



TEST REPORT

SCOPE: EMISSIONS, EFFICIENCY AND OUTPUT

FUEL: PELLET

TEST STANDARD: EPA (ASTM E2779-10)

MODEL: OSBURN 2500 PELLET STOVE

Notice to reader: Our OSBURN 2500 pellet stove was tested as part of our Eco-55 engine. Therefore, the Eco-55 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: 102747001MTL-001

REPORT DATE: Nov 25, 2016

**EVALUATION CENTER
Intertek Testing Services NA Ltd.
1829, 32nd Avenue
Lachine, Qc.**

RENDERED TO

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

PRODUCT EVALUATED:

Model Eco-55 Pellet Stove

Report of Testing of Eco-55 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 Eco-55 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 on November 1st, 2016.

B. TEST UNIT DESCRIPTION

The Eco-55 is a freestanding and automatically fed pellet stove constructed of carbon steel. The outer dimensions are 24.875-inches wide, 32.625-inches high and 29.525-inches deep. The unit has a front door with a viewing glass and a hopper to store the pellet. (See product drawings and component description in Appendix D)

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 tunnels were cleaned using standard wire brush chimney equipment. On October 26th, 2016 the unit was ready for testing.

1. TEST STANDARD

On November 1st, 2016, the Eco-55 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 performed for the measurement of 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 (November 1st, 2016). Control board was set at speed 6 out of 6 for the first hour, at speed 3 out of 6 for the following two hours and at speed 1 out of 6 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 0.915 kg/h. This test led to a 0.96 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	November 1 st , 2016	0.92	0.963	70.3%	75.8%	7.6	1.04

Table 2 - Efficiencies per categories

Run No.	Burn rate	(DE) Overall Efficiency	(OE) Overall Efficiency
	-	% HHV	% LHV
1	High	72.7%	78.4%
1	Medium	67.9%	73.2%
1	Low	67.2%	72.5%

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	72.0	71.2	29.2	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	360	15.06	302.57	546.23	51.224	54.424	2.8	2.8

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
1	High	2.05	30,086	28,540	5.4
1	Medium	0.96	13,154	12,478	6.5
1	Low	0.52	10,434	9,898	9.4

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	2126.48	2001.42	5.95	5.60	1.04	3.03%	0.06

V. PROCESS DESCRIPTION

A. AIR SUPPLY SYSTEM

Primary combustion air enters at the rear on the bottom center of the heater through a 3" pipe. This air is then fed through underneath the burn pot. 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 a membrane switch on the side of the heater. (See product drawings in Appendix H)

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). These wood pellet properties are the following:

Energy content :	8650 BTU/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 3.)

B. DILUTION TUNNEL

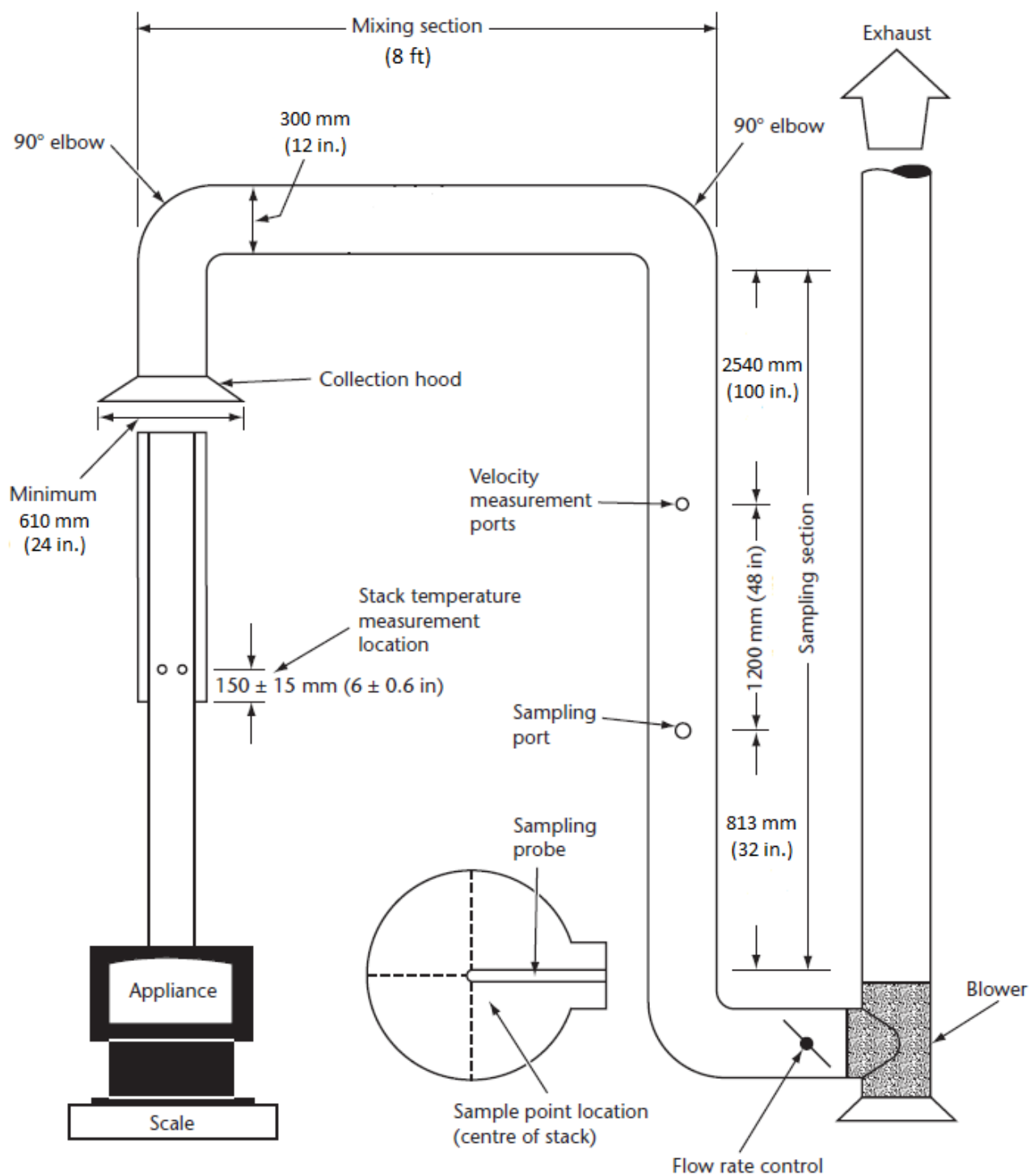
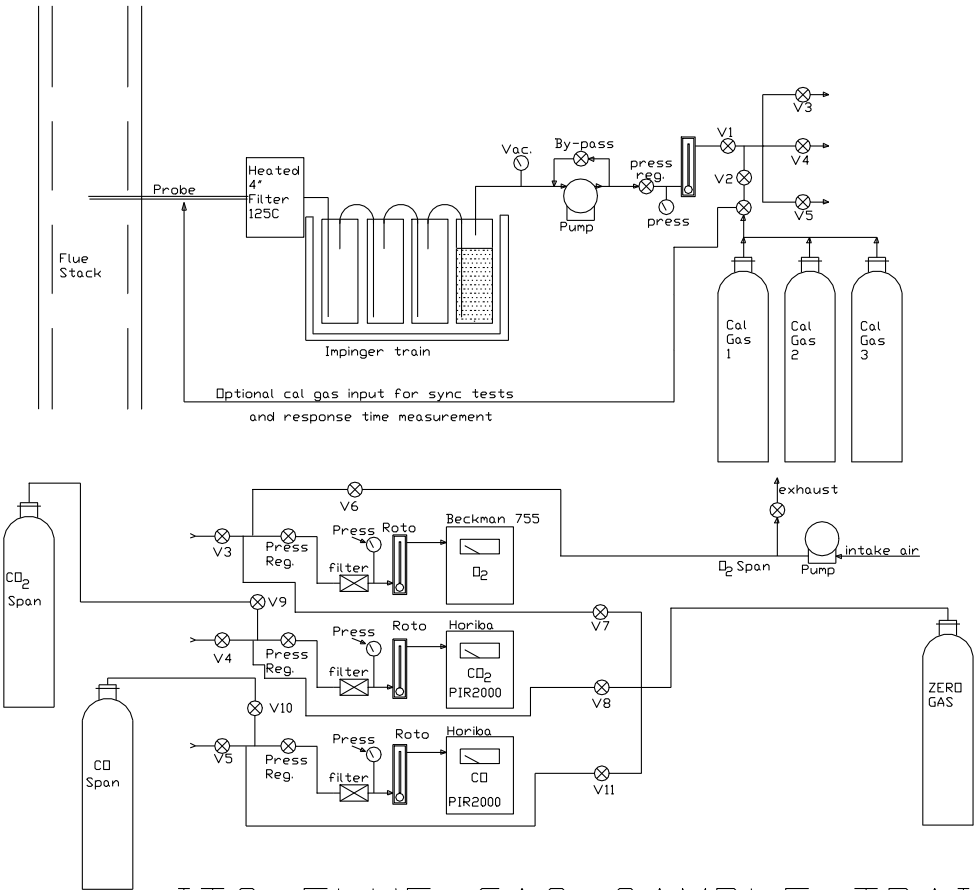
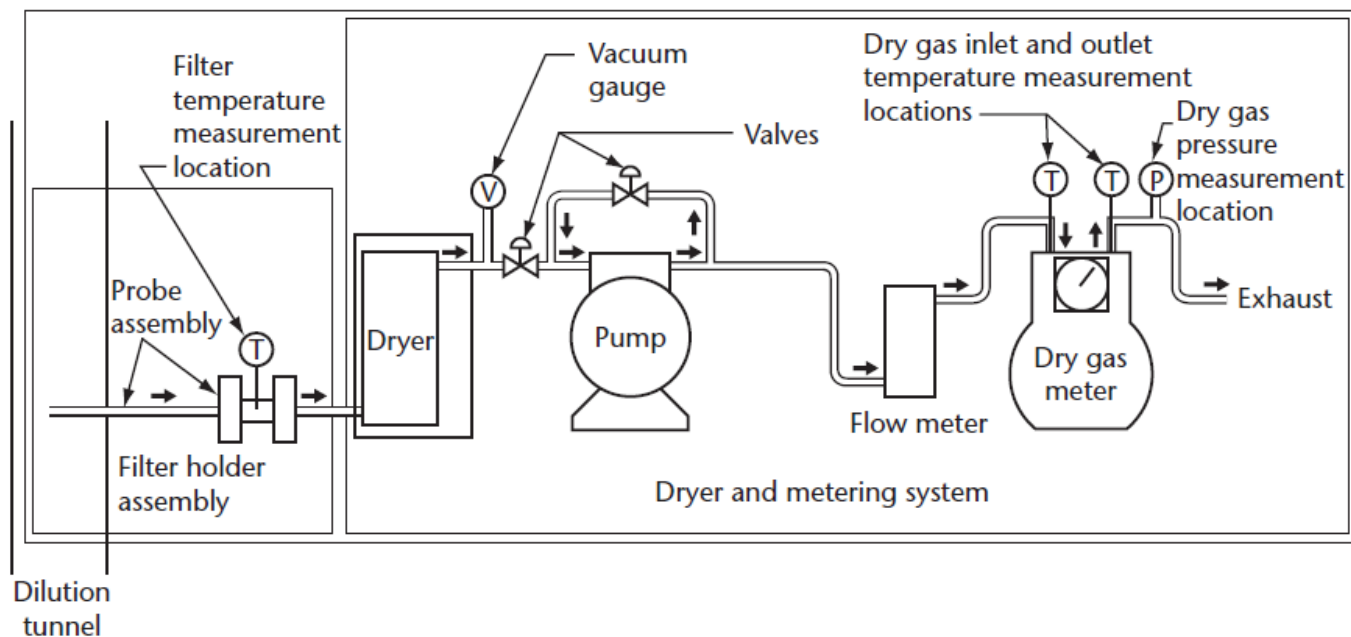


Figure 1- Dilution tunnel

C. STACK GAS SAMPLE TRAIN



ITS FLUE GAS SAMPLE TRAIN
FIGURE 2

D. DILUTION TUNNEL SAMPLE SYSTEMS**Figure 3 - 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 the 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 1 minute.

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 0.01 CFM or 4% of the sampling rate, whichever is less. 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 the test no vacuum was 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 Eco-55 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 0.96 g/h and therefore met this limit.

INTERTEK TESTING SERVICES NA

Reported by: _____
Claude Pelland, Eng.
Test Engineer

Reviewed by: _____
Rick Curkeet P.E.
Chief Engineer- Hearth Products



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Client : Stove Builder International inc.

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APPENDIX A Laboratory Operating Procedure



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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 0).
 - 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.
- d) 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.
- e) 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.
 - b) Plug probes and start samplers, adjust pump bypass valve to



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produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless post test 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: $(DGM_3 - DGM_1) = CFM_1 \times 10$

2) System 2: $(DGM_4 - DGM_2) = CFM_2 \times 10$

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 $0.04 \times 0.15 = 0.006$ 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.

C. Test run



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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 desiccators. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at two (2) hour intervals until weight change between weightings 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.

Appendix B Data and Calculation forms

APPENDIX B Data and Calculation Forms

Appendix B Data and Calculation forms

Outside weather data: Start

Québec, QC - Prévisions sur x

meteo.gc.ca/city/pages/qc-133_metric_f.html?unit=imperial

Apps Conversion kPa to in Hg Québec, Québec - Vos P Québec, QC - Prévisions Psychrometric Calculator

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Québec, QC

Aucune alerte en vigueur

▼ Conditions actuelles

24 dernières heures | Radar | Satellite | Foudre

 35°F °C °F	Enregistrées à : Aéroport int. Lesage de Québec Date : 9h00 HAE le mardi 1 novembre 2016		
	Condition : Généralement nuageux Pression : 30,4 pouces Tendance : À la baisse	Température : 34,9°F Point de rosée : 26,8°F Humidité : 72%	Vent : SSE 7 mph Visibilité : 25 miles

Outside weather data: End

Québec, QC - Prévisions sur x

meteo.gc.ca/city/pages/qc-133_metric_f.html?unit=imperial

Apps Conversion kPa to in Hg Québec, Québec - Vos P Québec, QC - Prévisions Psychrometric Calculator

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Québec, QC

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▼ Conditions actuelles

24 dernières heures | Radar | Satellite | Foudre

 39°F °C °F	Enregistrées à : Aéroport int. Lesage de Québec Date : 17h00 HAE le mardi 1 novembre 2016		
	Condition : Faible averse de pluie Pression : 30,2 pouces Tendance : À la baisse	Température : 38,8°F Point de rosée : 29,8°F Humidité : 70%	Vent : NE 13 mph Visibilité : 15 miles

Appendix B Data and Calculation forms

11/1/2016

Aéroport int. Lesage de Québec - Conditions des dernières 24 heures - Environnement Canada



Gouvernement
du Canada

Government
of Canada

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→ [Sommaire provincial](#)

Aéroport int. Lesage de Québec, Québec

Latitude 46.79° N | Longitude 71.39° O

Conditions des dernières 24 heures							Unités métriques	Graphique
Date / Heure (HAE)	Conditions	Température (°F)	Vent (mph)	Humidité relative (%)	Point de rosée (°F)	Pression (pouces)	Visibilité (mi)	
01 novembre 2016								
16:00	Généralement nuageux	40 (39,9)	ENE 11	65	29	30,2	25	
15:00	Généralement nuageux	41 (41,0) ↑	E 7	60	28	30,3	25	
14:00	Généralement nuageux	40 (40,1)	ESE 8	60	27	30,3	30	
13:00	Généralement nuageux	39 (39,4)	ESE 4	61	27	30,3	25	

http://meteo.gc.ca/pest_conditions/index_f.html?station=yqb&unit=imperial

1/6

11/1/2016

Aéroport int. Lesage de Québec - Conditions des dernières 24 heures - Environnement Canada

	Généralement nuageux							
12:00	Généralement nuageux	38 (37,9)	ESE 8	63	26	30,3	30	
11:00	Généralement nuageux	36 (36,3)	ESE 9	64	25	30,4	25	
10:00	Généralement nuageux	35 (35,2)	SSE 10	68	26	30,4	25	
9:00	Généralement nuageux	35 (34,9)	SSE 7	72	27	30,4	25	
8:00	Généralement nuageux	34 (34,3)	S 5	77	28	30,4	20	
7:00	Généralement nuageux	34 (34,0) ↓	SE 4	74	27	30,4	15	
6:00	Généralement nuageux	34 (34,0) ↓	SE 4	80	28	30,4	15	

http://meteo.gc.ca/pest_conditions/index_f.html?station=yqb&unit=imperial

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Appendix B Data and Calculation forms

1st hour test data

Time	Ambiant	Flue	Dilution Tunnel	DGM Outlet 1	DGM Inlet 1	DGM Inlet 2	Probe Temp 1	Probe Temp 2	DGM Outlet 2	Probe Temp 3	Manomètre Draft	Manomètre Tunnel	Balance	Corrected balance
Min	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	"H2O	"H2O	lbs	lbs
0	71.23	373.07	96.04	68.52	68.98	67.60	68.29	68.17	67.40	68.49	0.05	0.08	37.27	4.72
10	76.62	376.08	96.46	75.70	75.95	71.63	70.45	70.65	72.12	75.44	0.05	0.08	36.49	3.93
20	72.15	371.73	96.12	79.71	75.28	73.13	70.71	72.69	73.55	75.83	0.05	0.08	35.72	3.14
30	73.32	370.44	96.00	81.95	74.79	73.92	71.17	73.86	74.16	75.58	0.06	0.08	34.94	2.36
40	73.35	375.61	96.79	83.08	74.59	74.20	71.18	74.67	74.31	75.79	0.06	0.08	34.17	1.57
50	77.49	379.40	97.17	83.79	74.54	74.37	71.18	75.28	74.49	76.30	0.06	0.07	33.35	0.79
60	72.86	377.65	96.56	84.16	74.64	74.68	71.30	75.80	74.69	76.74	0.06	0.08	32.56	0.00

Date/Hour	Duration	TA	CO	CO	CO ₂ IR	O ₂	Pump	ExAir	Dilution factor
YYYY-MM-DD / HH:MM:SS	S	°F	ppm	%	%	%	l/min	%	
2016-11-01 11:15:43	0	82.4	122	0.0122	6.13	14.65	0.97	227.1	x1
2016-11-01 11:25:43	600	82.4	178	0.0178	6.33	13.98	0.98	195.9	x1
2016-11-01 11:35:43	1200	83.1	122	0.0122	6.42	14.37	0.97	213.3	x1
2016-11-01 11:45:43	1800	83.5	131	0.0131	6.21	15.29	0.98	263.5	x1
2016-11-01 11:55:43	2400	83.7	127	0.0127	6.61	13.85	0.98	191.0	x1
2016-11-01 12:05:43	3000	84.6	120	0.012	6.78	13.62	0.98	181.8	x1
2016-11-01 12:15:43	3600	85.1	127	0.0127	6.75	13.94	0.98	194.5	x1

