. du vent</u> 10's deg	<u>Vit. du vent</u> km/h 	<u>Visibilité</u> km 	<u>Pression à la station</u> kPa 	<u>Hmdx</u>	<u>Refr. éolien</u>	<u>Météo</u>
HEURE										
00:00 ±	14,3	13,0	92	11	18	11,3	99,10			Pluie
01:00 ±	13,9	13,0	94	12	16	11,3	99,04			Pluie
02:00 ±	13,8	12,7	93	10	13	24,1	98,98			Pluie
03:00 ±	13,7	12,4	92	10	9	24,1	98,91			ND
04:00 ±	13,3	12,7	96	8	7	19,3	98,90			Pluie
05:00 ±	13,7	12,8	94	8	9	32,2	98,88			ND
06:00 ±	14,0	12,9	93	6	12	32,2	98,86			ND
07:00 ±	13,9	13,3	96	4	5	16,1	98,85			Pluie
08:00 ±	14,6	13,8	95	9	4	32,2	98,83			ND

	<u>Temp.</u> °C 	<u>Point de rosée</u> °C 	<u>Hum. rel.</u> % 	<u>Dir. du vent</u> 10's deg	<u>Vit. du vent</u> km/h 	<u>Visibilité</u> km 	<u>Pression à la station</u> kPa 	<u>Hmdx</u>	<u>Refr. éolien</u>	<u>Météo</u>
09:00 ‡	15,4	14,6	95	32	3	16,1	98,81			<u>ND</u>
10:00 ‡	18,0	16,4	90	8	8	32,2	98,76			Généralement nuageux
11:00 ‡	20,7	17,0	79	22	22	24,1	98,74	26		<u>ND</u>
12:00 ‡	20,7	14,7	68	23	41	24,1	98,74			<u>ND</u>
13:00 ‡	20,3	14,5	69	23	28	32,2	98,75			Généralement nuageux
14:00 ‡	22,5	14,2	59	23	33	32,2	98,74	26		<u>ND</u>
15:00 ‡	22,3	13,8	58	23	39	48,3	98,74	26		<u>ND</u>
16:00 ‡	21,9	12,9	56	23	41	48,3	98,75	25		Généralement dégagé
17:00 ‡	21,6	13,1	58	23	35	48,3	98,79			<u>ND</u>
18:00 ‡	20,4	13,7	65	24	21	48,3	98,82			<u>ND</u>
19:00 ‡	19,5	13,3	67	22	21	48,3	98,85			Généralement dégagé
20:00 ‡	18,9	13,2	69	22	20	24,1	98,92			<u>ND</u>
21:00 ‡	17,3	13,5	78	23	10	24,1	98,96			<u>ND</u>
22:00 ‡	17,2	13,4	78	24	16	24,1	98,98			Généralement dégagé
23:00 ‡	16,2	13,0	81	22	9	24,1	98,97			<u>ND</u>

Légende

- E = Valeur estimatif
- M = Données manquantes

- ND = Non disponible
- ‡ = Ces données journalières n'ont subi qu'un contrôle de qualité préliminaire

Calibration Documents

Appendix C

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

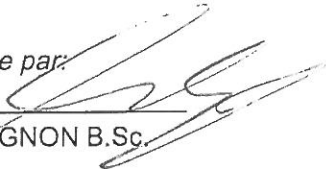
Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 03/05/2016
Code de produit: SPG-4MX0024334
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 590

No de série: SG-140107-A
No d'ordre de fabrication: 16-SGM-1725
Pression: 6750 kPa (15°C)
1000 psi (21°C)
Volume: 0,485 m3
Date d'expiration: 03/05/2019

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	0,8 % molaire	0,798 % molaire
OXYGÈNE	20 % molaire	19,8 % molaire
AZOTE	BALANCE	BALANCE
DIOXYDE DE CARBONE	40 % molaire	39,5 % molaire

Analyse réalisée par:


FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins, on choisit préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

La teneur en oxygène est mesurée à l'aide d'un analyseur d'oxygène Servomex.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

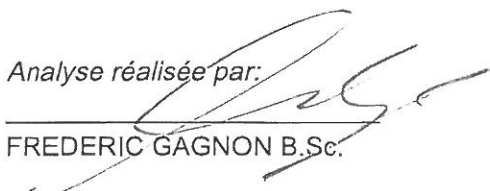
Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 03/05/2016
Code de produit: SPG-2MX0014570
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 350

No de série: SG-130251-A
No d'ordre de fabrication: 16-SGM-1718
Pression: 13500 kPa (15°C)
2000 psi (21°C)
Volume: 807,0 L
Date d'expiration: 03/05/2019

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	0,8 % molaire	0,770 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:


FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins, on choisit préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

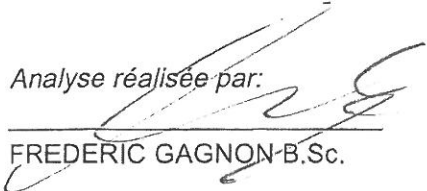
Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 03/05/2016
Code de produit: SPG-2MX0024331
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 350

No de série: SG-130201-A
No d'ordre de fabrication: 16-SGM-1727
Pression: 13500 kPa (15°C)
2000 psi (21°C)
Volume: 812,0 L
Date d'expiration: 03/05/2019

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	8 % molaire	7,97 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:


FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins, on choisit préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 03/05/2016
Code de produit: SPG-2MX0024332
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 580

No de série: SG090157A
No d'ordre de fabrication: 16-SGM-1726
Pression: 7571,5 kPa (15°C)
1121 psi (21°C)
Volume: 886,0 L
Date d'expiration: 03/05/2019

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
DIOXYDE DE CARBONE	40 % molaire	39,4 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:


SAMIA AMRANI B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins, on choisit préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

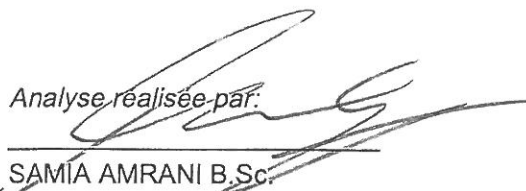
Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 02/05/2016
Code de produit: SPG-2MX0007686
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 580

No de série: S980151E
No d'ordre de fabrication: 16-SGM-1717
Pression: 13500 kPa (15°C)
2000 psi (21°C)
Volume: 860,337 L
Date d'expiration: 02/05/2019

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
DIOXYDE DE CARBONE	8 % molaire	8,08 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:


SAMIA AMRANI B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins, on choisit préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

Date: 2016-06-02

Equipment: Test bench #5

T1 (Flue)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

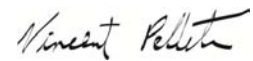
S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.38	%	
	Ave A.D.	0.19	%
Standard	Reading	A.D.	
70.0	69.82	0.26	
70.0	69.91	0.12	
70.0	69.93	0.10	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.23	%	
	Ave A.D.	0.12	%
Standard	Reading	A.D.	
200.0	199.74	0.13	
200.0	199.80	0.10	
200.0	199.78	0.11	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.04	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
600.0	599.87	0.02	
600.0	599.91	0.01	
600.0	599.92	0.01	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.00	%	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
1000.0	1000.00	0.00	
1000.0	1000.03	0.00	
1000.0	1000.02	0.00	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.00	%	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
1400.0	1399.99	0.00	
1400.0	1399.99	0.00	
1400.0	1399.99	0.00	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T2 (Ambiant)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

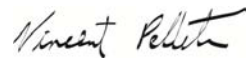
S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.79	%	
	Ave A.D.	0.40	%
Standard	Reading	A.D.	
70.0	69.70	0.43	
70.0	69.75	0.36	
70.0	69.74	0.37	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.39	%	
	Ave A.D.	0.19	%
Standard	Reading	A.D.	
200.0	199.60	0.20	
200.0	199.62	0.19	
200.0	199.61	0.20	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.10	%	
	Ave A.D.	0.05	%
Standard	Reading	A.D.	
600.0	599.69	0.05	
600.0	599.72	0.05	
600.0	599.70	0.05	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.03	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1000.0	999.82	0.02	
1000.0	999.84	0.02	
1000.0	999.81	0.02	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.03	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1400.0	1399.80	0.01	
1400.0	1399.76	0.02	
1400.0	1399.75	0.02	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T3 (Dilution tunnel)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

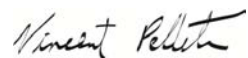
S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.08	%	
	Ave A.D.	0.54	%
Standard	Reading	A.D.	
70.0	69.60	0.57	
70.0	69.64	0.52	
70.0	69.64	0.52	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.49	%	
	Ave A.D.	0.25	%
Standard	Reading	A.D.	
200.0	199.50	0.25	
200.0	199.52	0.24	
200.0	199.51	0.25	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.13	%	
	Ave A.D.	0.06	%
Standard	Reading	A.D.	
600.0	599.62	0.06	
600.0	599.62	0.06	
600.0	593.62	1.06	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.06	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1000.0	999.71	0.03	
1000.0	999.70	0.03	
1000.0	999.67	0.03	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.05	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1400.0	1399.64	0.03	
1400.0	1399.63	0.03	
1400.0	1399.58	0.03	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T4 (Firebox top)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.35	%	
	Ave A.D.	0.67	%
Standard	Reading	A.D.	
70.0	69.56	0.63	
70.0	69.50	0.72	
70.0	69.54	0.66	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.61	%	
	Ave A.D.	0.31	%
Standard	Reading	A.D.	
200.0	199.39	0.31	
200.0	199.39	0.31	
200.0	199.40	0.30	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.18	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
600.0	599.46	0.09	
600.0	599.47	0.09	
600.0	599.48	0.09	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.09	%	
	Ave A.D.	0.05	%
Standard	Reading	A.D.	
1000.0	999.53	0.05	
1000.0	999.53	0.05	
1000.0	999.56	0.04	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.08	%	
	Ave A.D.	0.04	%
Standard	Reading	A.D.	
1400.0	1399.46	0.04	
1400.0	1399.46	0.04	
1400.0	1399.45	0.04	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T5 (Firebox back)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

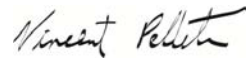
S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.79	%	
	Ave A.D.	0.89	%
Standard	Reading	A.D.	
70.0	69.33	0.95	
70.0	69.41	0.84	
70.0	69.41	0.85	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.74	%	
	Ave A.D.	0.37	%
Standard	Reading	A.D.	
200.0	199.25	0.38	
200.0	199.28	0.36	
200.0	199.27	0.37	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.22	%	
	Ave A.D.	0.11	%
Standard	Reading	A.D.	
600.0	599.34	0.11	
600.0	599.34	0.11	
600.0	599.33	0.11	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.12	%	
	Ave A.D.	0.06	%
Standard	Reading	A.D.	
1000.0	999.41	0.06	
1000.0	999.41	0.06	
1000.0	999.40	0.06	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.10	%	
	Ave A.D.	0.05	%
Standard	Reading	A.D.	
1400.0	1399.30	0.05	
1400.0	1399.30	0.05	
1400.0	1399.28	0.05	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T6 (Firebox right)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

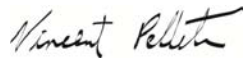
S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.88	%	
	Ave A.D.	0.94	%
Standard	Reading	A.D.	
70.0	69.36	0.92	
70.0	69.33	0.96	
70.0	69.34	0.94	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.80	%	
	Ave A.D.	0.40	%
Standard	Reading	A.D.	
200.0	199.19	0.40	
200.0	199.22	0.39	
200.0	199.20	0.40	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.24	%	
	Ave A.D.	0.12	%
Standard	Reading	A.D.	
600.0	599.29	0.12	
600.0	599.26	0.12	
600.0	599.26	0.12	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.13	%	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
1000.0	999.34	0.07	
1000.0	999.33	0.07	
1000.0	999.33	0.07	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.11	%	
	Ave A.D.	0.06	%
Standard	Reading	A.D.	
1400.0	1399.22	0.06	
1400.0	1399.21	0.06	
1400.0	1399.26	0.05	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T7 (Firebox left)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

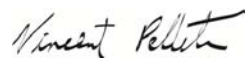
S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	2.00	%	
	Ave A.D.	1.00	%
Standard	Reading	A.D.	
70.0	69.28	1.03	
70.0	69.32	0.97	
70.0	69.30	1.00	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	0.83	%	
	Ave A.D.	0.42	%
Standard	Reading	A.D.	
200.0	199.16	0.42	
200.0	199.18	0.41	
200.0	199.15	0.42	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.26	%	
	Ave A.D.	0.13	%
Standard	Reading	A.D.	
600.0	599.19	0.13	
600.0	599.22	0.13	
600.0	599.22	0.13	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.15	%	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
1000.0	999.26	0.07	
1000.0	999.27	0.07	
1000.0	999.25	0.07	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.12	%	
	Ave A.D.	0.06	%
Standard	Reading	A.D.	
1400.0	1399.14	0.06	
1400.0	1399.14	0.06	
1400.0	1399.11	0.06	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T8 (Firebox bottom)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

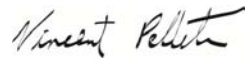
S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	2.23	%	
	Ave A.D.	1.11	%
Standard	Reading	A.D.	
70.0	69.22	1.11	
70.0	69.22	1.11	
70.0	69.22	1.11	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	0.92	%	
	Ave A.D.	0.46	%
Standard	Reading	A.D.	
200.0	199.09	0.46	
200.0	199.07	0.46	
200.0	199.08	0.46	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.30	%	
	Ave A.D.	0.15	%
Standard	Reading	A.D.	
600.0	599.11	0.15	
600.0	599.12	0.15	
600.0	599.13	0.14	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.17	%	
	Ave A.D.	0.08	%
Standard	Reading	A.D.	
1000.0	999.17	0.08	
1000.0	999.17	0.08	
1000.0	999.16	0.08	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.14	%	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
1400.0	1399.03	0.07	
1400.0	1399.02	0.07	
1400.0	1399.03	0.07	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T11 (Probe temp 1)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

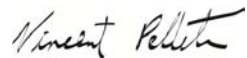
S.D.	0.02	%	
R.M.U.	0.01	%	
O.M.U	2.85	%	
	Ave A.D.	1.43	%
Standard	Reading	A.D.	
70.0	68.94	1.51	
70.0	69.06	1.34	
70.0	69.03	1.39	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.13	%	
	Ave A.D.	0.56	%
Standard	Reading	A.D.	
200.0	198.86	0.57	
200.0	198.89	0.56	
200.0	198.90	0.55	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.40	%	
	Ave A.D.	0.20	%
Standard	Reading	A.D.	
600.0	598.67	0.22	
600.0	598.94	0.18	
600.0	598.93	0.18	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.21	%	
	Ave A.D.	0.10	%
Standard	Reading	A.D.	
1000.0	998.96	0.10	
1000.0	998.97	0.10	
1000.0	998.98	0.10	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.18	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
1400.0	1398.72	0.09	
1400.0	1398.82	0.08	
1400.0	1398.81	0.09	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T14 (Probe temp 2)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

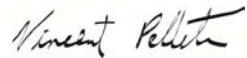
S.D.	0.02	%	
R.M.U.	0.01	%	
O.M.U	3.11	%	
	Ave A.D.	1.55	%
Standard	Reading	A.D.	
70.0	68.90	1.57	
70.0	68.92	1.54	
70.0	68.84	1.65	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.24	%	
	Ave A.D.	0.62	%
Standard	Reading	A.D.	
200.0	198.75	0.62	
200.0	198.77	0.61	
200.0	198.78	0.61	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.40	%	
	Ave A.D.	0.20	%
Standard	Reading	A.D.	
600.0	598.80	0.20	
600.0	598.81	0.20	
600.0	598.80	0.20	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.23	%	
	Ave A.D.	0.12	%
Standard	Reading	A.D.	
1000.0	998.84	0.12	
1000.0	998.84	0.12	
1000.0	998.81	0.12	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.17	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
1400.0	1398.70	0.09	
1400.0	1398.89	0.08	
1400.0	1398.78	0.09	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T15 (Spare 1)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

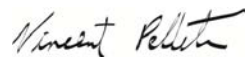
S.D.	0.02	%	
R.M.U.	0.01	%	
O.M.U	3.01	%	
	Ave A.D.	1.51	%
Standard	Reading	A.D.	
70.0	68.83	1.67	
70.0	69.06	1.35	
70.0	68.71	1.84	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.25	%	
	Ave A.D.	0.63	%
Standard	Reading	A.D.	
200.0	198.78	0.61	
200.0	198.72	0.64	
200.0	198.79	0.60	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.38	%	
	Ave A.D.	0.19	%
Standard	Reading	A.D.	
600.0	598.89	0.18	
600.0	598.83	0.20	
600.0	598.83	0.19	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.23	%	
	Ave A.D.	0.12	%
Standard	Reading	A.D.	
1000.0	998.81	0.12	
1000.0	998.86	0.11	
1000.0	998.87	0.11	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.17	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
1400.0	1398.76	0.09	
1400.0	1398.81	0.09	
1400.0	1398.71	0.09	



Vincent Pelletier

Date: 2016-06-02

Equipment: Test bench #5

T16 (Spare 2)

Temperature: 75 F

Accuracy: 0.01

R.H.: 48%

Reference: SBI-096

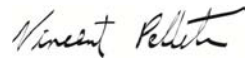
S.D.	0.02	%	
R.M.U.	0.01	%	
O.M.U	2.83	%	
	Ave A.D.	1.42	%
Standard	Reading	A.D.	
70.0	69.03	1.39	
70.0	68.99	1.44	
70.0	68.99	1.44	

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.15	%	
	Ave A.D.	0.57	%
Standard	Reading	A.D.	
200.0	198.85	0.58	
200.0	198.86	0.57	
200.0	198.90	0.55	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.37	%	
	Ave A.D.	0.18	%
Standard	Reading	A.D.	
600.0	598.89	0.18	
600.0	598.90	0.18	
600.0	598.85	0.19	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.21	%	
	Ave A.D.	0.11	%
Standard	Reading	A.D.	
1000.0	998.92	0.11	
1000.0	998.94	0.11	
1000.0	998.83	0.12	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.18	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
1400.0	1398.75	0.09	
1400.0	1398.76	0.09	
1400.0	1398.83	0.08	



Vincent Pelletier

Thermal Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: American Meter Company
 Model: DTM-200A
 Serial Number: 90R054300

Average Gas Meter y Factor 1.003

Calibration Date: 03-30-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-months
 Next Calibration Due: 03-08-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 73 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.09 "Hg
 Signature/Date: *Vincent Pelletier* 2016-03-30

Previous Calibration Comparison

Date	2015-09-08	Acceptable	
		Deviation (5%)	Deviation
y Factor	0.994	0.0497	0.009
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.023
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	579.840	584.385	589.425
Final Reference Meter	584.385	589.425	614.643
Initial DGM	467.453	471.857	476.954
Final DGM	471.857	476.954	501.989
Temp. Ref. Meter (°F), Tr	66.6	70.9	71.9
Temperature DGM (°F), Td	67.0	69.5	73.4
Time (Minutes)	102.0	40.0	91.0
Net Volume Ref. Meter, Vr	4.545	5.040	25.218
Net Volume DGM, Vd	4.404	5.097	25.035
Gas Meter y Factor =	1.026	0.979	1.003
Gas Meter y Factor Deviation (from avg.)	0.023	0.023	0.000
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.043176471

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Dry Gas Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: American Meter Company
 Model: DTM-200A
 Serial Number: 98Z332226

Average Gas Meter y Factor 1.006

Calibration Date: 03-30-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-months
 Next Calibration Due: 09-26-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 73 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.09 "Hg
 Signature/Date: *Vincent Pelletier* 2016-03-30

Previous Calibration Comparison

Date	2015-09-08	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.000	0.05	0.006
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.014
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	614.643	667.231	672.581
Final Reference Meter	667.231	672.581	692.897
Initial DGM	956.596	1008.026	1013.254
Final DGM	1008.026	1013.254	1033.598
Temp. Ref. Meter (°F), Tr	73.3	72.2	69.0
Temperature DGM (°F), Td	73.8	69.4	69.2
Time (Minutes)	1028.0	35.0	67.0
Net Volume Ref. Meter, Vr	52.588	5.350	20.316
Net Volume DGM, Vd	51.43	5.228	20.344
Gas Meter y Factor =	1.016	1.011	0.992
Gas Meter y Factor Deviation (from avg.)	0.010	0.004	0.014
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.050029183

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272



Ulrich Métrologie Inc.
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Montréal (Québec) H8T 1A1

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info@ulrich.ca
www.ulrich.ca



ACCREDITATION
ISO 17025
SCC Scope Number 220

CALIBRATION CERTIFICATE

Certificate no.: 525294
Identification: SBI-096
Description: CALIBRATOR, OMEGA CL23A
Size: TC K/J/T
Manufacturer: OMEGA
Model no.: CL23A
Serial no.: T-256137

Calibration date: April 07, 2016
Certificate issued: April 07, 2016
Interval: 12 months
Due date: April 07, 2017
Procedure no.: MET/CAL
Environment: CLAS Type 2 Laboratory
Temperature: 23 ± 2°C
Humidity: 35 - 55% RH
Metrologist: YUK

Property of: SBI
250 RUE DE COPENHAGUE
ST-AUGUSTIN-DE-DESMAUERS, QC G3A 2H3

Approved by: 
David Llorens, Quality Manager

This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and Ulrich Metrology's quality manual QM-09 Revision 9. Measurement results provided are traceable to either the National Research Council Canada (NRC), the National Institute of Standards and Technology (NIST), a national laboratory of another country signatory to the CLIM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

The above listed instrument meets or exceeds all specifications as stated in the reference procedure, unless noted otherwise. For measurement results associated with the conformance to a tolerance, the uncertainty in the measurement system did not exceed 25% (4:1 test uncertainty ratio) of the acceptable tolerance for each characteristic calibrated, unless otherwise noted in the report.

CALIBRATION DATA

See next page for measurement results.

Notes:

9V battery replaced.



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info@ulrich.ca
www.ulrich.ca

CALIBRATION DATA

Certificate no.: 525294
Identification: SBI-096
Description: CALIBRATOR THERMOMETER
Serial no.: T-256137
Procedure: Omega CL23A: 5520A-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
7870009	CALIBRATOR	FLUKE	5520A	2016/01/06	2017/01/31

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
Temperature measurements are performed by electrical simulation.						
DISPLAY CALIBRATION						
Did all segments of the display illuminate?						
Result of Operator Evaluation					PASS	
THERMOMETER CALIBRATION						
K Type Thermocouple						
-200.0degF		-200.1	-201.0	-199.0	PASS	1.7
-60.0degF		-59.9	-61.0	-59.0	PASS	3.1
-40.0degF		-40.0	-40.5	-39.5	PASS	1.5
32.0degF		31.9	31.5	32.5	PASS	1.7
1240.0degF		1240.0	1239.5	1240.5	PASS	1.1
1260.0degF		1260.0	1259.5	1260.5	PASS	1.1
2500.0degF		2500.0	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-200.3	-201.0	-199.0	PASS	2.1
-60.0degF		-60.0	-61.0	-59.0	PASS	3.5
-40.0degF		-40.1	-40.5	-39.5	PASS	1.7
32.0degF		31.9	31.5	32.5	PASS	2.0
1240.0degF		1239.9	1239.5	1240.5	PASS	1.6
1260.0degF		1259.9	1259.5	1260.5	PASS	1.6
1400.0degF		1399.8	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-199.9	-201.0	-199.0	PASS	2.3
-60.0degF		-59.8	-61.0	-59.0	PASS	2.3
-40.0degF		-40.0	-40.5	-39.5	PASS	1.2
32.0degF		32.0	31.5	32.5	PASS	1.7
750.0degF		749.9	749.5	750.5	PASS	2.0
CALIBRATOR CALIBRATION						
K Type Thermocouple						
-200.0degF		-199.7	-201.0	-199.0	PASS	1.7
-60.0degF		-59.9	-61.0	-59.0	PASS	3.1
-40.0degF		-39.9	-40.5	-39.5	PASS	1.5
32.0degF		32.0	31.5	32.5	PASS	1.7

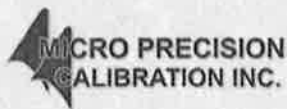


Ulrich Métrologie inc.
Ulrich Metrology inc.
9912, Côte-de-Liesse
Montréal (Québec) H8T 1A1

Tél. (514) 631-6653
Fax (514) 631-6122
info@ulrich.ca
www.ulrich.ca

PARAMETER	TRUE	TEST	ACCEPTANCE LIMITS		PASS/	TUR
	VALUE	RESULT	LOW	HIGH	FAIL	
1240.0degF		1240.2	1239.5	1240.5	PASS	1.1
1260.0degF		1260.2	1259.5	1260.5	PASS	1.1
2500.0degF		2500.5	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-200.2	-201.0	-199.0	PASS	2.1
-60.0degF		-60.2	-61.0	-59.0	PASS	3.5
-40.0degF		-40.1	-40.5	-39.5	PASS	1.7
32.0degF		31.8	31.5	32.5	PASS	2.0
1240.0degF		1240.1	1239.5	1240.5	PASS	1.6
1260.0degF		1260.1	1259.5	1260.5	PASS	1.6
1400.0degF		1399.9	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.3	-201.0	-199.0	PASS	2.3
-60.0degF		-60.3	-61.0	-59.0	PASS	2.3
-40.0degF		-40.1	-40.5	-39.5	PASS	1.2
32.0degF		31.7	31.5	32.5	PASS	1.7
750.0degF		749.8	749.5	750.5	PASS	2.0

End of Test Data



MICRO PRECISION CALIBRATION
22835 INDUSTRIAL PLACE
GRASS VALLEY CA 95949
530-268-1860



Certificate of Calibration

Date: Apr 22, 2016

Cert No. 222200812318776

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12

250 DE COPENHAGUE

SAINT-AUGUSTIN-DE-DESMANURES QC G3A 2H3

Work Order #: SAC-70078354

Purchase Order #: REWORK

Serial Number: 79977

Department: N/A

Performed By: ERICK CONKLIN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: April 22, 2016

Cal. Interval: 12 MONTHS

Cal. Due Date: April 22, 2017

MPC Control #: DA5991

Asset ID: SBI-097

Gage Type: ANEMOMETER

Manufacturer: EUOTRON INSTRUMENTS

Model Number: VT 50

Size: N/A

Temp/RH: 68.0°F / 43.0%

Calibration Notes:

Test Points

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result	Uncertainty
1	Temperature Tested at: (Deg F)	-4.0	-4.7	-3.3	-3.7	-3.7	Deg F	Passed	0.05
2	Tested at: (Deg F)	45.0	43.5	46.5	45.9	45.9	Deg F	Passed	0.05
3	Tested at: (Deg F)	90.0	87.6	92.4	91.2	91.2	Deg F	Passed	0.05
4	Tested at: (Deg F)	135.0	131.7	138.3	133.2	133.2	Deg F	Passed	0.05
5	Tested at: (Deg F)	176.0	171.8	180.1	173.4	173.4	Deg F	Passed	0.05
6	Air Velocity Tested At:	500	473	527	489	489	Fpm	Passed	14.5
7	Air Velocity Tested At:	1,000	930	1070	982	982	Fpm	Passed	29
8	Air Velocity Tested At:	2,000	1900	2100	1,984	1,984	Fpm	Passed	58
9	Air Velocity Tested At:	3,000	2870	3130	2,952	2,952	Fpm	Passed	87
10	Air Velocity Tested At:	4,000	3840	4160	4,020	4,020	Fpm	Passed	80
11	Air Velocity Tested At:	5,000	4810	5190	4,879	4,879	Fpm	Passed	100
12	Air Velocity Tested At:	6,000	5780	6220	5,963	5,963	Fpm	Passed	120

Calibrating Technician:

ERICK CONKLIN

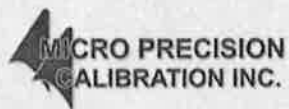
QC Approval:

Robert Means

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCSL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.



MICRO PRECISION CALIBRATION
22835 INDUSTRIAL PLACE
GRASS VALLEY CA 95949
530-268-1860



Certificate of Calibration

Date: Apr 22, 2016

Cert No. 22200812318776

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CR6800	HUMIDITY GENERATOR/ ENVIRONMENTAL CHAMBER	2500	0012263	THUNDER SCIENTIFIC CORPORATION	Aug 7, 2016	222008122801952
CL7456	STANDARD PLATINUM RESISTANCE THERMOMETER PROBE	5681	1595	FLUKE	Dec 4, 2016	A7B16006
CL7223	BLACK STACK	1560/2560	A07486/A07485/A0 7728	HART SCIENTIFIC, INC.	Nov 2, 2016	222008122718022
CJ5100	WIND TUNNEL WITH CONTROLLER	JS-500	375/305	INTERACTIVE INSTRUMENTS	Oct 29, 2016	222008122715516
AE2821	ANEMOMETER	AM-4822	N272316	LANDTEK	Oct 29, 2016	222008122715506

Procedures Used in this Event

Procedure Name
CUSTOMER SPECIFICATIONS

Description
Customer Specifications

Calibrating Technician:

ERICK CONKLIN

QC Approval:

Robert Means

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCCL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.

CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 51068

Customer Information

Customer: SBI St-Augustin

Address : 250, De Copenhague

Doors 11-12

St-Augustin-de-Desmaures

Customer PO #: 45864



**LABORATORY
ACCREDITATION
BUREAU** a division of A-S-B
ACCREDITED ISO/IEC 17025
Certificate # L2115-1 Calibration

Calibration Procedure Information

Procedure ID: GTP FLOW_INDI

Revision #: 7

Revision Date: 1/6/2013

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10126	Graftel	N/A	LFE-D System	7/6/2016
10126-T	Graftel	9202	Temperature Sensor	8/17/2018
51202	Paroscientific	760-100A	Pressure, 100 Psia	8/17/2016
10127	Furness	352	Delta P	7/6/2016
60030	Paroscientific	760-100A	Pressure, 100 psia	5/7/2016
10159	HOB0	U12-011	Environment Monitor System	11/18/2015

Sensor Information

Manufacturer: American Meter

Description: Gas Meter

Method Used: Laminar

Model #: DTM-200A

Rated Accuracy: ± 1 % of Reading

Accuracy Specified By: AmericanMeter

Instrument ID#: SBI-103

Range: 0 to 250 scfh

Condition: Functional

Serial #: 07J264834

Comments: Calibration Date: 09/02/2015

The instruments(s) listed on this certificate have been calibrated against standards traceable to the National Institute of Standards & Technology (NIST) or compared to nationally or internationally recognized consensus standards. The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel, LLC. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005, ANSI/NC SL Z540-I-1994 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel, LLC. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

Performed By: I.B. Caoili

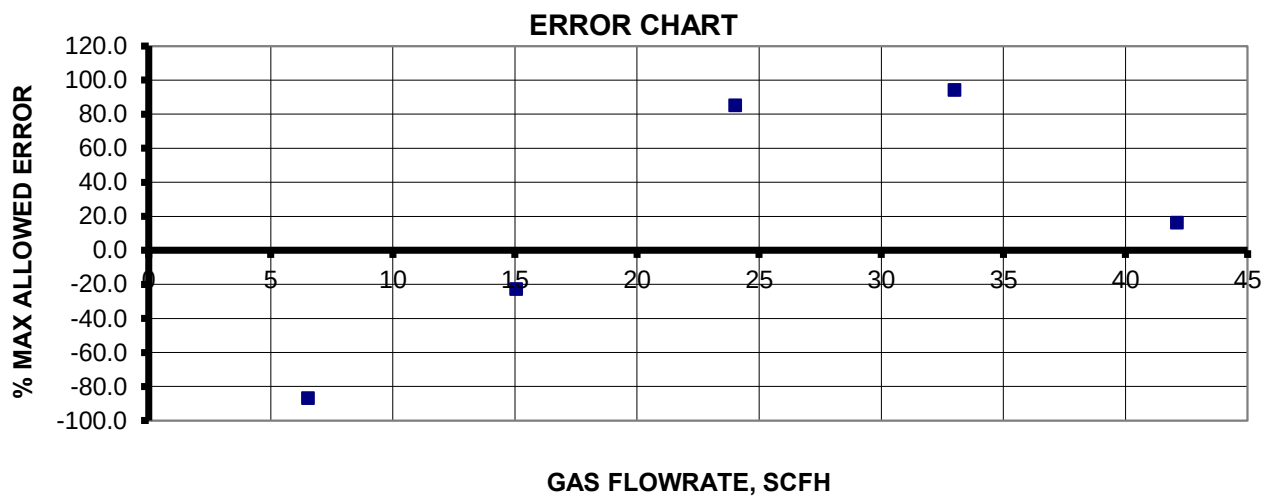
Date: 9/2/2015

I.B. Caoili
Calibration Technician

**ATTACHMENT TO CALIBRATION CERTIFICATE 51068
AS FOUND / AS LEFT DATA**

Page 2 of 2

Air Flow Rate From Standard, scfh	Air Vol From Standard, scf	Air Vol From Meter, cf	Air vol From Meter, scf	Diff Air Vol STD - METER scf	% Proof	Measurement Uncertainty, scf	STATUS
6.527	0.287	0.3	0.289	-0.002	99.138	0.002	Pass
15.052	0.967	1.0	0.969	-0.002	99.773	0.005	Pass
24.025	0.984	1.0	0.976	0.008	100.859	0.005	Pass
33.003	1.982	2.0	1.963	0.019	100.951	0.010	Pass
42.116	1.982	2.0	1.979	0.003	100.163	0.010	Pass



INSTRUMENT SPECIFICATIONS		
Test Gas	Air	
Standard Pressure, Meter	14.73	psia
Standard Temperature, Meter	60	F
Rated Accuracy	1	% Rding
Full Scale Flow Rate	250	scfh Natural Gas @ 1/2 inch WC
LABORATORY AMBIENT CONDITIONS		
Pressure	14.39	psia
Humidity	52.04	% RH
Temperature	71.40	F



Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering

NIST Traceable Calibration Data Sheet

Graftel, LLC, 870 Cambridge Drive, Elk Grove Village, IL 60007
P. 847-364-2600 F. 847-364-2899

www.graftel.com

Mettler Toledo

Service Business Unit Industrial
1900 Polaris Parkway
Columbus, Ohio 43240
1-800-METTLER

METTLER TOLEDO

ISO 9001 Registered

ANSI/NCSL Z540-1 Accrédité



Accrédité par l'American Association for
Laboratory Accreditation (A2LA)

CERT.CALIBRATION #1902.02

Certificat d'étalonnage**Client**

Société : SBI Fabricant De Poeles
Adresse : 250 Rue de Copenhague
Ville : Saint-Augustin-De-Desmaures *État/Province :* Quebec
Code postal : G3A 2H3 *Astea Customer ID:* 300276257

Instrument

Constructeur : Mettler Toledo *Modèle de terminal :* N/A
Modèle : 2256 *# série du terminal:* N/A
No de série : 11682461LL *# série de l'imprimant* N/A
Capacité : 625 kg N/A
Résolution : 0,02 kg *Nbre de Divisions:* 31250
Classe : III *Procédure utilisée :* NIST Handbook 44
No./ID d'inventaire: SBI-186
Procédure: Le présent certificat est émis conformément aux conditions de certification accordées par l'A2LA, en vertu de la norme ISO/IEC 17025. A2LA a évalué la capacité de mesure du laboratoire et la traçabilité des normes nationales reconnues.

Date de calibrage : 1-avr-2016 *Date, prochaine Cal.* 31-mars-2017
Signataire autorisé (A2LA) : Dany Careau *Signature:* ELECTRONIC SIGNATURE

Étalons de travail

Retracabilité: Les poids de test utilisés se réfèrent au National Institute of Standards and Technology.

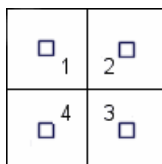
<i>Jeu de poids no :</i>	<i>Traçabilité NIST No.:</i>	<i>Classe ASTM/OIML</i>	<i>Date d'étalonnage :</i>	<i>Date proch. étalonnage</i>
0718	M15-050	M1	22-avr-2015	22-avr-2016
142	MT00997	F1	7-mai-2014	30-avr-2016
Q1	1415126	M1	1-juin-2015	1-juin-2016

Résultats de mesure

La température : 22 °C

Les conditions ambiantes ont été vérifiées afin d'assurer l'exactitude de l'étalonnage.

Test de variation



<i>Poids Appliqués</i>	<i>Position</i>	<i>Avant Réglage</i>
		<i>Valeur lue</i>
1: 100 kg	<i>Position 1</i>	100,00 kg
2: 100 kg	<i>Position 2</i>	100,04 kg
3: 100 kg	<i>Position 3</i>	100,02 kg
4: 100 kg	<i>Position 4</i>	99,96 kg
<i>Erreur maximum :</i>		0,08 kg
<i>Max Erreur Admissible :</i>		0,10 kg

Linéarité

	Avant réglage					
	Poids Appliqués	Valeur lue	Erreur		Erreur admissible	Dans la Tolérance
Zero 1,00	0,00 kg	0,00 kg	0,00 kg	0 d	1 d	OUI
2,00	40,00 kg	40,00 kg	0,00 kg	0 d	2 d	OUI
3,00	80,00 kg	80,00 kg	0,00 kg	0 d	3 d	OUI
4,00	120,00 kg	120,00 kg	0,00 kg	0 d	5 d	OUI
5,00	160,00 kg	160,00 kg	0,00 kg	0 d	5 d	OUI
Max 6,00	200,00 kg	200,00 kg	0,00 kg	0 d	5 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis

Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

☐ OUI☒ NON

Répétabilité

Poids appliqués : 100,00 kg

	Chargé	Vide	Différence
1	100,00 kg	0,00 kg	100 kg
2	100,00 kg	0,00 kg	100 kg
3	100,00 kg	0,00 kg	100 kg
	Erreur maximale :	0,00 kg	0,0 d
	Tolérance :	0,10 kg	5 d

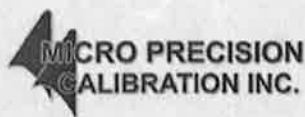
Incertitude

Mesure de l'incertitude = 0,012 kg

L'incertitude de mesure représente les incertitudes étendues selon un facteur de sécurité K=2 générant un niveau de confiance approximatif de 95 %. Des dispositions doivent être prises en matière d'environnement au lieu d'étalonnage, d'incertitude induite par l'article en étalonnage et d'effets indésirables causés par le transport du matériel d'étalonnage. Ces facteurs pourraient entraîner une incertitude plus grande que le CMC.

Remarques

Aucune.



MICRO PRECISION CALIBRATION
22835 INDUSTRIAL PLACE
GRASS VALLEY CA 95949
530-268-1860



Certificate of Calibration

Date: Jun 10, 2015

Cert No. 222008122545133

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12

250 DE COPENHAGUE

SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

MPC Control #: DB8361

Asset ID: SBI-203

Gage Type: PITOT STATIC TUBE

Manufacturer: DWYER INSTRUMENTS, INC.

Model Number: 160S-24

Size: N/A

Temp/RH: 69°F / 41 %

Work Order #: SAC-70072244

Purchase Order #: 44831

Serial Number: 160S-24A50U

Department: N/A

Performed By: BARRY MORRIS

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: June 09, 2015

Cal. Interval: 12 MONTHS

Cal. Due Date: June 09, 2016

Calibration Notes:

UNIT WAS CALIBRATED IN JUNCTION WITH GAGE SBI-105.

Test Points

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result	Uncertainty
1	Tested At:	0.100	0.090	0.110	0.100	0.100	in/H20	Passed	0.003
2	Tested At:	0.200	0.190	0.210	0.200	0.200	in/H20	Passed	0.003
3	Tested At:	0.300	0.290	0.310	0.300	0.300	in/H20	Passed	0.003
4	Tested At:	0.400	0.390	0.410	0.400	0.400	in/H20	Passed	0.003

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AW3587	TIMER	N/A	N/A	SPORTLINE	Jun 4, 2016	222008122539739
AW4419	MULTI-FUNCTION PRESSURE INDICATOR	DPI 145	14501283	DRUCK	Nov 19, 2015	2008120226860

Procedures Used in this Event

Procedure Name

MPC-00062

Description

Pressure and Vacuum

Calibrating Technician:

Barry Morris

BARRY MORRIS

QC Approval:

Brian Gold

Brian Gold

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCCL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

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Mettler Toledo

Service Business Unit Industrial
1900 Polaris Parkway
Columbus, Ohio 43240
1-800-METTLER

METTLER TOLEDO

ISO 9001 Registered

ANSI/NCSL Z540-1 Accrédité



Accrédité par l'American Association for
Laboratory Accreditation (A2LA)

CERT.CALIBRATION #1902.02

Certificat d'étalonnage**Client**

Société : SBI Fabricant De Poeles
Adresse : 250 Rue de Copenhague
Ville : Saint-Augustin-De-Desmaures *État/Province :* Quebec
Code postal : G3A 2H3 *Astea Customer ID:* 300276257

Instrument

Constructeur : SARTORIUS *Modèle de terminal :* N/A
Modèle : TE214S *# série du terminal:* N/A
No de série : 25851066 *# série de l'imprimant* N/A
Capacité : 210 g N/A
Résolution : 0,0001 g *Nbre de Divisions:* 2100000
Classe : I *Procédure utilisée :* NIST Handbook 44
No./ID d'inventaire: SBI-206
Procédure: Le présent certificat est émis conformément aux conditions de certification accordées par l'A2LA, en vertu de la norme ISO/IEC 17025. A2LA a évalué la capacité de mesure du laboratoire et la traçabilité des normes nationales reconnues.

Date de calibrage : 1-avr-2016 *Date, prochaine Cal.* 31-mars-2017
Signataire autorisé (A2LA) : Dany Careau *Signature:* ELECTRONIC SIGNATURE

Étalons de travail

Retracabilité: Les poids de test utilisés se réfèrent au National Institute of Standards and Technology.

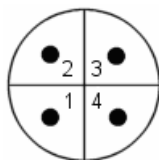
<i>Jeu de poids no :</i>	<i>Traçabilité NIST No.:</i>	<i>Classe ASTM/OIML</i>	<i>Date d'étalonnage :</i>	<i>Date proch. étalonnage</i>
0718	M15-050	M1	22-avr-2015	22-avr-2016
142	MT00997	F1	7-mai-2014	30-avr-2016
Q1	1415126	M1	1-juin-2015	1-juin-2016

Résultats de mesure

La température : 22 °C

Les conditions ambiantes ont été vérifiées afin d'assurer l'exactitude de l'étalonnage.

Test de variation



Poids Appliqués	Position	Avant Réglage
		Valeur lue
1: 50 g	Position 1	50,0001 g
2: 50 g	Position 2	50,0000 g
3: 50 g	Position 3	50,0001 g
4: 50 g	Position 4	50,0002 g
Erreur maximum :		0,0002 g
Max Erreur Admissible :		0,0003 g

Linéarité

	Avant réglage					Dans la Tolérance
	Poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1,00	0,0000 g	0,0000 g	0,0000 g	0 d	1 d	OUI
2,00	0,1000 g	0,1000 g	0,0000 g	0 d	1 d	OUI
3,00	1,0000 g	0,9999 g	-0,0001 g	1 d	1 d	OUI
4,00	10,0000 g	9,9999 g	-0,0001 g	1 d	2 d	OUI
5,00	50,0000 g	50,0001 g	0,0001 g	1 d	3 d	OUI
6,00	100,0000 g	99,9999 g	-0,0001 g	1 d	3 d	OUI
7,00	150,0000 g	149,9998 g	-0,0002 g	2 d	3 d	OUI
Max 8,00	200,0000 g	200,0001 g	0,0001 g	1 d	3 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis

Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

☐ OUI☒ NON

Répétabilité

Poids appliqués : 10,0000 g

	Chargé	Vide	Différence
1	9,9999 g	0,0000 g	9,9999 g
2	10,0000 g	0,0000 g	10 g
3	9,9999 g	0,0000 g	9,9999 g
	Erreur maximale :	0,0001 g	1,0 d
	Tolérance :	0,0002 g	2 d

Incertitude

Mesure de l'incertitude = 0,00017 g

L'incertitude de mesure représente les incertitudes étendues selon un facteur de sécurité K=2 générant un niveau de confiance approximatif de 95 %. Des dispositions doivent être prises en matière d'environnement au lieu d'étalonnage, d'incertitude induite par l'article en étalonnage et d'effets indésirables causés par le transport du matériel d'étalonnage. Ces facteurs pourraient entraîner une incertitude plus grande que le CMC.

Remarques

Aucune.



Ulrich Métrologie inc.
Ulrich Metrology Inc.
9912, Côte-de-Liesse
Montréal (Québec) H8T 1A1

Tél. (514) 631-6653
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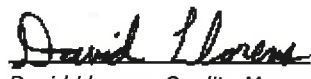


CALIBRATION CERTIFICATE

Certificate no.: 496310
Identification: SBI-213
Description: THERMO-HYGROMETER, AMPROBE TH-3
Manufacturer: AMPROBE
Model no.: TH-3
Serial no.: 101004044

Calibration date: October 14, 2015
Certificate issued: October 14, 2015
Interval: 12 months
Due date: October 14, 2016
Procedure no.: MET/CAL
Environment: CLAS Type 2 Laboratory
Temperature: 23 ± 2°C
Humidity: 35 - 55% RH
Metrologist: NFS

Property of: SBI
250 RUE DE COPENHAGUE
ST-AUGUSTIN-DE-DESMARES, QC G3A 2H3

Approved by: 
David Llorens, Quality Manager

This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and Ulrich Metrology's quality manual QM-09 Revision 9. Measurement results provided are traceable to either the National Research Council Canada (NRC), the National Institute of Standards and Technology (NIST), a national laboratory of another country signatory to the CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

The above listed instrument meets or exceeds all specifications as stated in the reference procedure, unless noted otherwise. For measurement results associated with the conformance to a tolerance, the uncertainty in the measurement system did not exceed 25% (4:1 test uncertainty ratio) of the acceptable tolerance for each characteristic calibrated, unless otherwise noted in the report.

CALIBRATION DATA

See next page for measurement results.

Notes:

EQUIPMENT RECEIVED OUT OF SPECIFICATIONS:

High humidity is out of tolerance @80% (reading of 75.1% instead of 77% minimum).
No adjustment. No support from manufacturer.

LIMITED CALIBRATION



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CALIBRATION DATA

Certificate no.: 496310
Identification: SBI-213
Description: THERMO-HYGROMETER
Serial no.: 101004044
Procedure: Amprobe TH-3: 2500ST-LT-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
1304953	HUMIDITY GENERATOR	THUNDER SCIENTIFIC	2500ST-LT	2015/06/19	2016/06/30

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
TEMPERATURE CALIBRATION						
23°C						
23.01degC		23.30	22.21	23.81	PASS	
RELATIVE HUMIDITY CALIBRATION AT 23°C						
20% RH						
20.01%		19.00	17.01	23.01	PASS	
50% RH						
50.02%		48.40	47.02	53.02	PASS	
80% RH						
80.00%		75.10	77.00	83.00	FAIL	

End of Test Data



Report of Calibration

As Found / As Left



Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH₂O/7520lp 8845A: Rev.1.0.A

Page 1 of 3

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003410
ID No.: SBI-247
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003410
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMANURES, QC
G3A 2H3

Environment

Temperature: 21.2°C
Humidity: 28%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor $K = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCCL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

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STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	1500188474/1500188475	29-Sep-2016
Multimeter	Fluke 8845A	ELC-MTR-04	AC15121397-9366020	13-Jan-2017

REMARKS:

None

Performed by:

Tony Wheaton

Tony Wheaton

Reviewed by:

Slava Pecurov

Slava Pecurov

Quality Management System is assessed and registered by Intertek as conforming to the requirements of ISO9001:2008

Alpha Controls & Instrumentation Inc., Suite 6, 361 Steelcase Road West, Markham, Ontario L3R 3V8

www.alphacontrols.com

(800) 567-8686

Form: ROC101 Rev 8

data: MMC

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003410
ID No.: SBI-247
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003410
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Range: 0 to 0.1 inH ₂ O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		-0.0005					
Output @ 0.0000 inH ₂ O, mA		3.919					
0.000 inH ₂ O	0.0000	-0.0005	-0.0005	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0244					
Output @ 0.025 inH ₂ O, mA		7.912					
0.025 inH ₂ O	0.0250	0.0245	-0.0005	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0493					
Output @ 0.050 inH ₂ O, mA		11.885					
0.050 inH ₂ O	0.0500	0.0493	-0.0007	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0745					
Output @ 0.075 inH ₂ O, mA		15.912					
0.075 inH ₂ O	0.0750	0.0745	-0.0005	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0994					
Output @ 0.100 inH ₂ O, mA		19.906					
0.100 inH ₂ O	0.1000	0.0994	-0.0006	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0745					
Output @ 0.075 inH ₂ O, mA		15.913					
0.075 inH ₂ O	0.0750	0.0745	-0.0005	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0491					
Output @ 0.050 inH ₂ O, mA		11.886					
0.050 inH ₂ O	0.0500	0.0493	-0.0007	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0242					
Output @ 0.025 inH ₂ O, mA		7.858					
0.025 inH ₂ O	0.0250	0.0241	-0.0009	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		-0.0007					
Output @ 0.0000 inH ₂ O, mA		3.884					
0.000 inH ₂ O	0.0000	-0.0007	-0.0007	±0.0020	inH ₂ O	Pass	1.5e-04
Range: 0 to 0.25 inH ₂ O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		-0.0005					
Output @ 0.0000 inH ₂ O, mA		3.971					
0.0000 inH ₂ O	0.0000	-0.0005	-0.0005	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.0618					
Output @ 0.0625 inH ₂ O, mA		7.948					
0.0625 inH ₂ O	0.0625	0.0617	-0.0008	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.1238					
Output @ 0.1250 inH ₂ O, mA		11.920					
0.1250 inH ₂ O	0.1250	0.1238	-0.0012	±0.0025	inH ₂ O	Pass	1.5e-04



Report of Calibration

As Found / As Left



Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH2O/7520lp 8845A: Rev.1.0.A

Page 3 of 3

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003410
ID No.: SBI-247
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003410
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1858					
Output @ 0.1875 inH2O, mA		15.895					
0.1875 inH2O	0.1875	0.1859	-0.0016	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.2483					
Output @ 0.2500 inH2O, mA		19.889					
0.2500 inH2O	0.2500	0.2483	-0.0017	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1870					
Output @ 0.1875 inH2O, mA		15.983					
0.1875 inH2O	0.1875	0.1872	-0.0003	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1252					
Output @ 0.1250 inH2O, mA		12.008					
0.1250 inH2O	0.1250	0.1251	0.0001	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0630					
Output @ 0.0625 inH2O, mA		8.034					
0.0625 inH2O	0.0625	0.0630	0.0005	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0005					
Output @ 0.0000 inH2O, mA		4.023					
0.0000 inH2O	0.0000	0.0004	0.0004	±0.0025	inH2O	Pass	1.5e-04

END OF REPORT



Report of Calibration

As Found / As Left



Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH₂O/7520lp 8845A: Rev.1.0.A

Page 1 of 3

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003612
ID No.: SBI-253
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003612
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMARES, QC
G3A 2H3

Environment

Temperature: 20.9°C
Humidity: 29%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor $K = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCSL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

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STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	1500188474/1500188475	29-Sep-2016
Multimeter	Fluke 8845A	ELC-MTR-04	AC15121397-9366020	13-Jan-2017

REMARKS:

Calibrated in vertical position.