Appendix B Data and Calculation forms

Integrated test data

Time	Ambiant	Flue	Dilution Tunnel	DGM Outlet 1	DGM Inlet 1	DGM Inlet 2	Probe Temp 1	Probe Temp 2	DGM Outlet 2	Probe Temp 3	Manomètre Draft	Manomètre Tunnel	Balance	Corrected balance
Min	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	"H2O	"H2O	lbs	lbs
0	71.23	373.07	96.04	68.52	68.98	67.60	68.29	68.17	67.40	68.49	0.05	0.08	37.27	12.71
10	76.62	376.08	96.46	75.70	75.95	71.63	70.45	70.65	72.12	75.44	0.05	0.08	36.49	11.92
20	72.15	371.73	96.12	79.71	75.28	73.13	70.71	72.69	73.55	75.83	0.05	0.08	35.72	11.16
30	73.32	370.44	96.00	81.95	74.79	73.92	71.17	73.86	74.16	75.58	0.06	0.08	34.94	10.38
40	73.35	375.61	96.79	83.08	74.59	74.20	71.18	74.67	74.31	75.79	0.06	0.08	34.17	9.61
50	77.49	379.40	97.17	83.79	74.54	74.37	71.18	75.28	74.49	76.30	0.06	0.07	33.35	8.78
60	72.86	377.65	96.56	84.16	74.64	74.68	71.30	75.80	74.69	76.74	0.06	0.08	32.56	7.99
70	72.23	320.04	92.49	84.56	74.73	74.47	71.35	76.24	74.30	N/A	0.05	0.09	32.14	7.57
80	69.12	287.59	89.75	84.80	74.88	73.81	71.50	76.68	73.55	N/A	0.05	0.08	31.78	7.21
90	68.12	280.73	88.39	85.02	75.00	73.18	71.58	76.91	72.88	N/A	0.04	0.08	31.39	6.82
100	69.86	271.29	87.84	84.97	75.02	72.77	71.59	76.96	72.55	N/A	0.04	0.08	31.02	6.46
110	71.37	268.39	87.94	84.93	74.98	72.71	71.62	76.90	72.36	N/A	0.04	0.08	30.71	6.14
120	72.01	266.06	87.69	84.80	74.99	72.76	71.72	76.78	72.33	N/A	0.04	0.07	30.37	5.80
130	72.21	266.16	87.94	84.95	75.04	72.73	71.96	76.69	72.50	N/A	0.04	0.08	30.00	5.43
140	72.46	265.25	87.80	84.83	75.02	72.66	72.10	76.62	72.51	N/A	0.04	0.07	29.64	5.07
150	72.48	269.51	88.06	84.73	75.13	72.71	72.25	76.63	72.57	N/A	0.04	0.08	29.26	4.69
160	72.73	271.89	88.41	84.80	75.22	72.76	72.05	77.00	72.77	N/A	0.04	0.08	28.88	4.32
170	72.60	271.12	88.27	85.05	75.26	72.88	72.10	77.29	72.86	N/A	0.04	0.08	28.52	3.95
180	73.04	273.54	88.92	85.06	75.33	72.95	72.17	77.44	72.92	N/A	0.04	0.08	28.14	3.57
190	72.67	212.45	83.38	85.15	75.44	72.65	72.29	77.62	72.41	N/A	0.04	0.08	27.97	3.41
200	72.54	195.84	81.68	85.27	75.51	72.02	72.35	77.75	71.84	N/A	0.03	0.08	27.78	3.22
210	72.45	196.72	81.26	85.50	75.55	71.61	72.38	77.86	71.48	N/A	0.03	0.08	27.56	2.99

Appendix B Data and Calculation forms

220	72.33	197.32	81.07	85.48	75.55	71.41	72.38	77.94	71.30	N/A	0.03	0.08	27.34	2.77
230	72.75	194.97	80.88	85.51	75.55	71.35	72.39	78.00	71.26	N/A	0.03	0.08	27.12	2.55
240	71.95	186.47	80.25	85.48	75.57	71.23	72.37	78.00	71.15	N/A	0.03	0.08	26.94	2.37
250	72.06	190.94	80.50	85.46	75.58	71.23	72.44	78.02	71.10	N/A	0.03	0.08	26.73	2.16
260	71.83	181.85	79.93	85.37	75.59	71.15	72.49	78.11	71.03	N/A	0.03	0.08	26.53	1.97
270	71.93	193.00	80.42	85.54	75.65	71.14	72.63	78.16	71.06	N/A	0.03	0.08	26.34	1.77
280	72.33	189.44	80.26	85.40	75.69	71.19	72.61	78.20	71.10	N/A	0.03	0.08	26.14	1.57
290	72.53	192.89	80.52	85.46	75.73	71.24	72.65	78.25	71.20	N/A	0.03	0.08	25.93	1.36
300	72.04	184.00	80.12	85.49	75.80	71.31	72.73	78.31	71.28	N/A	0.03	0.08	25.75	1.18
310	72.36	195.33	80.64	85.48	75.81	71.34	72.58	78.30	71.25	N/A	0.03	0.08	25.51	0.94
320	72.09	187.51	80.29	85.39	75.80	71.31	72.54	78.26	71.14	N/A	0.03	0.08	25.33	0.76
330	72.17	180.75	79.73	85.41	75.78	71.26	72.57	78.26	71.06	N/A	0.03	0.08	25.15	0.58
340	72.15	195.11	80.44	85.40	75.76	71.24	72.51	78.20	71.02	N/A	0.03	0.08	24.93	0.36
350	71.84	185.51	79.90	85.66	75.80	71.27	72.69	78.25	71.16	N/A	0.03	0.08	24.73	0.17
360	72.37	189.71	80.46	85.76	75.81	71.31	72.83	78.35	71.22	N/A	0.03	0.08	24.57	0.00

Appendix B Data and Calculation forms

Date/Hour	Duration	TA	CO	CO	CO ₂ IR	O ₂	Pump	ExAir	Dilution factor
YYYY-MM-DD / HH:MM:SS	S	°F	ppm	%	%	%	l/min	%	
2016-11-01 11:15:43	0	82.4	122	0.0122	6.13	14.65	0.97	227.1	x1
2016-11-01 11:25:43	600	82.4	178	0.0178	6.33	13.98	0.98	195.9	x1
2016-11-01 11:35:43	1200	83.1	122	0.0122	6.42	14.37	0.97	213.3	x1
2016-11-01 11:45:43	1800	83.5	131	0.0131	6.21	15.29	0.98	263.5	x1
2016-11-01 11:55:43	2400	83.7	127	0.0127	6.61	13.85	0.98	191.0	x1
2016-11-01 12:05:43	3000	84.6	120	0.012	6.78	13.62	0.98	181.8	x1
2016-11-01 12:15:43	3600	85.1	127	0.0127	6.75	13.94	0.98	194.5	x1
2016-11-01 12:25:43	4200	84.2	175	0.0175	4.85	17.62	0.98	511.1	x1
2016-11-01 12:35:43	4800	82.6	174	0.0174	3.24	18.05	0.98	599.4	x1
2016-11-01 12:45:43	5400	81.1	105	0.0105	2.91	17.78	0.98	543.4	x1
2016-11-01 12:55:43	6000	80.4	133	0.0133	2.79	18.01	0.98	590.5	x1
2016-11-01 13:05:43	6600	79.5	212	0.0212	2.60	17.95	0.97	578.2	x1
2016-11-01 13:15:43	7200	78.8	170	0.017	2.66	18.46	0.98	711.0	x1
2016-11-01 13:25:43	7800	78.6	198	0.0198	2.84	18.11	0.98	615.5	x1
2016-11-01 13:35:43	8400	78.3	139	0.0139	2.73	17.98	0.97	583.6	x1
2016-11-01 13:45:43	9000	78.3	156	0.0156	2.69	18.00	0.98	587.9	x1
2016-11-01 13:55:43	9600	78.4	167	0.0167	2.83	18.08	0.98	608.3	x1
2016-11-01 14:05:43	10200	78.4	303	0.0303	2.94	18.37	0.97	683.4	x1
2016-11-01 14:15:43	10800	78.6	200	0.02	2.86	18.09	0.97	609.4	x1
2016-11-01 14:25:43	11400	78.1	256	0.0256	2.07	18.83	0.97	846.2	x1
2016-11-01 14:35:43	12000	77.4	262	0.0262	1.78	19.19	0.98	1037.0	x1
2016-11-01 14:45:43	12600	76.8	320	0.032	1.75	19.28	0.97	1093.4	x1
2016-11-01 14:55:43	13200	76.5	452	0.0452	1.82	19.64	0.97	1393.2	x1
2016-11-01 15:05:43	13800	76.3	150	0.015	1.70	18.94	0.98	901.0	x1
2016-11-01 15:23:13	14850	75.9	214	0.0214	1.67	18.80	0.98	834.1	x1
2016-11-01 15:33:13	15450	75.7	350	0.035	1.63	19.47	0.98	1232.9	x1
2016-11-01 15:43:13	16050	75.7	222	0.0222	1.55	19.07	0.98	964.5	x1
2016-11-01 15:53:13	16650	75.7	193	0.0193	1.76	19.12	0.97	996.2	x1
2016-11-01 16:03:13	17250	75.7	309	0.0309	1.61	19.42	0.97	1192.1	x1
2016-11-01 16:13:13	17850	75.7	194	0.0194	1.69	19.25	0.98	1077.2	x1
2016-11-01 16:23:13	18450	75.7	227	0.0227	1.71	19.18	0.97	1030.5	x1

Appendix B Data and Calculation forms

2016-11-01 16:33:13	19050	75.7	233	0.0233	1.71	19.12	0.98	995.6	x1
2016-11-01 16:43:13	19650	75.2	234	0.0234	1.66	19.42	0.98	1199.8	x1
2016-11-01 16:53:13	20250	75.6	296	0.0296	1.62	19.35	0.97	1138.4	x1
2016-11-01 17:03:13	20850	75.6	346	0.0346	1.68	19.43	0.98	1202.9	x1
2016-11-01 17:13:13	21450	75.7	277	0.0277	1.63	19.32	0.97	1116.9	x1
2016-11-01 17:23:13	22050	75.9	179	0.0179	1.71	19.12	0.97	995.3	x1

Appendix B Data and Calculation forms

1st hour results

ASTM E2779 Calculation Sheet														
Manufacturer:		SBI	Tech:		Claude Pelland									
Model:		Eco-55												
Date:		2016-11-01												
Run:		1	Dry kilograms:		2.14									
Control #:		G102747001												
Test Duration:		60.0												
		Start	End											
Barometer (in.Hg):		30.4	30.3		Pitot type	Type S								
						0.84								
Dry Bulb (F):		72	72.6											
Humidity (%):		38.5	37.5											
Moisture content of wood (wet basis):		4.72												
Average		0.00	0.00	0.00	374.85	73.86	96.45	-	74.11	79.56	70.61	0.08	0.022	
Elapsed		Weight	*	*	*	*1	*2	*3	-	-	-	-	-	
Actual	Time	Remaining				Flue	Room	Tunnel	DGM 3	DGM 3	DGM 3	Filter 3	Tunnel	
Time	Minutes	Lbs.	CO	CO ₂	O ₂	Gas	Temp	Dry Bulb	Reading	Inlet T	Outlet T	Temp	Velocity	Draft
10:56:00	0.0	4.72	0.00	0.00	0.00	373.07	71.23	96.04	610.685	68.98	68.52	68.29	0.078	0.024
11:06:00	10.00	3.93	0.00	0.00	0.00	376.08	76.62	96.46	612.445	75.95	75.70	70.45	0.077	0.021
11:16:00	20.00	3.17	0.00	0.00	0.00	371.73	72.15	96.12	614.210	75.28	79.71	70.71	0.079	0.023
11:26:00	30.00	2.39	0.00	0.00	0.00	370.44	73.32	96.00	615.967	74.79	81.95	71.17	0.080	0.022
11:36:00	40.00	1.62	0.00	0.00	0.00	375.61	73.35	96.79	617.728	74.59	83.08	71.18	0.079	0.020
11:46:00	50.00	0.79	0.00	0.00	0.00	379.40	77.49	97.17	619.490	74.54	83.79	71.18	0.075	0.021
11:56:00	60.00	0.00	0.00	0.00	0.00	377.65	72.86	96.56	621.250	74.64	84.16	71.30	0.082	0.023

Appendix B Data and Calculation forms

				6" Tunnel	0.1963	ft ²					(ASTM E2515 Formula)						
Manufacturer:				SBI	12" Tunnel	0.7854	ft ²					Manufacturer:					
Model:				Eco-55					Tunnel area (ft2):				0.3491	Manufacturer:			
Date:				11-1-16					Wood moisture (% wet):				4.75	Model:			
Run:				1					Load Weight (lbs wet):				4.717441	Date:			
Project #:				G102747001					Burn Rate (Dry kg/hr):				2.038	Run:			
Test Duration:				60													
Total Gas Volume (DGM 3):				10.331					Final Temperature (DGM #3) Degrees Rankin:				536.835				
Average Barometric Pressure:				30.35					Final Tunnel Temperature Degrees Rankin:				556.448				
Molecular Weight:				28.78					Final Tunnel Velocity (feet per second):				15.1131177				
Pitot Correction:				0.941313					Standardized Tunnel Flow (dscfm):				298.479034				
Calibration Factor (DGM #3):				0.9830													
(3) VS:				0.157735													
				Filter					Average								
				Face					Inlet +								
				Velocity					Outlet								
				Delta-P					Average				#3				
				(in. H2O)					99.4				dDGM				
				Tunnel					Proportional Rates				Vol.Std.				
				PR3													
				Time									Time				
				Delta-P									Delta-P				
				SQRT									SQRT				
				0.2785									0.2785				
				0.2770									0.2770				
				0.2817									0.2817				
				0.2826									0.2826				
				0.2813									0.2813				
				0.2735									0.2735				
				0.2863									0.2863				

Appendix B Data and Calculation forms

Intertek Testing Services										REPORT DATA									
Manufacturer: SBI Model: Eco-55 Date: 11-1-16 Run: 1 Project #: G102747001 Test Duration: 60 (minutes)					RESULTS Average emission rate(gr/hr) 1.037 Burn Rate (Dry kg/hr): 2.038					Client: SBI Run: 1 Date: 11-1-16 Project: G102747001 Model: Eco-55 Fuel Moisture (Dry): 0.05 Stack Static (neg): -0.078 Barometer: 30.35 Average Room Temp: 73.86									
PRESSURE FACTOR: 1.01437 TEMPERATURE FACTORS DGM #3: 0.98354					BAROMETRIC PRESSURE Average: 30.35 Start: 30.4 End: 30.3					Initial Door Temp #REF! Final Door Temp #REF!									
VOLUMES SAMPLED DGM #3: 10.36127					DRY GAS METER VALUES DGM #3 Final: 621.250 Initial: 610.685					Burn Rate: 2.038									
TOTAL TUNNEL VOLUME (scf): 17909					SAMPLE RATIOS Sample Train 3: 1728.431					TEMPERATURES (DEG. RANKIN) DGM #3: 536.835									
TOTAL EMISSIONS Sample Train 3 (g): 1.04					CALIBRATION FACTORS DGM #3: 0.9830					Filter 1: #REF! Filter 2: #REF! Tunnel: 96.45 DGM 1: 76.84 DGM 2: #REF!									
EMISSION RATES Sample Train 3 (g/hr): 1.04					TUNNEL FLOW RATE: 298.479 PARTICULATE CATCH (mg) Total Sample Train 3: 0.60 Filter and seal Sample Train 3: 0.4 MAX Allowed 7.50% Probe Sample Train 3: 0.2 DEVIATION: 0.00%					Water Collected: Room Temp Before After 71 73 Bar Pressure Before After 30.40 30.30 Relative Humidity Before After 38.5 37.5 Air Velocity Before After 0 0									
Train 3 Cs 5.7908E-05 Cr 0 Et 1.04 Et AVERAGE Deviation (g/kg) Train #3 0.485 Train #2 0.000 Deviation 0.485					Room Particulate Correction Mr 0 Milligram Catch (mg) Vmr 7.7544 Total Volume Sampled (dscf) Rotometer (glass) at 100 flow rate is 0.12924 cfm Grams Emissions					Average Dilution Tunnel Measurements Burn Velocity Flow Rate Temp Total Sample Time (Ft/sec) (dscf/min) (R) 3 2 3 2 60 15.11 298.48 556.45 10.36 0.00 0.6 0.0 Dilution Tunnel Dual Train Precision Sample Ratios Total Emissions (g) Train 3 Train 2 Train 3 Train 2 Deviation (%) 1728.43 0.00 1.04 0.00 0.00% Initial Run Average Draft Time Draft 0.024 60 0.022 Emission 0.519									
					Burn Rate 2.038 Run 1 Date 2016-11-01 Burn Rate 2.038 Emission 0.519					62.852 68.15									

Appendix B Data and Calculation forms

VERSION: 2.4		2010-04-15				
Manufacturer: SBI		Appliance Type: Pellet		(Cat, Non-Cat, Pellet)		
Model: ECO-55						
Date: 01-11-2016		Temp. Units		F	(F or C)	
Run: 1		Weight Units		lb	(kg or lb)	
Control #: G102747001				Default Fuel Values		
Test Duration: 60				HHV (kJ/kg)	D. Fir	Oak
Output Category: Max				%C	48.73	50
				%H	6.87	6.6
				%O	43.9	42.9
Wood Moisture (% wet):		4.50	HHV	20,236	kJ/kg	%Ash
Load Weight (lb wet):		4.72	%C	48.73		
Burn Rate (dry kg/h):		2.04	%H	6.87		
Total Particulate Emissions:		1.04 g	%O	43.785		
			%Ash	0.615		
Averages		0.01	6.46	14.24	374.85	73.86
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	4.72	0.01	6.13	14.65	373.1	71.2
10	3.93	0.02	6.33	13.98	376.1	76.6
20	3.15	0.01	6.42	14.37	371.7	72.2
30	2.36	0.01	6.21	15.29	370.4	73.3
40	1.57	0.01	6.61	13.85	375.6	73.3
50	0.79	0.01	6.78	13.62	379.4	77.5
60	0.00	0.01	6.75	13.94	377.6	72.9

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.

Manufacturer: SBI					
Model: ECO-55					
Date: 01-11-2016					
Run: 1					
Control #: G102747001					
Test Duration: 60 min					
Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [v], [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 1.061					
Eff 72.70% 78.44% Comb Eff 99.50% 99.50% HT Eff 73.06% 78.83% Output 30,086 kJ/h Burn Rate 2.05 kg/h Grams CO 5 g Input 41,386 kJ/h MC wet 4.50					
Averages 0.01 6.46 2.04 20.51 14.04 190.47 23.25 100.5% 75.2% 75.6% 18.39 1.07 50.00 1.02 50.00 44835 4.06 6.87 2.74 20236.00 4.50 79.49					
INPUT DATA Oxygen Calculation Input Data Combust Heat Transfer Net Eff Air Fuel Ratio (A/F) Dry Molecular Weight (M_d) Dry Moles Exhaust Gas (N_d) %HC Combustion Efficiency: 99.50% Total Input (kJ): 41,386 Total Output (kJ): 30,086 Efficiency: 72.70% Total CO (g): 5.37					
Elapsed Time Weight Remaining (kg) % CO [e] % CO₂ [d] Excess Air E/A Total O₂ Calc. % O₂ [g] Flue Gas (°C) Room Temp (°C) Eff % Transfer % Net % Fuel Ratio Wet Wt Now % Wet Consumed Dry Wt. Now % Dry Consumed Total Input Carbon /12= [a] Hydrogen /1= [b] Oxygen /16= [c] Calorific Value Moisture Fuel Burnt [h]					
0 2.14 0.01 6.13 219.6% 20.53 14.39 189.5 21.8 100.5% 74.4% 74.8% 19.4 2.14 0.00 2.05 0.00 0 4.06 6.87 2.74 20236.00 4.50 79.46					
10 1.78 0.02 6.33 209.2% 20.52 14.18 191.2 24.8 100.4% 75.0% 75.3% 18.7 1.78 16.67 1.70 16.67 10347 4.06 6.87 2.74 20236.00 4.50 79.47					
20 1.43 0.01 6.42 205.2% 20.51 14.08 188.7 22.3 100.5% 75.2% 75.6% 18.5 1.43 33.33 1.36 33.33 6898 4.06 6.87 2.74 20236.00 4.50 79.48					
30 1.07 0.01 6.21 215.4% 20.52 14.31 188.0 23.0 100.5% 74.9% 75.2% 19.1 1.07 50.00 1.02 50.00 6898 4.06 6.87 2.74 20236.00 4.50 79.47					
40 0.71 0.01 6.61 196.4% 20.50 13.88 190.9 23.0 100.4% 75.5% 75.9% 18.0 0.71 66.67 0.68 66.67 6898 4.06 6.87 2.74 20236.00 4.50 79.50					
50 0.36 0.01 6.78 189.0% 20.49 13.70 193.0 25.3 100.4% 75.9% 76.2% 17.5 0.36 83.33 0.34 83.33 10347 4.06 6.87 2.74 20236.00 4.50 79.51					
60 0.00 0.01 6.75 190.3% 20.49 13.73 192.0 22.7 100.4% 75.7% 76.0% 17.6 0.00 100.00 0.00 100.00 3449 4.06 6.87 2.74 20236.00 4.50 79.50					

[illegible]

Appendix B Data and Calculation forms

SUMS							AVERAGE	SUMS						
1942.12	3147.78	169.39	17091.04	-823.43	12146.24	913.05	4940.88	10892.62	-200.81	11093.4	33942.7	-200.8	5.4	-4.6
Energy Losses (kJ/kg of Dry Fuel)							Total							
Flue Gas Constituent							Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
278.07	486.45	23.44	2577.27	-128.12	1736.87	130.47	5104.47	0.00	0	0.00	0	0	0.00	0.00
276.03	460.14	33.09	2474.97	-117.18	1734.12	130.36	4991.54	2552.16	-43	2595.00	7794	-43	1.65	-1.07
275.93	451.01	22.38	2442.61	-119.46	1734.37	130.36	4937.20	1682.92	-33	1715.84	5215	-33	0.74	-0.73
273.64	469.74	24.84	2503.84	-124.83	1733.30	130.23	5010.76	1707.99	-34	1741.91	5190	-34	0.82	-0.76
278.65	435.73	22.63	2394.46	-113.79	1735.62	130.50	4883.79	1664.71	-31	1695.63	5233	-31	0.75	-0.69
278.77	419.08	20.85	2333.26	-109.92	1735.03	130.49	4807.55	2458.09	-45	2503.40	7889	-45	1.04	-1.00
281.03	425.64	22.16	2364.62	-110.13	1736.93	130.63	4850.87	826.75	-15	841.66	2622	-15	0.37	-0.33