Performed by:

Tony Wheaton
Tony Wheaton

Reviewed by:

Slava Peciurov
Slava Peciurov

Quality Management System is assessed and registered by Intertek as conforming to the requirements of ISO9001:2008

Alpha Controls & Instrumentation Inc., Suite 6, 361 Steelcase Road West, Markham, Ontario L3R 3V8 www.alphacontrols.com (800) 567-8686

Form: ROC101 Rev B

data: MMC

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003612
ID No.: SBI-253
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003612
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Range: 0 to 0.1 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0000					
Output @ 0.0000 inH2O, mA		3.998					
0.000 inH2O	0.0000	0.0000	0.0000	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0244					
Output @ 0.025 inH2O, mA		7.894					
0.025 inH2O	0.0250	0.0243	-0.0007	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0488					
Output @ 0.050 inH2O, mA		11.803					
0.050 inH2O	0.0500	0.0488	-0.0012	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0737					
Output @ 0.075 inH2O, mA		15.802					
0.075 inH2O	0.0750	0.0738	-0.0012	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0991					
Output @ 0.100 inH2O, mA		19.905					
0.100 inH2O	0.1000	0.0994	-0.0006	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0735					
Output @ 0.075 inH2O, mA		15.755					
0.075 inH2O	0.0750	0.0735	-0.0015	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0491					
Output @ 0.050 inH2O, mA		11.891					
0.050 inH2O	0.0500	0.0493	-0.0007	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0247					
Output @ 0.025 inH2O, mA		7.947					
0.025 inH2O	0.0250	0.0247	-0.0003	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0000					
Output @ 0.0000 inH2O, mA		3.999					
0.000 inH2O	0.0000	0.0000	0.0000	±0.0020	inH2O	Pass	1.5e-04
Range: 0 to 0.25 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0002					
Output @ 0.0000 inH2O, mA		3.999					
0.0000 inH2O	0.0000	0.0000	0.0000	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0620					
Output @ 0.0625 inH2O, mA		7.964					
0.0625 inH2O	0.0625	0.0619	-0.0006	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1243					
Output @ 0.1250 inH2O, mA		11.942					
0.1250 inH2O	0.1250	0.1241	-0.0009	±0.0025	inH2O	Pass	1.5e-04



Report of Calibration

As Found / As Left



Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH₂O/7520lp 8845A: Rev.1.0.A

Page 3 of 3

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E51U01003612
ID No.: SBI-253
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031301-E51U01003612
Adjusted: No
Condition: In Tolerance
Calibration Date: 18-Mar-2016
Calibration Due: 18-Mar-2017

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1860					
Output @ 0.1875 inH ₂ O, mA		15.906					
0.1875 inH ₂ O	0.1875	0.1860	-0.0015	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.2490					
Output @ 0.2500 inH ₂ O, mA		19.940					
0.2500 inH ₂ O	0.2500	0.2491	-0.0009	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.1868					
Output @ 0.1875 inH ₂ O, mA		15.959					
0.1875 inH ₂ O	0.1875	0.1869	-0.0006	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.1245					
Output @ 0.1250 inH ₂ O, mA		11.960					
0.1250 inH ₂ O	0.1250	0.1244	-0.0006	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.0618					
Output @ 0.0625 inH ₂ O, mA		7.943					
0.0625 inH ₂ O	0.0625	0.0616	-0.0009	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.0000					
Output @ 0.0000 inH ₂ O, mA		3.998					
0.0000 inH ₂ O	0.0000	0.0000	0.0000	±0.0025	inH ₂ O	Pass	1.5e-04

END OF REPORT



Report of Calibration

As Found / As Left



Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A

Page 1 of 2

UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-4
ID No.: SBI-261
Description: Mass Flow Controller

Calibration

Report No.: AC16041499-251111-4
Adjusted: No
Condition: In Tolerance
Calibration Date: 28-Apr-2016
Calibration Due: 28-Apr-2017

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMAURES, QC
G3A 2H3

Environment

Temperature: 22.2°C
Humidity: 19%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor $K = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCCL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

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STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-01	1500183748	26-Jun-2016
Process Calibrator	Fluke 744	ELC-CAL-02	AC15101258-8223003	20-Oct-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

None

Performed by:

Slava Peciurov

Reviewed by:

Ben Lemelin

Quality Management System is assessed and registered by Intertek as conforming to the requirements of ISO9001:2008

Alpha Controls & Instrumentation Inc., Suite 6, 361 Steelcase Road West, Markham, Ontario L3R 3V8

www.alphacontrols.com

(800) 567-8686

Form: ROC101 Rev 8

data: C4P

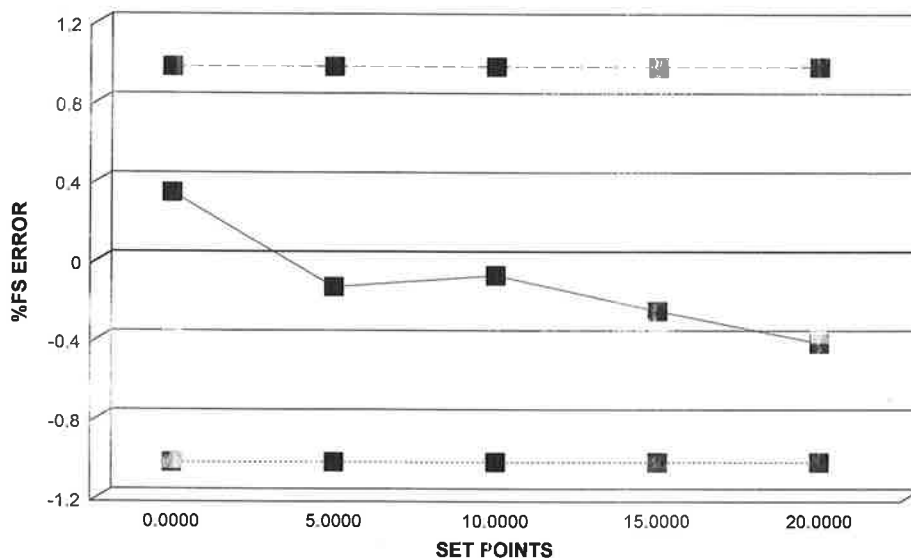
UUT

Made by: Aalborg
Model: GFC37
Serial No.: 2511114
ID No.: SBI-261
Description: Mass Flow Controller

Calibration

Report No: AC16041499-251111-4
Adjusted: No
Condition: In Tolerance
Calibration Date: 28-Apr-2016
Calibration Due: 28-Apr-2017

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.021V	0.0112	0.08	0.363800	±1.000000	slm@70.0F	Pass
5.0000	1.286V	5.1667	5.14	-0.113400	±1.000000	slm@70.0F	Pass
10.0000	2.540V	10.1708	10.16	-0.054200	±1.000000	slm@70.0F	Pass
15.0000	3.794V	15.2231	15.18	-0.235600	±1.000000	slm@70.0F	Pass
20.0000	5.048V	20.2716	20.19	-0.398000	±1.000000	slm@70.0F	Pass



Calibration Gas: N2
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg (MolBloc); +/-0.7% rdg (MCRM)

END OF REPORT



Report of Calibration As Found



Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A

Page 1 of 2

UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-6
ID No.: SBI-262
Description: Mass Flow Controller

Calibration

Report No.: AC16041499-251111-6
Adjusted: No
Condition: In Tolerance
Calibration Date: 26-Apr-2016

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMAURES, QC
G3A 2H3

Environment

Temperature: 21.9°C
Humidity: 29%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor $K = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCCL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

This report shall not be reproduced except in full without written approval of Alpha Controls and Instrumentation Inc.

STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-01	1500183748	26-Jun-2016
Process Calibrator	Fluke 744	ELC-CAL-02	AC15101258-8223003	20-Oct-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

None

Performed by:

Slava Pecurov

Reviewed by:

Ben Lemelin

Quality Management System is assessed and registered by Intertek as conforming to the requirements of ISO9001:2008

Alpha Controls & Instrumentation Inc., Suite 6, 361 Steelcase Road West, Markham, Ontario L3R 3V8

www.alphacontrols.com

(800) 567-8686

Form: ROC101 Rev 8

data: C4P

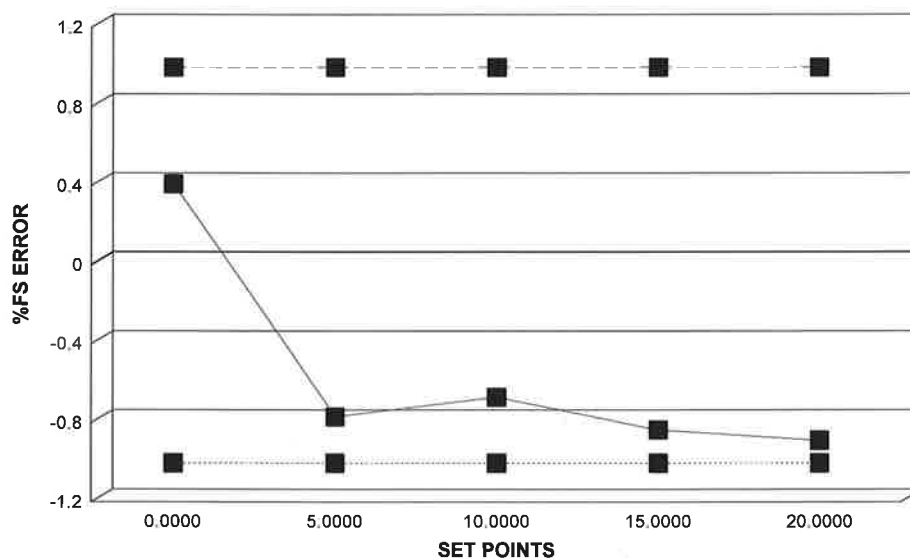
UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-6
ID No.: SBI-262
Description: Mass Flow Controller

Calibration

Report No.: AC16041499-251111-6
Adjusted: No
Condition: In Tolerance
Calibration Date: 26-Apr-2016

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.021V	0.0020	0.08	0.41	±1.00	slm@70.0F	Pass
5.0000	1.278V	5.2657	5.11	-0.77	±1.00	slm@70.0F	Pass
10.0000	2.532V	10.2619	10.13	-0.67	±1.00	slm@70.0F	Pass
15.0000	3.785V	15.3068	15.14	-0.83	±1.00	slm@70.0F	Pass
20.0000	5.040V	20.3373	20.16	-0.89	±1.00	slm@70.0F	Pass



Calibration Gas:
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg (MolBloc); +/-0.7% rdg (MCRM)

END OF REPORT



Report of Calibration

As Left



Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A

Page 1 of 2

UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-6
ID No.: SBI-262
Description: Mass Flow Controller

Calibration

Report No.: AC16041499-251111-6
Adjusted: Yes
Condition: In Tolerance
Calibration Date: 28-Apr-2016
Calibration Due: 28-Apr-2017

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMAURES, QC
G3A 2H3

Environment

Temperature: 21.2°C
Humidity: 20%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor $K = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCSL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

This report shall not be reproduced except in full without written approval of Alpha Controls and Instrumentation Inc.

STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-01	1500183748	26-Jun-2016
Process Calibrator	Fluke 744	ELC-CAL-02	AC15101258-8223003	20-Oct-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

None

Performed by:

Slava Peciurov

Reviewed by:

Ben Lemelin

Quality Management System is assessed and registered by Intertek as conforming to the requirements of ISO9001:2008

Alpha Controls & Instrumentation Inc., Suite 6, 361 Steelcase Road West, Markham, Ontario L3R 3V8

www.alphacontrols.com

(800) 567-8686

Form: ROC101 Rev B

data: C4P

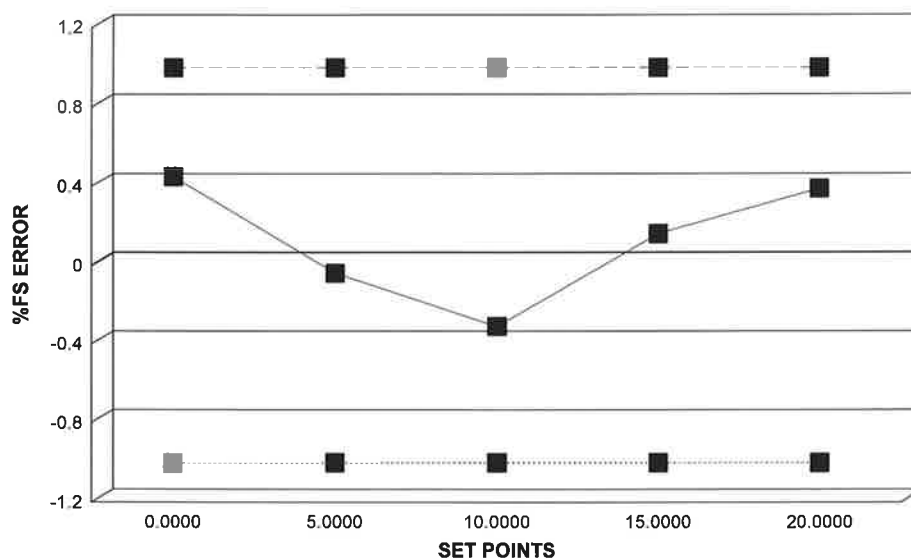
UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-6
ID No.: SBI-262
Description: Mass Flow Controller

Calibration

Report No.: AC16041499-251111-6
Adjusted: Yes
Condition: In Tolerance
Calibration Date: 28-Apr-2016
Calibration Due: 28-Apr-2017

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.026V	0.0141	0.10	0.45	±1.00	slm@70.0F	Pass
5.0000	1.279V	5.1238	5.12	-0.04	±1.00	slm@70.0F	Pass
10.0000	2.533V	10.1941	10.13	-0.31	±1.00	slm@70.0F	Pass
15.0000	3.790V	15.1280	15.16	0.16	±1.00	slm@70.0F	Pass
20.0000	5.047V	20.1103	20.19	0.39	±1.00	slm@70.0F	Pass



Calibration Gas: N2
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg (MolBloc); +/-0.7% rdg (MCRM)

END OF REPORT

Dry Gas Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: Rockwell International
 Model: S-275
 Serial Number: 00938

Average Gas Meter y Factor 0.983

Calibration Date: 06-02-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-month
 Next Calibration Due: 12-01-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 68.1 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.1 "Hg
 Signature/Date: *Vincent Pelletier* 2016-06-02

Previous Calibration Comparison

Date	N/A	Acceptable	
		Deviation (5%)	Deviation
y Factor	N/A	0	0.983
Acceptance	Out of Limits		

Current Calibration

Acceptable y Deviation	N/A
Maximum y Deviation	N/A
Acceptance	N/A

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	700.100	705.285	711.504
Final Reference Meter	705.051	711.066	719.923
Initial DGM	501.239	506.448	512.697
Final DGM	506.211	512.369	521.162
Temp. Ref. Meter (°F), Tr	73.2	73.6	74.0
Temperature DGM (°F), Td	74.2	74.0	74.8
Time (Minutes)	51.0	30.0	30.0
Net Volume Ref. Meter, Vr	4.951	5.781	8.419
Net Volume DGM, Vd	4.972	5.921	8.465
Gas Meter y Factor =	0.991	0.970	0.989
Gas Meter y Factor Deviation (from avg.)	0.007	0.013	0.006
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.097490196

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272



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d'Industrie Canada

Approval and Calibration Services
Laboratory
Standards Building
151 Tunney's Pasture Driveway
Ottawa, Ontario
K1A 0C9

Laboratoire des services
d'approbation et d'étalonnage
Immeuble des normes
151, allée Tunney's Pasture
Ottawa, Ontario
K1A 0C9

Document	Calibrated (YMD) - Étalonné (AMJ)
M15-0050	2015/04/22
Project/Applicant - Projet/Requérant	Recalibration - Date - de réétalonnage
CP-ML-15-0007	2016/04/22
Mettler-Toledo Inc.	
Owner - Propriétaire	
Mettler-Toledo Inc.	
110-780 rue King Ouest, suite 220	
Sherbrooke QC J1H 1R7	

Certificate of Calibration and Designation

I, the undersigned, being authorized by the Minister of Industry to exercise the power of the Minister of Industry pursuant to Section 13, sub-section 1 of the Weights and Measures Act,

1) hereby certify that the standard or set of standards has been calibrated in accordance with Part III of the Weights and Measures Regulations in relation to a reference standard traceable to the National Measurement Standards of Canada through an unbroken chain of comparisons where the National Measurement Standards are maintained by the National Research Council of Canada, and

2) designate the said standard or set of standards described below as local standard(s):

Project #: CP-ML-15-0007
Serial No.: 0718
Standard Group: Accredited Weight Kits
Manufacturer: Mettler-Toledo Inc.
Characteristics: Mettler 5 kg to 10 mg - multiple 500g (Version: 2004/03/22)

Certificat d'Étalonnage et de Désignation

Je, soussigné(e), étant autorisé(e) par le ministre d'Industrie à exercer les pouvoirs du ministre d'Industrie conformément à l'article 13, paragraphe 1 de la Loi sur les poids et mesures,

1) certifie par la présente que l'étalon ou jeu d'étalons a été étalonné conformément à la Partie III du Règlement sur les poids et mesures et par rapport à un étalon de référence traçable aux étalons nationaux de mesure du Canada par une chaîne ininterrompue de comparaisons où les étalons nationaux de mesure sont maintenus par le Conseil national de recherches du Canada, et

2) désigne ledit étalon ou jeu d'étalons décrits ci-dessous à titre d'étalon(s) local(aux):

No. Projet: CP-ML-15-0007
No. de série: 0718
Groupe d'étalons: Jeux de poids accrédités
Fabricant: Mettler-Toledo Inc.
Caractéristiques: Mettler 5 kg à 10 mg - multiple 500g (Version: 2004/03/22)

PROCEDURE(S) USED

MA-CP-001 ver. 4.0

SOFTWARE USED

DTCS ver. 2.4.0

PROCÉDURE(S) UTILISÉ(S)

MA-CP-001 ver. 4.0

LOGICIEL(S) UTILISÉ(S)

SECI ver. 2.4.0

STANDARD(S) USED / ÉTALON(S) UTILISÉ(S)

Device / Instrument	Model / Modèle	Manufacturer / Fabricant	Certificate / Certificat	Standard Group / Groupe d'étalons
874017	N/A	Oertling	M14-0552Rev1	BM Metric Mass Standards BM Étalons de masse - syst. mé
ML88025	Class S-1	Henry Troemner Inc.	M13-0138	BM Metric Mass Standards BM Étalons de masse - syst. mé
MS58		Troemner Inc.	M13-0137	BM Metric Mass Standards BM Étalons de masse - syst. mé

Calibrated by: **Denis D'Aoust**
Étalonné par: Legal Metrologist
Métrologiste légal

Designated by: **Isabelle Tremblay**
Désigné par: Laboratory Manager
Gestionnaire de laboratoire

Date
APR 22 2015

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The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council. Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

Le Service d'évaluation des laboratoires d'étalonnage (CLAS) du Conseil national de recherches du Canada (CNRC) a évalué et certifié la capacité d'étalonnage du laboratoire et la traçabilité au Système international d'unités (SI) ou à des étalons acceptables selon le CLAS. Le présent certificat d'étalonnage est délivré conformément aux conditions de certification du CLAS et aux conditions d'accréditation du Conseil canadien des normes (CCN). Le CLAS et le CCN ne garantissent pas l'exactitude des étalonnages individuels effectués par les laboratoires accrédités.





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Document	Calibrated (YMD) - Étalonné (AMJ)
M15-0050	2015/04/22
Project/Applicant - Projet/Requérant	Recalibration - Date - de réétalonnage
CP-ML-15-0007	2016/04/22
Mettler-Toledo Inc.	

Certificate of Calibration and Designation

Certificat d'Étalonnage et de Désignation

VERIFICATION VALUES - VALEURS D'ESSAI

Identification Number Numéro d'identification	Nominal Value Valeur nominale
718A	5 kg
718B	5 kg
718A	2 kg
718B	2 kg
718B	1 kg
718A	500 g
718B	500 g
718C	500 g
718D	500 g
718E	500 g
718A	200 g
718B	200 g
718A	100 g
718A	50 g
718A	20 g
718B	20 g
718A	10 g
718A	5 g
718A	2 g
718B	2 g
718	1 g
	500 mg
	200 mg
.	200 mg
	100 mg
	50 mg
	20 mg
.	20 mg
	10 mg

NOTES:

All weights listed above were calibrated and adjusted when necessary, with deviations less than or equal to one-half of the maximum permissible error (MPE).

All values were determined in conventional mass, as defined by the Organisation internationale de métrologie légale (OIML). "For a weight taken at a reference temperature of 20 °C, the conventional mass is the mass of a reference weight of a density of 8 000 kg m⁻³ which it balances in air of a reference density of 1.2 kg m⁻³."

The applied standard tolerances are those established in Section 54 and set out in Schedule IV, Part III and IV of the Weights and Measures Regulations.

Nominal values marked with a "*" were found to have deviations between one-half of the MPE and the MPE. Nominal values marked with a "*" were found to have deviations greater than the MPE.

NOTES:

Tous les poids ci-haut ont été étalonnés et ajustés lorsque nécessaire, avec un écart qui ne dépasse pas la moitié de l'erreur maximale tolérée (EMT).

Toutes les valeurs étaient déterminées en masse conventionnelle tel est définie par l'Organisation internationale de métrologie légale (OIML). " Pour poids pris à la température de référence de 20 °C, la masse conventionnelle est la masse d'un poids de référence d'une densité de 8000 kg m⁻³ qu'elle équilibre dans un air de masse volumique de 1,2 kg m⁻³."

Les marges de tolérance appliquées sont établies à l'article 54 et décrites à l'annexe IV, parties III et IV du Règlement sur les poids et mesures.

Les valeurs nominales identifiées par «*» indiquent des valeurs trouvées ayant un écart entre la moitié de l'EMT et l'EMT. Les valeurs nominales identifiées par «**» indiquent des valeurs trouvées ayant un écart qui dépasse l'EMT.

Fair Measure
For All



La mesure juste
pour tous



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Industry Canada

District de Québec
1550, avenue d'Estimauville
Québec, Québec, G1J 0C4

Numéro du jeu de poids Q1	Émis le (AAAA-MM-JJ) 2015-06-01	Date d'expiration (AAAA-MM-JJ) 2016-06-01
Propriétaire Mettler Toledo Inc.		
Adresse 2345 rue Watt, Porte #15B, Québec, Québec G1P 3X2		
Personne ressource Sylvain Doyon	Numéro de téléphone 581-742-3483	

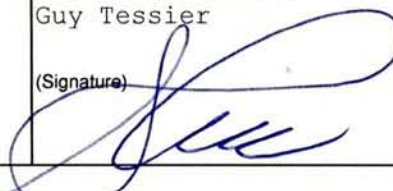
CERTIFICAT DE DÉSIGNATION

Étalons gravimétriques

Je soussigné(e), étant autorisé(e) par le ministre d'Industrie à exercer les pouvoirs du ministre d'Industrie conformément à l'article 13 (1) de la *Loi sur les poids et mesures*,

- certifie par la présente que l'étalon ou jeu d'étalons a été étalonné conformément à la Partie III du Règlement sur les poids et mesures et par rapport à un étalon de référence traçable aux étalons nationaux de mesure du Canada par une chaîne ininterrompue de comparaisons où les étalons nationaux de mesure sont maintenus par le Conseil national de recherches du Canada, et
- désigne ledit étalon ou jeu d'étalons décrits ci-dessous à titre d'étalon(s) local(aux):

Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale
Q1-101	20 kg	Q1-102	20 kg	Q1-103	20 kg	Q1-104	20 kg
Q1-105	20 kg	Q1-106	20 kg	Q1-107	20 kg	Q1-108	20 kg
Q1-109	20 kg	Q1-110	20 kg	Q1-111	20 kg	Q1-112	20 kg
Q1-113	20 kg	Q1-114	20 kg	Q1-115	20 kg	Q1-116	20 kg
Q1-117	20 kg	Q1-118	20 kg	Q1-119	20 kg	Q1-120	20 kg
Q1-121	20 kg	Q1-122	20 kg	Q1-123	20 kg	Q1-124	20 kg
Q1-125	20 kg	Q1-126	20 kg	Q1-127	20 kg	Q1-128	20 kg
Q1-129	20 kg	Q1-130	20 kg	Q1-131	20 kg	Q1-132	20 kg
Q1-133	20 kg	Q1-134	20 kg	Q1-135	20 kg	Q1-136	20 kg
Q1-137	20 kg	Q1-138	20 kg	Q1-139	20 kg	Q1-140	20 kg
Q1-141	20 kg	Q1-142	20 kg	Q1-143	20 kg	Q1-144	20 kg
Q1-145	20 kg	Q1-146	20 kg	Q1-147	20 kg	Q1-148	20 kg
Q1-149	20 kg	Q1-150	20 kg				

District District de Québec (28)	Certifié par Benoit Coutu-Castonguay Numéro du certificat d'étalonnage 1415126	Désigné par : (Lettres moulées) Guy Tessier (Signature) 	Titre du poste Gestionnaire de district / District manager
--	---	--	---

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1415126
de - Code d'établissement
2046881

[illegible]

METTLER TOLEDO

1900 Polaris Pkwy
Columbus, OH 43240
1-800-METTLER

**METTLER TOLEDO**

Certificate No: MT00957
Serial Number : 493
Date Issued 02/24/2014
Next Calibration Due : 02/28/2015
Calibrated by : MTNA
Traceability Number : MT5061

Authorized Signature:

Nominal Value&Suffix	Serial Number	Conv. Mass (g)	Uncertainty (mg, k = 2)
1 mg	(493)	0.0010001	0.0011
2 mg	(493)	0.0019982	0.0011
2 mg *	(493)	0.0019993	0.0011
5 mg	(493)	0.0050010	0.0011
10 mg	(493)	0.0099991	0.0011
20 mg	(493)	0.0200003	0.0011
20 mg *	(493)	0.0199985	0.0011
50 mg	(493)	0.0499994	0.0013
100 mg	(493)	0.1000019	0.0017
200 mg	(493)	0.2000086	0.0021
200 mg *	(493)	0.2000043	0.0021
500 mg	(493)	0.5000039	0.0025
1 g	(493)	1.0000090	0.0030
2 g	(493)	2.0000015	0.0040
2 g *	(493)	2.0000063	0.0040
5 g	(493)	5.0000116	0.0050
10 g	(493)	10.0000060	0.0078
20 g	(493)	20.0000268	0.0094
20 g *	(493)	20.0000273	0.0094
50 g	(493)	50.000062	0.012
100 g	(493)	100.000069	0.019
200 g	(493)	200.000063	0.030
200 g *	(493)	200.000087	0.030

METTLER TOLEDO

1900 Polaris Pkwy
Columbus, OH 43240
1-800-METTLER

**METTLER TOLEDO**

Certificate No: MT00997
Serial Number : 142
Date Issued 05/07/2014
Next Calibration Due : 04/30/2016
Calibrated by : MTNA
Traceability Number : MT5061

Authorized Signature:

Nominal Value&Suffix	Serial Number	Conv. Mass (g)	Uncertainty (mg, k = 2)
1 g 2	(142)	0.9999752	0.0030
2 g	(142)	1.9999811	0.0040
2 g *	(142)	1.9999735	0.0040
5 g	(142)	4.9999845	0.0050
10 g	(142)	9.9999710	0.0078
20 g	(142)	19.9999618	0.0094
20 g *	(142)	19.9999623	0.0094
50 g	(142)	50.000042	0.012
100 g	(142)	99.999930	0.019
200 g	(142)	200.000133	0.036
200 g *	(142)	200.000266	0.036
500 g	(142)	500.000215	0.084
1 kg	(142)	1000.00101	0.16
1 kg *	(142)	1000.00259	0.20
2 kg	(142)	2000.00798	0.51
2 kg *	(142)	2000.00398	0.51
5 kg 1	(142)	5000.0171	2.2
5 kg 2	(142)	5000.0111	2.2
5 kg 3	(142)	5000.0111	2.2
5 kg 4	(142)	5000.0131	2.2
5 kg 5	(142)	5000.0151	2.2
5 kg 6	(142)	5000.0091	2.2

Unit Drawings and Installation Manual

Appendix D

INFORMATION REMOVED FOR Non-CBI VERSION OF REPORT

Dry Gas Meter Calibration Data

Appendix E

CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 51068

Customer Information

Customer: SBI St-Augustin

Address : 250, De Copenhague

Doors 11-12

St-Augustin-de-Desmaures

Customer PO #: 45864



**LABORATORY
ACCREDITATION
BUREAU** a division of A-S-B
ACCREDITED ISO/IEC 17025
Certificate # L2115-1 Calibration

Calibration Procedure Information

Procedure ID: GTP FLOW_INDI

Revision #: 7

Revision Date: 1/6/2013

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10126	Graftel	N/A	LFE-D System	7/6/2016
10126-T	Graftel	9202	Temperature Sensor	8/17/2018
51202	Paroscientific	760-100A	Pressure, 100 Psia	8/17/2016
10127	Furness	352	Delta P	7/6/2016
60030	Paroscientific	760-100A	Pressure, 100 psia	5/7/2016
10159	HOB0	U12-011	Environment Monitor System	11/18/2015

Sensor Information

Manufacturer: American Meter

Description: Gas Meter

Method Used: Laminar

Model #: DTM-200A

Rated Accuracy: ± 1 % of Reading

Accuracy Specified By: AmericanMeter

Instrument ID#: SBI-103

Range: 0 to 250 scfh

Condition: Functional

Serial #: 07J264834

Comments: Calibration Date: 09/02/2015

The instruments(s) listed on this certificate have been calibrated against standards traceable to the National Institute of Standards & Technology (NIST) or compared to nationally or internationally recognized consensus standards. The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel, LLC. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005, ANSI/NC SL Z540-I-1994 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel, LLC. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

Performed By: I.B. Caoili

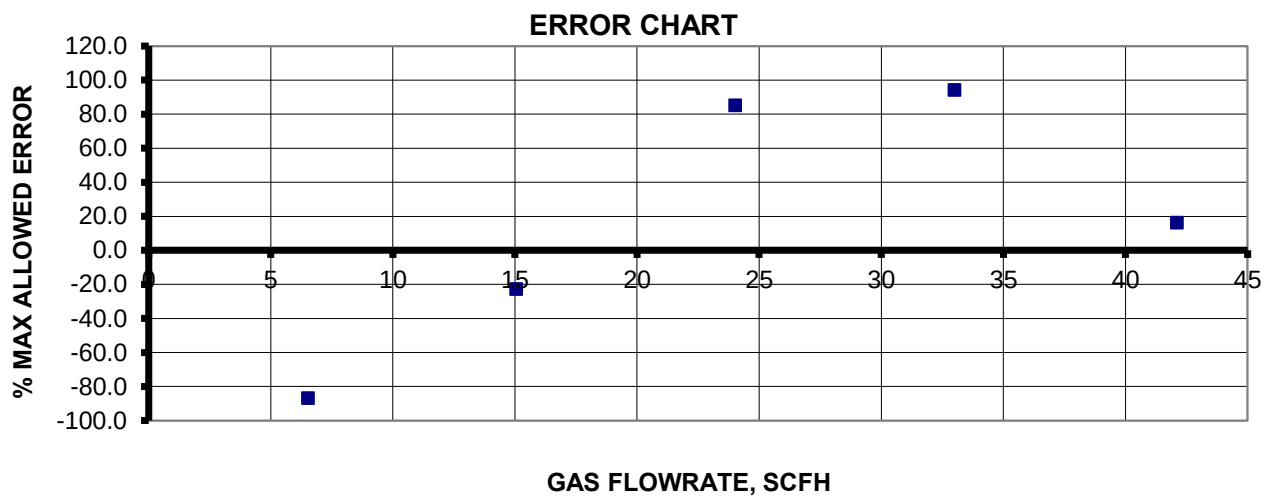
Date: 9/2/2015

I.B. Caoili
Calibration Technician

**ATTACHMENT TO CALIBRATION CERTIFICATE 51068
AS FOUND / AS LEFT DATA**

Page 2 of 2

Air Flow Rate From Standard, scfh	Air Vol From Standard, scf	Air Vol From Meter, cf	Air vol From Meter, scf	Diff Air Vol STD - METER scf	% Proof	Measurement Uncertainty, scf	STATUS
6.527	0.287	0.3	0.289	-0.002	99.138	0.002	Pass
15.052	0.967	1.0	0.969	-0.002	99.773	0.005	Pass
24.025	0.984	1.0	0.976	0.008	100.859	0.005	Pass
33.003	1.982	2.0	1.963	0.019	100.951	0.010	Pass
42.116	1.982	2.0	1.979	0.003	100.163	0.010	Pass



INSTRUMENT SPECIFICATIONS		
Test Gas	Air	
Standard Pressure, Meter	14.73	psia
Standard Temperature, Meter	60	F
Rated Accuracy	1	% Rding
Full Scale Flow Rate	250	scfh Natural Gas @ 1/2 inch WC
LABORATORY AMBIENT CONDITIONS		
Pressure	14.39	psia
Humidity	52.04	% RH
Temperature	71.40	F



Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering

NIST Traceable Calibration Data Sheet

Graftel, LLC, 870 Cambridge Drive, Elk Grove Village, IL 60007
P. 847-364-2600 F. 847-364-2899

www.graftel.com

Dry Gas Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: American Meter Company
 Model: DTM-200A
 Serial Number: 98Z332226

Average Gas Meter y Factor 1.006

Calibration Date: 03-30-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-months
 Next Calibration Due: 09-26-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 73 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.09 "Hg
 Signature/Date: *Vincent Pelletier* 2016-03-30

Previous Calibration Comparison

Date	2015-09-08	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.000	0.05	0.006
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.014
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	614.643	667.231	672.581
Final Reference Meter	667.231	672.581	692.897
Initial DGM	956.596	1008.026	1013.254
Final DGM	1008.026	1013.254	1033.598
Temp. Ref. Meter (°F), Tr	73.3	72.2	69.0
Temperature DGM (°F), Td	73.8	69.4	69.2
Time (Minutes)	1028.0	35.0	67.0
Net Volume Ref. Meter, Vr	52.588	5.350	20.316
Net Volume DGM, Vd	51.43	5.228	20.344
Gas Meter y Factor =	1.016	1.011	0.992
Gas Meter y Factor Deviation (from avg.)	0.010	0.004	0.014
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.050029183

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Thermal Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: American Meter Company
 Model: DTM-200A
 Serial Number: 90R054300

Average Gas Meter y Factor 1.003

Calibration Date: 03-30-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-months
 Next Calibration Due: 03-08-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 73 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.09 "Hg
 Signature/Date: *Vincent Pelletier* 2016-03-30

Previous Calibration Comparison

Date	2015-09-08	Acceptable	
		Deviation (5%)	Deviation
y Factor	0.994	0.0497	0.009
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.023
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	579.840	584.385	589.425
Final Reference Meter	584.385	589.425	614.643
Initial DGM	467.453	471.857	476.954
Final DGM	471.857	476.954	501.989
Temp. Ref. Meter (°F), Tr	66.6	70.9	71.9
Temperature DGM (°F), Td	67.0	69.5	73.4
Time (Minutes)	102.0	40.0	91.0
Net Volume Ref. Meter, Vr	4.545	5.040	25.218
Net Volume DGM, Vd	4.404	5.097	25.035
Gas Meter y Factor =	1.026	0.979	1.003
Gas Meter y Factor Deviation (from avg.)	0.023	0.023	0.000
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.043176471

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Dry Gas Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: Rockwell International
 Model: S-275
 Serial Number: 00938

Average Gas Meter y Factor 0.983

Calibration Date: 06-02-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-month
 Next Calibration Due: 12-01-16
 Instrument Range: 1.000 cfm
 Standard Temp.: 68.1 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.1 "Hg
 Signature/Date: *Vincent Pelletier* 2016-06-02

Previous Calibration Comparison

Date	N/A	Acceptable	
		Deviation (5%)	Deviation
y Factor	N/A	0	0.983
Acceptance	Out of Limits		

Current Calibration

Acceptable y Deviation	N/A
Maximum y Deviation	N/A
Acceptance	N/A

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 02, 2015
	Calib. Value	0.9931 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H ₂ O)	0.00	0.00	0.00
Initial Reference Meter	700.100	705.285	711.504
Final Reference Meter	705.051	711.066	719.923
Initial DGM	501.239	506.448	512.697
Final DGM	506.211	512.369	521.162
Temp. Ref. Meter (°F), Tr	73.2	73.6	74.0
Temperature DGM (°F), Td	74.2	74.0	74.8
Time (Minutes)	51.0	30.0	30.0
Net Volume Ref. Meter, Vr	4.951	5.781	8.419
Net Volume DGM, Vd	4.972	5.921	8.465
Gas Meter y Factor =	0.991	0.970	0.989
Gas Meter y Factor Deviation (from avg.)	0.007	0.013	0.006
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.097490196

1. Deviation = |Average value for all runs - current run value|
2. $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{1/2}$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Unit Pre-burn Documentation

Appendix F

April 8th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	180.10	70.95	99.50	N/A	N/A	N/A	N/A	N/A	2.88
10	180.30	70.89	99.50	N/A	N/A	N/A	N/A	N/A	2.65
20	180.40	70.98	100.20	N/A	N/A	N/A	N/A	N/A	2.38
30	181.30	71.09	100.10	N/A	N/A	N/A	N/A	N/A	2.14
40	181.40	71.28	100.50	N/A	N/A	N/A	N/A	N/A	1.92
50	181.90	71.30	100.40	N/A	N/A	N/A	N/A	N/A	1.69
60	181.80	71.25	100.60	N/A	N/A	N/A	N/A	N/A	1.47
70	188.20	71.06	101.50	N/A	N/A	N/A	N/A	N/A	1.18
80	202.60	71.21	103.70	N/A	N/A	N/A	N/A	N/A	0.91
90	192.90	72.05	102.50	N/A	N/A	N/A	N/A	N/A	0.69
100	192.10	71.98	102.40	N/A	N/A	N/A	N/A	N/A	0.47
110	194.90	71.95	102.90	N/A	N/A	N/A	N/A	N/A	0.24
120	200.10	72.69	104.40	N/A	N/A	N/A	N/A	N/A	0.00

April 9th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	262.40	74.98	114.20	N/A	N/A	N/A	N/A	N/A	5.18
10	263.90	75.37	115.40	N/A	N/A	N/A	N/A	N/A	4.75
20	264.10	75.24	115.30	N/A	N/A	N/A	N/A	N/A	4.32
30	266.40	76.14	115.90	N/A	N/A	N/A	N/A	N/A	3.89
40	265.90	75.98	115.60	N/A	N/A	N/A	N/A	N/A	3.46
50	273.50	75.56	116.10	N/A	N/A	N/A	N/A	N/A	3.03
60	274.50	76.54	116.30	N/A	N/A	N/A	N/A	N/A	2.60
70	271.20	78.08	117.30	N/A	N/A	N/A	N/A	N/A	2.17
80	270.90	75.69	118.40	N/A	N/A	N/A	N/A	N/A	1.73
90	267.90	78.10	117.30	N/A	N/A	N/A	N/A	N/A	1.30

100	268.50	76.44	117.10	N/A	N/A	N/A	N/A	N/A	0.87
110	264.70	76.33	115.50	N/A	N/A	N/A	N/A	N/A	0.43
120	263.90	77.23	115.30	N/A	N/A	N/A	N/A	N/A	0.00

April 10th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	283.00	75.14	121.90	N/A	N/A	N/A	N/A	N/A	6.60
10	286.00	74.23	121.80	N/A	N/A	N/A	N/A	N/A	6.05
20	287.00	74.48	124.70	N/A	N/A	N/A	N/A	N/A	5.50
30	288.00	75.12	124.90	N/A	N/A	N/A	N/A	N/A	4.95
40	291.00	75.68	120.40	N/A	N/A	N/A	N/A	N/A	4.40
50	290.00	74.12	120.80	N/A	N/A	N/A	N/A	N/A	3.85
60	289.00	74.92	121.00	N/A	N/A	N/A	N/A	N/A	3.30
70	296.00	75.38	124.80	N/A	N/A	N/A	N/A	N/A	2.75
80	298.00	74.82	125.60	N/A	N/A	N/A	N/A	N/A	2.20
90	302.00	75.00	126.40	N/A	N/A	N/A	N/A	N/A	1.65
100	297.00	75.05	126.70	N/A	N/A	N/A	N/A	N/A	1.10
110	303.00	75.90	126.20	N/A	N/A	N/A	N/A	N/A	0.55
120	304.00	76.38	128.70	N/A	N/A	N/A	N/A	N/A	0.00

April 11th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	307.40	74.89	126.40	N/A	N/A	N/A	N/A	N/A	6.43
10	307.90	75.44	127.90	N/A	N/A	N/A	N/A	N/A	5.89
20	308.40	74.09	127.40	N/A	N/A	N/A	N/A	N/A	5.36
30	308.40	74.08	128.44	N/A	N/A	N/A	N/A	N/A	4.82
40	310.90	74.12	127.10	N/A	N/A	N/A	N/A	N/A	4.29
50	309.70	73.95	127.30	N/A	N/A	N/A	N/A	N/A	3.75

60	306.80	74.10	129.40	N/A	N/A	N/A	N/A	N/A	3.21
70	301.50	73.78	128.60	N/A	N/A	N/A	N/A	N/A	2.68
80	303.40	74.03	129.40	N/A	N/A	N/A	N/A	N/A	2.14
90	302.10	74.55	129.30	N/A	N/A	N/A	N/A	N/A	1.61
100	311.60	74.57	131.50	N/A	N/A	N/A	N/A	N/A	1.07
110	309.60	74.71	131.90	N/A	N/A	N/A	N/A	N/A	0.54
120	307.20	75.09	131.30	N/A	N/A	N/A	N/A	N/A	0.00

April 12th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	405.70	76.19	153.90	N/A	N/A	N/A	N/A	N/A	6.05
10	338.40	75.50	145.60	N/A	N/A	N/A	N/A	N/A	5.54
20	311.90	74.99	139.70	N/A	N/A	N/A	N/A	N/A	5.02
30	293.70	75.76	135.30	N/A	N/A	N/A	N/A	N/A	4.54
40	287.50	74.81	133.40	N/A	N/A	N/A	N/A	N/A	4.04
50	281.80	75.41	131.40	N/A	N/A	N/A	N/A	N/A	3.56
60	285.50	76.74	133.20	N/A	N/A	N/A	N/A	N/A	3.06
70	274.70	77.13	131.60	N/A	N/A	N/A	N/A	N/A	2.57
80	281.30	76.91	132.70	N/A	N/A	N/A	N/A	N/A	2.07
90	290.70	77.00	134.00	N/A	N/A	N/A	N/A	N/A	1.55
100	297.20	76.48	134.40	N/A	N/A	N/A	N/A	N/A	1.04
110	292.40	75.84	133.00	N/A	N/A	N/A	N/A	N/A	0.51
120	287.00	77.00	129.20	N/A	N/A	N/A	N/A	N/A	0.00

April 13th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	328.50	74.58	124.10	N/A	N/A	N/A	N/A	N/A	5.20
10	295.90	73.93	119.00	N/A	N/A	N/A	N/A	N/A	4.81

20	277.40	73.81	115.50	N/A	N/A	N/A	N/A	N/A	4.36
30	269.80	73.61	113.80	N/A	N/A	N/A	N/A	N/A	3.91
40	259.00	73.49	111.70	N/A	N/A	N/A	N/A	N/A	3.61
50	260.60	72.70	111.50	N/A	N/A	N/A	N/A	N/A	2.21
60	261.30	72.99	111.70	N/A	N/A	N/A	N/A	N/A	2.45
70	258.50	73.36	112.60	N/A	N/A	N/A	N/A	N/A	2.02
80	253.10	73.52	111.60	N/A	N/A	N/A	N/A	N/A	1.58
90	253.70	73.42	112.00	N/A	N/A	N/A	N/A	N/A	1.13
100	250.60	73.39	111.10	N/A	N/A	N/A	N/A	N/A	0.72
110	245.50	73.57	110.40	N/A	N/A	N/A	N/A	N/A	0.30
120	232.20	72.59	106.20	N/A	N/A	N/A	N/A	N/A	0.00

April 22th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	299.40	78.98	121.90	N/A	N/A	N/A	N/A	N/A	6.06
10	299.30	78.12	121.40	N/A	N/A	N/A	N/A	N/A	5.56
20	299.70	78.45	122.70	N/A	N/A	N/A	N/A	N/A	5.05
30	301.20	78.32	124.10	N/A	N/A	N/A	N/A	N/A	4.55
40	302.80	78.12	124.90	N/A	N/A	N/A	N/A	N/A	4.04
50	304.90	78.44	125.80	N/A	N/A	N/A	N/A	N/A	3.54
60	306.10	78.55	127.40	N/A	N/A	N/A	N/A	N/A	3.03
70	296.50	77.87	125.60	N/A	N/A	N/A	N/A	N/A	2.53
80	300.60	78.06	126.60	N/A	N/A	N/A	N/A	N/A	2.02
90	305.90	78.16	127.50	N/A	N/A	N/A	N/A	N/A	1.52
100	311.20	78.74	128.40	N/A	N/A	N/A	N/A	N/A	1.01
110	306.30	78.64	127.70	N/A	N/A	N/A	N/A	N/A	0.51
120	308.90	78.84	127.50	N/A	N/A	N/A	N/A	N/A	0.00

April 30th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	316.90	77.45	118.40	N/A	N/A	N/A	N/A	N/A	6.07
10	316.80	78.42	119.40	N/A	N/A	N/A	N/A	N/A	5.59
20	317.40	79.14	119.80	N/A	N/A	N/A	N/A	N/A	5.07
30	318.40	79.96	120.40	N/A	N/A	N/A	N/A	N/A	4.55
40	320.90	78.50	123.70	N/A	N/A	N/A	N/A	N/A	4.03
50	318.40	78.49	124.80	N/A	N/A	N/A	N/A	N/A	3.55
60	334.10	78.47	128.90	N/A	N/A	N/A	N/A	N/A	3.06
70	316.30	77.83	125.70	N/A	N/A	N/A	N/A	N/A	2.56
80	313.20	77.49	123.90	N/A	N/A	N/A	N/A	N/A	2.07
90	314.50	77.18	123.70	N/A	N/A	N/A	N/A	N/A	1.55
100	312.40	77.54	123.60	N/A	N/A	N/A	N/A	N/A	1.03
110	319.30	78.02	124.10	N/A	N/A	N/A	N/A	N/A	0.48
120	317.30	77.62	116.20	N/A	N/A	N/A	N/A	N/A	0.00

May 12th, 2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	192.30	73.35	91.50	134.10	149.50	300.50	324.30	120.30	3.98
10	194.70	73.29	91.75	134.20	148.30	301.20	324.60	120.40	3.69
20	188.90	73.63	90.69	133.80	147.60	303.60	322.20	120.10	3.32
30	191.20	74.24	90.32	133.10	148.50	300.20	325.30	120.20	3.03
40	189.60	74.63	93.40	133.50	149.70	306.30	324.20	120.50	2.67
50	194.50	73.20	91.25	134.60	149.30	303.50	326.30	120.60	2.32
60	192.40	73.00	91.39	134.20	149.00	302.30	327.00	120.50	2.00
70	189.10	73.34	90.56	133.70	147.50	297.80	326.60	120.90	1.69
80	188.00	74.67	91.70	133.60	146.20	303.90	314.00	121.10	1.37

90	190.70	73.94	91.52	134.50	148.00	310.80	324.50	121.80	1.02
100	195.90	73.89	92.57	135.70	149.10	327.20	328.50	121.90	0.66
110	188.20	74.24	91.94	136.50	145.40	297.70	303.00	122.20	0.37
120	198.70	74.28	93.73	136.90	150.60	320.70	327.70	122.70	0.00
0	197.30	76.27	95.97	139.60	150.70	327.30	324.90	121.00	3.94
10	195.60	76.13	95.30	139.10	150.30	318.50	307.60	120.60	3.60
20	197.80	76.18	99.54	137.30	151.20	321.30	305.30	121.10	3.26
30	196.30	76.48	96.30	140.30	148.60	312.00	310.50	121.50	2.94
40	199.30	76.30	96.13	139.60	147.60	313.50	312.70	121.70	2.64
50	198.40	76.90	96.11	140.20	149.60	314.50	322.80	121.90	2.30
60	197.40	77.35	96.02	140.80	148.20	318.20	317.50	122.00	1.94
70	196.70	76.13	96.80	139.10	149.60	320.30	308.90	121.40	1.66
80	208.80	76.22	98.48	138.80	152.30	320.50	306.90	120.60	1.36
90	193.50	76.36	96.57	139.30	149.10	311.00	316.00	120.90	1.02
100	191.70	76.68	96.13	139.20	147.40	321.70	312.70	121.20	0.68
110	192.40	76.90	96.11	140.10	149.00	332.20	321.70	123.00	0.32
120	190.40	77.35	96.02	140.90	148.10	320.20	318.60	123.30	0.00