Appendix B Data and Calculation forms

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 60
Output Category: Max

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.7%	78.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	78.8%

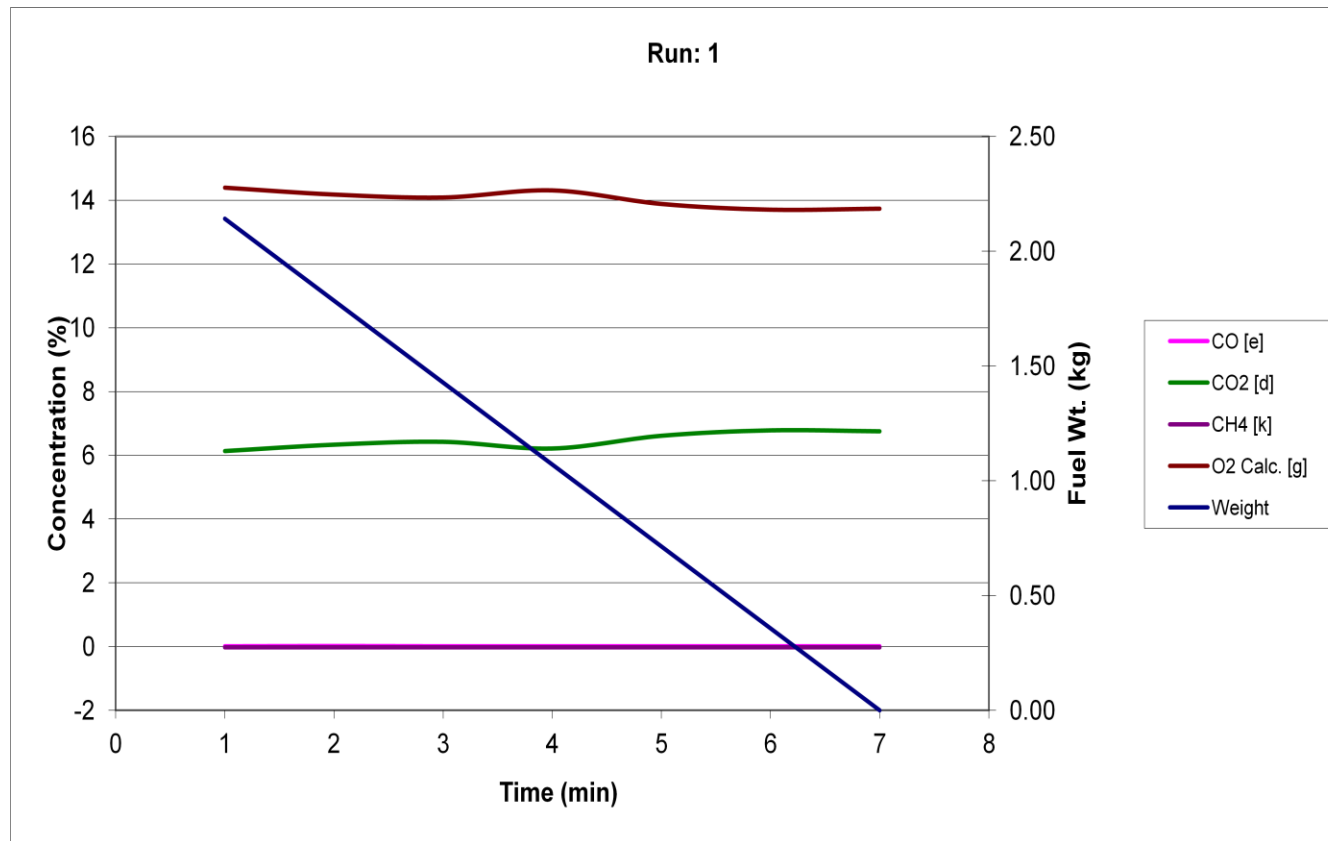
Output Rate (kJ/h)	30,086	28,540	(Btu/h)
Burn Rate (kg/h)	2.05	4.51	(lb/h)
Input (kJ/h)	41,386	39,260	(Btu/h)

Test Load Weight (dry kg)	2.05	4.51	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	1.04		
CO (g)	5		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.03	0.18
g/kg Dry Fuel	0.51	2.62
g/h	1.04	5.37
lb/MM Btu Output	0.08	0.41

Air/Fuel Ratio (A/F)	16.78
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Appendix B Data and Calculation forms



Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

Appendix B Data and Calculation forms

Integrated test results

ASTM E2779 Calculation Sheet																			
Manufacturer:	SBI	Eng:	Claude Pelland																
Model:	Eco-55																		
Date:	2016-11-01																		
Run:	1	Dry kilograms:	5.76																
Control #:	G102747001																		
Test Duration:	360.0																		
		Start	End																
	Barometer (in.Hg):	30.4	30.2	Pitot type:	Type S														
				0.84															
	Dry Bulb (F):	72	71.2																
	Humidity (%):	38.5	39.7																
Moisture content of wood (wet basis):		12.71																	
	Average	0.00	0.00	0.00	253.66	72.31	86.23		75.17	84.15	71.94		72.19	72.10	76.73	0.08	0.016		
	Elapsed	Weight																	
Actual	Time	Remaining				Flue	Room	Tunnel	DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Draft	Elapsed
Time	Minutes	Lbs.	CO	CO ₂	O ₂	Gas	Temp	Dry Bulb	Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft	Time
10:56:00	0.0	12.71	0.00	0.00	0.00	373.07	71.23	96.04	874.988	68.98	68.52	68.29	560.667	67.60	67.40	68.17	0.078	0.024	0.00
11:06:00	10.00	11.92	0.00	0.00	0.00	376.08	76.62	96.46	876.450	75.95	75.70	70.45	562.180	71.63	72.12	70.65	0.077	0.021	10.00
11:16:00	20.00	11.16	0.00	0.00	0.00	371.73	72.15	96.12	877.875	75.28	79.71	70.71	563.670	73.13	73.55	72.69	0.079	0.023	20.00
11:26:00	30.00	10.38	0.00	0.00	0.00	370.44	73.32	96.00	879.300	74.79	81.95	71.17	565.150	73.92	74.16	73.86	0.080	0.022	30.00
11:36:00	40.00	9.61	0.00	0.00	0.00	375.61	73.35	96.79	880.725	74.59	83.08	71.18	566.660	74.20	74.31	74.67	0.079	0.020	40.00
11:46:00	50.00	8.78	0.00	0.00	0.00	379.40	77.49	97.17	882.137	74.54	83.79	71.18	568.150	74.37	74.49	75.28	0.075	0.021	50.00
11:56:00	60.00	7.99	0.00	0.00	0.00	377.65	72.86	96.56	883.555	74.64	84.16	71.30	569.650	74.68	74.69	75.80	0.082	0.023	60.00
12:06:00	70.00	7.57	0.00	0.00	0.00	320.04	72.23	92.49	884.975	74.73	84.56	71.35	571.145	74.47	74.30	76.24	0.086	0.022	70.00
12:16:00	80.00	7.21	0.00	0.00	0.00	287.59	69.12	89.75	886.397	74.88	84.80	71.50	572.650	73.81	73.55	76.68	0.079	0.017	80.00
12:26:00	90.00	6.82	0.00	0.00	0.00	280.73	68.12	88.39	887.820	75.00	85.02	71.58	574.135	73.18	72.88	76.91	0.078	0.019	90.00
12:36:00	100.00	6.46	0.00	0.00	0.00	271.29	69.86	87.84	889.238	75.02	84.97	71.59	575.632	72.77	72.55	76.96	0.078	0.016	100.00
12:46:00	110.00	6.14	0.00	0.00	0.00	268.39	71.37	87.94	890.658	74.98	84.93	71.62	577.127	72.71	72.36	76.90	0.081	0.015	110.00
12:56:00	120.00	5.80	0.00	0.00	0.00	266.06	72.01	87.69	892.082	74.99	84.80	71.72	578.630	72.76	72.33	76.78	0.074	0.015	120.00
13:06:00	130.00	5.43	0.00	0.00	0.00	266.16	72.21	87.94	893.505	75.04	84.95	71.96	580.140	72.73	72.50	76.69	0.077	0.014	130.00
13:16:00	140.00	5.07	0.00	0.00	0.00	265.25	72.46	87.80	894.925	75.02	84.83	72.10	581.630	72.66	72.51	76.62	0.074	0.016	140.00
13:26:00	150.00	4.69	0.00	0.00	0.00	269.51	72.48	88.06	896.340	75.13	84.73	72.25	583.120	72.71	72.57	76.63	0.077	0.014	150.00
13:36:00	160.00	4.32	0.00	0.00	0.00	271.89	72.73	88.41	897.760	75.22	84.80	72.05	584.615	72.76	72.77	77.00	0.076	0.014	160.00
13:46:00	170.00	3.95	0.00	0.00	0.00	271.12	72.60	88.27	899.190	75.26	85.05	72.10	586.120	72.88	72.86	77.29	0.078	0.017	170.00
13:56:00	180.00	3.57	0.00	0.00	0.00	273.54	73.04	88.92	900.614	75.33	85.06	72.17	587.609	72.95	72.92	77.44	0.079	0.016	180.00
14:06:00	190.00	3.41	0.00	0.00	0.00	212.45	72.67	83.38	902.037	75.44	85.15	72.29	589.125	72.65	72.41	77.62	0.078	0.015	190.00
14:16:00	200.00	3.22	0.00	0.00	0.00	195.84	72.54	81.68	903.460	75.51	85.27	72.35	590.620	72.02	71.84	77.75	0.085	0.016	200.00
14:26:00	210.00	2.99	0.00	0.00	0.00	196.72	72.45	81.26	904.883	75.55	85.50	72.38	592.135	71.61	71.48	77.86	0.084	0.013	210.00
14:36:00	220.00	2.77	0.00	0.00	0.00	197.32	72.33	81.07	906.310	75.55	85.48	72.38	593.622	71.41	71.30	77.94	0.079	0.014	220.00
14:46:00	230.00	2.55	0.00	0.00	0.00	194.97	72.75	80.88	907.735	75.55	85.51	72.39	595.138	71.35	71.26	78.00	0.081	0.014	230.00
14:56:00	240.00	2.37	0.00	0.00	0.00	186.47	71.95	80.25	909.165	75.57	85.48	72.37	596.630	71.23	71.15	78.00	0.082	0.014	240.00

Appendix B Data and Calculation forms

15:06:00	250.00	2.16	0.00	0.00	0.00	190.94	72.06	80.50	910.590	75.58	85.46	72.44	598.140	71.23	71.10	78.02	0.075	0.015	250.00
15:16:00	260.00	1.97	0.00	0.00	0.00	181.85	71.83	79.93	912.017	75.59	85.37	72.49	599.650	71.15	71.03	78.11	0.080	0.013	260.00
15:26:00	270.00	1.77	0.00	0.00	0.00	193.00	71.93	80.42	913.445	75.65	85.54	72.63	601.150	71.14	71.06	78.16	0.084	0.015	270.00
15:36:00	280.00	1.57	0.00	0.00	0.00	189.44	72.33	80.26	914.870	75.69	85.40	72.61	602.660	71.19	71.10	78.20	0.078	0.014	280.00
15:46:00	290.00	1.36	0.00	0.00	0.00	192.89	72.53	80.52	916.305	75.73	85.46	72.65	604.170	71.24	71.20	78.25	0.082	0.012	290.00
15:56:00	300.00	1.18	0.00	0.00	0.00	184.00	72.04	80.12	917.735	75.80	85.49	72.73	605.673	71.31	71.28	78.31	0.080	0.015	300.00
16:06:00	310.00	0.94	0.00	0.00	0.00	195.33	72.36	80.64	919.163	75.81	85.48	72.58	607.175	71.34	71.25	78.30	0.081	0.016	310.00
16:16:00	320.00	0.76	0.00	0.00	0.00	187.51	72.09	80.29	920.593	75.80	85.39	72.54	608.685	71.31	71.14	78.26	0.077	0.014	320.00
16:26:00	330.00	0.58	0.00	0.00	0.00	180.75	72.17	79.73	922.020	75.78	85.41	72.57	610.188	71.26	71.06	78.26	0.080	0.016	330.00
16:36:00	340.00	0.36	0.00	0.00	0.00	195.11	72.15	80.44	923.450	75.76	85.40	72.51	611.695	71.24	71.02	78.20	0.085	0.014	340.00
16:46:00	350.00	0.17	0.00	0.00	0.00	185.51	71.84	79.90	924.880	75.80	85.66	72.69	613.213	71.27	71.16	78.25	0.079	0.012	350.00
16:56:00	360.00	0.00	0.00	0.00	0.00	189.71	72.37	80.46	926.327	75.81	85.76	72.83	614.723	71.31	71.22	78.35	0.080	0.014	360.00

Appendix B Data and Calculation forms

										6" Tunnel		0.1963 ft ²		(ASTM E2515 Formula)											
Manufacturer:										SBI		12" Tunnel		0.7854 ft ²											
Model:										Eco-55				Tunnel area (ft2):		0.3491		Manufacturer:		SBI					
Date:										11-1-16				Wood moisture (% wet):		4.75		Model:		Eco-55					
Run:										1				Load Weight (lbs wet):		12.7058		Date:		11-1-16					
Project #:										G102747001				Burn Rate (Dry kg/hr):		0.915		Run:		1					
Test Duration:										360															
Total Gas Volume (DGM 1):										51.175						Final Temperature (DGM #1) Degrees Rankin:		539.662							
Total Gas Volume (DGM 2):										54.390						Final Temperature (DGM #2) Degrees Rankin:		532.150							
Average Barometric Pressure:										30.3						Final Tunnel Temperature Degrees Rankin:		546.226							
Molecular Weight:										28.78						Final Tunnel Velocity (feet per second):		15.063728							
Pitot Correction:										0.941313						Standardized Tunnel Flow (dscofm):		302.57166							
Calibration Factor (DGM #1):										1.0070															
Calibration Factor (DGM #2):										1.0020															
(1) VS:										0.032334				Average Inlet +		Average Inlet +									
(2) VS:										0.030422				Outlet		Outlet									
										Filter		Filter				Average		Average							
										Face		Face		Delta-P		Tunnel		Temp.		Temp.					
										Velocity		Velocity		Temp.		Temp.		99.8		99.9					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1		DGM 2		Tunnel		SQRT		Delta-P					
										DGM 1		DGM 2		Tunnel		Meter 1		Meter 2		Proportional Rates					
										Reading		Inlet T		Outlet T		PR1		PR2		#1					
										Inlet T		Outlet T		Vol.Std.		Vol.Std.		#2							
										Dry Bulb		DGM 1													

Appendix B Data and Calculation forms

910.59	75.58	85.46	598.14	71.233435	71.0951	80.4998	7.59	8.14	0.075	14.58780	540.5	531.2	101.74	103.09	1419	1522	250	0.2741
912.02	75.59	85.37	599.65	71.146552	71.0256	79.9283	7.60	8.14	0.080	15.04146	540.5	531.1	98.72	99.91	1421	1523	260	0.2828
913.45	75.65	85.54	601.15	71.141172	71.064	80.4205	7.60	8.09	0.084	15.43997	540.6	531.1	96.28	96.77	1422	1513	270	0.2902
914.87	75.69	85.40	602.66	71.190173	71.0995	80.2631	7.59	8.14	0.078	14.82121	540.5	531.1	100.08	101.43	1419	1523	280	0.2786
916.31	75.73	85.46	604.17	71.241278	71.199	80.5168	7.64	8.14	0.082	15.22312	540.6	531.2	98.15	98.77	1429	1522	290	0.2861
917.74	75.80	85.49	605.67	71.31152	71.2786	80.1231	7.61	8.10	0.080	15.01520	540.6	531.3	99.07	99.58	1424	1515	300	0.2823
919.16	75.81	85.48	607.18	71.343021	71.2515	80.6375	7.60	8.10	0.081	15.18567	540.6	531.3	97.92	98.49	1422	1514	310	0.2853
920.59	75.80	85.39	608.69	71.306917	71.1429	80.2926	7.61	8.14	0.077	14.79642	540.6	531.2	100.59	101.58	1424	1522	320	0.2781
922.02	75.78	85.41	610.19	71.260955	71.0593	79.7331	7.60	8.10	0.080	15.02225	540.6	531.2	98.77	99.51	1421	1515	330	0.2825
923.45	75.76	85.40	611.70	71.244183	71.0217	80.4449	7.61	8.13	0.085	15.50186	540.6	531.1	96.04	96.82	1424	1520	340	0.2913
924.88	75.80	85.66	613.21	71.268417	71.158	79.8954	7.61	8.18	0.079	14.97369	540.7	531.2	99.28	100.84	1423	1530	350	0.2815
926.33	75.81	85.76	614.72	71.314563	71.2189	80.4598	7.70	8.14	0.080	15.00466	540.8	531.3	100.33	100.18	1440	1522	360	0.2820

Appendix B Data and Calculation forms

Intertek Testing Services										REPORT DATA									
Manufacturer: SBI Model: Eco-55 Date: 11-1-16 Run: 1 Project #: G102747001 Test Duration: 360 (minutes)					RESULTS					Client: SBI Run: 1 Date: 11-1-16 Project: G102747001 Model: Eco-55									
					Average emission rate: (g/hr)					0.963					Fuel Moisture (Dry): 0.05				
					Burn Rate (Dry kg/hr):					0.915					Stack Static (neg): -0.078				
															Barometer: 30.3				
															Average Room Temp: 72.31				
PRESSURE FACTOR: 1.01270					BAROMETRIC PRESSURE					Initial Door Temp #REF!									
TEMPERATURE FACTORS					Average: 30.3					Final Door Temp #REF!									
					Start: 30.4														
DGM #1: 0.97839					End: 30.2														
DGM #2: 0.99220																			
					DRY GAS METER VALUES					Burn Rate: 0.915									
VOLUMES SAMPLED					DGM #1 Final: 926.327														
					Initial: 874.988														
DGM #1: 51.22360																			
DGM #2: 54.42428																			
					DGM #2 Final: 614.723														
TOTAL TUNNEL VOLUME (scf): 108926					Initial: 560.667					Filter 1: 71.94									
										Filter 2: 76.73									
SAMPLE RATIOS					TEMPERATURES (DEG. RANKIN)					Tunnel: 86.23									
Sample Train 1: 2126.477					DGM #1: 539.662					DGM 1: 79.66									
Sample Train 2: 2001.419					DGM #2: 532.150					DGM 2: 72.15									
										Water Collected:									
TOTAL EMISSIONS					CALIBRATION FACTORS														
Sample Train 1 (g): 5.95					DGM #1: 1.0070					Room Temp Bar Pressure Relative Humidity Air Velocity									
Sample Train 2 (g): 5.60					DGM #2: 1.0020					Before After Before After Before After Before After									
										71 72 30.40 30.20 38.5 39.7 0 0									
EMISSION RATES					TUNNEL FLOW RATE: 302.572														
Sample Train 1 (g/hr): 0.99																			
Sample Train 2 (g/hr): 0.93																			
					PARTICULATE CATCH (mg)														
					Total Sample Train 1: 2.80														
					Total Sample Train 2: 2.80														
					Filter and seal Sample Train 1: 2.40														
MAX Allowed 7.50%					Filter and seal Sample Train 2: 2.40					Average Dilution Tunnel Measurements									
					Probe Sample Train 1: 0.40					Sample Data									
DEVIATION: 3.03%					Probe Sample Train 2: 0.40					Particulate Catch									
										1 2									
										2.8 2.8									
Train 1 Train 2					Room Particulate Correction					Dilution Tunnel Dual Train Precision									
Cs 5.46623E-05 5.1448E-05					Mr 0 Milligram Catch (mg)					Sample Ratios Total Emissions (g)									
Cr 0 0					Vmr 46.5264					Train 1 Train 2 Train 1 Train 2 Deviation (%)									
Et 5.95 5.60					Total Volume Sampled (dscf)					1 2 3.03%									
					Rotometer (glass) at 100														
					flow rate is 0.12924 cfm														
Et AVERAGE 5.78					Grams Emissions					Burn Rate Average Temp Initial Run Average									
										Rate Surface Draft Time Draft									
Deviation (g/kg)										0.915 0.00 0.024 360 0.016									
Train #1 1.034										Run Date Burn Rate Emission									
Train #2 0.973										1 2016-11-01 0.915 0.963									
Deviation 0.061																			