May 13th, 2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	195.60	73.20	91.35	130.80	147.20	297.60	323.80	119.40	4.00
10	190.60	73.48	90.54	131.00	147.50	298.60	323.70	119.60	3.68
20	193.50	73.62	91.60	131.50	147.60	297.50	324.20	119.80	3.33
30	192.40	73.84	91.35	131.90	148.10	299.50	325.60	120.00	2.97
40	196.60	73.89	92.45	133.10	148.50	301.30	325.30	120.20	2.61
50	192.50	74.24	91.50	133.40	148.30	300.50	326.40	120.30	2.32
60	198.70	74.28	93.88	133.60	149.00	302.30	327.00	120.50	2.00
70	189.10	73.34	90.56	133.70	147.50	297.80	326.60	120.90	1.69
80	188.00	74.67	91.70	133.60	146.20	303.90	314.00	121.10	1.37

90	190.70	73.94	91.52	134.50	148.00	310.80	324.50	121.80	1.02
100	195.90	73.89	92.57	135.70	149.10	327.20	328.50	121.90	0.66
110	188.20	74.24	91.94	136.50	145.40	297.70	303.00	122.20	0.37
120	198.70	74.28	93.73	136.90	150.60	320.70	327.70	122.70	0.00
0	255.50	79.59	113.80	129.30	151.10	282.90	283.90	121.60	4.05
10	240.40	79.37	110.80	129.40	151.60	283.40	284.40	121.10	3.63
20	224.90	80.48	108.80	129.80	152.10	282.80	283.80	122.30	3.27
30	227.40	79.58	108.20	130.90	151.90	283.20	284.80	122.10	2.91
40	220.10	79.73	107.50	130.20	151.30	283.90	284.90	121.40	2.55
50	217.50	79.75	107.00	131.50	152.10	284.80	285.90	121.50	2.21
60	217.00	80.14	106.70	130.40	152.30	284.60	285.40	121.90	1.85
70	217.40	79.68	107.10	131.20	152.90	285.60	285.10	122.40	1.51
80	223.00	80.40	107.50	131.74	152.40	284.80	285.90	122.40	1.14
90	215.60	82.56	107.50	132.60	151.90	285.30	286.40	122.80	0.81
100	221.00	84.38	107.80	131.80	152.20	285.90	288.40	123.10	0.46
110	191.80	81.06	103.70	132.50	152.30	286.40	289.40	123.20	0.22
120	181.10	81.28	101.40	132.90	152.70	286.50	290.30	123.50	0.00

May 17th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	204.30	70.45	94.11	115.10	143.20	269.40	271.25	109.00	3.93
10	201.60	70.30	94.23	115.30	143.50	269.60	272.30	109.10	3.61
20	202.10	70.60	94.12	116.00	143.90	270.50	269.10	109.60	3.28
30	203.40	70.13	94.62	116.20	144.20	270.40	270.30	109.80	2.97
40	205.60	70.65	94.60	116.30	144.10	271.20	269.60	110.09	2.64
50	204.80	70.80	94.73	116.60	144.30	270.30	270.20	111.10	2.32
60	203.20	70.95	94.83	116.10	144.50	268.80	271.40	111.30	1.97
70	203.90	70.70	95.65	120.00	146.10	270.10	269.60	113.80	1.61
80	205.50	70.75	96.21	122.70	146.80	268.50	270.70	115.40	1.29
90	207.30	71.13	96.41	122.90	147.50	274.90	276.30	115.70	0.97

100	209.20	71.29	96.99	124.20	149.60	276.90	279.10	117.10	0.64
110	201.60	71.33	96.95	125.30	147.20	260.30	265.30	117.90	0.33
120	205.60	71.76	96.81	124.70	148.20	272.00	272.60	117.00	0.00
0	205.70	72.84	99.75	128.20	151.90	281.20	283.90	123.00	4.03
10	206.80	73.01	99.70	128.60	152.30	284.10	284.20	123.30	3.67
20	205.70	73.10	99.98	129.30	152.30	283.00	282.20	123.70	3.36
30	204.10	73.38	99.83	129.10	151.60	281.30	280.60	123.70	3.03
40	202.80	73.54	99.85	129.20	150.70	272.90	275.00	123.50	2.69
50	201.20	73.56	99.88	129.20	149.70	271.00	270.80	123.00	2.38
60	209.30	73.53	100.40	128.80	153.60	299.90	296.50	123.40	2.00
70	209.90	73.65	100.30	129.10	153.60	304.50	297.30	123.50	1.67
80	206.90	74.03	100.50	130.40	153.00	293.90	287.00	123.90	1.35
90	203.60	74.00	100.20	130.40	150.40	282.40	279.10	122.90	1.02
100	204.40	75.00	100.60	130.20	151.50	286.80	281.60	123.20	0.71
110	210.10	74.68	101.40	130.90	154.00	295.90	292.90	123.50	0.34
120	207.40	74.53	101.50	132.10	152.80	286.70	283.50	123.90	0.00

May 20th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	203.40	77.84	99.56	137.60	152.30	319.40	311.80	128.00	4.20
10	203.10	77.96	99.80	137.90	151.60	315.40	313.40	128.30	3.87
20	204.30	78.10	101.50	138.40	150.70	318.60	310.80	128.50	3.54
30	203.90	77.56	99.56	138.20	149.70	317.80	312.70	128.90	3.20
40	201.60	77.80	100.30	137.80	153.60	325.30	311.80	129.10	2.83
50	202.40	77.78	100.20	138.20	155.20	328.60	313.80	129.40	2.48
60	203.20	77.87	99.70	138.00	156.70	323.00	315.00	129.60	2.13
70	203.30	77.48	99.54	137.90	155.20	331.50	312.00	130.10	1.78
80	204.50	78.17	100.10	137.80	156.70	337.70	320.50	130.60	1.43
90	207.30	77.53	100.20	138.40	157.30	361.10	331.40	131.10	1.06
100	220.00	77.86	103.20	139.70	164.20	336.00	316.90	130.40	0.72

110	205.10	78.13	101.10	138.70	157.10	318.00	308.10	130.40	0.39
120	202.00	78.59	100.70	137.60	155.70	325.60	319.60	130.20	0.00

May 21th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	214.70	80.45	106.20	129.10	152.70	268.10	274.13	121.96	4.06
10	215.60	80.35	106.10	129.60	152.60	269.40	274.30	122.80	3.84
20	218.60	80.12	107.60	131.20	151.20	268.00	274.80	122.10	3.47
30	220.40	81.35	106.80	129.70	152.30	269.80	274.10	122.90	3.07
40	217.60	81.96	105.60	128.90	152.60	272.70	274.90	123.20	2.75
50	219.50	81.20	105.70	129.10	154.00	271.90	274.30	123.10	2.38
60	221.10	81.26	106.60	129.20	150.70	272.90	275.00	123.50	2.09
70	220.40	80.43	106.80	129.20	149.70	271.00	270.80	123.00	1.75
80	218.90	81.17	106.70	128.80	153.60	299.90	296.50	123.40	1.46
90	209.90	81.27	105.90	129.10	153.60	304.50	297.30	123.50	1.14
100	222.10	81.02	107.30	130.40	153.00	293.90	287.00	123.90	0.74
110	215.00	81.36	106.90	130.90	154.00	295.90	292.90	123.50	0.37
120	217.80	82.17	107.40	129.30	152.30	283.00	282.20	123.70	0.00
0	263.30	77.08	108.00	185.30	193.30	444.20	445.10	188.90	4.21
10	243.20	77.41	105.50	172.10	175.60	369.50	372.80	168.60	3.84
20	224.70	76.79	102.00	159.20	162.20	357.40	356.90	153.10	3.44
30	214.50	76.81	100.10	150.80	156.00	343.60	346.60	143.30	3.07
40	204.30	76.74	98.68	146.00	150.40	325.90	327.00	137.70	2.16
50	199.70	76.21	97.32	143.10	148.10	329.70	333.80	134.60	2.34
60	196.80	76.60	96.78	141.40	146.80	324.60	329.70	132.30	1.99
70	193.40	77.02	96.59	141.10	145.70	319.20	320.50	132.20	1.62
80	199.10	76.72	97.31	140.60	147.70	327.20	326.60	131.50	1.27
90	201.40	77.01	97.46	140.40	149.40	339.30	341.00	130.40	0.88
100	196.90	77.15	96.86	140.80	147.30	325.90	327.50	130.80	0.54

110	194.90	77.38	96.01	140.10	147.00	333.30	335.90	130.70	0.20
120	176.80	77.37	94.55	138.10	137.40	265.90	270.70	127.50	0.00

May 30th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	255.50	79.59	113.80	182.71	392.73	184.66	147.51	391.95	4.05
10	240.40	79.37	110.80	165.52	327.36	164.88	137.00	327.48	3.63
20	224.90	80.48	108.80	148.96	296.25	154.69	124.50	306.44	3.27
30	227.40	79.58	108.20	139.38	286.16	154.25	120.46	302.94	2.91
40	220.10	79.73	107.50	133.87	270.10	145.53	116.63	278.83	2.55
50	217.50	79.75	107.00	130.12	298.07	144.85	113.88	278.48	2.21
60	217.00	80.14	106.70	129.33	282.23	139.61	112.82	261.58	1.85
70	217.40	79.68	107.10	127.87	282.48	140.11	111.29	260.34	1.51
80	223.00	80.40	107.50	128.84	271.92	139.23	112.62	256.43	1.14
90	215.60	82.56	107.50	126.59	288.78	138.77	110.59	265.30	0.81
100	221.00	84.38	107.80	127.86	301.85	144.04	112.86	280.29	0.46
110	191.80	81.06	103.70	129.58	289.91	145.63	114.78	282.25	0.22
120	181.10	81.28	101.40	129.25	242.68	135.90	114.15	237.08	0.00

May 31th,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	284.10	76.19	115.80	185.42	394.56	192.93	147.88	395.47	4.05
10	241.70	75.33	108.60	165.75	336.71	167.95	134.72	333.72	3.63
20	219.90	76.48	105.20	149.84	302.44	158.49	124.74	314.08	3.27
30	223.80	79.72	105.20	138.93	285.88	150.32	116.31	295.90	2.91
40	217.10	80.28	105.00	133.33	293.52	151.93	113.87	310.50	2.55
50	217.10	80.65	105.30	131.86	280.50	147.69	112.83	285.51	2.21
60	217.20	78.82	103.70	127.89	292.73	146.82	109.91	295.37	1.85
70	207.10	78.18	103.20	127.15	262.96	148.91	110.42	286.14	1.51
80	211.70	79.25	103.60	125.16	262.46	145.76	108.84	281.80	1.14

90	208.80	80.89	103.40	125.04	264.48	146.53	110.22	282.78	0.81
100	216.50	78.46	103.30	125.36	266.40	144.92	109.02	284.02	0.46
110	200.40	78.70	103.90	125.25	265.34	143.97	108.45	281.01	0.22
120	187.50	79.80	101.10	123.97	231.76	134.11	106.75	235.49	0.00

JUNE 1,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	274.50	79.23	114.00	187.36	478.12	193.92	151.38	475.43	7.75
10	237.40	78.87	108.30	173.09	361.79	167.77	142.33	357.72	7.32
20	224.80	78.06	106.00	158.58	337.75	158.45	134.94	334.49	6.89
30	212.90	80.27	104.40	148.29	337.46	154.68	128.54	341.69	6.40
40	207.40	79.77	103.60	142.52	332.07	150.75	123.79	334.51	6.16
50	212.70	78.90	103.80	136.94	314.65	142.88	117.61	309.03	5.85
60	212.10	78.93	103.60	134.42	328.27	147.04	117.92	327.70	5.45
70	207.60	80.49	103.20	133.94	312.33	144.31	117.13	314.69	4.99
80	208.00	78.58	103.20	131.75	313.14	143.35	114.73	317.51	4.80
90	208.70	78.52	103.30	132.80	315.87	145.39	116.96	319.23	4.49
100	209.00	80.90	103.80	132.05	314.77	141.68	115.27	310.15	3.80
110	215.50	82.39	105.60	130.34	315.05	141.70	113.98	308.92	3.38
120	190.30	82.84	102.50	130.81	264.70	134.42	113.54	261.51	3.07

JUNE 1,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	337.60	80.37	122.30	182.71	392.73	184.66	147.51	391.95	4.36
10	303.50	80.26	117.50	165.52	327.36	164.88	137.00	327.48	4.00
20	270.30	78.90	112.90	148.96	296.25	154.69	124.50	306.44	3.60
30	251.60	79.78	110.30	139.38	286.16	154.25	120.46	302.94	3.16
40	247.40	79.38	109.00	133.87	270.10	145.53	116.63	278.83	2.78
50	240.40	78.94	107.90	130.12	298.07	144.85	113.88	278.48	2.41
60	232.10	78.97	106.40	129.33	282.23	139.61	112.82	261.58	2.02

70	226.80	78.39	105.20	127.87	282.48	140.11	111.29	260.34	1.65
80	221.40	79.37	105.00	128.84	271.92	139.23	112.62	256.43	1.26
90	223.20	80.63	105.90	126.59	288.78	138.77	110.59	265.30	0.90
100	220.80	80.40	105.10	127.86	301.85	144.04	112.86	280.29	0.56
110	219.30	80.73	104.90	129.58	289.91	145.63	114.78	282.25	0.24
120	211.60	80.82	104.00	129.25	242.68	135.90	114.15	237.08	0.00

JUNE 3,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	307.29	77.27	114.22	187.36	478.12	193.92	151.38	475.43	4.39
10	246.88	78.44	106.00	173.09	361.79	167.77	142.33	357.72	3.95
20	230.57	78.51	103.48	158.58	337.75	158.45	134.94	334.49	3.47
30	226.38	78.71	103.01	148.29	337.46	154.68	128.54	341.69	3.09
40	223.61	79.37	102.29	142.52	332.07	150.75	123.79	334.51	2.74
50	214.51	77.35	100.92	136.94	314.65	142.88	117.61	309.03	2.48
60	217.31	79.12	100.91	134.42	328.27	147.04	117.92	327.70	2.01
70	213.74	78.30	100.60	133.94	312.33	144.31	117.13	314.69	1.67
80	212.86	78.78	100.11	131.75	313.14	143.35	114.73	317.51	1.39
90	213.51	79.66	100.87	132.80	315.87	145.39	116.96	319.23	0.93
100	212.93	77.79	100.60	132.05	314.77	141.68	115.27	310.15	0.63
110	210.62	79.10	99.86	130.34	315.05	141.70	113.98	308.92	0.31
120	193.08	77.59	97.39	130.81	264.70	134.42	113.54	261.51	0.00

JUNE 3,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	290.22	76.10	117.18	185.42	394.56	192.93	147.88	395.47	4.27
10	250.20	77.30	110.32	165.75	336.71	167.95	134.72	333.72	3.86
20	231.14	78.54	106.70	149.84	302.44	158.49	124.74	314.08	3.42
30	221.95	76.75	105.02	138.93	285.88	150.32	116.31	295.90	3.08
40	222.78	77.93	104.38	133.33	293.52	151.93	113.87	310.50	2.68

50	216.14	77.43	104.24	131.86	280.50	147.69	112.83	285.51	2.29
60	217.82	76.74	104.05	127.89	292.73	146.82	109.91	295.37	1.99
70	218.60	78.77	104.47	127.15	262.96	148.91	110.42	286.14	1.62
80	213.15	77.18	104.02	125.16	262.46	145.76	108.84	281.80	1.32
90	217.93	79.12	103.67	125.04	264.48	146.53	110.22	282.78	0.93
100	211.93	77.20	103.45	125.36	266.40	144.92	109.02	284.02	0.63
110	209.93	78.16	103.19	125.25	265.34	143.97	108.45	281.01	0.32
120	193.74	77.14	100.60	123.97	231.76	134.11	106.75	235.49	0.00

JUNE 6,2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	282.23	75.82	103.27	182.71	392.73	184.66	147.51	391.95	4.28
10	243.92	78.19	98.94	165.52	327.36	164.88	137.00	327.48	3.79
20	232.99	77.68	97.07	148.96	296.25	154.69	124.50	306.44	3.42
30	229.93	78.54	96.88	139.38	286.16	154.25	120.46	302.94	3.01
40	220.78	76.78	96.08	133.87	270.10	145.53	116.63	278.83	2.70
50	218.29	78.24	95.43	130.12	298.07	144.85	113.88	278.48	2.33
60	212.30	76.97	95.23	129.33	282.23	139.61	112.82	261.58	2.00
70	209.54	78.41	94.47	127.87	282.48	140.11	111.29	260.34	1.67
80	206.69	77.74	94.36	128.84	271.92	139.23	112.62	256.43	1.31
90	210.01	77.94	94.50	126.59	288.78	138.77	110.59	265.30	0.99
100	217.67	78.32	95.44	127.86	301.85	144.04	112.86	280.29	0.58
110	216.99	78.26	95.62	129.58	289.91	145.63	114.78	282.25	0.25
120	193.45	78.25	92.93	129.25	242.68	135.90	114.15	237.08	0.00
0	310.03	76.86	108.60	193.94	477.50	200.25	164.07	474.50	4.48
10	273.89	77.49	104.89	175.36	360.80	176.26	147.76	356.80	4.06
20	255.85	76.93	101.97	157.80	338.50	164.25	134.41	335.40	3.64
30	248.91	78.35	100.64	145.68	338.10	157.35	125.39	331.86	3.25
40	236.12	79.77	99.62	139.88	331.58	152.06	121.82	334.25	2.85
50	239.60	78.91	99.41	136.17	314.50	150.99	119.22	311.48	2.46
60	225.52	78.36	97.89	133.89	328.12	146.55	117.36	326.96	2.12

70	238.77	78.62	98.59	132.11	312.80	150.86	116.83	314.23	1.71
80	236.16	78.48	98.50	131.77	310.80	150.26	116.19	318.47	1.35
90	232.06	78.75	98.35	131.72	315.10	148.27	116.14	319.24	0.97
100	226.95	78.39	97.12	130.75	314.88	147.06	114.89	311.02	0.65
110	242.52	78.80	99.42	130.93	315.90	150.95	115.59	309.85	0.20
120	194.88	77.92	94.00	130.78	264.80	136.09	114.36	264.59	0.00

Stack Loss Efficiency data/Results

Appendix G

VERSION: 2.4

2010-04-15

Manufacturer: SBI

Model: Cambridge

Date: 2016-06-07

Run: 2

Control #: QC20160606

Test Duration: 180

Output Category: Integrated

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19 810	19 887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Fuel Data

Energetex P.

HHV	20 119	kJ/kg
%C	48.73	
%H	6.87	
%O	43.785	
%Ash	0.615	

Wood Moisture (% wet):	4.50
Load Weight (lb wet):	3.56
Burn Rate (dry kg/h):	0.51
Total Particulate Emissions:	17.33 g

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages	0.09	1.14	19.89	165.54	80.52
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Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO ₂	O ₂	Flue Gas Temp.	Room Temp
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0	3.56	0.10	1.65	19.81	210.6	79.9
10	3.31	0.09	1.11	19.54	187.7	78.3
20	3.12	0.07	1.09	20.19	166.5	78.1
30	2.93	0.08	1.09	20.05	160.2	77.1
40	2.69	0.09	1.04	19.64	156.3	78.3
50	2.52	0.08	1.18	20.04	155.5	82.3
60	2.29	0.09	1.19	19.97	156.6	78.7
70	2.07	0.08	1.34	19.80	158.1	79.0
80	1.86	0.09	0.91	19.96	158.4	80.5
90	1.68	0.08	1.00	20.02	162.3	80.9
100	1.49	0.11	1.17	19.80	164.9	81.4
110	1.32	0.08	1.15	20.00	160.1	81.9
120	1.12	0.09	0.94	19.88	164.6	81.7
130	0.92	0.08	0.99	20.01	165.1	82.0
140	0.77	0.08	1.22	19.65	159.2	81.6
150	0.60	0.08	1.23	19.99	159.7	81.9
160	0.38	0.08	1.14	19.91	170.9	82.0
170	0.20	0.10	0.99	19.83	164.7	82.0
180	0.00	0.08	1.31	19.85	164.0	82.4

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 180 min

	HHV	LHV
Eff	65.58%	70.80%
Comb Eff	98.69%	98.69%
HT Eff	66.46%	71.74%
Output	6 785	kJ/h
Burn Rate	0.51	kg/h
Grams CO	134	g
Input	10 345	kJ/h
MC wet	4.50	
Averages	0.09	1.14

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
CO_{2-ult} 19.63
F₀
1.034

Overall Heating Efficiency:	65.58%	Air Fuel Ratio (A/F)		
Combustion Efficiency:	98.69%	Dry Molecular Weight (M _d)	28.97	
Heat Transfer Efficiency:	66.46%	Dry Moles Exhaust Gas (N _r):	2093.17	%HC
		Air Fuel Ratio (A/F)	60.13	0.8

Heat Output:	6 436 Btu/h	6 785 kJ/h
Heat Input:	9 813 Btu/h	10 345 kJ/h

Burn Duration: 3.00 h

Burn Rate: 1.13 lb/h 0.514 kg/h

Stack Temp: 163.0 Deg. F 72.8 Deg. C

INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %	Air Fuel Ratio	Wet Wt Now Wt	% Wet Consumed x	Dry Wt. Now Wt _{din}	% Dry Comsumed y	Total Input	Carbon /12= [a]
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)										
0	1.62	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	1.62	0.00	1.54	0.00	0	4.06
10	1.50	0.09	1.11	1540.1%	20.86	19.71	86.5	25.7	98.7%	60.3%	59.5%	100.1	1.50	6.97	1.44	6.97	3020	4.06
20	1.41	0.07	1.09	1597.1%	20.86	19.74	74.7	25.6	100.1%	65.8%	65.9%	103.9	1.41	12.49	1.35	12.49	1681	4.06
30	1.33	0.08	1.09	1573.9%	20.86	19.73	71.2	25.1	99.0%	67.4%	66.7%	102.3	1.33	17.81	1.27	17.81	1866	4.06
40	1.22	0.09	1.04	1640.4%	20.86	19.78	69.0	25.7	98.5%	67.9%	66.9%	106.3	1.22	24.51	1.16	24.51	1777	4.06
50	1.14	0.08	1.18	1461.3%	20.86	19.64	68.6	27.9	99.4%	71.8%	71.4%	95.3	1.14	29.26	1.09	29.26	1722	4.06
60	1.04	0.09	1.19	1429.8%	20.85	19.62	69.2	25.9	98.3%	70.7%	69.6%	93.2	1.04	35.61	0.99	35.61	1936	4.06
70	0.94	0.08	1.34	1278.6%	20.84	19.46	70.0	26.1	99.0%	72.7%	72.0%	84.0	0.94	41.73	0.90	41.73	1869	4.06
80	0.85	0.09	0.91	1854.0%	20.87	19.92	70.2	27.0	97.8%	64.7%	63.3%	119.5	0.85	47.66	0.81	47.66	1736	4.06
90	0.76	0.08	1.00	1713.1%	20.87	19.83	72.4	27.2	98.9%	65.9%	65.1%	110.9	0.76	52.92	0.73	52.92	1647	4.06
100	0.67	0.11	1.17	1438.1%	20.85	19.63	73.8	27.5	97.5%	68.9%	67.2%	93.6	0.67	58.27	0.64	58.27	1547	4.06
110	0.60	0.08	1.15	1491.2%	20.86	19.67	71.1	27.7	98.9%	70.0%	69.2%	97.1	0.60	62.89	0.57	62.89	1612	4.06
120	0.51	0.09	0.94	1805.7%	20.87	19.89	73.7	27.6	98.3%	63.8%	62.7%	116.6	0.51	68.66	0.48	68.66	1742	4.06
130	0.42	0.08	0.99	1740.3%	20.87	19.84	74.0	27.8	99.4%	65.1%	64.6%	112.7	0.42	74.12	0.40	74.12	1520	4.06
140	0.35	0.08	1.22	1406.2%	20.85	19.59	70.6	27.6	99.0%	71.3%	70.6%	91.9	0.35	78.46	0.33	78.46	1409	4.06
150	0.27	0.08	1.23	1402.3%	20.85	19.58	70.9	27.7	99.4%	71.4%	71.0%	91.7	0.27	83.20	0.26	83.20	1703	4.06
160	0.17	0.08	1.14	1505.2%	20.86	19.68	77.2	27.8	99.0%	66.8%	66.1%	98.0	0.17	89.43	0.16	89.43	1725	4.06
170	0.09	0.10	0.99	1698.0%	20.87	19.83	73.7	27.8	97.4%	65.3%	63.6%	109.7	0.09	94.32	0.09	94.32	2522	4.06
180	0.00	0.08	1.31	1313.4%	20.85	19.50	73.3	28.0	99.3%	71.6%	71.1%	86.2	0.00	100.00	0.00	100.00	882	4.06

Combustion Efficiency: 98.69%
Total Input (kJ): 31 035 29 435 (Btu)
Total Output (kJ): 20 354 19 305 (Btu)
Efficiency: 65.58%
Total CO (g): 134.36

Moisture of Wood (wet basis): 4.5
Initial Dry Weight W_{t_{do}} (kg): 1.54
Moisture Content Dry 4.71

Dry kg : 1.54
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 1.62
Fuel Heating HHV LHV
Value in kJ/kg - CV: 20 119 18 638 Btu/lb 8655.4 8018.1

6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.56	675.51	2.95	-0.66	2713.33	35.88	2.62	347.34	1839.38	1402.81	1368.69	1352.56
Fuel Properties			Mw	Mass Balance					kg Wood per 100 mole dfp							Moisture Present	Stack Temp K	Heat Content Change - Ambient to Stack			
Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Moisture Fuel Burnt	(moles/100 mole dry flue gas)						Moles per kg of Dry Wood								Flue Gas Constituent			
				[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O			CO ₂	O ₂	CO	N ₂
6.87	2.74	20119.00	4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67
6.87	2.74	20119.00	4.50	79.10	20.98	0.29	1.03	-0.02	0.03	38.51	683.63	3.01	-0.66	2743.87	35.88	2.62	359.63	2375.99	1808.09	1763.14	1742.57
6.87	2.74	20119.00	4.50	79.10	20.98	0.28	1.00	-0.02	0.03	39.25	710.84	2.40	-0.79	2848.61	36.15	2.62	347.85	1911.11	1458.14	1422.82	1406.02
6.87	2.74	20119.00	4.50	79.10	20.98	0.28	1.01	-0.02	0.03	38.63	699.20	2.93	-0.70	2803.03	35.96	2.62	344.38	1793.51	1369.62	1336.73	1320.89
6.87	2.74	20119.00	4.50	79.09	20.98	0.27	0.98	-0.02	0.03	38.32	728.88	3.24	-0.70	2914.36	35.96	2.62	342.18	1682.71	1285.45	1254.70	1239.80
6.87	2.74	20119.00	4.50	79.11	20.98	0.30	1.09	-0.02	0.03	38.98	648.67	2.55	-0.67	2613.04	35.91	2.62	341.77	1581.17	1207.39	1178.39	1164.43
6.87	2.74	20119.00	4.50	79.10	20.98	0.31	1.11	-0.02	0.03	38.43	633.55	3.01	-0.58	2554.49	35.72	2.62	342.39	1682.54	1285.20	1254.42	1239.54
6.87	2.74	20119.00	4.50	79.11	20.98	0.35	1.23	-0.02	0.03	38.97	566.10	2.44	-0.56	2301.06	35.67	2.62	343.18	1706.87	1303.50	1272.22	1257.14
6.87	2.74	20119.00	4.50	79.08	20.98	0.24	0.87	-0.02	0.02	37.70	825.02	3.92	-0.76	3275.95	36.08	2.62	343.36	1680.82	1283.31	1252.44	1237.61
6.87	2.74	20119.00	4.50	79.09	20.98	0.26	0.94	-0.02	0.03	38.44	762.20	3.18	-0.76	3040.56	36.09	2.62	345.53	1759.27	1342.51	1310.04	1294.57
6.87	2.74	20119.00	4.50	79.09	20.98	0.31	1.10	-0.02	0.03	37.94	636.52	3.45	-0.52	2564.42	35.61	2.62	346.96	1804.53	1376.52	1343.10	1327.26
6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.07	-0.02	0.03	38.70	661.76	2.82	-0.65	2661.75	35.87	2.62	344.29	1689.32	1289.33	1258.20	1243.32
6.87	2.74	20119.00	4.50	79.08	20.98	0.25	0.89	-0.02	0.02	37.98	803.53	3.64	-0.76	3195.47	36.09	2.62	346.82	1794.06	1368.53	1335.31	1319.56
6.87	2.74	20119.00	4.50	79.09	20.98	0.26	0.93	-0.02	0.03	38.67	775.07	3.00	-0.81	3089.76	36.18	2.62	347.11	1797.37	1370.91	1337.59	1321.82
6.87	2.74	20119.00	4.50	79.11	20.98	0.32	1.12	-0.02	0.03	38.83	623.49	2.65	-0.62	2517.49	35.80	2.62	343.80	1674.85	1278.45	1247.63	1232.87
6.87	2.74	20119.00	4.50	79.11	20.98	0.32	1.13	-0.02	0.03	39.07	622.08	2.44	-0.65	2512.81	35.86	2.62	344.09	1681.46	1283.38	1252.41	1237.60
6.87	2.74	20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.71	668.15	2.81	-0.67	2685.93	35.89	2.62	350.32	1925.32	1467.47	1431.55	1414.73
6.87	2.74	20119.00	4.50	79.08	20.98	0.26	0.94	-0.02	0.03	37.64	753.77	3.87	-0.65	3006.59	35.86	2.62	346.88	1788.14	1363.93	1330.81	1315.11
6.87	2.74	20119.00	4.50	79.11	20.98	0.34	1.20	-0.02	0.03	39.10	581.93	2.35	-0.59	2361.22	35.75	2.62	346.50	1766.41	1347.42	1314.71	1299.20

			SUMS							AVERAGE	SUMS						
1730.06	1639.31	300.11	1348.00	17838.67	15953.65	69127.20	-11133.06	31088.62	2268.49	6657.45	10681.38	407.67	10273.7	21235.6	407.7	134.4	-17.1
Temperature		Room Temp	Energy Losses (kJ/kg of Dry Fuel)							Total Loss Rate							
			Flue Gas Constituent								Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
CH ₄	H ₂ O	K	CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC		Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	CO	HC
2707.79	2525.06	299.77	110.82	974.38	681.23	3883.50	-336.03	1641.95	121.71	7077.57	0.00	0	0.00	0	0	0.00	0.00
2243.51	2111.44	298.85	91.49	1236.06	858.42	4781.37	-589.94	1653.58	120.63	8151.61	1223.59	40	1183.87	1796	40	12.67	-1.59
1796.19	1704.18	298.74	75.02	1036.50	683.15	4005.20	-708.46	1651.14	119.56	6862.10	573.34	-2	575.62	1108	-2	5.62	-1.06
1683.02	1601.17	298.22	69.28	957.64	833.29	3702.50	-622.86	1638.67	119.29	6697.82	621.20	19	601.94	1245	19	7.61	-1.04
1578.07	1502.94	298.85	64.48	936.94	920.66	3613.23	-625.30	1635.40	119.04	6664.45	588.71	26	562.88	1189	26	8.01	-0.99
1483.90	1411.49	301.08	61.63	783.20	725.61	3042.69	-599.25	1629.46	118.80	5762.15	493.28	11	482.64	1229	11	6.12	-0.92
1578.17	1502.59	299.07	64.66	814.24	855.55	3166.38	-518.20	1624.46	119.04	6126.13	589.46	32	557.27	1346	32	8.11	-0.89
1601.61	1523.89	299.25	66.53	737.91	693.69	2892.76	-495.46	1622.90	119.09	5637.42	523.80	18	505.58	1346	18	6.35	-0.83
1577.82	1500.18	300.12	63.36	1058.76	1113.93	4054.34	-674.90	1640.36	119.03	7374.88	636.30	38	598.74	1100	38	9.47	-1.04
1653.00	1569.12	300.31	67.63	1023.27	903.89	3936.21	-680.97	1643.46	119.21	7012.70	574.04	18	556.03	1073	18	7.29	-1.00
1696.68	1608.68	300.61	68.46	876.19	979.99	3403.66	-465.71	1622.88	119.31	6604.78	507.98	39	468.71	1039	39	7.42	-0.64
1586.84	1507.04	300.86	65.37	853.23	800.60	3309.42	-583.87	1631.32	119.05	6195.11	496.35	17	479.18	1116	17	6.32	-0.84
1686.82	1599.35	300.74	68.14	1099.65	1035.13	4216.63	-680.32	1644.48	119.29	7503.00	649.75	30	619.33	1093	30	8.83	-1.06
1690.27	1602.07	300.95	69.51	1062.55	851.94	4084.12	-723.29	1648.97	119.30	7113.09	537.49	10	527.97	983	10	6.34	-0.98
1572.86	1494.39	300.73	65.03	797.10	753.52	3103.74	-550.44	1627.46	119.02	5915.41	414.23	14	400.17	995	14	5.20	-0.69
1579.33	1500.11	300.85	65.69	798.37	692.51	3109.86	-576.36	1630.31	119.03	5839.40	494.29	10	484.63	1209	10	5.77	-0.88
1812.86	1714.53	300.93	74.53	980.49	800.64	3799.87	-593.41	1639.72	119.59	6821.44	584.96	18	567.43	1140	18	6.76	-0.91
1681.43	1593.95	300.95	67.30	1028.09	1100.42	3954.01	-578.96	1633.93	119.28	7324.07	918.01	65	853.15	1604	65	13.58	-1.30
1660.87	1574.67	301.13	69.06	784.11	669.50	3067.70	-529.35	1628.17	119.23	5808.43	254.59	6	248.54	627	6	2.89	-0.42

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 180
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	65.6%	70.8%
Combustion Efficiency	98.7%	98.7%
Heat Transfer Efficiency	66%	71.7%

Output Rate (kJ/h)	6 785	6 436	(Btu/h)
Burn Rate (kg/h)	0.51	1.13	(lb/h)
Input (kJ/h)	10 345	9 813	(Btu/h)

Test Load Weight (dry kg)	1.54	3.40	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	134		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.85	6.60
g/kg Dry Fuel	11.23	87.10
g/h	5.78	44.79
lb/MM Btu Output	1.98	15.34

Air/Fuel Ratio (A/F)	60.13
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VERSION:

2.4

2010-04-15

VERSION: 2.4

2010-04-15

Manufacturer: SBI

Model: Cambridge

Date: 2016-06-07

Run: 2

Control #: QC20160606

Test Duration: 120

Output Category: Integrated

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19 810	19 887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

Fuel Data

Energex P.

Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 4.81
 Burn Rate (dry kg/h): 1.04
 Total Particulate Emissions: 17.33 g

HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages 0.09 2.24 18.68 237.61 79.03

Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		

0	4.81	0.06	3.72	17.26	361.2	76.9
10	4.28	0.08	2.64	18.52	306.6	77.1
20	3.74	0.09	2.47	18.99	261.2	82.0
30	3.34	0.09	2.30	18.74	243.0	80.6
40	2.96	0.09	1.89	18.54	226.9	80.9
50	2.60	0.08	2.01	17.87	212.6	78.7
60	2.21	0.09	2.15	19.00	207.6	77.4
70	1.78	0.09	2.22	19.34	213.3	78.7
80	1.41	0.09	2.02	18.91	216.8	77.3
90	1.08	0.10	2.12	18.94	208.1	82.3
100	0.70	0.08	1.93	18.05	214.5	78.6
110	0.43	0.09	1.94	18.86	206.4	76.9
120	0.00	0.10	1.65	19.81	210.6	79.9

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606

Test Duration: 120	min	
	HHV	LHV
Eff	66.17%	71.43%
Comb Eff	99.03%	99.03%
HT Eff	66.82%	72.13%
Output	13 873	kJ/h
Burn Rate	1.04	kg/h
Grams CO	100	g
Input	20 966	kJ/h
MC wet	4.50	
Averages	0.09	2.24

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
CO_{2-ult} 19.63
F₀
1.050

Overall Heating Efficiency: 66.17%
Combustion Efficiency: 99.03%
Heat Transfer Efficiency: 66.82%

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M _d)	29.10
Dry Moles Exhaust Gas (N):	1360.96
Air Fuel Ratio (A/F)	39.09

%HC
0.8

Combustion Efficiency:
Total Input (kJ):
Total Output (kJ):
Efficiency:
Total CO (g):

Heat Output: 13 160 Btu/h 13 873 kJ/h
Heat Input: 19 888 Btu/h 20 966 kJ/h

Burn Duration: 2.00 h

Burn Rate: 2.30 lb/h 1.042 kg/h

Stack Temp: 227.3 Deg. F 108.5 Deg. C

	Averages	0.09	2.24	7.74	20.79	18.51	114.23	26.13	99.1%	68.4%	67.8%	52.96	1.02	53.08	0.98	53.08	43806	4.06	6.87	2.74	20119.00
Elapsed Time	INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt	% Dry	Total Input	Fuel Properties			
	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x	Now Wt _{in}	Consumed y		Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value
0	2.18	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	2.18	0.00	2.08	0.00	0	4.06	6.87	2.74	20119.00
10	1.94	0.08	2.64	621.1%	20.76	18.08	152.6	25.1	99.4%	62.6%	62.2%	43.6	1.94	11.02	1.85	11.02	6974	4.06	6.87	2.74	20119.00
20	1.70	0.09	2.47	667.8%	20.77	18.26	127.3	27.8	99.2%	67.6%	67.0%	46.5	1.70	22.25	1.62	22.25	4097	4.06	6.87	2.74	20119.00
30	1.52	0.09	2.30	722.3%	20.78	18.44	117.2	27.0	99.2%	68.3%	67.7%	49.8	1.52	30.56	1.45	30.56	3400	4.06	6.87	2.74	20119.00
40	1.34	0.09	1.89	889.4%	20.81	18.87	108.3	27.2	98.8%	66.4%	65.6%	60.0	1.34	38.46	1.28	38.46	3226	4.06	6.87	2.74	20119.00
50	1.18	0.08	2.01	840.1%	20.80	18.75	100.4	26.0	99.5%	69.8%	69.4%	57.0	1.18	45.95	1.13	45.95	3269	4.06	6.87	2.74	20119.00
60	1.00	0.09	2.15	777.1%	20.79	18.60	97.6	25.2	99.1%	71.8%	71.1%	53.1	1.00	54.05	0.96	54.05	3574	4.06	6.87	2.74	20119.00
70	0.81	0.09	2.22	750.6%	20.79	18.52	100.7	25.9	99.1%	71.7%	71.1%	51.5	0.81	62.99	0.77	62.99	3487	4.06	6.87	2.74	20119.00
80	0.64	0.09	2.02	829.5%	20.80	18.73	102.7	25.2	98.9%	69.0%	68.3%	56.3	0.64	70.69	0.61	70.69	3051	4.06	6.87	2.74	20119.00
90	0.49	0.10	2.12	783.7%	20.79	18.62	97.9	28.0	98.6%	72.2%	71.2%	53.5	0.49	77.55	0.47	77.55	3095	4.06	6.87	2.74	20119.00
100	0.32	0.08	1.93	875.6%	20.81	18.83	101.4	25.9	99.3%	68.6%	68.1%	59.2	0.32	85.45	0.30	85.45	2833	4.06	6.87	2.74	20119.00
110	0.20	0.09	1.94	864.8%	20.80	18.82	96.9	24.9	98.8%	69.8%	69.0%	58.5	0.20	91.06	0.19	91.06	4925	4.06	6.87	2.74	20119.00
120	0.00	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	0.00	100.00	0.00	100.00	1874	4.06	6.87	2.74	20119.00

Moisture Content M_{Cwb} : 4.5

99.03%
41 932
27 746
66.17%
100.28

Moisture of Wood (wet basis): 4.5
Initial Dry Weight W_{tdo} (kg): 2.08
Moisture Content Dry 4.71

Dry kg : 2.08
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 2.18
Fuel Heating HHV LHV
Value in kJ/kg - CV: 20 119 18 638

HHV LHV
Btu/lb 8655.4 8018.1

4.50	79.17	21.00	0.57	1.98	-0.02	0.06	39.55	340.81	1.63	-0.31	1451.43	35.19	2.62	387.38	3488.78	2634.58	2564.16	2535.27	3338.71	3069.13	299.28	1797.53	11121.30
Mw Moisture Fuel Burnt	Mass Balance					kg Wood per 100 mole dtp	Moles per kg of Dry Wood							Stack Temp K	Heat Content Change - Ambient to Stack Temperature						Room Temp K		
	(moles/100 mole dry flue gas)														Flue Gas Constituent							CO ₂	O ₂
	[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O	Moisture Present		CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O		CO ₂	O ₂
4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32	876.87
4.50	79.20	21.01	0.67	2.32	-0.02	0.07	39.87	273.04	1.24	-0.26	1196.25	35.08	2.62	425.72	5105.23	3830.45	3721.98	3681.33	4939.96	4453.04	298.20	203.57	1045.87
4.50	79.19	21.00	0.63	2.18	-0.02	0.06	39.73	293.68	1.39	-0.27	1273.87	35.10	2.62	400.47	3951.69	2979.24	2898.39	2865.99	3792.49	3468.81	300.95	157.02	874.95
4.50	79.18	21.00	0.58	2.04	-0.02	0.06	39.65	317.81	1.50	-0.29	1364.82	35.15	2.62	390.39	3569.32	2697.28	2625.64	2595.97	3411.68	3142.87	300.14	141.51	857.24
4.50	79.15	20.99	0.48	1.70	-0.02	0.05	39.25	391.93	1.95	-0.35	1643.78	35.26	2.62	381.41	3197.57	2420.98	2357.80	2330.92	3046.24	2822.62	300.30	125.52	948.84
4.50	79.16	21.00	0.51	1.79	-0.02	0.05	39.69	370.28	1.54	-0.37	1563.16	35.31	2.62	373.51	2923.18	2217.61	2160.81	2135.95	2775.23	2587.14	299.11	116.02	821.15
4.50	79.17	21.00	0.55	1.91	-0.02	0.05	39.55	342.10	1.62	-0.31	1456.32	35.19	2.62	370.73	2838.50	2155.02	2100.22	2075.97	2691.24	2514.72	298.39	112.27	737.23
4.50	79.17	21.00	0.56	1.97	-0.02	0.06	39.60	330.39	1.56	-0.30	1412.19	35.17	2.62	373.85	2938.02	2228.72	2171.60	2146.62	2789.65	2600.04	299.08	116.34	736.34
4.50	79.15	21.00	0.52	1.81	-0.02	0.05	39.39	365.34	1.79	-0.33	1543.69	35.22	2.62	375.84	3046.96	2310.73	2251.35	2225.49	2894.47	2695.48	298.34	120.03	844.19
4.50	79.16	21.00	0.54	1.90	-0.02	0.05	39.27	344.89	1.88	-0.28	1466.10	35.13	2.62	371.00	2746.12	2083.52	2030.21	2006.84	2606.62	2430.79	301.10	107.83	718.58
4.50	79.15	21.00	0.49	1.72	-0.02	0.05	39.55	385.97	1.68	-0.38	1622.06	35.31	2.62	374.55	2967.42	2250.68	2192.92	2167.71	2818.29	2625.54	299.06	117.36	868.70
4.50	79.15	20.99	0.50	1.74	-0.02	0.05	39.28	380.96	1.92	-0.33	1602.39	35.23	2.62	370.06	2824.05	2144.50	2090.09	2065.93	2676.53	2502.63	298.07	110.92	816.96
4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67	2707.79	2525.06	299.77	110.82	974.38

SUMS					AVERAGE	SUMS						
6032.82	45850.23	-3618.86	21515.02	1600.79	6484.52	14185.91	407.56	13778.4	29620.2	407.6	100.3	-10.9
Energy Losses (kJ/kg of Dry Fuel)					Total Loss Rate							
Flue Gas Constituent						Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
188.65	3939.67	-179.77	1730.66	129.58	6943.99	0.00	0	0.00	0	0	0.00	0.00
356.41	4403.80	-231.23	1698.61	126.76	7603.78	2635.79	42	2593.56	4338	42	12.07	-1.43
398.74	3650.90	-240.87	1665.14	124.18	6630.05	1350.23	32	1318.69	2747	32	7.95	-0.88
429.82	3543.02	-261.14	1655.84	123.33	6489.62	1096.67	28	1068.66	2303	28	7.12	-0.79
557.09	3831.51	-309.32	1649.65	122.49	6925.78	1110.36	39	1071.20	2115	39	8.76	-0.89
439.21	3338.83	-331.79	1643.70	121.88	6148.99	999.14	17	982.06	2270	17	7.01	-0.97
462.57	3023.28	-280.52	1635.81	121.69	5812.32	1032.58	32	1000.70	2542	32	8.07	-0.89
446.10	3031.44	-271.29	1637.84	121.91	5818.68	1008.50	30	978.64	2479	30	7.59	-0.84
511.23	3435.46	-291.88	1643.35	122.16	6384.53	968.25	33	935.46	2083	33	7.61	-0.79
534.76	2942.22	-251.45	1629.83	121.47	5803.24	892.67	43	849.56	2202	43	8.08	-0.69
480.40	3516.16	-335.57	1645.45	121.98	6414.47	903.31	20	883.29	1930	20	6.64	-0.85
546.57	3310.44	-297.99	1637.20	121.65	6245.76	1529.06	60	1468.97	3396	60	13.14	-1.31
681.29	3883.50	-336.03	1641.95	121.71	7077.62	659.35	32	627.56	1215	32	6.23	-0.56

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 120
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	66.2%	71.4%
Combustion Efficiency	99.0%	99.0%
Heat Transfer Efficiency	67%	72.1%

Output Rate (kJ/h)	13 873	13 160	(Btu/h)
Burn Rate (kg/h)	1.04	2.30	(lb/h)
Input (kJ/h)	20 966	19 888	(Btu/h)

Test Load Weight (dry kg)	2.08	4.59	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	100		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.62	3.61
g/kg Dry Fuel	8.31	48.12
g/h	8.67	50.14
lb/MM Btu Output	1.45	8.40

Air/Fuel Ratio (A/F)	39.09
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VERSION:

2.4

2010-04-15

VERSION: 2.4
 2010-04-15
 Manufacturer: SBI
 Model: Cambridge
 Date: 2016-06-07
 Run: 2
 Control #: QC20160606
 Test Duration: 60
 Output Category: Integrated
 Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 4.96
 Burn Rate (dry kg/h): 2.15
 Total Particulate Emissions: 17.33 g

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
 Weight Units lb (kg or lb)

Default Fuel Values
 HHV (kJ/kg) D. Fir 19 810 Oak 19 887
 %C 48.73 50
 %H 6.87 6.6
 %O 43.9 42.9
 %Ash 0.5 0.5

Fuel Data
 Energex P.
 HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

Averages		0.05	5.60	15.33	357.68	77.69
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	4.96	0.06	5.90	15.37	359.7	76.5
10	4.15	0.04	5.79	14.84	355.5	79.9
20	3.35	0.05	5.81	14.96	355.5	78.1
30	2.57	0.03	5.88	14.99	352.8	77.8
40	1.75	0.05	6.20	14.31	355.4	77.0
50	0.87	0.06	5.92	15.57	363.7	77.6
60	0.00	0.06	3.72	17.26	361.2	76.9

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 60 min

	HHV	LHV
Eff	71.49%	77.17%
Comb Eff	99.50%	99.50%
HT Eff	71.85%	77.56%
Output	30 912	kJ/h
Burn Rate	2.15	kg/h
Grams CO	23	g
Input	43 239	kJ/h
MC wet	4.50	
Averages	0.05	5.60

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
 CO_{2-ult} 19.63
 F₀
 1.060

Overall Heating Efficiency: 71.49%
 Combustion Efficiency: 99.50%
 Heat Transfer Efficiency: 71.85%

Air Fuel Ratio (A/F)	
Dry Molecular Weight (M _d)	29.49
Dry Moles Exhaust Gas (N):	658.74
Air Fuel Ratio (A/F)	18.92

%HC
 0.8

Combustion Efficiency:
 Total Input (kJ):
 Total Output (kJ):
 Efficiency:
 Total CO (g):

Heat Output: 29 323 Btu/h 30 912 kJ/h
 Heat Input: 41 017 Btu/h 43 239 kJ/h
 Burn Duration: 1.00 h
 Burn Rate: 4.74 lb/h 2.149 kg/h
 Stack Temp: 357.3 Deg. F 180.7 Deg. C

	Averages	0.05	5.60	2.56	20.56	14.94	180.94	25.38	100.0%	73.7%	73.7%	21.57	1.14	49.16	1.09	49.16	47032	4.06	6.87	2.74	20119.00	
INPUT DATA				Oxygen Calculation				Input Data		Combust	Heat Transfer	Net Eff	Air Fuel Ratio	Wet Wt Now	% Wet Consumed x	Dry Wt. Now Wt _{an}	% Dry Comsumed y	Total Input	Fuel Properties			
Elapsed Time	Weight Remaining (kg)	% CO[e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)	Carbon /12= [a]										Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	
0	2.25	0.06	5.90	229.6%	20.54	14.61	182.1	24.7	99.9%	74.8%	74.7%	19.9	2.25	0.00	2.15	0.00	0	4.06	6.87	2.74	20119.00	
10	1.88	0.04	5.79	236.8%	20.55	14.74	179.7	26.6	100.2%	74.9%	75.1%	20.4	1.88	16.33	1.80	16.33	10548	4.06	6.87	2.74	20119.00	
20	1.52	0.05	5.81	235.2%	20.55	14.72	179.7	25.6	100.1%	74.9%	74.9%	20.3	1.52	32.46	1.45	32.46	6887	4.06	6.87	2.74	20119.00	
30	1.17	0.03	5.88	231.9%	20.55	14.65	178.2	25.5	100.2%	75.2%	75.4%	20.1	1.17	48.19	1.11	48.19	6974	4.06	6.87	2.74	20119.00	
40	0.79	0.05	6.20	214.3%	20.52	14.30	179.7	25.0	100.1%	75.8%	75.8%	19.0	0.79	64.72	0.76	64.72	7410	4.06	6.87	2.74	20119.00	
50	0.39	0.06	5.92	228.1%	20.54	14.59	184.3	25.3	99.8%	74.6%	74.5%	19.8	0.39	82.46	0.38	82.46	11420	4.06	6.87	2.74	20119.00	
60	0.00	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	0.00	100.00	0.00	100.00	3792	4.06	6.87	2.74	20119.00	