Appendix B Data and Calculation forms

VERSION:	2.4	2010-04-15							
Manufacturer:	SBI		Appliance Type: Pellet		(Cat, Non-Cat, Pellet)				
Model:	ECO-55								
Date:	01-11-2016		Temp. Units	F	(F or C)	Default Fuel Values			
Run:	1		Weight Units	lb	(kg or lb)		D. Fir	Oak	
Control #:	G102747001					HHV (kJ/kg)	19,810	19,887	
Test Duration:	360					%C	48.73	50	
Output Category:	Integ		Fuel Data			%H	6.87	6.6	
				D. Fir		%O	43.9	42.9	
Wood Moisture (% wet):	4.50		HHV	20,236	kJ/kg	%Ash	0.5	0.5	
Load Weight (lb wet):	12.71		%C	48.73					
Burn Rate (dry kg/h):	0.92		%H	6.87					
Total Particulate Emissions:	5.78 g		%O	43.785					
			%Ash	0.615					
	Averages	0.02	3.02	17.90	253.65	72.31			
					Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp			
		CO	CO ₂	O ₂					
0	12.71	0.01	6.13	14.65	373.1	71.2			
10	11.92	0.02	6.33	13.98	376.1	76.6			
20	11.16	0.01	6.42	14.37	371.7	72.2			
30	10.38	0.01	6.21	15.29	370.4	73.3			
40	9.61	0.01	6.61	13.85	375.6	73.3			
50	8.78	0.01	6.78	13.62	379.4	77.5			
60	7.99	0.01	6.75	13.94	377.6	72.9			
70	7.57	0.02	4.85	17.62	320.0	72.2			
80	7.21	0.02	3.24	18.05	287.6	69.1			
90	6.82	0.01	2.91	17.78	280.7	68.1			
100	6.46	0.01	2.79	18.01	271.3	69.9			
110	6.14	0.02	2.60	17.95	268.4	71.4			
120	5.80	0.02	2.66	18.46	266.1	72.0			
130	5.43	0.02	2.84	18.11	266.2	72.2			
140	5.07	0.01	2.73	17.98	265.3	72.5			
150	4.69	0.02	2.69	18.00	269.5	72.5			
160	4.32	0.02	2.83	18.08	271.9	72.7			
170	3.95	0.03	2.94	18.37	271.1	72.6			
180	3.57	0.02	2.86	18.09	273.5	73.0			
190	3.41	0.03	2.07	18.83	212.5	72.7			
200	3.22	0.03	1.78	19.19	195.8	72.5			
210	2.99	0.03	1.75	19.28	196.7	72.4			
220	2.77	0.05	1.82	19.64	197.3	72.3			
230	2.55	0.02	1.70	18.94	195.0	72.8			
240	2.37	0.02	1.67	18.80	186.5	72.0			

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

Appendix B Data and Calculation forms

250	2.16	0.04	1.63	19.47	190.9	72.1						
260	1.97	0.02	1.55	19.07	181.9	71.8						
270	1.77	0.02	1.76	19.12	193.0	71.9						
280	1.57	0.03	1.61	19.42	189.4	72.3						
290	1.36	0.02	1.69	19.25	192.9	72.5						
300	1.18	0.02	1.71	19.18	184.0	72.0						
310	0.94	0.02	1.71	19.12	195.3	72.4						
320	0.76	0.02	1.66	19.42	187.5	72.1						
330	0.58	0.03	1.62	19.35	180.8	72.2						
340	0.36	0.03	1.68	19.43	195.1	72.1						
350	0.17	0.03	1.63	19.32	185.5	71.8						
360	0.00	0.02	1.71	19.12	189.7	72.4						

[illegible]

Appendix B Data and Calculation forms

[illegible]

Appendix B Data and Calculation forms

SUMS							AVERAGE	SUMS						
6069.68	29491.90	4242.50	125252.55	-15161.54	62312.43	4599.12	5859.64	31300.19	-1278.40	32578.6	80890.5	*****	45.8	-31.3
Energy Losses (kJ/kg of Dry Fuel)							Total							
Flue Gas Constituent							Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO₂	O₂	CO	N₂	CH₄	H₂O Comb	H₂O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
278.07	486.45	23.44	2577.27	-128.12	1736.87	130.47	5104.47	0.00	0	0.00	0	0	0.00	0.00
276.03	460.14	33.09	2474.97	-117.18	1734.12	130.36	4991.54	2530.53	-42	2573.01	7728	-42	1.63	-1.06
275.93	451.01	22.38	2442.61	-119.46	1734.37	130.36	4937.20	1647.26	-32	1679.49	5104	-32	0.73	-0.71
273.64	469.74	24.84	2503.84	-124.83	1733.30	130.23	5010.76	1682.66	-33	1716.08	5113	-33	0.81	-0.75
278.65	435.73	22.63	2394.46	-113.79	1735.62	130.50	4883.79	1692.93	-31	1724.37	5322	-31	0.76	-0.70
278.77	419.08	20.85	2333.26	-109.92	1735.03	130.49	4807.55	1687.33	-31	1718.43	5415	-31	0.71	-0.69
281.03	425.64	22.16	2364.62	-110.13	1736.93	130.63	4850.87	1271.65	-23	1294.59	4033	-23	0.56	-0.52
225.85	549.97	42.36	2662.17	-172.36	1704.69	127.69	5140.37	868.66	-22	890.56	2551	-22	0.70	-0.52
197.97	803.67	63.03	3506.06	-289.63	1697.20	126.19	6104.50	991.91	-37	1028.61	2296	-37	1.00	-0.84
192.98	890.82	42.47	3808.47	-343.43	1698.94	125.88	6416.14	1042.55	-49	1091.25	2246	-49	0.67	-1.00
182.39	885.21	56.03	3758.09	-355.10	1692.50	125.31	6344.44	934.68	-44	978.59	2047	-44	0.81	-0.94
177.81	936.42	95.53	3931.45	-368.13	1690.87	125.09	6589.04	942.17	-39	981.05	1951	-39	1.34	-0.94
175.37	899.83	74.99	3791.11	-367.50	1688.75	124.94	6387.48	982.54	-45	1027.40	2130	-45	1.13	-1.01
175.04	832.19	81.69	3544.50	-334.42	1685.16	124.93	6109.09	966.19	-40	1006.06	2234	-40	1.26	-0.95
174.44	868.63	59.81	3674.79	-362.99	1687.42	124.87	6226.97	998.32	-48	1046.77	2246	-48	0.94	-1.04
178.31	902.77	68.10	3809.86	-365.73	1690.64	125.09	6409.04	1041.40	-48	1089.60	2247	-48	1.08	-1.06
180.20	859.70	63.25	3658.63	-342.19	1689.59	125.20	6240.37	1000.47	-44	1044.09	2244	-44	1.09	-0.98
178.60	814.56	120.27	3491.04	-300.46	1684.68	125.17	6113.86	993.43	-29	1022.70	2295	-29	1.91	-0.87
181.22	853.70	81.96	3639.85	-331.28	1689.34	125.27	6240.06	730.04	-29	759.13	1637	-29	0.94	-0.69
124.56	855.12	144.20	3485.04	-465.69	1661.66	122.17	5927.06	449.44	-24	473.79	1085	-24	1.07	-0.63
109.49	890.31	171.45	3570.07	-549.73	1659.01	121.33	5971.94	543.41	-34	577.80	1298	-34	1.53	-0.90
109.97	910.85	212.21	3646.66	-540.45	1658.73	121.38	6119.36	596.60	-32	628.59	1376	-32	2.03	-0.94
109.71	869.91	285.88	3497.73	-474.65	1652.38	121.42	6062.37	577.91	-18	595.96	1351	-18	2.68	-0.81
109.35	935.61	103.56	3733.75	-618.56	1665.40	121.28	6050.39	524.33	-45	568.87	1229	-45	0.88	-0.96
101.84	889.33	149.70	3544.37	-607.42	1658.89	120.89	5857.61	494.93	-39	533.55	1215	-39	1.24	-0.92
104.82	939.04	248.56	3734.86	-573.65	1658.43	121.11	6233.17	540.17	-28	568.35	1213	-28	2.12	-0.89
97.73	926.22	167.25	3667.01	-656.36	1660.83	120.66	5983.34	505.56	-41	546.83	1204	-41	1.39	-0.99
107.93	889.15	128.30	3561.07	-580.28	1660.63	121.22	5888.02	510.26	-39	549.36	1243	-39	1.09	-0.90
103.53	940.29	222.78	3735.38	-596.79	1659.60	121.02	6185.81	549.47	-33	582.68	1248	-33	1.95	-0.95
107.33	924.38	134.33	3687.47	-606.72	1662.89	121.18	6030.85	509.57	-40	549.42	1200	-40	1.12	-0.92
99.41	846.09	154.91	3379.99	-587.03	1655.00	120.76	5669.12	515.85	-39	555.13	1325	-39	1.39	-0.96
109.42	929.97	159.04	3714.10	-585.06	1662.46	121.32	6111.23	556.08	-39	594.80	1285	-39	1.42	-0.95
102.54	901.11	164.47	3589.38	-604.18	1659.19	120.93	5933.45	462.78	-34	497.03	1116	-34	1.26	-0.84
95.91	866.21	212.19	3443.64	-597.44	1653.74	120.59	5794.84	502.18	-33	535.56	1251	-33	1.81	-0.93
108.57	940.53	238.55	3750.96	-556.26	1659.46	121.32	6263.12	556.34	-28	584.56	1241	-28	2.08	-0.89
100.62	902.18	197.67	3588.12	-600.49	1657.58	120.84	5966.52	685.11	-46	731.33	1638	-46	2.23	-1.24
104.67	890.35	122.58	3555.89	-604.13	1660.52	121.03	5850.92	215.49	-18	233.20	530	-18	0.44	-0.40

Appendix B Data and Calculation forms

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 360
Output Category: Integ

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	70.3%	75.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	71%	76.2%

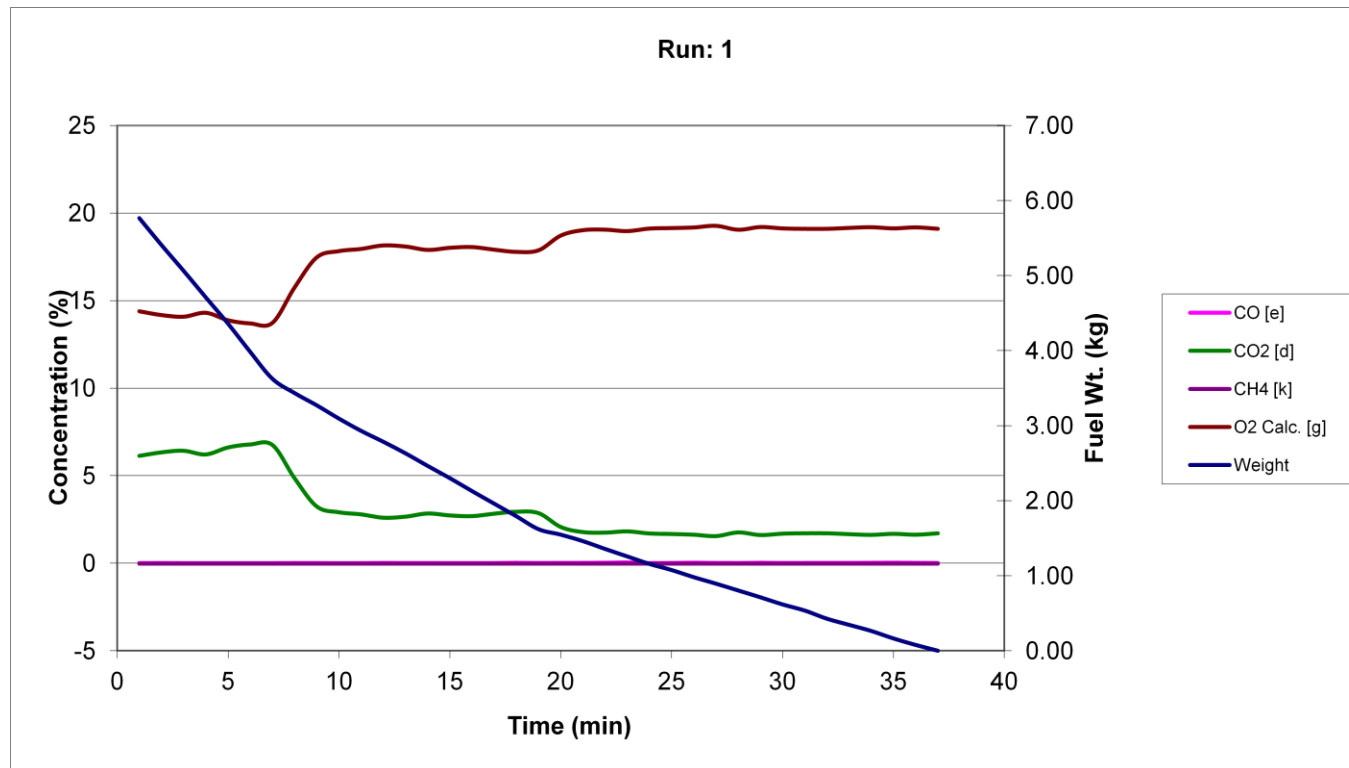
Output Rate (kJ/h)	13,052	12,381	(Btu/h)
Burn Rate (kg/h)	0.92	2.02	(lb/h)
Input (kJ/h)	18,574	17,620	(Btu/h)

Test Load Weight (dry kg)	5.51	12.14	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	46		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.07	0.58
g/kg Dry Fuel	1.05	8.32
g/h	0.96	7.64
lb/MM Btu Output	0.17	1.36

Air/Fuel Ratio (A/F)	31.75
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Appendix B Data and Calculation forms



Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

Appendix B Data and Calculation forms

Medium burn rate results

VERSION: 2.4		2010-04-15								
Manufacturer: SBI				Appliance Type: Pellet		(Cat, Non-Cat, Pellet)				
Model: ECO-55										
Date: 01-11-2016				Temp. Units		F	(F or C)	Default Fuel Values		
Run: 1				Weight Units		lb	(kg or lb)		D. Fir	Oak
Control #: G102747001								HHV (kJ/kg)	19,810	19,887
Test Duration: 120								%C	48.73	50
Output Category: Med						Fuel Data		%H	6.87	6.6
								%O	43.9	42.9
Wood Moisture (% wet):		4.50		HHV		20,236	kJ/kg	%Ash	0.5	0.5
Load Weight (lb wet):		4.42		%C		48.73				
Burn Rate (dry kg/h):		0.96		%H		6.87				
Total Particulate Emissions:		5.78 g		%O		43.785				
				%Ash		0.615				
Averages		0.02	3.28	17.73	283.43	71.49				
					Temp. (°F)					
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp				
		CO	CO₂	O₂						
0	4.42	0.01	6.75	13.94	373.1	71.2				
10	4.05	0.02	4.85	17.62	320.0	72.2				
20	3.68	0.02	3.24	18.05	287.6	69.1				
30	3.32	0.01	2.91	17.78	280.7	68.1				
40	2.95	0.01	2.79	18.01	271.3	69.9				
50	2.58	0.02	2.60	17.95	268.4	71.4				
60	2.21	0.02	2.66	18.46	266.1	72.0				
70	1.84	0.02	2.84	18.11	266.2	72.2				
80	1.47	0.01	2.73	17.98	265.3	72.5				
90	1.11	0.02	2.69	18.00	269.5	72.5				
100	0.74	0.02	2.83	18.08	271.9	72.7				
110	0.37	0.03	2.94	18.37	271.1	72.6				
120	0.00	0.02	2.86	18.09	273.5	73.0				

Manufacturer:	SBI
Model:	ECO-55
Date:	01-11-2016
Run:	1
Control #:	G102747001
Test Duration:	120

	Ultimate CO ₂
CO _{2-ult}	19.63
	F ₀
	1.055

					Air Fuel Ratio (A/F)									
Overall Heating Efficiency:	67.88%		Dry Molecular Weight (M _d)	29.22										
Combustion Efficiency:	99.50%		Dry Moles Exhaust Gas (N _g):	1036.28		%HC						Combustion Efficiency:		
Heat Transfer Efficiency:	68.22%		Air Fuel Ratio (A/F)	29.77	0.8							Total Input (kJ):		
												Total Output (kJ):		
Heat Output:	12,478 Btu/h		13,154 kJ/h									Efficiency:		
Heat Input:	18,382 Btu/h		19,378 kJ/h									Total CO (g):		
Burn Duration:	2.00	h												
Burn Rate:	2.11	lb/h	0.958	kg/h										
Stack Temp:	276.0	Deg. F	135.5	Deg. C										
	101.2%	69.1%	69.9%	38.82	1.00	50.00	0.96	50.00	38756	4.06	6.87	2.74	20236.00	
	Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry		Fuel Properties				
	Eff	Transfer	Eff	Fuel	Now	Consumed	Now	Consumed	Total	Carbon	Hydrogen	Oxygen	Calorific	
(C)	%	%	%	Ratio	Wt	x	Wt _{dn}	y	Input	/12= [a]	/1= [b]	/16= [c]	Value	
	100.4%	75.9%	76.2%	17.6	2.01	0.00	1.92	0.00	0	4.06	6.87	2.74	20236.00	
	100.6%	74.1%	74.6%	24.4	1.84	8.33	1.76	8.33	4844	4.06	6.87	2.74	20236.00	
	101.1%	69.1%	69.8%	36.6	1.67	16.67	1.60	16.67	3230	4.06	6.87	2.74	20236.00	
	101.5%	67.3%	68.3%	40.8	1.50	25.00	1.44	25.00	3230	4.06	6.87	2.74	20236.00	
	101.5%	67.7%	68.6%	42.6	1.34	33.33	1.28	33.33	3230	4.06	6.87	2.74	20236.00	
	101.3%	66.5%	67.4%	45.5	1.17	41.67	1.12	41.67	3230	4.06	6.87	2.74	20236.00	
	101.4%	67.5%	68.4%	44.6	1.00	50.00	0.96	50.00	3230	4.06	6.87	2.74	20236.00	
	101.2%	69.0%	69.8%	41.7	0.84	58.33	0.80	58.33	3230	4.06	6.87	2.74	20236.00	
	101.5%	68.2%	69.2%	43.5	0.67	66.67	0.64	66.67	3230	4.06	6.87	2.74	20236.00	
	101.5%	67.3%	68.3%	44.1	0.50	75.00	0.48	75.00	3230	4.06	6.87	2.74	20236.00	
	101.3%	68.2%	69.2%	41.9	0.33	83.33	0.32	83.33	3230	4.06	6.87	2.74	20236.00	
	100.9%	69.2%	69.8%	40.1	0.17	91.67	0.16	91.67	3230	4.06	6.87	2.74	20236.00	
	101.2%	68.3%	69.2%	41.4	0.00	100.00	0.00	100.00	1615	4.06	6.87	2.74	20236.00	

Appendix B Data and Calculation forms

[illegible]

Appendix B Data and Calculation forms

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 120
Output Category: Med

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	67.9%	73.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	68%	73.6%