Moisture Content M_{Cwb} : 4.5

99.50%
43 239 41 010 (Btu)
30 912 29 318 (Btu)
71.49%
22.63

Moisture of Wood (wet basis): 4.5
Initial Dry Weight Wt_{do} (kg): 2.15
Moisture Content Dry 4.71

Dry kg : 2.15
CA: 48.73
HY: 6.87
OX: 43.785

Load Weight (kg): 2.25

Fuel Heating HHV LHV
Value in kJ/kg - CV: 20 119 18 638 Btu/lb 8655.4 8018.1

4.50	79.41	21.06	1.39	4.80	-0.02	0.14	40.62	112.34	0.37	-0.13	591.06	34.82	2.62	454.09	6292.56	4692.80	4552.88	4504.63	6151.27	5444.91	298.53	1789.01	3696.11
Mw	Mass Balance					kg Wood per 100 mole dfp	Moles per kg of Dry Wood							Stack Temp K	Heat Content Change - Ambient to Stack Temperature						Room Temp K		
Moisture	(moles/100 mole dry flue gas)												Moisture Present		Flue Gas Constituent								
Fuel Burnt	[h]	[u]	[w]	[j]	[k]		Nk	CO ₂	O ₂	CO	HC	N ₂			H ₂ O	CO ₂	O ₂	CO	N ₂	CH ₄			
4.50	79.43	21.07	1.46	5.06	-0.02	0.15	40.58	100.52	0.38	-0.11	546.33	34.77	2.62	455.22	6365.65	4746.85	4605.21	4556.42	6223.74	5507.45	297.89	258.32	477.16
4.50	79.43	21.07	1.43	4.95	-0.02	0.14	40.72	103.68	0.27	-0.13	558.64	34.82	2.62	452.87	6193.98	4619.30	4481.58	4434.08	6054.86	5359.64	299.75	252.23	478.95
4.50	79.43	21.07	1.44	4.97	-0.02	0.14	40.66	102.99	0.32	-0.12	555.88	34.80	2.62	452.85	6230.37	4647.40	4509.08	4461.24	6088.33	5392.61	298.78	253.34	478.66
4.50	79.44	21.07	1.45	5.02	-0.02	0.14	40.75	101.52	0.24	-0.13	550.57	34.82	2.62	451.39	6174.46	4607.29	4470.55	4423.04	6030.23	5346.65	298.61	251.63	467.75
4.50	79.45	21.08	1.53	5.30	-0.02	0.15	40.67	93.81	0.30	-0.11	521.20	34.78	2.62	452.81	6252.36	4664.46	4525.79	4477.74	6108.41	5412.64	298.16	254.28	437.56
4.50	79.43	21.07	1.47	5.08	-0.01	0.15	40.53	99.87	0.43	-0.10	543.72	34.76	2.62	457.43	6437.69	4797.77	4653.91	4604.76	6300.31	5565.48	298.47	260.89	479.16
4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32	876.87

SUMS					AVERAGE	SUMS						
744.44	18658.62	-796.50	12042.93	905.50	5291.44	12085.54	-25.77	12111.3	34946.0	-25.8	22.6	-4.6
Energy Losses (kJ/kg of Dry Fuel)					Total Loss Rate	Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
Flue Gas Constituent											CO	HC
CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC								
110.56	2489.29	-94.82	1720.50	129.52	5090.53	0.00	0	0.00	0	0	0.00	0.00
76.43	2477.07	-114.88	1717.57	129.13	5016.50	2630.13	-20	2650.51	7918	-20	3.90	-1.08
91.35	2479.91	-107.11	1717.86	129.22	5043.23	1726.34	-6	1731.98	5161	-6	3.05	-0.65
67.74	2435.18	-115.71	1717.21	129.10	4952.90	1716.88	-17	1733.61	5257	-17	2.29	-0.72
85.44	2333.78	-96.54	1717.39	129.27	4861.19	1790.41	-4	1794.75	5620	-4	3.06	-0.63
124.25	2503.72	-87.68	1721.73	129.67	5131.74	2912.91	20	2892.95	8507	20	6.87	-0.89
188.68	3939.67	-179.77	1730.66	129.58	6944.02	1308.86	1	1307.51	2483	1	3.46	-0.60

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 60
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	71.5%	77.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	72%	77.6%

Output Rate (kJ/h)	30 912	29 323	(Btu/h)
Burn Rate (kg/h)	2.15	4.74	(lb/h)
Input (kJ/h)	43 239	41 017	(Btu/h)

Test Load Weight (dry kg)	2.15	4.74	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	23		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.56	0.73
g/kg Dry Fuel	8.06	10.53
g/h	17.33	22.63
lb/MM Btu Output	1.30	1.70

Air/Fuel Ratio (A/F)	18.92
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VERSION:

2.4

2010-04-15

VERSION: 2.4 2010-04-15

Manufacturer: SBI
 Model: Cambridge
 Date: 2016-06-07
 Run: 2
 Control #: QC20160606
 Test Duration: 360
 Output Category: Integrated

Appliance Type: Pellet (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
 Weight Units lb (kg or lb)

Default Fuel Values
 HHV (kJ/kg) 19 810 19 887
 %C 48.73 50
 %H 6.87 6.6
 %O 43.9 42.9
 %Ash 0.5 0.5

Wood Moisture (% wet): 4.50
 Load Weight (lb wet): 13.32
 Burn Rate (dry kg/h): 0.96
 Total Particulate Emissions: 17.33 g

Fuel Data
 Energex P.
 HHV 20 119 kJ/kg
 %C 48.73
 %H 6.87
 %O 43.785
 %Ash 0.615

Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages		0.08	2.29	18.68	220.71	79.58
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO ₂	O ₂	Flue Gas	Room Temp
0	13.32	0.06	5.90	15.37	359.7	76.5
10	12.51	0.04	5.79	14.84	355.5	79.9
20	11.71	0.05	5.81	14.96	355.5	78.1
30	10.93	0.03	5.88	14.99	352.8	77.8
40	10.12	0.05	6.20	14.31	355.4	77.0
50	9.23	0.06	5.92	15.57	363.7	77.6
60	8.37	0.06	3.72	17.26	361.2	76.9
70	7.84	0.08	2.64	18.52	306.6	77.1
80	7.30	0.09	2.47	18.99	261.2	82.0
90	6.90	0.09	2.30	18.74	243.0	80.6
100	6.52	0.09	1.89	18.54	226.9	80.9
110	6.16	0.08	2.01	17.87	212.6	78.7
120	5.77	0.09	2.15	19.00	207.6	77.4
130	5.34	0.09	2.22	19.34	213.3	78.7
140	4.97	0.09	2.02	18.91	216.8	77.3
150	4.64	0.10	2.12	18.94	208.1	82.3
160	4.26	0.08	1.93	18.05	214.5	78.6
170	3.99	0.09	1.94	18.86	206.4	76.9
180	3.56	0.10	1.65	19.81	210.6	79.9
190	3.31	0.09	1.11	19.54	187.7	78.3
200	3.12	0.07	1.09	20.19	166.5	78.1
210	2.93	0.08	1.09	20.05	160.2	77.1
220	2.69	0.09	1.04	19.64	156.3	78.3
230	2.52	0.08	1.18	20.04	155.5	82.3
240	2.29	0.09	1.19	19.97	156.6	78.7

Note 2: In cases where the "Fuel Weight Remaining" is the same for three or more readings in a row, a "divide by zero error" will occur in the calculation sheet. In such cases, adjust the weight values by interpolation between the first occurrence and the next reading showing a decrease in weight.

250	2.07	0.08	1.34	19.80	158.1	79.0
260	1.86	0.09	0.91	19.96	158.4	80.5
270	1.68	0.08	1.00	20.02	162.3	80.9
280	1.49	0.11	1.17	19.80	164.9	81.4
290	1.32	0.08	1.15	20.00	160.1	81.9
300	1.12	0.09	0.94	19.88	164.6	81.7
310	0.92	0.08	0.99	20.01	165.1	82.0
320	0.77	0.08	1.22	19.65	159.2	81.6
330	0.60	0.08	1.23	19.99	159.7	81.9
340	0.38	0.08	1.14	19.91	170.9	82.0
350	0.20	0.10	0.99	19.83	164.7	82.0
360	0.00	0.08	1.31	19.85	164.0	82.4

Manufacturer: SBI																				
Model: Cambridge																				
Date: 06-07-16																				
Run: 2																				
Control #: QC20160606																				
Test Duration: 360 min																				
		HHV	LHV																	
Eff		69.65%	75.18%																	
Comb Eff		99.35%	99.35%																	
HT Eff		70.10%	75.67%																	
Output		13 481	kJ/h																	
Burn Rate		0.96	kg/h																	
Grams CO		247	g																	
Input		19 356	kJ/h																	
MC wet		4.50																		
Averages		0.08	2.29	10.63	20.78	18.45	104.84	26.43	99.1%	69.2%	68.6%	70.84	2.12	64.96	2.02	64.96	117018	4.06	6.87	2.74
INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Fuel Properties			
Elapsed	Weight	%	%	Excess	Total	Calc. %	Flue	Room	Eff	Transfer	Eff	Fuel	Now	Consumed	Now	Consumed	Total	Carbon	Hydrogen	Oxygen
Time	Remaining (kg)	CO [e]	CO ₂ [d]	Air EA	O ₂	O ₂ [g]	Gas (°C)	Temp (°C)	%	%	%	Ratio	Wt	x	Wt _{dn}	y	Input	/12= [a]	/1= [b]	/16= [c]
0	6.04	0.06	5.90	229.6%	20.54	14.61	182.1	24.7	99.9%	74.8%	74.7%	19.9	6.04	0.00	5.77	0.00	0	4.06	6.87	2.74
10	5.68	0.04	5.79	236.8%	20.55	14.74	179.7	26.6	100.2%	74.9%	75.1%	20.4	5.68	6.07	5.42	6.07	10539	4.06	6.87	2.74
20	5.31	0.05	5.81	235.2%	20.55	14.72	179.7	25.6	100.1%	74.9%	74.9%	20.3	5.31	12.08	5.08	12.08	6885	4.06	6.87	2.74
30	4.96	0.03	5.88	231.9%	20.55	14.65	178.2	25.5	100.2%	75.2%	75.4%	20.1	4.96	17.93	4.74	17.93	6962	4.06	6.87	2.74
40	4.59	0.05	6.20	214.3%	20.52	14.30	179.7	25.0	100.1%	75.8%	75.8%	19.0	4.59	24.07	4.38	24.07	7410	4.06	6.87	2.74
50	4.19	0.06	5.92	228.1%	20.54	14.59	184.3	25.3	99.8%	74.6%	74.5%	19.8	4.19	30.69	4.00	30.69	7624	4.06	6.87	2.74
60	3.80	0.06	3.72	419.3%	20.69	16.94	182.9	24.9	100.0%	65.5%	65.5%	31.4	3.80	37.20	3.63	37.20	6090	4.06	6.87	2.74
70	3.56	0.08	2.64	621.1%	20.76	18.08	152.6	25.1	99.4%	62.6%	62.2%	43.6	3.56	41.18	3.40	41.18	4661	4.06	6.87	2.74
80	3.31	0.09	2.47	667.8%	20.77	18.26	127.3	27.8	99.2%	67.6%	67.0%	46.5	3.31	45.22	3.16	45.22	4068	4.06	6.87	2.74
90	3.13	0.09	2.30	722.3%	20.78	18.44	117.2	27.0	99.2%	68.3%	67.7%	49.8	3.13	48.18	2.99	48.18	3379	4.06	6.87	2.74
100	2.96	0.09	1.89	889.4%	20.81	18.87	108.3	27.2	98.8%	66.4%	65.6%	60.0	2.96	51.04	2.83	51.04	3252	4.06	6.87	2.74
110	2.79	0.08	2.01	840.1%	20.80	18.75	100.4	26.0	99.5%	69.8%	69.4%	57.0	2.79	53.78	2.67	53.78	3271	4.06	6.87	2.74
120	2.62	0.09	2.15	777.1%	20.79	18.60	97.6	25.2	99.1%	71.8%	71.1%	53.1	2.62	56.67	2.50	56.67	3542	4.06	6.87	2.74
130	2.42	0.09	2.22	750.6%	20.79	18.52	100.7	25.9	99.1%	71.7%	71.1%	51.5	2.42	59.88	2.32	59.88	3499	4.06	6.87	2.74
140	2.25	0.09	2.02	829.5%	20.80	18.73	102.7	25.2	98.9%	69.0%	68.3%	56.3	2.25	62.70	2.15	62.70	3080	4.06	6.87	2.74
150	2.10	0.10	2.12	783.7%	20.79	18.62	97.9	28.0	98.6%	72.2%	71.2%	53.5	2.10	65.19	2.01	65.19	3105	4.06	6.87	2.74
160	1.93	0.08	1.93	875.6%	20.81	18.83	101.4	25.9	99.3%	68.6%	68.1%	59.2	1.93	68.05	1.84	68.05	2841	4.06	6.87	2.74
170	1.81	0.09	1.94	864.8%	20.80	18.82	96.9	24.9	98.8%	69.8%	69.0%	58.5	1.81	70.08	1.73	70.08	3036	4.06	6.87	2.74
180	1.62	0.10	1.65	1020.8%	20.82	19.12	99.2	26.6	98.3%	65.9%	64.8%	68.0	1.62	73.28	1.54	73.28	2940	4.06	6.87	2.74
190	1.50	0.09	1.11	1540.1%	20.86	19.71	86.5	25.7	98.7%	60.3%	59.5%	100.1	1.50	75.14	1.44	75.14	1938	4.06	6.87	2.74
200	1.41	0.07	1.09	1597.1%	20.86	19.74	74.7	25.6	100.1%	65.8%	65.9%	103.9	1.41	76.61	1.35	76.61	1681	4.06	6.87	2.74
210	1.33	0.08	1.09	1573.9%	20.86	19.73	71.2	25.1	99.0%	67.4%	66.7%	102.3	1.33	78.04	1.27	78.04	1866	4.06	6.87	2.74
220	1.22	0.09	1.04	1640.4%	20.86	19.78	69.0	25.7	98.5%	67.9%	66.9%	106.3	1.22	79.83	1.16	79.83	1777	4.06	6.87	2.74
230	1.14	0.08	1.18	1461.3%	20.86	19.64	68.6	27.9	99.4%	71.8%	71.4%	95.3	1.14	81.10	1.09	81.10	1722	4.06	6.87	2.74
240	1.04	0.09	1.19	1429.8%	20.85	19.62	69.2	25.9	98.3%	70.7%	69.6%	93.2	1.04	82.79	0.99	82.79	1936	4.06	6.87	2.74
250	0.94	0.08	1.34	1278.6%	20.84	19.46	70.0	26.1	99.0%	72.7%	72.0%	84.0	0.94	84.43	0.90	84.43	1869	4.06	6.87	2.74
260	0.85	0.09	0.91	1854.0%	20.87	19.92	70.2	27.0	97.8%	64.7%	63.3%	119.5	0.85	86.01	0.81	86.01	1736	4.06	6.87	2.74
270	0.76	0.08	1.00	1713.1%	20.87	19.83	72.4	27.2	98.9%	65.9%	65.1%	110.9	0.76	87.42	0.73	87.42	1647	4.06	6.87	2.74
280	0.67	0.11	1.17	1438.1%	20.85	19.63	73.8	27.5	97.5%	68.9%	67.2%	93.6	0.67	88.85	0.64	88.85	1547	4.06	6.87	2.74
290	0.60	0.08	1.15	1491.2%	20.86	19.67	71.1	27.7	98.9%	70.0%	69.2%	97.1	0.60	90.08	0.57	90.08	1612	4.06	6.87	2.74
300	0.51	0.09	0.94	1805.7%	20.87	19.89	73.7	27.6	98.3%	63.8%	62.7%	116.6	0.51	91.63	0.48	91.63	1742	4.06	6.87	2.74
310	0.42	0.08	0.99	1740.3%	20.87	19.84	74.0	27.8	99.4%	65.1%	64.6%	112.7	0.42	93.08	0.40	93.08	1520	4.06	6.87	2.74
320	0.35	0.08	1.22	1406.2%	20.85	19.59	70.6	27.6	99.0%	71.3%	70.6%	91.9	0.35	94.24	0.33	94.24	1409	4.06	6.87	2.74
330	0.27	0.08	1.23	1402.3%	20.85	19.58	70.9	27.7	99.4%	71.4%	71.0%	91.7	0.27	95.51	0.26	95.51	1703	4.06	6.87	2.74
340	0.17	0.08	1.14	1505.2%	20.86	19.68	77.2	27.8	99.0%	66.8%	66.1%	98.0	0.17	97.18	0.16	97.18	1725	4.06	6.87	2.74
350	0.09	0.10	0.99	1698.0%	20.87	19.83	73.7	27.8	97.4%	65.3%	63.6%	109.7	0.09	98.48	0.09	98.48	2522	4.06	6.87	2.74
360	0.00	0.08	1.31	1313.4%	20.85	19.50	73.3	28.0	99.3%	71.6%	71.1%	86.2	0.00	100.00	0.00	100.00	882	4.06	6.87	2.74

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
CO_{2-ult} 19.63
F₀
1.050

Overall Heating Efficiency: 69.65%
Combustion Efficiency: 99.35%
Heat Transfer Efficiency: 70.10%

Heat Output: 12 788 Btu/h
Heat Input: 18 361 Btu/h

Burn Duration: 6.00 h

Burn Rate: 2.12 lb/h 0.962 kg/h

Stack Temp: 216.8 Deg. F 102.7 Deg. C

Air Fuel Ratio (A/F)

Dry Molecular Weight (M _d)	29.10
Dry Moles Exhaust Gas (N _d)	1341.68
Air Fuel Ratio (A/F)	38.54

0.8%HC
Total
Total

Moisture Content M_{Cwb}: 4.5

η Efficiency:	99.35%	Moisture of Wood (wet basis):	4.5	Dry kg :	5.77
al Input (kJ):	116 136 110 149 (Btu)	Initial Dry Weight W _{t_{do}} (kg):	5.77	CA:	48.73
Output (kJ):	80 887 76 717 (Btu)	Moisture Content Dry	4.71	HY:	6.87
Efficiency:	69.65%			OX:	43.785
otal CO (g):	247.08				

Load Weight (kg):	6.04				
Fuel Heating	HHV	LHV	HHV	LHV	
Value in kJ/kg - CV:	20 119	18 638	Btu/lb	8655.4	8018.1

20119.00	4.50	79.18	21.00	0.58	2.02	-0.02	0.06	39.24	470.74	2.08	-0.46	1941.50	35.47	2.62	377.99	3110.92	2346.53	2283.15	2257.56	2983.04	2732.57	299.58	4565.40
Calorific Value	Mw Moisture Fuel Burnt	Mass Balance (moles/100 mole dry flue gas)					kg Wood per 100 mole dfp	Moles per kg of Dry Wood						Moisture Present	Stack Temp K	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp K	CO ₂
		[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O			CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O		
20119.00	4.50	79.43	21.07	1.46	5.06	-0.02	0.15	40.58	100.52	0.38	-0.11	546.33	34.77	2.62	455.22	6365.65	4746.85	4605.21	4556.42	6223.74	5507.45	297.89	258.32
20119.00	4.50	79.43	21.07	1.43	4.95	-0.02	0.14	40.72	103.68	0.27	-0.13	558.64	34.82	2.62	452.87	6193.98	4619.30	4481.58	4434.08	6054.86	5359.64	299.75	252.23
20119.00	4.50	79.43	21.07	1.44	4.97	-0.02	0.14	40.66	102.99	0.32	-0.12	555.88	34.80	2.62	452.85	6230.37	4647.40	4509.08	4461.24	6088.33	5392.61	298.78	253.34
20119.00	4.50	79.44	21.07	1.45	5.02	-0.02	0.14	40.75	101.52	0.24	-0.13	550.57	34.82	2.62	451.39	6174.46	4607.29	4470.55	4423.04	6030.23	5346.65	298.61	251.63
20119.00	4.50	79.45	21.08	1.53	5.30	-0.02	0.15	40.67	93.81	0.30	-0.11	521.20	34.78	2.62	452.81	6252.36	4664.46	4525.79	4477.74	6108.41	5412.64	298.16	254.28
20119.00	4.50	79.43	21.07	1.47	5.08	-0.01	0.15	40.53	99.87	0.43	-0.10	543.72	34.76	2.62	457.43	6437.69	4797.77	4653.91	4604.76	6300.31	5565.48	298.47	260.89
20119.00	4.50	79.28	21.03	0.93	3.22	-0.02	0.09	40.40	183.96	0.66	-0.20	861.11	34.96	2.62	456.03	6393.37	4766.53	4624.05	4575.12	6253.00	5529.91	298.07	258.32
20119.00	4.50	79.20	21.01	0.67	2.32	-0.02	0.07	39.87	273.04	1.24	-0.26	1196.25	35.08	2.62	425.72	5105.23	3830.45	3721.98	3681.33	4939.96	4453.04	298.20	203.57
20119.00	4.50	79.19	21.00	0.63	2.18	-0.02	0.06	39.73	293.68	1.39	-0.27	1273.87	35.10	2.62	400.47	3951.69	2979.24	2898.38	2865.99	3792.49	3468.81	300.95	157.02
20119.00	4.50	79.18	21.00	0.58	2.04	-0.02	0.06	39.65	317.81	1.50	-0.29	1364.82	35.15	2.62	390.39	3569.32	2697.28	2625.64	2595.97	3411.68	3142.87	300.14	141.51
20119.00	4.50	79.15	20.99	0.48	1.70	-0.02	0.05	39.25	391.93	1.95	-0.35	1643.78	35.26	2.62	381.41	3197.57	2420.98	2357.80	2330.92	3046.24	2822.62	300.30	125.52
20119.00	4.50	79.16	21.00	0.51	1.79	-0.02	0.05	39.69	370.28	1.54	-0.37	1563.16	35.31	2.62	373.51	2923.18	2217.61	2160.81	2135.95	2775.23	2587.14	299.11	116.02
20119.00	4.50	79.17	21.00	0.55	1.91	-0.02	0.05	39.55	342.10	1.62	-0.31	1456.32	35.19	2.62	370.73	2838.50	2155.02	2100.22	2075.97	2691.24	2514.72	298.39	112.27
20119.00	4.50	79.17	21.00	0.56	1.97	-0.02	0.06	39.60	330.39	1.56	-0.30	1412.19	35.17	2.62	373.85	2938.02	2228.72	2171.60	2146.62	2789.65	2600.04	299.08	116.34
20119.00	4.50	79.15	21.00	0.52	1.81	-0.02	0.05	39.39	365.34	1.79	-0.33	1543.69	35.22	2.62	375.84	3046.96	2310.73	2251.35	2225.49	2894.47	2695.48	298.34	120.03
20119.00	4.50	79.16	21.00	0.54	1.90	-0.02	0.05	39.27	344.89	1.88	-0.28	1466.10	35.13	2.62	371.00	2746.12	2083.52	2030.21	2006.84	2606.62	2430.79	301.10	107.83
20119.00	4.50	79.15	21.00	0.49	1.72	-0.02	0.05	39.55	385.97	1.68	-0.38	1622.06	35.31	2.62	374.55	2967.42	2250.68	2192.92	2167.71	2818.29	2625.54	299.06	117.36
20119.00	4.50	79.15	20.99	0.50	1.74	-0.02	0.05	39.28	380.96	1.92	-0.33	1602.39	35.23	2.62	370.06	2824.05	2144.50	2090.09	2065.93	2676.53	2502.63	298.07	110.92
20119.00	4.50	79.13	20.99	0.43	1.50	-0.02	0.04	38.85	450.20	2.39	-0.38	1862.88	35.32	2.62	372.38	2852.65	2164.33	2108.95	2084.67	2707.79	2525.06	299.77	110.82
20119.00	4.50	79.10	20.98	0.29	1.03	-0.02	0.03	38.51	683.63	3.01	-0.66	2743.87	35.88	2.62	359.63	2375.99	1808.09	1763.14	1742.57	2243.51	2111.44	298.85	91.49
20119.00	4.50	79.10	20.98	0.28	1.00	-0.02	0.03	39.25	710.84	2.40	-0.79	2848.61	36.15	2.62	347.85	1911.11	1458.14	1422.82	1406.02	1796.19	1704.18	298.74	75.02
20119.00	4.50	79.10	20.98	0.28	1.01	-0.02	0.03	38.63	699.20	2.93	-0.70	2803.03	35.96	2.62	344.38	1793.51	1369.62	1336.73	1320.89	1683.02	1601.17	298.22	69.28
20119.00	4.50	79.09	20.98	0.27	0.98	-0.02	0.03	38.32	728.88	3.24	-0.70	2914.36	35.96	2.62	342.18	1682.71	1285.45	1254.70	1239.80	1578.07	1502.94	298.85	64.48
20119.00	4.50	79.11	20.98	0.30	1.09	-0.02	0.03	38.98	648.67	2.55	-0.67	2613.04	35.91	2.62	341.77	1581.17	1207.39	1178.39	1164.43	1483.90	1411.49	301.08	61.63
20119.00	4.50	79.10	20.98	0.31	1.11	-0.02	0.03	38.43	633.55	3.01	-0.58	2554.49	35.72	2.62	342.39	1682.54	1285.20	1254.42	1239.54	1578.17	1502.59	299.07	64.66
20119.00	4.50	79.11	20.98	0.35	1.23	-0.02	0.03	38.97	566.10	2.44	-0.56	2301.06	35.67	2.62	343.18	1706.87	1303.50	1272.22	1257.14	1601.61	1523.89	299.25	66.53
20119.00	4.50	79.08	20.98	0.24	0.87	-0.02	0.02	37.70	825.02	3.92	-0.76	3275.95	36.08	2.62	343.36	1680.82	1283.31	1252.44	1237.61	1577.82	1500.18	300.12	63.36
20119.00	4.50	79.09	20.98	0.26	0.94	-0.02	0.03	38.44	762.20	3.18	-0.76	3040.56	36.09	2.62	345.53	1759.27	1342.51	1310.04	1294.57	1653.00	1569.12	300.31	67.63
20119.00	4.50	79.09	20.98	0.31	1.10	-0.02	0.03	37.94	636.52	3.45	-0.52	2564.42	35.61	2.62	346.96	1804.53	1376.52	1343.10	1327.26	1696.68	1608.68	300.61	68.46
20119.00	4.50	79.10	20.98	0.30	1.07	-0.02	0.03	38.70	661.76	2.82	-0.65	2661.75	35.87	2.62	344.29	1689.32	1289.33	1258.20	1243.32	1586.84	1507.04	300.86	65.37
20119.00	4.50	79.08	20.98	0.25	0.89	-0.02	0.02	37.98	803.53	3.64	-0.76	3195.47	36.09	2.62	346.82	1794.06	1368.53	1335.31	1319.56	1686.82	1599.35	300.74	68.14
20119.00	4.50	79.09	20.98	0.26	0.93	-0.02	0.03	38.67	775.07	3.00	-0.81	3089.76	36.18	2.62	347.11	1797.37	1370.91	1337.59	1321.82	1690.27	1602.07	300.95	69.51
20119.00	4.50	79.11	20.98	0.32	1.12	-0.02	0.03	38.83	623.49	2.65	-0.62	2517.49	35.80	2.62	343.80	1674.85	1278.45	1247.63	1232.87	1572.86	1494.39	300.73	65.03
20119.00	4.50	79.11	20.98	0.32	1.13	-0.02	0.03	39.07	622.08	2.44	-0.65	2512.81	35.86	2.62	344.09	1681.46	1283.38	1252.41	1237.60	1579.33	1500.11	300.85	65.69
20119.00	4.50	79.10	20.98	0.30	1.06	-0.02	0.03	38.71	668.15	2.81	-0.67	2685.93	35.89	2.62	350.32	1925.32	1467.47	1431.55	1414.73	1812.86	1714.53	300.93	74.53
20119.00	4.50	79.08	20.98	0.26	0.94	-0.02	0.03	37.64	753.77	3.87	-0.65	3006.59	35.86	2.62	346.88	1788.14	1363.93	1330.81	1315.11	1681.43	1593.95	300.95	67.30
20119.00	4.50	79.11	20.98	0.34	1.20	-0.02	0.03	39.10	581.93	2.35	-0.59	2361.22	35.75	2.62	346.50	1766.41	1347.42	1314.71	1299.20	1660.87	1574.67	301.13	69.06