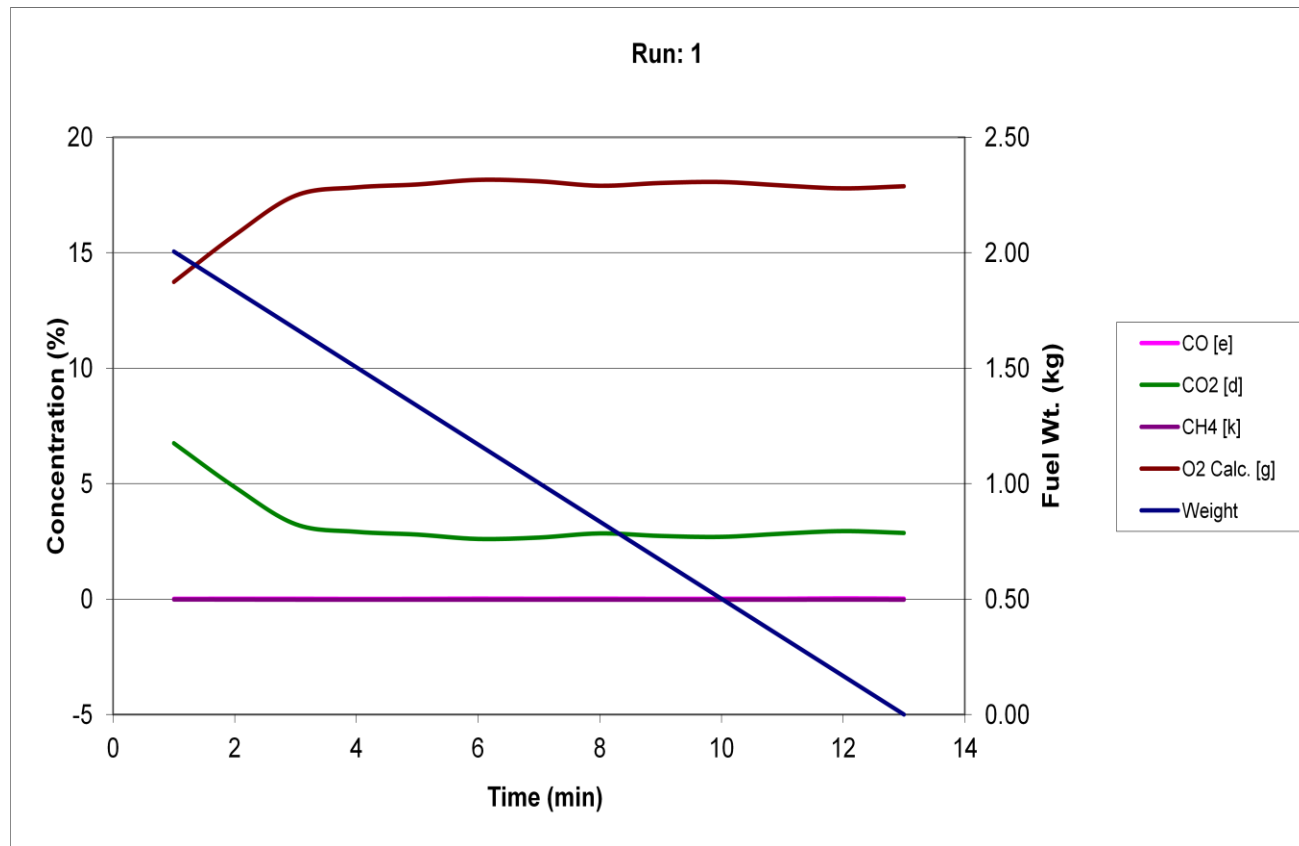
Output Rate (kJ/h)	13,154	12,478	(Btu/h)
Burn Rate (kg/h)	0.96	2.11	(lb/h)
Input (kJ/h)	19,378	18,382	(Btu/h)

Test Load Weight (dry kg)	1.92	4.22	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	13		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.22	0.50
g/kg Dry Fuel	3.02	6.81
g/h	2.89	6.52
lb/MM Btu Output	0.51	1.15

Air/Fuel Ratio (A/F)	29.77
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Appendix B Data and Calculation forms



Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

Appendix B Data and Calculation forms

Minimum burn rate results

VERSION: 2.4		2010-04-15																
Manufacturer: SBI				Appliance Type: Pellet		(Cat, Non-Cat, Pellet)												
Model: ECO-55																		
Date: 01-11-2016				Temp. Units		F (F or C)				Default Fuel Values								
Run: 1				Weight Units		lb (kg or lb)						D. Fir		Oak				
Control #: G102747001										HHV (kJ/kg)		19,810		19,887				
Test Duration: 180										%C		48.73		50				
Output Category: Min						Fuel Data				%H		6.87		6.6				
						D. Fir				%O		43.9		42.9				
Wood Moisture (% wet):		4.50				HHV		20,236 kJ/kg		%Ash		0.5		0.5				
Load Weight (lb wet):		3.57				%C		48.73										
Burn Rate (dry kg/h):		0.52				%H		6.87										
Total Particulate Emissions:		5.78 g				%O		43.785										
						%Ash		0.615										
		Averages		0.03		1.77		19.16		195.96		72.28						
Elapsed Time (min)		Fuel Weight Remaining (lb)		Flue Gas Composition (%)			Temp. (°F)											
				CO			CO ₂			O ₂			Flue Gas			Room Temp		
0		3.57		0.02			2.86			18.09			273.5			73.0		
10		3.41		0.03			2.07			18.83			212.5			72.7		
20		3.22		0.03			1.78			19.19			195.8			72.5		
30		2.99		0.03			1.75			19.28			196.7			72.4		
40		2.77		0.05			1.82			19.64			197.3			72.3		
50		2.55		0.02			1.70			18.94			195.0			72.8		
60		2.37		0.02			1.67			18.80			186.5			72.0		
70		2.16		0.04			1.63			19.47			190.9			72.1		
80		1.97		0.02			1.55			19.07			181.9			71.8		
90		1.77		0.02			1.76			19.12			193.0			71.9		
100		1.57		0.03			1.61			19.42			189.4			72.3		
110		1.36		0.02			1.69			19.25			192.9			72.5		
120		1.18		0.02			1.71			19.18			184.0			72.0		
130		0.94		0.02			1.71			19.12			195.3			72.4		
140		0.76		0.02			1.66			19.42			187.5			72.1		
150		0.58		0.03			1.62			19.35			180.8			72.2		
160		0.36		0.03			1.68			19.43			195.1			72.1		
170		0.17		0.03			1.63			19.32			185.5			71.8		
180		0.00		0.02			1.71			19.12			189.7			72.4		

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

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Appendix B Data and Calculation forms

SUMS							AVERAGE	SUMS						
2088.62	17100.40	3299.57	68525.54	-10736.16	31555.74	2305.70	6007.34	9500.93	-622.47	10123.4	22547.3	-622.5	28.2	-16.3
Energy Losses (kJ/kg of Dry Fuel)							Total							
Flue Gas Constituent							Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
181.23	853.74	81.95	3640.03	-331.28	1689.35	125.27	6240.29	0.00	0	0.00	0	0	0.00	0.00
124.56	855.12	144.20	3485.04	-465.69	1661.66	122.17	5927.06	654.89	-35	690.38	1581	-35	1.56	-0.92
109.49	890.31	171.45	3570.07	-549.73	1659.01	121.33	5971.94	543.41	-34	577.80	1298	-34	1.53	-0.90
109.97	910.85	212.21	3646.66	-540.45	1658.73	121.38	6119.36	596.60	-32	628.59	1376	-32	2.03	-0.94
109.71	869.91	285.88	3497.73	-474.65	1652.38	121.42	6062.37	577.91	-18	595.96	1351	-18	2.68	-0.81
109.35	935.61	103.56	3733.75	-618.56	1665.40	121.28	6050.39	524.33	-45	568.87	1229	-45	0.88	-0.96
101.84	889.33	149.70	3544.37	-607.42	1658.89	120.89	5857.61	494.93	-39	533.55	1215	-39	1.24	-0.92
104.82	939.04	248.56	3734.86	-573.65	1658.43	121.11	6233.17	540.17	-28	568.35	1213	-28	2.12	-0.89
97.73	926.22	167.25	3667.01	-656.36	1660.83	120.66	5983.34	505.56	-41	546.83	1204	-41	1.39	-0.99
107.93	889.15	128.30	3561.07	-580.28	1660.63	121.22	5888.02	510.26	-39	549.36	1243	-39	1.09	-0.90
103.53	940.29	222.78	3735.38	-596.79	1659.60	121.02	6185.81	549.47	-33	582.68	1248	-33	1.95	-0.95
107.33	924.38	134.33	3687.47	-606.72	1662.89	121.18	6030.85	509.57	-40	549.42	1200	-40	1.12	-0.92
99.41	846.09	154.91	3379.99	-587.03	1655.00	120.76	5669.12	515.85	-39	555.13	1325	-39	1.39	-0.96
109.42	929.97	159.04	3714.10	-585.06	1662.46	121.32	6111.23	556.08	-39	594.80	1285	-39	1.42	-0.95
102.54	901.11	164.47	3589.38	-604.18	1659.19	120.93	5933.45	462.78	-34	497.03	1116	-34	1.26	-0.84
95.91	866.21	212.19	3443.64	-597.44	1653.74	120.59	5794.84	502.18	-33	535.56	1251	-33	1.81	-0.93
108.57	940.53	238.55	3750.96	-556.26	1659.46	121.32	6263.12	556.34	-28	584.56	1241	-28	2.08	-0.89
100.62	902.18	197.67	3588.12	-600.49	1657.58	120.84	5966.52	685.11	-46	731.33	1638	-46	2.23	-1.24
104.67	890.35	122.58	3555.89	-604.13	1660.52	121.03	5850.92	215.49	-18	233.20	530	-18	0.44	-0.40

Appendix B Data and Calculation forms

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 180
Output Category: Min

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	67.2%	72.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	67%	72.8%

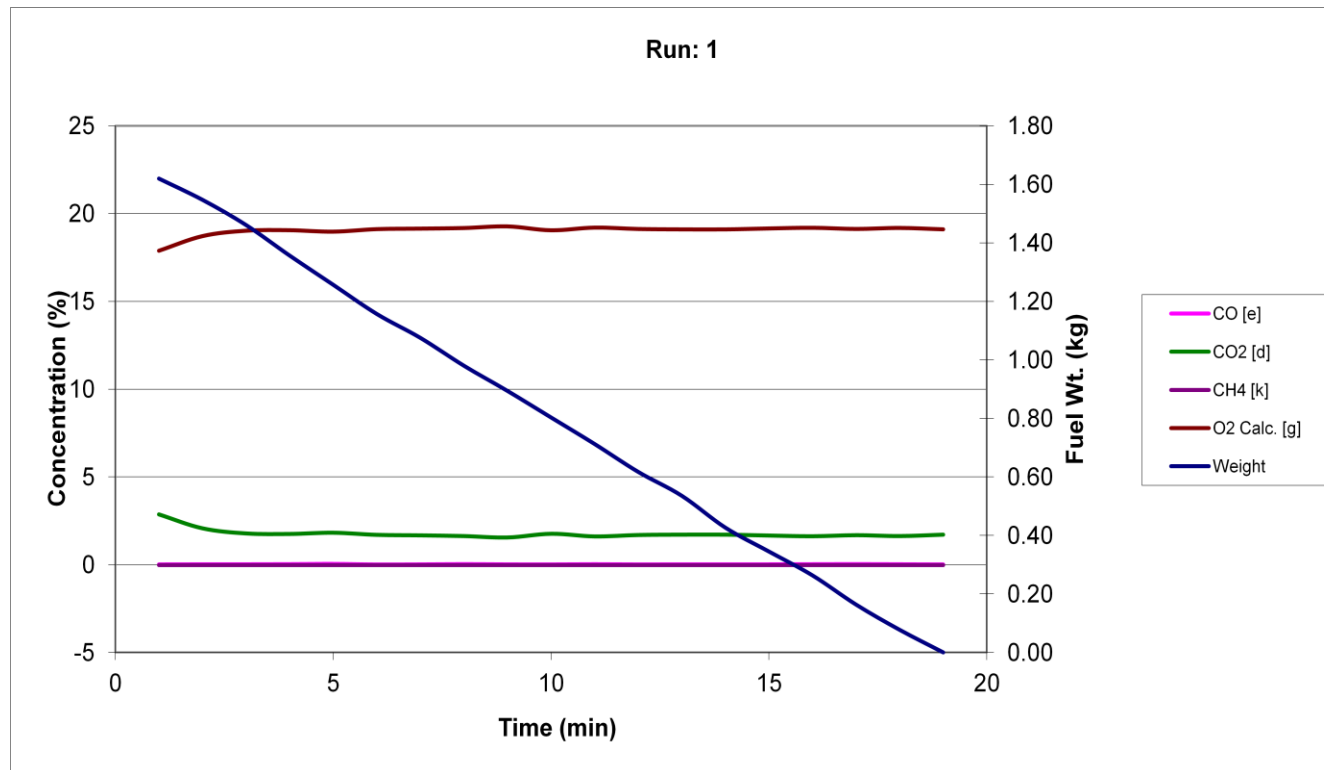
Output Rate (kJ/h)	7,008	6,648	(Btu/h)
Burn Rate (kg/h)	0.52	1.14	(lb/h)
Input (kJ/h)	10,434	9,898	(Btu/h)

Test Load Weight (dry kg)	1.55	3.41	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	28		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.27	1.34
g/kg Dry Fuel	3.74	18.25
g/h	1.93	9.41
lb/MM Btu Output	0.64	3.12

Air/Fuel Ratio (A/F)	47.06
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Appendix B Data and Calculation forms



Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

Appendix B Data and Calculation forms



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Eco-55 Series

Project #: DP-07

Sample ID # ECO-55-A1

Date: 2016-11-01

Engineer: Claude Pelland Run #: 1

Sample Train #: 1A

Balance Equipment #: SBI-206

Thermo/Hygrometer Equipment #: SBI-212

Front Filter #	1	Tare:	0.1220	Preliminary Wt :	0.1242	
Rear Filter #	2	Tare:	0.1222	Preliminary Wt :	0.1223	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :		2016-11-01/18:32				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:46	4.0	68.7	0.1242	100mg Ref = 0.1000 Read. = 0.1000	
				0.1223		
2016-11-04	8:47	3.8	66.8	0.1242	100mg Ref = 0.1000 Read. = 0.1001	
				0.1224		
Probe #:	21	Tare:	147.7586	Preliminary Wt :	147.7606	
Date/Time in dessicator :		2016-11-01/18:36				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:39	4.0	68.7	147.7593	200g Ref = 200.0011 Read. = 200.0008	
2016-11-04	8:42	3.8	66.8	147.7589	200g Ref = 200.0011 Read. = 200.0010	
2016-11-04	14:45	5.0	67.1	147.7590	200g Ref = 200.0011 Read. = 200.0010	

Date: 2016-11-01

Engineer Signature: _____

Appendix B Data and Calculation forms



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Eco-55 Series

Project #: DP-07

Sample ID #: ECO-55-A1

Date: 2016-11-01

Engineer: Claude Pelland Run #: 1

Sample Train #: 1B

Balance Equipment #: SBI-206

Thermo/Hygrometer Equipment #: SBI-212

Front Filter #	3	Tare:	0.1216	Preliminary Wt :	0.1238	
Rear Filter #	4	Tare:	0.1224	Preliminary Wt :	0.1225	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :		2016-11-01/18:40				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:48	4.0	68.7	0.1239	100mg Ref = 0.1000 Read. = 0.1000	
				0.1225		
2016-11-04	8:49	3.8	66.8	0.1238	100mg Ref = 0.1000 Read. = 0.1001	
				0.1226		
Probe #:	22	Tare:	136.8113	Preliminary Wt :	136.8118	
Date/Time in dessicator :		2016-11-01/18:44				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:41	4.0	68.7	136.8122	200g Ref = 200.0011 Read. = 200.0008	
2016-11-04	8:44	3.8	66.8	136.8117	200g Ref = 200.0011 Read. = 200.0010	
2016-11-04	14:46	5.0	67.1	136.8117	200g Ref = 200.0011 Read. = 200.0010	

Date: 2016-11-01

Engineer Signature: _____

Appendix B Data and Calculation forms



SAMPLE WEIGHT DETERMINATION

Client: SBI

Model: Eco-55 Series

Project #: DP-07

Sample ID # ECO-55-A1

Date: 2016-11-01

Engineer: Claude Pelland Run #: 1

Sample Train #: 1C

Balance Equipment #: SBI-206

Thermo/Hygrometer Equipment #: SBI-212

Front Filter #	5	Tare:	0.1220	Preliminary Wt :	0.1223	
Rear Filter #	6	Tare:	0.1216	Preliminary Wt :	0.1216	
Seal Set #	N/A	Tare:	N/A	Preliminary Wt :	N/A	
Date/Time in dessicator :		2016-11-01/11:37				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:51	4.0	68.7	0.1225	100mg Ref = 0.1000 Read. = 0.1000	
				0.1216		
2016-11-04	8:52	3.8	66.8	0.1225	100mg Ref = 0.1000 Read. = 0.1001	
				0.1216		
Probe #:	25	Tare:	136.2137	Preliminary Wt :	136.2165	
Date/Time in dessicator :		2016-11-01/11:40				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit	Initials
2016-11-03	11:43	4.0	68.7	136.2151	200g Ref = 200.0011 Read. = 200.0008	
2016-11-04	8:45	3.8	66.8	136.2140	200g Ref = 200.0011 Read. = 200.0010	
2016-11-04	14:48	5.0	67.1	136.2139	200g Ref = 200.0011 Read. = 200.0010	

Date: 2016-11-01

Engineer Signature: _____

Appendix B Data and Calculation forms

Calibration records

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206
Hygrometer ID:	SBI-212

Calibration

Date (YYYY-MM-DD)	Time (HH:MM)	Calibration weight ID	Calibration weight true mass	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)
2016-10-24	14:44	SBI-238	200.0011	200.0013	43.6	66.9
2016-10-24	14:45	SBI-238	10.0001	10.0002	44.9	67.1
2016-10-24	14:47	SBI-237	0.1000	0.1000	44.4	67.3
2016-10-25	13:17	SBI-238	200.0011	200.0011	41.6	67.6
2016-10-25	13:21	SBI-238	10.0001	10.0001	41.6	67.6
2016-10-25	13:22	SBI-237	0.1000	0.1000	41.6	67.6
2016-10-26	15:54	SBI-238	200.0011	200.0007	40.9	67.7
2016-10-26	15:55	SBI-238	10.0001	10.0000	40.9	67.7
2016-10-26	15:56	SBI-237	0.1000	0.1000	40.9	67.7
2016-10-27	17:08	SBI-238	200.0011	200.0007	46.3	68.4
2016-10-27	17:09	SBI-238	10.0001	10.0000	46.3	68.4
2016-10-27	17:10	SBI-237	0.1000	0.1001	46.3	68.4
2016-10-28	08:33	SBI-238	200.0011	200.0009	41.9	66.9
2016-10-28	08:34	SBI-238	10.0001	10.0001	41.9	66.9
2016-10-28	08:35	SBI-237	0.1000	0.1000	41.9	66.9
2016-10-30	13:58	SBI-238	200.0011	200.0013	37.6	67.1
2016-10-30	13:59	SBI-238	10.0001	10.0001	37.6	67.1
2016-10-30	14:00	SBI-237	0.1000	0.1001	37.6	67.1
2016-10-31	06:21	SBI-238	200.0011	200.0011	36.7	67.5
2016-10-31	06:22	SBI-238	10.0001	10.0000	36.7	67.5
2016-10-31	06:23	SBI-237	0.1000	0.1000	36.7	67.5

Appendix B Data and Calculation forms

Calibration records 2

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206
Hygrometer ID:	SBI-212

Calibration

[illegible]

Appendix B Data and Calculation forms

Filters weights

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-25	13:30	1	0.1221	2.5	65.9	N/A
2016-10-25	13:56	2	0.1224	2.5	65.9	N/A
2016-10-25	13:57	3	0.1218	2.5	65.9	N/A
2016-10-25	13:58	4	0.1227	2.5	65.9	N/A
2016-10-25	13:59	5	0.1222	2.5	65.9	N/A
2016-10-25	14:00	6	0.1218	2.5	65.9	N/A
2016-10-25	14:01	7	0.1220	2.5	65.9	N/A
2016-10-25	14:02	8	0.1221	2.5	65.9	N/A
2016-10-25	14:03	9	0.1225	2.5	65.9	N/A
2016-10-25	14:03	10	0.1221	2.5	65.9	N/A
2016-10-25	14:04	11	0.1212	2.5	65.9	N/A
2016-10-25	14:05	12	0.1225	2.5	65.9	N/A
2016-10-25	14:07	13	0.1223	2.5	65.9	N/A
2016-10-25	14:08	14	0.1215	2.5	65.9	N/A
2016-10-25	14:09	15	0.1222	2.5	65.9	N/A
2016-10-25	14:09	16	0.1226	2.5	65.9	N/A
2016-10-25	14:10	17	0.1219	2.5	65.9	N/A
2016-10-25	14:11	18	0.1226	2.5	65.9	N/A
2016-10-25	14:12	19	0.1220	2.5	65.9	N/A
2016-10-25	14:13	20	0.1224	2.5	65.9	N/A
2016-10-25	14:27	21	0.1226	2.5	65.9	N/A
2016-10-25	14:28	22	0.1222	2.5	65.9	N/A
2016-10-25	14:33	23	0.1220	2.5	65.9	N/A
2016-10-25	14:34	24	0.1232	2.5	65.9	N/A

Appendix B Data and Calculation forms

Filters weights 2

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-25	14:35	25	0.1225	2.5	65.9	N/A
2016-10-25	14:36	26	0.1223	2.5	65.9	N/A
2016-10-25	14:37	27	0.1227	2.5	65.9	N/A
2016-10-25	14:37	28	0.1228	2.5	65.9	N/A
2016-10-25	14:38	29	0.1223	2.5	65.9	N/A
2016-10-25	14:39	30	0.1231	2.5	65.9	N/A
2016-10-25	14:40	31	0.1219	2.5	65.9	N/A
2016-10-25	14:40	32	0.1221	2.5	65.9	N/A
2016-10-25	14:41	33	0.1219	2.5	65.9	N/A
2016-10-25	14:42	34	0.1216	2.5	65.9	N/A
2016-10-25	14:42	35	0.1229	2.5	65.9	N/A
2016-10-25	14:43	36	0.1227	2.5	65.9	N/A
2016-10-25	14:48	37	0.0846	2.5	65.9	N/A
2016-10-25	14:48	38	0.0838	2.5	65.9	N/A
2016-10-25	14:49	39	0.0832	2.5	65.9	N/A
2016-10-25	14:49	40	0.0843	2.5	65.9	N/A
2016-10-25	14:50	41	0.0830	2.5	65.9	N/A
2016-10-25	14:50	42	0.0837	2.5	65.9	N/A
2016-10-25	14:51	43	0.0843	2.5	65.9	N/A
2016-10-25	14:51	44	0.0840	2.5	65.9	N/A
2016-10-25	14:52	45	0.0844	2.5	65.9	N/A
2016-10-25	14:52	46	0.0849	2.5	65.9	N/A
2016-10-25	14:53	47	0.0848	2.5	65.9	N/A
2016-10-25	14:53	48	0.0846	2.5	65.9	N/A

Appendix B Data and Calculation forms

Filters weights 3

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-25	14:54	49	0.1211	2.5	65.9	N/A
2016-10-25	14:55	50	0.1209	2.5	65.9	N/A
2016-10-25	14:56	51	0.1216	2.5	65.9	N/A
2016-10-25	14:56	52	0.1213	2.5	65.9	N/A
2016-10-25	14:57	53	0.1210	2.5	65.9	N/A
2016-10-25	14:57	54	0.1221	2.5	65.9	N/A
2016-10-25	14:58	55	0.1211	2.5	65.9	N/A
2016-10-25	14:58	56	0.1215	2.5	65.9	N/A
2016-10-25	14:59	57	0.1220	2.5	65.9	N/A
2016-10-25	15:00	58	0.1220	2.5	65.9	N/A
2016-10-25	15:00	59	0.1217	2.5	65.9	N/A
2016-10-25	15:00	60	0.1212	2.5	65.9	N/A
2016-10-26	16:57	1	0.1221	3.4	66.8	N/A
2016-10-26	16:58	2	0.1222	3.4	66.8	N/A
2016-10-26	16:58	3	0.1217	3.4	66.8	N/A
2016-10-26	16:59	4	0.1224	3.4	66.8	N/A
2016-10-26	17:00	5	0.1222	3.4	66.8	N/A
2016-10-26	17:00	6	0.1217	3.4	66.8	N/A
2016-10-26	17:01	7	0.1219	3.4	66.8	N/A
2016-10-26	17:02	8	0.1220	3.4	66.8	N/A
2016-10-26	17:02	9	0.1225	3.4	66.8	N/A
2016-10-26	17:03	10	0.1221	3.4	66.8	N/A
2016-10-26	17:03	11	0.1211	3.4	66.8	N/A
2016-10-26	17:04	12	0.1226	3.4	66.8	N/A

Appendix B Data and Calculation forms

Filters weights 4

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-26	17:06	13	0.1222	3.4	66.8	N/A
2016-10-26	17:08	14	0.1214	3.4	66.8	N/A
2016-10-26	17:08	15	0.1222	3.4	66.8	N/A
2016-10-26	17:09	16	0.1226	3.4	66.8	N/A
2016-10-26	17:09	17	0.1217	3.4	66.8	N/A
2016-10-26	17:10	18	0.1226	3.4	66.8	N/A
2016-10-26	17:11	19	0.1220	3.4	66.8	N/A
2016-10-26	17:12	20	0.1225	3.4	66.8	N/A
2016-10-26	17:12	21	0.1227	3.4	66.8	N/A
2016-10-26	17:13	22	0.1223	3.4	66.8	N/A
2016-10-26	17:14	23	0.1220	3.4	66.8	N/A
2016-10-26	17:14	24	0.1233	3.4	66.8	N/A
2016-10-26	17:15	25	0.1225	3.4	66.8	N/A
2016-10-26	17:16	26	0.1222	3.4	66.8	N/A
2016-10-26	17:17	27	0.1226	3.4	66.8	N/A
2016-10-26	17:17	28	0.1227	3.4	66.8	N/A
2016-10-26	17:18	29	0.1222	3.4	66.8	N/A
2016-10-26	17:18	30	0.1230	3.4	66.8	N/A
2016-10-26	17:19	31	0.1219	3.4	66.8	N/A
2016-10-26	17:20	32	0.1221	3.4	66.8	N/A
2016-10-26	17:21	33	0.1219	3.4	66.8	N/A
2016-10-26	17:23	34	0.1216	3.4	66.8	N/A
2016-10-26	17:23	35	0.1230	3.4	66.8	N/A
2016-10-26	17:24	36	0.1226	3.4	66.8	N/A

Appendix B Data and Calculation forms

Filters weights 5

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-26	17:26	37	0.0846	3.4	66.8	N/A
2016-10-26	17:26	38	0.0837	3.4	66.8	N/A
2016-10-26	17:27	39	0.0833	3.4	66.8	N/A
2016-10-26	17:28	40	0.0844	3.4	66.8	N/A
2016-10-26	17:29	41	0.0831	3.4	66.8	N/A
2016-10-26	17:29	42	0.0838	3.4	66.8	N/A
2016-10-26	17:30	43	0.0843	3.4	66.8	N/A
2016-10-26	17:31	44	0.0840	3.4	66.8	N/A
2016-10-26	17:31	45	0.0844	3.4	66.8	N/A
2016-10-26	17:32	46	0.0849	3.4	66.8	N/A
2016-10-26	17:32	47	0.0848	3.4	66.8	N/A
2016-10-26	17:33	48	0.0845	3.4	66.8	N/A
2016-10-26	17:33	49	0.1211	3.4	66.8	N/A
2016-10-26	17:34	50	0.1209	3.4	66.8	N/A
2016-10-26	17:34	51	0.1217	3.4	66.8	N/A
2016-10-26	17:35	52	0.1214	3.4	66.8	N/A
2016-10-26	17:36	53	0.1211	3.4	66.8	N/A
2016-10-26	17:36	54	0.1221	3.4	66.8	N/A
2016-10-26	17:36	55	0.1210	3.4	66.8	N/A
2016-10-26	17:37	56	0.1215	3.4	66.8	N/A
2016-10-26	17:37	57	0.1220	3.4	66.8	N/A
2016-10-26	17:38	58	0.1220	3.4	66.8	N/A
2016-10-26	17:38	59	0.1217	3.4	66.8	N/A
2016-10-26	17:39	60	0.1214	3.4	66.8	N/A

Appendix B Data and Calculation forms

Filters weights 6

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Filter ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-28	16:56	1	0.1221	3.5	66.7	N/A
2016-10-28	16:57	2	0.1222	3.5	66.7	N/A
2016-10-28	16:57	3	0.1216	3.5	66.7	N/A
2016-10-28	16:58	4	0.1224	3.5	66.7	N/A
2016-10-28	16:59	5	0.1220	3.5	66.7	N/A
2016-10-28	17:00	6	0.1216	3.5	66.7	N/A
2016-10-28	17:00	7	0.1218	3.5	66.7	N/A
2016-10-28	17:01	8	0.1219	3.5	66.7	N/A
2016-10-28	17:02	9	0.1224	3.5	66.7	N/A
2016-10-28	17:03	10	0.1220	3.5	66.7	N/A
2016-10-30	14:27	1	0.1220	2.6	66.3	1
2016-10-30	14:28	2	0.1222	2.6	66.3	1
2016-10-30	14:28	3	0.1216	2.6	66.3	1
2016-10-30	14:29	4	0.1224	2.6	66.3	1
2016-10-30	14:30	5	0.1220	2.6	66.3	1
2016-10-30	14:31	6	0.1216	2.6	66.3	1
2016-10-30	14:32	7	0.1219	2.6	66.3	1
2016-10-30	14:33	8	0.1219	2.6	66.3	1
2016-10-30	14:34	9	0.1223	2.6	66.3	N/A
2016-10-30	14:34	10	0.1220	2.6	66.3	N/A
2016-10-30	14:35	18	0.1225	2.6	66.3	N/A
2016-10-30	14:36	30	0.1230	2.6	66.3	N/A

Appendix B Data and Calculation forms

Filters weights Final

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

[illegible]

Appendix B Data and Calculation forms

Probe weights

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-24	15:28	17	137.0198	N/A	N/A	N/A
2016-10-24	15:35	18	139.7196	N/A	N/A	N/A
2016-10-24	15:42	19	140.1499	N/A	N/A	N/A
2016-10-24	15:44	20	139.1616	N/A	N/A	N/A
2016-10-24	15:47	21	147.7610	N/A	N/A	N/A
2016-10-24	15:51	22	136.8146	N/A	N/A	N/A
2016-10-24	15:53	23	136.0041	N/A	N/A	N/A
2016-10-24	15:55	24	139.5794	N/A	N/A	N/A
2016-10-24	15:57	25	136.2166	N/A	N/A	N/A
2016-10-24	16:00	26	108.4413	N/A	N/A	N/A
2016-10-24	16:03	27	136.2286	N/A	N/A	N/A
2016-10-24	16:05	28	108.5198	N/A	N/A	N/A
2016-10-24	16:11	29	136.6485	N/A	N/A	N/A
2016-10-24	16:13	30	136.0147	N/A	N/A	N/A
2016-10-24	16:15	31	107.9008	N/A	N/A	N/A
2016-10-24	16:16	32	108.4076	N/A	N/A	N/A
2016-10-25	13:26	17	137.0188	2.5	65.9	N/A
2016-10-25	13:28	18	139.7188	2.5	65.9	N/A
2016-10-25	13:39	19	140.1492	2.5	65.9	N/A
2016-10-25	13:40	20	139.1604	2.5	65.9	N/A
2016-10-25	13:41	21	147.7609	2.5	65.9	N/A
2016-10-25	13:42	22	136.8141	2.5	65.9	N/A
2016-10-25	13:43	23	136.0027	2.5	65.9	N/A
2016-10-25	13:44	24	139.5788	2.5	65.9	N/A

Appendix B Data and Calculation forms

Probe weights 2

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-25	13:46	25	136.2164	2.5	65.9	N/A
2016-10-25	13:48	26	108.4402	2.5	65.9	N/A
2016-10-25	13:49	27	136.2260	2.5	65.9	N/A
2016-10-25	13:50	28	108.5187	2.5	65.9	N/A
2016-10-25	13:51	29	136.6479	2.5	65.9	N/A
2016-10-25	13:52	30	136.0133	2.5	65.9	N/A
2016-10-25	13:53	31	107.9001	2.5	65.9	N/A
2016-10-25	13:54	32	108.4070	2.5	65.9	N/A
2016-10-26	16:00	17	137.0172	3.4	66.8	N/A
2016-10-26	16:00	18	139.7174	3.4	66.8	N/A
2016-10-26	16:02	19	140.1478	3.4	66.8	N/A
2016-10-26	16:02	20	139.1582	3.4	66.8	N/A
2016-10-26	16:03	21	147.7600	3.4	66.8	N/A
2016-10-26	16:05	22	136.8130	3.4	66.8	N/A
2016-10-26	16:05	23	136.0007	3.4	66.8	N/A
2016-10-26	16:06	24	139.5759	3.4	66.8	N/A
2016-10-26	16:07	25	136.2153	3.4	66.8	N/A
2016-10-26	16:08	26	108.4391	3.4	66.8	N/A
2016-10-26	16:09	27	136.2223	3.4	66.8	N/A
2016-10-26	16:09	28	108.5174	3.4	66.8	N/A
2016-10-26	16:10	29	136.6466	3.4	66.8	N/A
2016-10-26	16:11	30	136.0118	3.4	66.8	N/A
2016-10-26	16:12	31	107.8983	3.4	66.8	N/A
2016-10-26	16:13	32	108.4058	3.4	66.8	N/A

Appendix B Data and Calculation forms

Probe weights 3

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-27	17:24	17	137.0172	7.3	66.6	N/A
2016-10-27	17:26	18	139.7169	7.3	66.6	N/A
2016-10-27	17:27	19	140.1474	7.3	66.6	N/A
2016-10-27	17:29	20	139.1580	7.3	66.6	N/A
2016-10-27	17:30	21	147.7603	7.3	66.6	N/A
2016-10-27	17:31	22	136.8128	7.3	66.6	N/A
2016-10-27	17:33	23	136.0006	7.3	66.6	N/A
2016-10-27	17:34	24	139.5753	7.3	66.6	N/A
2016-10-27	17:35	25	136.2149	7.3	66.6	N/A
2016-10-27	17:37	26	108.4386	7.3	66.6	N/A
2016-10-27	17:38	27	136.2198	7.3	66.6	N/A
2016-10-27	17:39	28	108.5165	7.3	66.6	N/A
2016-10-27	17:40	29	136.6460	7.3	66.6	N/A
2016-10-27	17:42	30	136.0113	7.3	66.6	N/A
2016-10-27	17:43	31	107.8974	7.3	66.6	N/A
2016-10-27	17:44	32	108.4054	7.3	66.6	N/A
2016-10-28	08:40	17	137.0160	2.7	65.2	N/A
2016-10-28	08:41	18	139.7162	2.7	65.2	N/A
2016-10-28	08:42	19	140.1470	2.7	65.2	N/A
2016-10-28	08:44	20	139.1563	2.7	65.2	N/A
2016-10-28	08:45	21	147.7595	2.7	65.2	N/A
2016-10-28	08:46	22	136.8126	2.7	65.2	N/A
2016-10-28	08:47	23	135.9991	2.7	65.2	N/A
2016-10-28	08:48	24	139.5742	2.7	65.2	N/A

Appendix B Data and Calculation forms

Probe weights 4

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-28	08:49	25	136.2150	2.7	65.2	N/A
2016-10-28	08:51	26	108.4386	2.7	65.2	N/A
2016-10-28	08:52	27	136.2187	2.7	65.2	N/A
2016-10-28	08:53	28	108.5162	2.7	65.2	N/A
2016-10-28	08:54	29	136.6460	2.7	65.2	N/A
2016-10-28	08:56	30	136.0114	2.7	65.2	N/A
2016-10-28	08:57	31	107.8974	2.7	65.2	N/A
2016-10-28	08:58	32	108.4053	2.7	65.2	N/A
2016-10-28	16:37	17	137.0161	3.5	66.7	N/A
2016-10-28	16:38	18	139.7160	3.5	66.7	N/A
2016-10-28	16:41	19	140.1470	3.5	66.7	N/A
2016-10-28	16:41	20	139.1565	3.5	66.7	N/A
2016-10-28	16:43	21	147.7600	3.5	66.7	N/A
2016-10-28	16:43	22	136.8127	3.5	66.7	N/A
2016-10-28	16:44	23	135.9993	3.5	66.7	N/A
2016-10-28	16:45	24	139.5743	3.5	66.7	N/A
2016-10-28	16:47	25	136.2151	3.5	66.7	N/A
2016-10-28	16:48	26	108.4384	3.5	66.7	N/A
2016-10-28	16:49	27	136.2182	3.5	66.7	N/A
2016-10-28	16:50	28	108.5163	3.5	66.7	N/A
2016-10-28	16:50	29	136.6461	3.5	66.7	N/A
2016-10-28	16:51	30	136.0113	3.5	66.7	N/A
2016-10-28	16:52	31	107.8973	3.5	66.7	N/A
2016-10-28	16:53	32	108.4055	3.5	66.7	N/A

Appendix B Data and Calculation forms

Probe weights 5

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-30	14:03	17	137.0147	2.6	66.3	N/A
2016-10-30	14:05	18	139.7150	2.6	66.3	N/A
2016-10-30	14:07	19	140.1452	2.6	66.3	N/A
2016-10-30	14:07	20	139.1549	2.6	66.3	N/A
2016-10-30	14:08	21	147.7599	2.6	66.3	N/A
2016-10-30	14:09	22	136.8122	2.6	66.3	N/A
2016-10-30	14:10	23	135.9978	2.6	66.3	N/A
2016-10-30	14:11	24	139.5722	2.6	66.3	N/A
2016-10-30	14:12	25	136.2143	2.6	66.3	N/A
2016-10-30	14:16	26	108.4355	2.6	66.3	N/A
2016-10-30	14:17	27	136.2142	2.6	66.3	N/A
2016-10-30	14:18	28	108.5153	2.6	66.3	N/A
2016-10-30	14:18	29	136.6451	2.6	66.3	N/A
2016-10-30	14:19	30	136.0103	2.6	66.3	N/A
2016-10-30	14:20	31	107.8956	2.6	66.3	N/A
2016-10-30	14:21	32	108.4044	2.6	66.3	N/A
2016-10-31	06:24	17	137.0141	2.3	66.1	N/A
2016-10-31	06:25	18	139.7148	2.3	66.1	N/A
2016-10-31	06:26	19	140.1446	2.3	66.1	N/A
2016-10-31	06:27	20	139.1543	2.3	66.1	N/A
2016-10-31	06:28	21	147.7593	2.3	66.1	N/A
2016-10-31	06:30	22	136.8120	2.3	66.1	N/A
2016-10-31	06:31	23	135.9970	2.3	66.1	N/A
2016-10-31	06:32	24	139.5715	2.3	66.1	N/A

Appendix B Data and Calculation forms

Probe weights 6

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

Date (YYYY-MM-DD)	Time (HH:MM)	Probe ID	Reading (g)	Relative Humidity (%)	Ambiant temperature (°F)	Run number
2016-10-31	06:34	25	136.2141	2.3	66.1	N/A
2016-10-31	06:35	26	108.4348	2.3	66.1	N/A
2016-10-31	06:36	27	136.2124	2.3	66.1	N/A
2016-10-31	06:38	28	108.5147	2.3	66.1	N/A
2016-10-31	06:39	29	136.6444	2.3	66.1	N/A
2016-10-31	06:40	30	136.0098	2.3	66.1	N/A
2016-10-31	06:41	31	107.8950	2.3	66.1	N/A
2016-10-31	06:42	32	108.4042	2.3	66.1	N/A
2016-10-31	17:35	17	137.0139	3.0	67.7	N/A
2016-10-31	17:36	18	139.7143	3.0	67.7	N/A
2016-10-31	17:37	19	140.1440	3.0	67.7	N/A
2016-10-31	17:39	20	139.1537	3.0	67.7	N/A
2016-10-31	17:40	21	147.7588	3.0	67.7	N/A
2016-10-31	17:41	22	136.8115	3.0	67.7	N/A
2016-10-31	17:43	23	135.9967	3.0	67.7	N/A
2016-10-31	17:45	24	139.5709	3.0	67.7	N/A
2016-10-31	17:46	25	136.2139	3.0	67.7	N/A
2016-10-31	17:47	26	108.4348	3.0	67.7	N/A
2016-10-31	17:49	27	136.2117	3.0	67.7	N/A
2016-10-31	17:50	28	108.5142	3.0	67.7	N/A
2016-10-31	17:52	29	136.6444	3.0	67.7	N/A
2016-10-31	17:53	30	136.0098	3.0	67.7	N/A
2016-10-31	17:55	31	107.8949	3.0	67.7	N/A
2016-10-31	17:56	32	108.4038	3.0	67.7	N/A

Appendix B Data and Calculation forms

Probe weights 7

Appendix B Data and Calculation forms

Probe weights 7

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

[illegible]

Appendix B Data and Calculation forms

Probe weights Final

General information

Project:	ECO-55 Series (G102747001)
Project Engineer:	Claude Pelland
Project Engineer Signature:	
Scale ID:	SBI-206

[illegible]

Appendix C

Calibration Documents

Date: 2016-02-04

Equipment: Test bench #4

T2 (Ambiant)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.59	%	
	Ave A.D.	0.29	%
Standard	Reading	A.D.	
70.0	69.79	0.30	
70.0	69.80	0.29	
70.0	69.75	0.36	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.28	%	
	Ave A.D.	0.14	%
Standard	Reading	A.D.	
200.0	199.73	0.14	
200.0	199.72	0.14	
200.0	199.64	0.18	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.03	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
600.0	599.89	0.02	
600.0	599.92	0.01	
600.0	599.86	0.02	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.01	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1000.0	1000.08	0.01	
1000.0	1000.04	0.00	
1000.0	1000.05	0.01	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.02	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1400.0	1400.12	0.01	
1400.0	1400.13	0.01	
1400.0	1400.08	0.01	



Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T3 (Dilution tunnel)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	0.98	%	
	Ave A.D.	0.49	%
Standard	Reading	A.D.	
70.0	69.64	0.51	
70.0	69.67	0.47	
70.0	69.70	0.43	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.44	%	
	Ave A.D.	0.22	%
Standard	Reading	A.D.	
200.0	199.56	0.22	
200.0	199.56	0.22	
200.0	199.56	0.22	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.09	%	
	Ave A.D.	0.04	%
Standard	Reading	A.D.	
600.0	599.76	0.04	
600.0	599.73	0.04	
600.0	599.75	0.04	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.02	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1000.0	999.92	0.01	
1000.0	999.93	0.01	
1000.0	999.91	0.01	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.01	%	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
1400.0	1399.96	0.00	
1400.0	1399.96	0.00	
1400.0	1399.90	0.01	

Vincent Pelletier

Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T4 (Firebox top)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.16	%	
	Ave A.D.	0.58	%
Standard	Reading	A.D.	
70.0	69.58	0.60	
70.0	69.61	0.56	
70.0	69.61	0.56	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.48	%	
	Ave A.D.	0.24	%
Standard	Reading	A.D.	
200.0	199.53	0.24	
200.0	199.51	0.25	
200.0	199.54	0.23	

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	599.70	0.05	
600.0	599.70	0.05	
600.0	599.72	0.05	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.03	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1000.0	999.84	0.02	
1000.0	999.87	0.01	
1000.0	999.88	0.01	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.02	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1400.0	1399.89	0.01	
1400.0	1399.88	0.01	
1400.0	1399.89	0.01	



Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T5 (Firebox back)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.29	%	
	Ave A.D.	0.64	%
Standard	Reading	A.D.	
70.0	69.53	0.67	
70.0	69.57	0.62	
70.0	69.60	0.57	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.54	%	
	Ave A.D.	0.27	%
Standard	Reading	A.D.	
200.0	199.45	0.27	
200.0	199.46	0.27	
200.0	199.42	0.29	

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	599.63	0.06	
600.0	599.60	0.07	
600.0	599.60	0.07	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.05	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1000.0	999.77	0.02	
1000.0	999.77	0.02	
1000.0	999.78	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	1399.82	0.01	



Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T6 (Firebox right)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.57	%	
	Ave A.D.	0.79	%
Standard	Reading	A.D.	
70.0	69.43	0.81	
70.0	69.47	0.76	
70.0	69.48	0.75	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.62	%	
	Ave A.D.	0.31	%
Standard	Reading	A.D.	
200.0	199.36	0.32	
200.0	199.40	0.30	
200.0	199.38	0.31	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.14	%	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
600.0	599.57	0.07	
600.0	599.57	0.07	
600.0	599.55	0.07	

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	999.73	0.03	
1000.0	999.72	0.03	
1000.0	999.72	0.03	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.04	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1400.0	1399.73	0.02	
1400.0	1399.73	0.02	
1400.0	1399.73	0.02	



Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T7 (Firebox left)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.55	%	
	Ave A.D.	0.78	%
Standard	Reading	A.D.	
70.0	69.50	0.71	
70.0	69.41	0.84	
70.0	69.41	0.85	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.67	%	
	Ave A.D.	0.33	%
Standard	Reading	A.D.	
200.0	199.36	0.32	
200.0	199.31	0.35	
200.0	199.33	0.34	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.17	%	
	Ave A.D.	0.09	%
Standard	Reading	A.D.	
600.0	599.48	0.09	
600.0	599.48	0.09	
600.0	599.49	0.08	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.07	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1000.0	999.66	0.03	
1000.0	999.67	0.03	
1000.0	999.68	0.03	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.05	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1400.0	1399.66	0.02	
1400.0	1399.65	0.02	
1400.0	1399.68	0.02	

Vincent Pelletier

Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T8 (Firebox bottom)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.74	%	
	Ave A.D.	0.87	%
Standard	Reading	A.D.	
70.0	69.37	0.89	
70.0	69.41	0.85	
70.0	69.53	0.67	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.71	%	
	Ave A.D.	0.35	%
Standard	Reading	A.D.	
200.0	199.29	0.35	
200.0	199.30	0.35	
200.0	199.24	0.38	

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	599.47	0.09	
600.0	599.45	0.09	
600.0	599.42	0.10	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.08	%	
	Ave A.D.	0.04	%
Standard	Reading	A.D.	
1000.0	999.61	0.04	
1000.0	999.62	0.04	
1000.0	999.62	0.04	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.06	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1400.0	1399.62	0.03	
1400.0	1399.60	0.03	
1400.0	1399.62	0.03	


Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T11 (Probe temp 1)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	2.05	%	
	Ave A.D.	1.02	%
Standard	Reading	A.D.	
70.0	69.27	1.05	
70.0	69.30	1.00	
70.0	69.31	0.99	

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	199.21	0.39	
200.0	199.20	0.40	
200.0	199.19	0.40	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.20	%	
	Ave A.D.	0.10	%
Standard	Reading	A.D.	
600.0	599.41	0.10	
600.0	599.39	0.10	
600.0	599.36	0.11	

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	999.54	0.05	
1000.0	999.52	0.05	
1000.0	999.53	0.05	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.07	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1400.0	1399.55	0.03	
1400.0	1399.54	0.03	
1400.0	1399.54	0.03	


Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T14 (Probe temp 2)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.95	%	
	Ave A.D.	0.98	%
Standard	Reading	A.D.	
70.0	69.35	0.93	
70.0	69.29	1.02	
70.0	69.29	1.02	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.79	%	
	Ave A.D.	0.40	%
Standard	Reading	A.D.	
200.0	199.21	0.40	
200.0	199.21	0.40	
200.0	199.21	0.40	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.21	%	
	Ave A.D.	0.10	%
Standard	Reading	A.D.	
600.0	599.37	0.10	
600.0	599.38	0.10	
600.0	599.35	0.11	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.10	%	
	Ave A.D.	0.05	%
Standard	Reading	A.D.	
1000.0	999.55	0.04	
1000.0	999.41	0.06	
1000.0	999.55	0.05	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.06	%	
	Ave A.D.	0.03	%
Standard	Reading	A.D.	
1400.0	1399.57	0.03	
1400.0	1399.57	0.03	
1400.0	1399.36	0.05	


Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T15 (Spare 1)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.75	%	
	Ave A.D.	0.87	%
Standard	Reading	A.D.	
70.0	69.37	0.90	
70.0	69.41	0.85	
70.0	69.37	0.89	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.70	%	
	Ave A.D.	0.35	%
Standard	Reading	A.D.	
200.0	199.29	0.35	
200.0	199.31	0.35	
200.0	199.29	0.35	

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	599.45	0.09	
600.0	599.48	0.09	
600.0	599.46	0.09	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.07	%	
	Ave A.D.	0.04	%
Standard	Reading	A.D.	
1000.0	999.64	0.04	
1000.0	999.62	0.04	
1000.0	999.62	0.04	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.05	%	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
1400.0	1399.65	0.02	
1400.0	1399.65	0.02	
1400.0	1399.62	0.03	



Vincent Pelletier

Date: 2016-02-04

Equipment: Test bench #4

T2 (Spare 2)

Temperature: 68 F

Accuracy: 0.01

R.H.: 18%

Reference: SBI-096

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	1.33	%	
	Ave A.D.	0.66	%
Standard	Reading	A.D.	
70.0	69.51	0.69	
70.0	69.56	0.63	
70.0	69.61	0.56	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.55	%	
	Ave A.D.	0.27	%
Standard	Reading	A.D.	
200.0	199.46	0.27	
200.0	199.45	0.28	
200.0	199.47	0.27	

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	599.63	0.06	
600.0	599.60	0.07	
600.0	599.64	0.06	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.08	%	
	Ave A.D.	0.04	%
Standard	Reading	A.D.	
1000.0	999.77	0.02	
1000.0	999.48	0.05	
1000.0	999.81	0.02	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	0.03	%	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
1400.0	1399.81	0.01	
1400.0	1399.84	0.01	
1400.0	1399.83	0.01	


Vincent Pelletier



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

CERT.CALIBRATION #1902.02

Certificat d'étalonnage

Client

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

Instrument

<i>Constructeur :</i>	Weigh-Tronix	<i>Modèle de terminal :</i>	IND560
<i>Modèle :</i>	DSL 4848-05	<i># série du terminal:</i>	00927386KL
<i>No de série :</i>	B00927386KL	<i># série de l'imprimant</i>	N/A
<i>Capacité :</i>	500 kg		N/A
<i>Résolution :</i>	0,02 kg	<i>Nbre de Divisions:</i>	25000
<i>Classe :</i>	III	<i>Procédure utilisée :</i>	NIST Handbook 44
<i>No./ID d'inventaire:</i>	SBI-014		
<i>Procédure:</i>	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.		

<i>Date de calibrage :</i>	1-avr-2016	<i>Date, prochaine Cal.</i>	31-mars-2017
<i>Signataire autorisé (A2LA) :</i>	Dany Careau	<i>Signature:</i>	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

☐ 1	☐ 2
☐ 4	☐ 3

<i>Poids Appliqués</i>	<i>Position</i>	<i>Avant Réglage</i>	<i>Après Réglage</i>
		<i>Valeur lue</i>	<i>Valeur lue</i>
1: 100 kg	<i>Position 1</i>	99,92 kg	99,96 kg
2: 100 kg	<i>Position 2</i>	99,98 kg	100,04 kg
3: 100 kg	<i>Position 3</i>	99,94 kg	99,98 kg
4: 100 kg	<i>Position 4</i>	99,94 kg	99,98 kg
<i>Erreur maximum :</i>		0,08 kg	0,08 kg
<i>Max Erreur Admissible :</i>		0,10 kg	0,1 kg

Linéarité

	<i>Avant réglage</i>					<i>Dans la Tolérance</i>
	<i>Poids Appliqués</i>	<i>Valeur lue</i>	<i>Erreur</i>		<i>Erreur admissible</i>	
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	79,98 kg	-0,02 kg	1 d	3 d	OUI
4,00	120,00 kg	119,96 kg	-0,04 kg	2 d	5 d	OUI
5,00	160,00 kg	159,96 kg	-0,04 kg	2 d	5 d	OUI
Max 6,00	200,00 kg	199,94 kg	-0,06 kg	3 d	5 d	OUI

☐ Méthode de substitution utilisée

	Après réglage					Dans la Tolérance
	Poids Appliqués	Valeur lue	Erreur		Erreur admissible	
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.



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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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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



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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



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CALIBRATION CERTIFICATE

Certificate no.:	525236	Calibration date:	April 07, 2016
Identification:	SBI-188	Certificate issued:	April 07, 2016
Description:	POWER METER, P3INTERNATIONAL P4400 KILL A	Interval:	12 months
Size:	AC 1 PHASE	Due date:	April 07, 2017
Manufacturer:	P3INTERNATIONAL	Procedure no.:	MET/CAL
Model no.:	P4400 KILL A WATT	Environment:	CLAS Type 2 Laboratory
Serial no.:	3039508	Temperature:	23 ± 2°C
		Humidity:	35 - 55% RH
		Metrologist:	YUK

Property of: SBI
250 RUE DE COPENHAGUE
ST-AUGUSTIN-DE-DESMAURES, 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 CLPM 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.



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CALIBRATION DATA

Certificate no.: 525236
Identification: SBI-188
Description: POWER METER
Serial no.: 3039508
Procedure: P3 international P4400 KILL A WATT: Swift-e/187/355-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
UM-STW7	STOPWATCH	CONTROL COMPANY	1030	2015/12/31	2016/12/31
UM2-187	MULTIMETER	FLUKE	187	2015/10/05	2016/10/31
95620062	CLAMP METER	FLUKE	355	2016/03/28	2017/03/28

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE	TEST	ACCEPTANCE LIMITS		PASS/	TUR
	VALUE	RESULT	LOW	HIGH	FAIL	

Since the power meter specifications are not available
only test results and nominal values are given.

Measurement Uncertainty:

Voltage < .5%, Current < 1.6%, Power < 2.1%

Frequency < 0.03%, KWH < 2.2%

250W load

119.6V @ 60Hz	119.2
2.00A	2.10
239.2W @ 60Hz	250.0
239.2VA @ 60Hz	252.0
1.00PF @ 60Hz	0.99
60.00Hz	59.90

500W load

120V @ 60Hz	120
4.01A	4.07
481.2W @ 60Hz	485.0
481.2VA @ 60Hz	485.0
1.00PF @ 60Hz	1.00

1000W load

120V @ 60Hz	120
8.12A	8.16
974.4W @ 60Hz	980.0
974.4VA @ 60Hz	980.0
1.00PF @ 60Hz	1.00

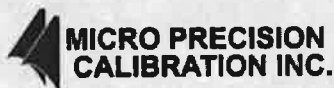
1700W load

120V @ 60Hz	120
14.10A	14.10
1692.0W @ 60Hz	1695.0
1692.0VA @ 60Hz	1697.0
1.00PF @ 60Hz	0.99

KWH TEST

0.50Kwh	0.50
---------	------

End of Test Data



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



Certificate of Calibration

Date: Jul 19, 2016

Cert No. 222200812427074

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12

250 DE COPENHAGUE

SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

MPC Control #: DB6309

Asset ID: SBI-204

Gage Type: PITOT STATIC TUBE

Manufacturer: DWYER INSTRUMENTS, INC.

Model Number: 160S-24

Size: N/A

Temp/RH: 68.0°F / 45.0%

Work Order #: SAC-70080129

Purchase Order #: 49495

Serial Number: N/A

Department: N/A

Performed By: BARRY MORRIS

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: July 14, 2016

Cal. Interval: 12 MONTHS

Cal. Due Date: July 14, 2017

Calibration Notes:

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 2, 2017	222200812372718
AW4419	MULTI-FUNCTION PRESSURE INDICATOR	DPI 145	14501283	DRUCK	Mar 18, 2018	2222008122754295
CR6447	PRECISION PRESSURE INDICATOR	DPI 740	74002329	DRUCK	Feb 1, 2017	2222008122841105

Calibrating Technician:

Barry Morris

BARRY MORRIS

QC Approval:

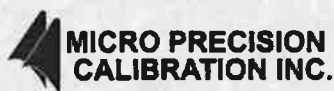
B. Gold

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.

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: Jul 19, 2016

Cert No. 222200812427074

Procedures Used in this Event

Procedure Name
MANUFACTURER

Description
MANUAL REV CONTROL

Calibrating Technician:

BARRY MORRIS

QC Approval:

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.

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.

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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.

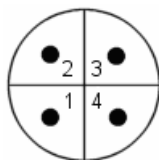
<i>Jeu de poids no :</i>	<i>Traçabilité NIST No.:</i>	<i>Classe ASTM/OIML</i>	<i>Date d'étalonnage :</i>	<i>Date proch. étalonnage</i>
0718	M15-050	M1	22-avr-2015	22-avr-2016
142	MT00997	F1	7-mai-2014	30-avr-2016
Q1	1415126	M1	1-juin-2015	1-juin-2016

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.



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CALIBRATION CERTIFICATE

Certificate no.: 528221
Identification: SBI-212
Description: THERMO-HYGROMETER, AMPROBE TH-3
Manufacturer: AMPROBE
Model no.: TH-3
Serial no.: 100906351

Calibration date: April 26, 2016
Certificate issued: April 26, 2016
Interval: 12 months
Due date: April 26, 2017
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.



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CALIBRATION DATA

Certificate no.: 528221
Identification: SBI-212
Description: THERMO-HYGROMETER
Serial no.: 100906351
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	LIMITS HIGH	PASS/ FAIL	TUR
TEMPERATURE CALIBRATION						
23°C						
22.94degC		23.30	22.14	23.74	PASS	
RELATIVE HUMIDITY CALIBRATION AT 23°C						
20% RH						
19.95%		18.80	16.95	22.95	PASS	
50% RH						
50.01%		48.60	47.01	53.01	PASS	
80% RH						
79.98%		77.00	76.98	82.98	PASS	

End of Test Data

Certificate No: MT0056579

METTLER-TOLEDO, LLC

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

METTLER TOLEDO



Calibration Cert # 1788.01

Mass Calibration Certificate

Customer Information

Customer Name: Stove Builder International Inc. *City:* Saint-Augustin-De-Dema
Address: 250 Rue Copenhagen *State / Province:* QC
Purchase Order: *Zip / Postal Code:* G3A 2H3

Measurement and Test Equipment Identification

Serial Number: B316238717 *Date Received:* 7/21/2016
Manufacturer: Mettler-Toledo *Condition:* Good
Asset number: SBI-237-100mg/SBI-238-10g, 200g *Tolerance Class:* OIML E2, F1, F2

Environmental Conditions

Temperature: 20.969 °C *Relative Humidity:* 47.79 %RH
Barometric Pressure: 983.68 hPa *Air Density:* 1.1602 kg/m³

The standards used to perform this calibration are traceable to NIST through METTLER TOLEDO traceability number: MT5061

This certificate is issued in accordance with the conditions granted by A2LA under Certificate number 1788.01, which is based on ISO/IEC17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards. All uncertainties in this certificate are reported at a 95% (k=2) confidence factor.

This certificate may not be partially reproduced, except with prior written permission of the issuing laboratory and A2LA.

Calibration Date: 07/25/2016

Next Calibration Due: 07/24/2018

Calibration Technician: Kathy Weatherbie

Signature:

A handwritten signature in dark ink, appearing to read 'Davis Pichot'.

07/25/2016

Metrology Specialist

Date

Certificate No: MT0056579

As Found Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm ³)
200 g	(B316238717)	200.001135	200.000947	0.036	3.0	7.95
10 g	(B316238717)	10.0000642	10.0000548	0.0079	0.20	7.95
100 mg	(B316238717)	0.1000001	0.1000000	0.0017	0.016	7.95

Certificate No: MT0056579

As Left Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm ³)
200 g	(B316238717)	200.001135	200.000947	0.036	3.0	7.95
10 g	(B316238717)	10.0000642	10.0000548	0.0079	0.20	7.95
100 mg	(B316238717)	0.1000001	0.1000000	0.0017	0.016	7.95

Certificate No: MT0056579

Comparators Used

#	Equipment Used	Serial Number	Equipment Type	Calibration Due
#6	: a5XL	B010016731	Automated Mass Comparator	06/30/2017
11#	: a200XL	B010016733	Automated Mass Comparator	04/30/2017

Comments

100 mg weight s/n B316239338 has been added to this set s/n B316238717

Definitions

Nominal Value - The value as labeled on the weight or defined by shape in accordance with OIML R111 for milligram weights. The number within the parentheses after the nominal value is the serial number of the set to which the weight belongs.

True Mass - The mass value of the weight if measured in a vacuum.

Conventional Mass - For a mass at 20 °C, "Conventional Mass" is the mass of a reference standard of density 8000 kg/m³ which it balances in air with a density of 1.2 kg/m³. This value should be referenced when testing the accuracy of a weighing device using any of the nominal values contained in this certificate. The As Found results will equal the As Left in cases where no adjustment or replacement was required.

Uncertainty - All Uncertainty values are reported at approximately 95% confidence level (k=2) . The uncertainty value does not include a component for the affects due to magnetism.

Tolerance - The acceptable range of deviation (positive and negative) from the nominal value, including the uncertainty, as defined by ASTM and OIML for the respective classes.

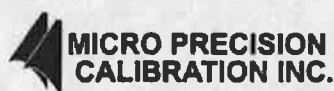
Density - The assumed density of the material used by the manufacturer.

Calibration Process - The procedures used to obtain the measurements results are based on SOPs as defined in NIST IR6969. The same process was used to obtain the As Found and As Left results.

OOT - The As Found measurement result combined with the uncertainty exceeded the tolerance for the specified weight class.

A - Weight was adjusted after As Found testing to within the appropriate tolerance class.

R - The received weight was replaced due to an out of tolerance condition and the weight was not adjustable or the weight for this nominal value was missing.



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



Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Jul 19, 2016

Cert No. 222200812427139

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12

250 DE COPENHAGUE

SAINT-AUGUSTIN-DE-DESMANURES QC G3A 2H3

MPC Control #: DB6310

Asset ID: SBI-240

Gage Type: MINI-VANE ANEMOMETER

Manufacturer: KESTREL

Model Number: 3000

Size: N/A

Temp/RH: 68.0°F / 45.0%

Work Order #: SAC-70080129

Purchase Order #: 49495

Serial Number: 1959554

Department: N/A

Performed By: BARRY MORRIS

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: July 15, 2016

Cal. Interval: 12 MONTHS

Cal. Due Date: July 15, 2017

Calibration Notes:

Test Points

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result	Uncertainty
1	Velocity:	500	485	515	498	498	ft/min	Passed	15
2		1,000	970	1030	995	995	ft/min	Passed	29
3		3,000	2910	3090	2,994	2,994	ft/min	Passed	87
4		6,000	5820	6180	5,981	5,981	ft/min	Passed	120
5	Temperature:	21.0	20.0	22.0	21.0	21.0	Deg C	Passed	0.1
6	Relative Humidity:	45.0	43.6	46.3	45.2	45.2	RH%	Passed	0.65

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
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

Calibrating Technician:

Barry Morris

BARRY MORRIS

QC Approval:

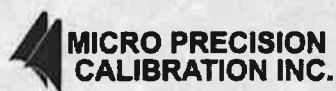
B. Gold

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/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



Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Jul 19, 2016

Cert No. 222200812427139

Procedures Used in this Event

Procedure Name

MPC-00182

Description

Air Velocity, Temperature and Flow Meters, General, 9-9-2015 rev01

Calibrating Technician:

BARRY MORRIS

QC Approval:

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.