SUMS						AVERAGE	SUMS						
30804.82	21861.04	125812.87	-15032.63	61273.95	4523.49	6319.16	35249.30	750.73	34498.6	81768.6	750.7	247.1	-31.4
Energy Losses (kJ/kg of Dry Fuel)						Total Loss Rate							
Flue Gas Constituent							Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC	CO						HC	
477.16	110.56	2489.29	-94.82	1720.50	129.52	5090.53	0.00	0	0.00	0	0	0.00	0.00
478.95	76.43	2477.07	-114.88	1717.57	129.13	5016.50	2627.69	-20	2648.05	7911	-20	3.90	-1.07
478.66	91.35	2479.91	-107.11	1717.86	129.22	5043.23	1725.75	-6	1731.38	5159	-6	3.04	-0.65
467.75	67.74	2435.18	-115.71	1717.21	129.10	4952.90	1713.83	-17	1730.52	5248	-17	2.28	-0.71
437.56	85.44	2333.78	-96.54	1717.39	129.27	4861.19	1790.52	-4	1794.87	5620	-4	3.06	-0.63
479.16	124.25	2503.72	-87.68	1721.73	129.67	5131.74	1944.55	13	1931.22	5679	13	4.58	-0.59
876.87	188.68	3939.67	-179.77	1730.66	129.58	6944.02	2102.06	2	2099.90	3988	2	5.56	-0.97
1045.87	356.41	4403.80	-231.23	1698.61	126.76	7603.78	1761.42	28	1733.20	2899	28	8.06	-0.96
874.95	398.74	3650.90	-240.87	1665.14	124.18	6630.05	1340.66	31	1309.35	2728	31	7.90	-0.87
857.24	429.82	3543.02	-261.14	1655.84	123.33	6489.62	1089.91	28	1062.08	2289	28	7.08	-0.79
948.84	557.09	3831.51	-309.32	1649.65	122.49	6925.78	1119.33	39	1079.86	2132	39	8.83	-0.90
821.15	439.21	3338.83	-331.79	1643.70	121.88	6148.99	999.67	17	982.58	2271	17	7.01	-0.97
737.23	462.57	3023.28	-280.52	1635.81	121.69	5812.32	1023.41	32	991.80	2519	32	8.00	-0.89
736.34	446.10	3031.44	-271.29	1637.84	121.91	5818.68	1011.99	30	982.03	2487	30	7.62	-0.85
844.19	511.23	3435.46	-291.88	1643.35	122.16	6384.53	977.41	33	944.30	2103	33	7.68	-0.80
718.58	534.76	2942.22	-251.45	1629.83	121.47	5803.24	895.76	43	852.50	2210	43	8.11	-0.70
868.70	480.40	3516.16	-335.57	1645.45	121.98	6414.47	905.75	20	885.68	1935	20	6.66	-0.85
816.96	546.57	3310.44	-297.99	1637.20	121.65	6245.76	942.54	37	905.49	2094	37	8.10	-0.81
974.38	681.29	3883.50	-336.03	1641.95	121.71	7077.62	1034.10	50	984.25	1905	50	9.78	-0.88
1236.06	858.42	4781.37	-589.94	1653.58	120.63	8151.61	785.18	25	759.69	1153	25	8.13	-1.02
1036.50	683.15	4005.20	-708.46	1651.14	119.56	6862.10	573.34	-2	575.62	1108	-2	5.62	-1.06
957.64	833.29	3702.50	-622.86	1638.67	119.29	6697.82	621.20	19	601.94	1245	19	7.61	-1.04
936.94	920.66	3613.23	-625.30	1635.40	119.04	6664.45	588.71	26	562.88	1189	26	8.01	-0.99
783.20	725.61	3042.69	-599.25	1629.46	118.80	5762.15	493.28	11	482.64	1229	11	6.12	-0.92
814.24	855.55	3166.38	-518.20	1624.46	119.04	6126.13	589.46	32	557.27	1346	32	8.11	-0.89
737.91	693.69	2892.76	-495.46	1622.90	119.09	5637.42	523.80	18	505.58	1346	18	6.35	-0.83
1058.76	1113.93	4054.34	-674.90	1640.36	119.03	7374.88	636.30	38	598.74	1100	38	9.47	-1.04
1023.27	903.89	3936.21	-680.97	1643.46	119.21	7012.70	574.04	18	556.03	1073	18	7.29	-1.00
876.19	979.99	3403.66	-465.71	1622.88	119.31	6604.78	507.98	39	468.71	1039	39	7.42	-0.64
853.23	800.60	3309.42	-583.87	1631.32	119.05	6195.11	496.35	17	479.18	1116	17	6.32	-0.84
1099.65	1035.13	4216.63	-680.32	1644.48	119.29	7503.00	649.75	30	619.33	1093	30	8.83	-1.06
1062.55	851.94	4084.12	-723.29	1648.97	119.30	7113.09	537.49	10	527.97	983	10	6.34	-0.98
797.10	753.52	3103.74	-550.44	1627.46	119.02	5915.41	414.23	14	400.17	995	14	5.20	-0.69
798.37	692.51	3109.86	-576.36	1630.31	119.03	5839.40	494.29	10	484.63	1209	10	5.77	-0.88
980.49	800.64	3799.87	-593.41	1639.72	119.59	6821.44	584.96	18	567.43	1140	18	6.76	-0.91
1028.09	1100.42	3954.01	-578.96	1633.93	119.28	7324.07	918.01	65	853.15	1604	65	13.58	-1.30
784.11	669.50	3067.70	-529.35	1628.17	119.23	5808.43	254.59	6	248.54	627	6	2.89	-0.42

Intertek Testing Services

Manufacturer: SBI
Model: Cambridge
Date: 06-07-16
Run: 2
Control #: QC20160606
Test Duration: 360
Output Category: Integrated

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	69.6%	75.2%
Combustion Efficiency	99.4%	99.4%
Heat Transfer Efficiency	70%	75.7%

Output Rate (kJ/h)	13 481	12 788	(Btu/h)
Burn Rate (kg/h)	0.96	2.12	(lb/h)
Input (kJ/h)	19 356	18 361	(Btu/h)

Test Load Weight (dry kg)	5.77	12.72	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	17.33		
CO (g)	247		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.21	3.05
g/kg Dry Fuel	3.00	42.80
g/h	2.89	41.18
lb/MM Btu Output	0.50	7.10

Air/Fuel Ratio (A/F)	38.54
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VERSION:

2.4

2010-04-15

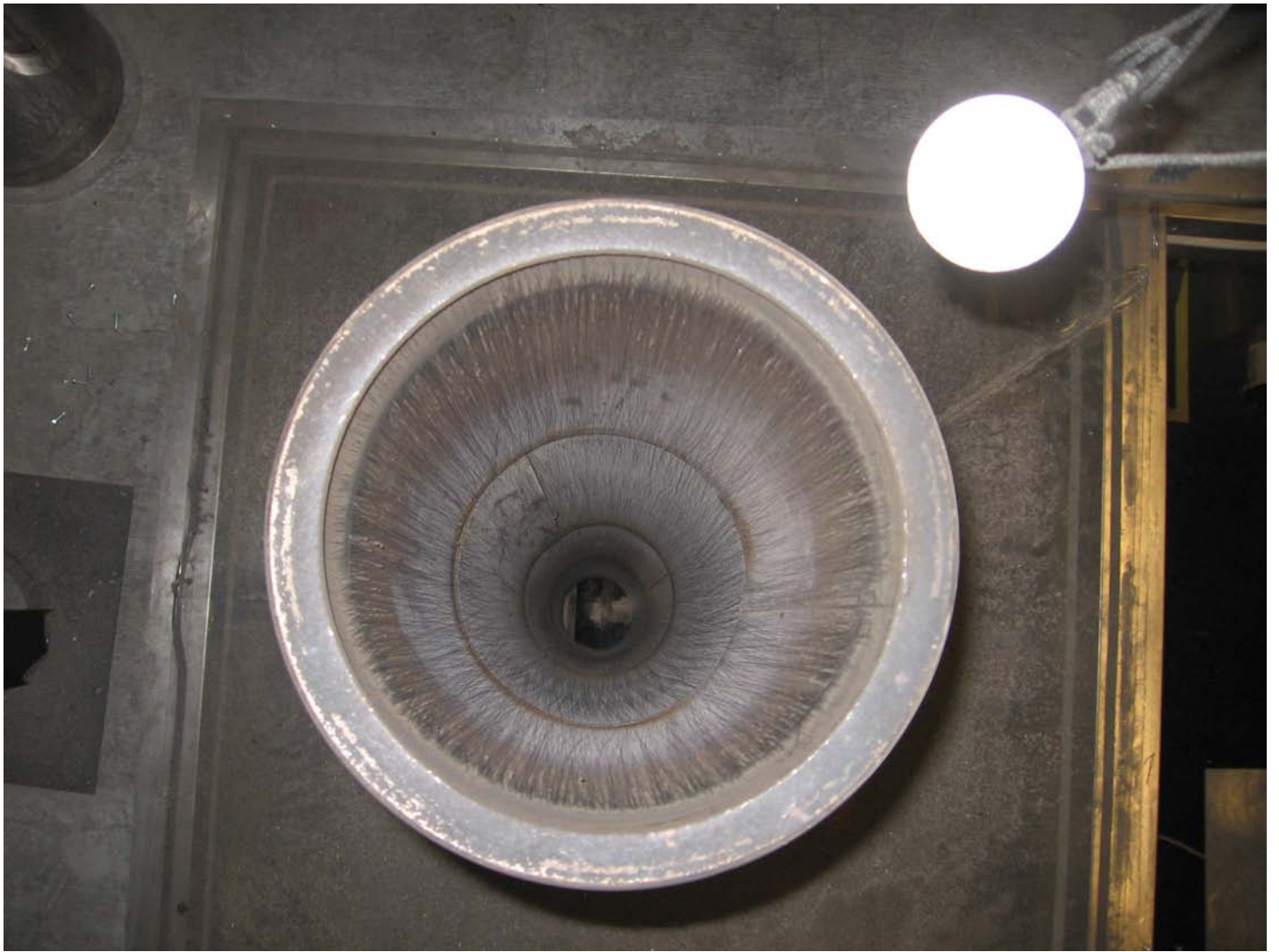
Tunnel Cleaning and Test Load Photographs

Appendix H







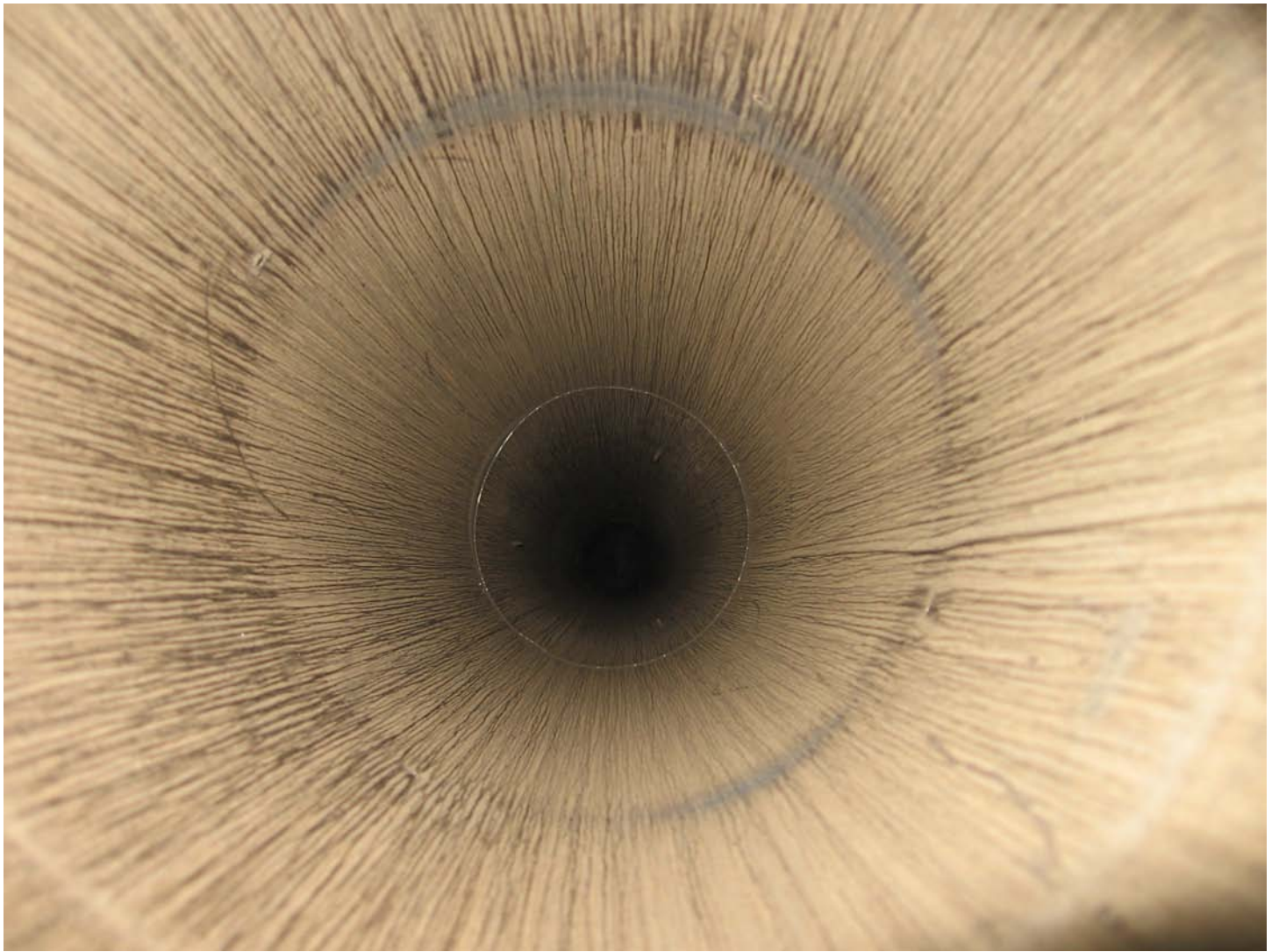






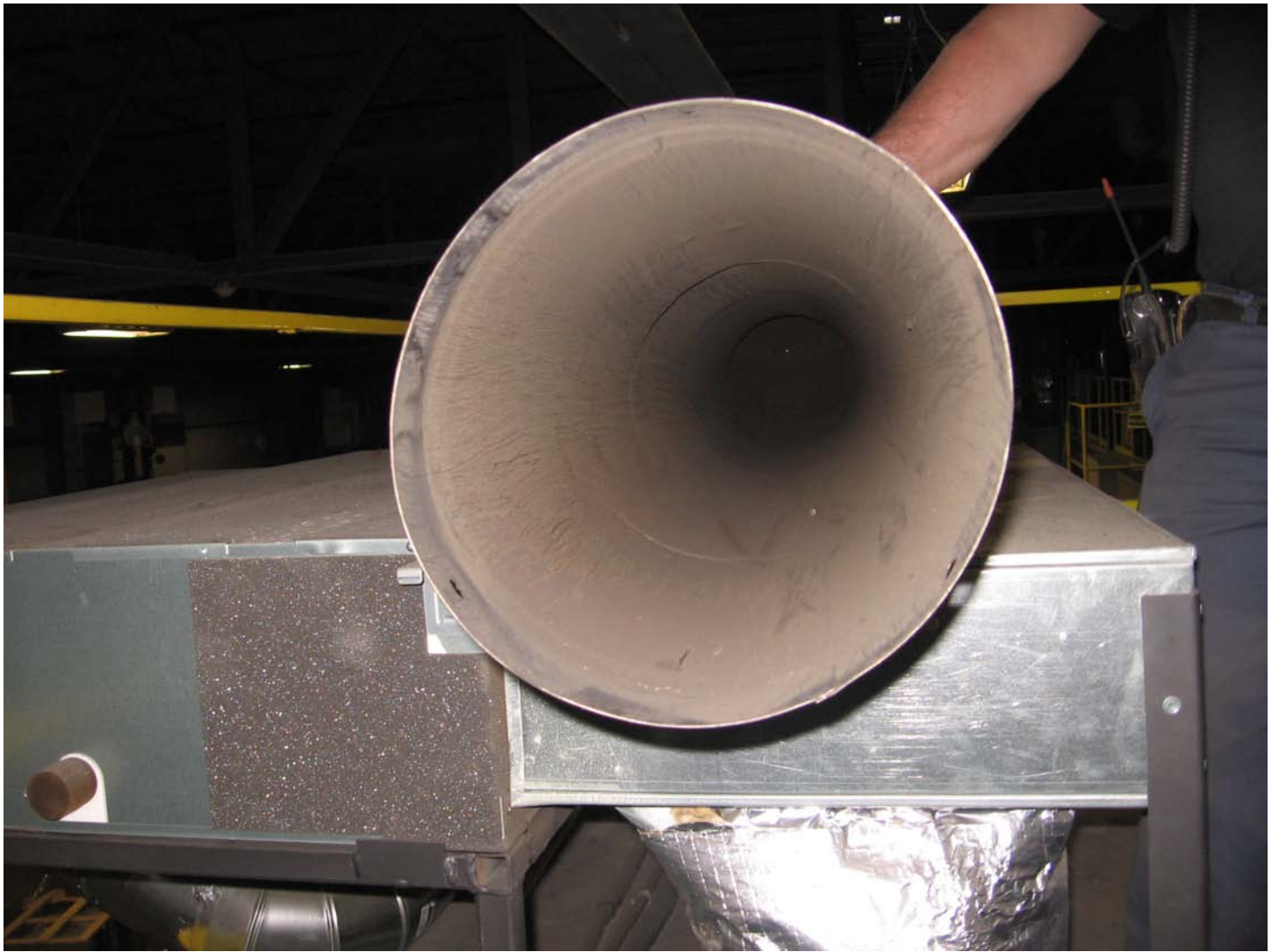
















COMBUSTION ADJUSTMENT

AUGER MOTOR 1

+

-

0%

COMBUSTION FAN

+

-

-5%

EXHAUST FAN

+

-

-10%

DEFAULT

SAVE+EXIT

MENU

P.13 CONVECT VOLT (LVL 1-6)

CONVECT-V1	50 V	
CONVECT-V2	55 V	
CONVECT-V3	60 V	
CONVECT-V4	70 V	
CONVECT-V5	75 V	
CONVECT-V6	85 V	
	SAVE & EXIT	

P.6 EXHAUST (SPEEDS 7-12)

EXHAUST-7

80 V

EXHAUST-8

80 V

EXHAUST-9

80 V

EXHAUST-10

80 V

EXHAUST-11

80 V

EXHAUST-12

80 V



SAVE &
EXIT



P.2 AUGER 1 (SPEEDS 7-12)

AUGER1-7

24 %

AUGER1-8

28 %

AUGER1-9

31 %

AUGER1-10

33 %

AUGER1-11

36 %

AUGER1-12

39 %



SAVE &
EXIT



P.1 AUGER 1 (SPEEDS 1-6)

AUGER1-1

11 %

AUGER1-2

13 %

AUGER1-3

16 %

AUGER1-4

17 %

AUGER1-5

19 %

AUGER1-6

21 %



SAVE &
EXIT



P.4 AUGER 2 (SPEEDS 7-12)

AUGER2-7

100 %

AUGER2-8

100 %

AUGER2-9

100 %

AUGER2-10

100 %

AUGER2-11

100 %

AUGER2-12

100 %



SAVE &
EXIT



P.3 AUGER 2 (SPEEDS 1-6)

AUGER2-1

92 %

AUGER2-2

92 %

AUGER2-3

92 %

AUGER2-4

92 %

AUGER2-5

95 %

AUGER2-6

100 %



SAVE &
EXIT



P.7 COMBUST (SPEEDS 1-6)

COMBUST-1

0 V

COMBUST-2

0 V

COMBUST-3

63 V

COMBUST-4

63 V

COMBUST-5

74 V

COMBUST-6

74 V



SAVE &
EXIT



P.8 COMBUST (SPEEDS 7-12)

COMBUST-7

78 V

COMBUST-8

78 V

COMBUST-9

84 V

COMBUST-10

84 V

COMBUST-11

84 V

COMBUST-12

84 V



SAVE &
EXIT



EPA Correspondence Appendix I



Notre *passion* devient source d'énergie
We Turn *passion* Into Energy

Fabricant de poêles International Inc.
Stove Builder International Inc.

April 21st, 2016

Air Branch/Wood Heater Program Lead
Monitoring, Assistance, and Media Programs Division
Office of Compliance
U.S. EPA
1200 Pennsylvania Ave., NW
MS:2227A
Washington, DC 20004
Attn: Rafael Sanchez

Subject: 30 days notice for certification of model line name **Cambridge**

Dear Mr. Sanchez

The model line **Cambridge** and equivalent model **Osburn 3000** are affected wood heaters under the amended U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces; Final Rule, Subpart AAA §60.530.

Under section §60.534 (g), Stove Builder International Inc. ("SBI") is required to provide a 30 days' notice before the date of certification testing to begin. We would therefore like to notify you that we intend to start a certification program on the model line stated above on June 6th, 2016. This certification program is planned to end on June 7th, 2016.

The model line **Cambridge** is a pellet stove as defined in section §60.530 and will be sold in SBI's Enerzone brand. The **Osburn 3000** is an equivalent model sharing the same features except the aesthetic look and will be sold in the Osburn brand. In accordance with the regulations, it will be tested using ASTM E2779-10 in conjunction with ASTM 2515-11 and CSA B415.1-10.

The accredited laboratory performing the test will be a division of **Intertek Testing NA Ltd** located at:

1829, 32nd Avenue, Lachine
Quebec, Canada, H8T 3J1

And contact information at Intertek will be the following:

Claude Pelland, Eng
claudio.pelland@intertek.com

Current address of Stove Builder International Inc. can be found at the bottom of this document and contact information at SBI will be:

Vincent Pelletier, Jr. Eng.

vpelletier@sbi-international.com

Should you need additional documents, please let us know.

Sincerely,

A handwritten signature in cursive script that reads "Vincent Pelletier".

Vincent Pelletier, Jr. Eng.

Chemical Engineer

Stove Builder International Inc.