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.



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-DESMAUERS, 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.

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
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 inH ₂ O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0000					
Output @ 0.0000 inH ₂ O, mA		3.998					
0.000 inH ₂ O	0.0000	0.0000	0.0000	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0244					
Output @ 0.025 inH ₂ O, mA		7.894					
0.025 inH ₂ O	0.0250	0.0243	-0.0007	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0488					
Output @ 0.050 inH ₂ O, mA		11.803					
0.050 inH ₂ O	0.0500	0.0488	-0.0012	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0737					
Output @ 0.075 inH ₂ O, mA		15.802					
0.075 inH ₂ O	0.0750	0.0738	-0.0012	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0991					
Output @ 0.100 inH ₂ O, mA		19.905					
0.100 inH ₂ O	0.1000	0.0994	-0.0006	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0735					
Output @ 0.075 inH ₂ O, mA		15.755					
0.075 inH ₂ O	0.0750	0.0735	-0.0015	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0491					
Output @ 0.050 inH ₂ O, mA		11.891					
0.050 inH ₂ O	0.0500	0.0493	-0.0007	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0247					
Output @ 0.025 inH ₂ O, mA		7.947					
0.025 inH ₂ O	0.0250	0.0247	-0.0003	±0.0020	inH ₂ O	Pass	1.5e-04
Display Reading		0.0000					
Output @ 0.0000 inH ₂ O, mA		3.999					
0.000 inH ₂ O	0.0000	0.0000	0.0000	±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		0.0002					
Output @ 0.0000 inH ₂ O, mA		3.999					
0.0000 inH ₂ O	0.0000	0.0000	0.0000	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.0620					
Output @ 0.0625 inH ₂ O, mA		7.964					
0.0625 inH ₂ O	0.0625	0.0619	-0.0006	±0.0025	inH ₂ O	Pass	1.5e-04
Display Reading		0.1243					
Output @ 0.1250 inH ₂ O, mA		11.942					
0.1250 inH ₂ O	0.1250	0.1241	-0.0009	±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.: 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

<u>Test Description</u>	<u>STD</u>	<u>UUT</u>	<u>Error</u>	<u>Tolerance</u>	<u>Units</u>	<u>P/F</u>	<u>Uncertainty</u>
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 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.: E52U01007512
ID No.: SBI-254
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031712-E52U01007512
Adjusted: Yes
Condition: In Tolerance
Calibration Date: 7-Apr-2016
Calibration Due: 7-Apr-2017

Customer

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

Environment

Temperature: 24.0°C
Humidity: 26%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
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:

Adjusted through cal menu on the unit.

Calibrated in vertical position.

Performed by:

Alex Radomishelsky

Reviewed by:

Slava Peciurov

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



Report of Calibration

As Left



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

Page 2 of 3

UUT		Calibration	
Made by:	Dwyer	Report No.:	AC16031712-E52U01007512
Model:	MS-121-LCD	Adjusted:	Yes
Serial No.:	E52U01007512	Condition:	In Tolerance
ID No.:	SBI-254	Calibration Date:	7-Apr-2016
Description:	Digital Pressure Gauge	Calibration Due:	7-Apr-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		0.0002					
Output @ 0.0000 inH2O, mA		4.014					
0.000 inH2O	0.0000	0.0001	0.0001	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0254					
Output @ 0.025 inH2O, mA		8.072					
0.025 inH2O	0.0250	0.0255	0.0005	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.05					
Output @ 0.050 inH2O, mA		12.004					
0.050 inH2O	0.0500	0.0500	0.0000	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0752					
Output @ 0.075 inH2O, mA		16.024					
0.075 inH2O	0.0750	0.0752	0.0002	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.1001					
Output @ 0.100 inH2O, mA		19.991					
0.100 inH2O	0.1000	0.0999	-0.0001	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0752					
Output @ 0.075 inH2O, mA		16.022					
0.075 inH2O	0.0750	0.0751	0.0001	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.51					
Output @ 0.050 inH2O, mA		12.159					
0.050 inH2O	0.0500	0.0510	0.0010	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0256					
Output @ 0.025 inH2O, mA		8.142					
0.025 inH2O	0.0250	0.0259	0.0009	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0000					
Output @ 0.0000 inH2O, mA		4.027					
0.000 inH2O	0.0000	0.0002	0.0002	±0.0020	inH2O	Pass	1.5e-04
Range: 0 to 0.25 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0000					
Output @ 0.0000 inH2O, mA		4.015					
0.0000 inH2O	0.0000	0.0002	0.0002	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0625					
Output @ 0.0625 inH2O, mA		8.003					
0.0625 inH2O	0.0625	0.0625	0.0000	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.125					
Output @ 0.1250 inH2O, mA		12.003					
0.1250 inH2O	0.1250	0.1250	0.0000	±0.0025	inH2O	Pass	1.5e-04

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



Report of Calibration

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.: E52U01007512
ID No.: SBI-254
Description: Digital Pressure Gauge

Calibration

Report No.: AC16031712-E52U01007512
Adjusted: Yes
Condition: In Tolerance
Calibration Date: 7-Apr-2016
Calibration Due: 7-Apr-2017

<u>Test Description</u>	<u>STD</u>	<u>UUT</u>	<u>Error</u>	<u>Tolerance</u>	<u>Units</u>	<u>P/E</u>	<u>Uncertainty</u>
Display Reading		0.187					
Output @ 0.1875 inH2O, mA		15.971					
0.1875 inH2O	0.1875	0.1870	-0.0005	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.2502					
Output @ 0.2500 inH2O, mA		20.009					
0.2500 inH2O	0.2500	0.2501	0.0001	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1875					
Output @ 0.1875 inH2O, mA		16.004					
0.1875 inH2O	0.1875	0.1876	0.0001	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1252					
Output @ 0.1250 inH2O, mA		12.037					
0.1250 inH2O	0.1250	0.1256	0.0006	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.063					
Output @ 0.0625 inH2O, mA		8.002					
0.0625 inH2O	0.0625	0.0625	0.0000	±0.0025	inH2O	Pass	1.5e-04
Display Reading		-0.0005					
Output @ 0.0000 inH2O, mA		3.979					
0.0000 inH2O	0.0000	-0.0003	-0.0003	±0.0025	inH2O	Pass	1.5e-04

END OF REPORT



**Mesures
Canada**

Un organisme
d'Industrie Canada

**Measurement
Canada**

An Agency of
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

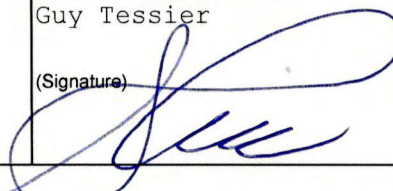
CERTIFICAT DE DÉSIGNATION

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
--	---	--	---

Le droit d'auteur de ce certificat appartient à Mesures Canada et ne doit pas être reproduit autrement qu'en totalité sans avoir préalablement obtenu l'autorisation écrite de Mesures Canada.



1415126

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

Date: 1-20-16Page of Manufacturer: SBIModel: Eco-55Project #: Run: 1Tech: Reviewer: **CONTINUOUS ANALYZERS****Pre-Test (Adjust and Record)**

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	7575 ppm	7700 ppm	624 ppm	608 ppm
CO ₂	0	0	39.3	39.4	7.79	8.00
O ₂	0	0	20.87 %	20.95 %	3.88	3.85

385

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Span Drift	Cal. Drift	OK?	Not OK*
CO	0	7588	615					
CO ₂	0.02	40.4	7.90					
O ₂	0	21.01	3.87					

- Greater than 5% of the range used.

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-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.

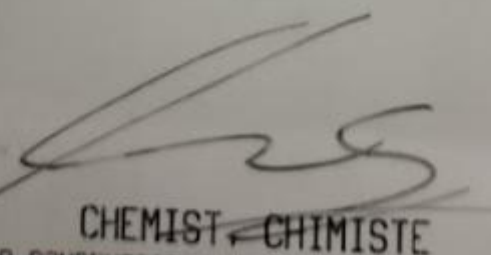


AIR LIQUIDE

#PROD : SPG-4MX0024330
DATE : 2016-05-09
#OF : 16-SGM-1724
#CYL/BOUT : SG-140111-A
VOLUME : 642 L
PRESS 15C : 10125 KPA
EXP. DATE : 2019-05-09

CERTIFIED MIXTURE
MELANGE CERTIFIE

CO	608 PPM
O2	3.85 %
CO2	8.00 %
N2	BALANCE


CHEMIST / CHIMISTE

MOLE R CONCENTRATION / CONCENTRATION MOLAI R

EMPTY

VIDE

IN USE

EN SERVICE

Appendix D
Unit Drawings and Installation Manual

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CERTIFICATE OF CALIBRATION



Certificate Number: 2016002444

Page 1 of 1

Manufacturer:	American Meter Company	RMA:	AC16081504
Model:	DTM-200A	Workorder:	2016002444
Description:	Flow Meter	Barcode:	AL00021168-P
Serial:	07J264834	Received:	In Tolerance
ID:	SBI-103	Calibration Date:	23-Sep-2016
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAREUX QC, G3A 2H3	Calibration Due:	23-Sep-2017
		Temperature:	20.81°C
		Humidity:	53.9%RH
		Procedure:	SOP751-F01 (Rev.02)

Alpha Controls & Instrumentation Inc. certifies that the instrument listed above meets or exceeds manufacturing specifications. It has been calibrated using equipment and/or standards whose accuracies are traceable to the National Institute of Standards and Technology (NIST), or have been derived from acceptable values of natural physical constants, or by the ratio type of self-calibration.

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

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

STANDARDS USED

Description	Model	ID	Cal Date	Due Date
Flow Transfer Standard	Alicat MCRM-250SLPM-D	FLOW-CAL-02	10-Dec-2015	10-Dec-2016
Stopwatch	Extech HW30	MISC-SWT-04	04-Apr-2016	04-Apr-2017
Pressure Calibrator	Druck DPI 150	PRE-CAL-02	09-Sep-2016	09-Sep-2017
High Precision HC2 probe	Rotronic HC2-SH	TRH-PRB-07	29-Jul-2016	29-Jan-2017

Notes: Test Data attached.



Performed by:

Slava Peciurov

(digitally signed)

Reviewed by:

Ben Lemelin

(digitally signed)

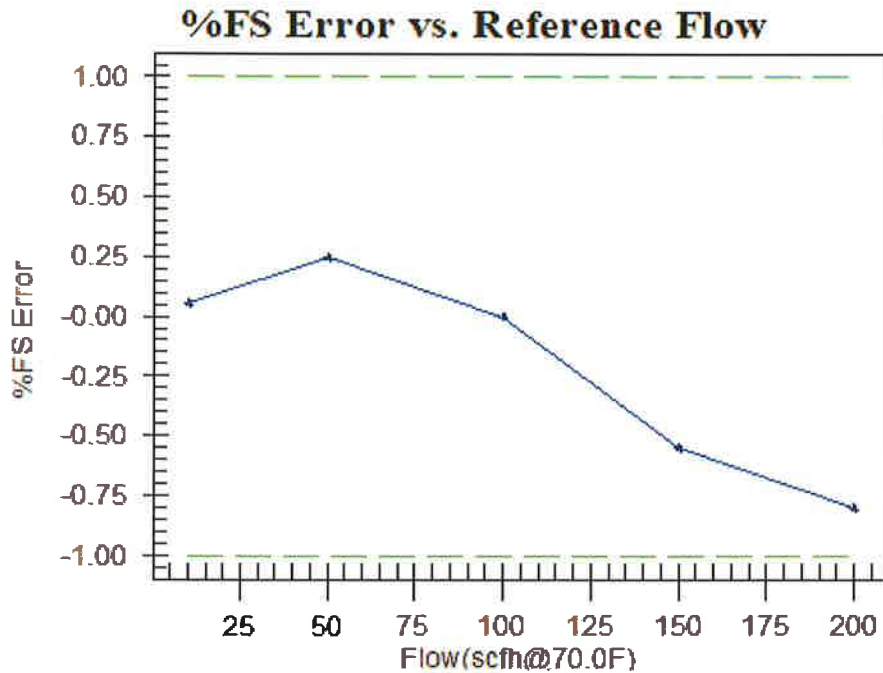
Flow Test Data Report

Date: Sep 23 2016
Operator: Slava Peciurov
Gas: Air
Test Data File: C:\DHI\COMPASS for Flow\Data\American Meter Company\07J264834\20160923_000.dat

DUT

Manufacturer American Meter Company
Model DTM-200A
SN 07J264834
ID
Flow Range 0.000 to 200.000 scfh@70.0F
Output Range 0.000 to 200.000 scfh@70.0F
Tolerance 1 %Span

Set Point (scfh@70.0F)	Ref Flow (scfh@70.0F)	DUT Flow (scfh@70.0F)	DUT Output (scfh@70.0F)	%Rdg Error	%FS Error	Status
10.000	9.9958	10.100	10.100	1.043	0.052	Pass
50.000	49.9998	50.500	50.500	1.000	0.250	Pass
100.000	99.9995	100.000	100.000	0.001	0.000	Pass
150.000	149.9993	148.900	148.900	-0.733	-0.550	Pass
200.000	199.9990	198.400	198.400	-0.799	-0.799	Pass



Dry Gas Metering System Calibration

Y factor for Method 5G sampling

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

Average Gas Meter y Factor 1.007

Calibration Date: 10-28-16
 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.: 30.24 "Hg
 Signature/Date: *Vincent Pelletier* 2016-10-28

Previous Calibration Comparison

Date	2015-03-30	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.003	0.05015	0.004
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.002
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 23, 2016
	Calib. Value	0.9900 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	839.711	842.225	861.646
Final Reference Meter	842.200	861.646	868.037
Initial DGM	846.264	848.745	867.939
Final DGM	848.723	867.939	874.244
Temp. Ref. Meter (°F), Tr	65.6	65.8	64.8
Temperature DGM (°F), Td	67.6	67.8	67.5
Time (Minutes)	30.0	120.0	32.0
Net Volume Ref. Meter, Vr	2.489	19.421	6.391
Net Volume DGM, Vd	2.459	19.194	6.305
Gas Meter y Factor =	1.006	1.006	1.009
Gas Meter y Factor Deviation (from avg.)	0.001	0.001	0.002
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.081966667

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 1.002

Calibration Date: 10-28-16
 Calibrated by: Vincent Pelletier
 Calibration Frequency: 6-months
 Next Calibration Due: 04-26-17
 Instrument Range: 1.000 cfm
 Standard Temp.: 73 oF
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.24 "Hg
 Signature/Date: *Vincent Pelletier* 2016-10-28

Previous Calibration Comparison

Date	2015-03-30	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.006	0.0503	0.004
Acceptance			

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.001
Acceptance	Acceptable

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 23, 2016
	Calib. Value	0.9900 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	825.914	831.864	836.619
Final Reference Meter	831.816	836.584	839.664
Initial DGM	546.358	552.255	556.965
Final DGM	552.208	556.926	559.982
Temp. Ref. Meter (°F), Tr	65.2	66.0	65.2
Temperature DGM (°F), Td	66.6	66.9	66.9
Time (Minutes)	30.0	30.0	30.0
Net Volume Ref. Meter, Vr	5.902	4.720	3.045
Net Volume DGM, Vd	5.85	4.671	3.017
Gas Meter y Factor =	1.001	1.002	1.002
Gas Meter y Factor Deviation (from avg.)	0.001	0.000	0.000
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.195

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: 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	Model	Standard Test Meter
Calibrator	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. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^{\wedge}2$

* 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: SBI-046 (90R054300) Système 1

**Average Gas
Meter y Factor**
1.003

Calibration Date: 11-15-16
 Calibrated by: Claude Paré
 Calibration Frequency: Post Test Calibration
 Next Calibration Due: ---
 Instrument Range: 1.000 cfm
 Standard Temp.: 69.2 °F
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.06 "Hg
 Signature/Date:  2016-11-15

Previous Calibration Comparision

Date	2016-10-28	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.003	0.05015	0.000
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.001
Acceptance	Acceptable

Reference Standard *

Standard	Model	Standard Test Meter
Calibrator	S/N	07J264834
	Calib. Date	23-sept-16
	Calib. Value	0.9900 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	869.1	874.3	879.8
Final Reference Meter	874.1	879.3	884.8
Initial DGM	39.574	44.733	50.184
Final DGM	44.532	49.694	55.14
Temp. Ref. Meter (°F), Tr	68.2	68.7	70.7
Temperature DGM (°F), Td	69.9	71.5	72.9
Time (Minutes)	35.0	35.0	35.0
Net Volume Ref. Meter, Vr	5.000	5.000	5.000
Net Volume DGM, Vd	4.958	4.961	4.956
Gas Meter y Factor =	1.002	1.003	1.003
Gas Meter y Factor Deviation (from avg.)	0.001	0.001	0.000
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where:

0.141657143

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. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^2$

* 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: SBI-047 (98Z332226) Système 2

**Average Gas
Meter y Factor**
1.000

Calibration Date: 11-15-16
 Calibrated by: Claude Paré
 Calibration Frequency: Post Test Calibration
 Next Calibration Due: ---
 Instrument Range: 1.000 cfm
 Standard Temp.: 70.9 °F
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30.03 "Hg
 Signature/Date:  2016-11-15

Previous Calibration Comparision

Date	2016-10-28	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.006	0.0503	0.006
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.001
Acceptance	Acceptable

Reference Standard *

Standard	Model	Standard Test Meter
Calibrator	S/N	07J264834
	Calib. Date	23-sept-16
	Calib. Value	0.9900 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	886.9	892.1	897.3
Final Reference Meter	891.9	897.1	902.3
Initial DGM	735.362	740.535	745.702
Final DGM	740.335	745.502	750.674
Temp. Ref. Meter (°F), Tr	71.2	71.5	72.0
Temperature DGM (°F), Td	73.7	73.8	74.3
Time (Minutes)	33.0	33.0	33.0
Net Volume Ref. Meter, Vr	5.000	5.000	5.000
Net Volume DGM, Vd	4.973	4.967	4.972
Gas Meter y Factor =	1.000	1.001	1.000
Gas Meter y Factor Deviation (from avg.)	0.000	0.001	0.000
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where:

0.15069697

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. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^2$

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

Thermal Metering System Calibration

Y factor for Method 5G sampling

Manufacturer: Rockwell international
 Model: S-275
 Serial Number: SBI-276 (009388)

**Average Gas
Meter y Factor**
0.997

Calibration Date: _____
 Calibrated by: Claude Paré
 Calibration Frequency: Post Test Calibration
 Next Calibration Due: 06-30-00
 Instrument Range: 1.000 cfm
 Standard Temp.: 71.7 °F
 Standard Press.: 29.92 "Hg
 Barometric Press.: 30 "Hg
 Signature/Date: *Claude* 2016-11-16

Previous Calibration Comparision

Date	2016-11-15	Acceptable	
		Deviation (5%)	Deviation
y Factor	0.983	0.04915	0.014
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.002
Acceptance	Acceptable

Reference Standard *

Standard	Model	Standard Test Meter
Calibrator	S/N	07J264834
	Calib. Date	23-sept-16
	Calib. Value	0.9900 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	903.2	908.5	913.7
Final Reference Meter	908.2	913.5	918.7
Initial DGM	622.21	627.47	632.645
Final DGM	627.17	632.435	637.62
Temp. Ref. Meter (°F), Tr	72.2	72.4	72.1
Temperature DGM (°F), Td	72.2	72.4	72.1
Time (Minutes)	32.0	33.0	33.0
Net Volume Ref. Meter, Vr	5.000	5.000	5.000
Net Volume DGM, Vd	4.96	4.965	4.975
Gas Meter y Factor =	0.998	0.997	0.995
Gas Meter y Factor Deviation (from avg.)	0.001	0.000	0.002
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where:

0.155

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. $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r^2$

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

Appendix F
Unit Pre-Burn Documentation

09-08-2016

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	431.67	77.91	114.52	N/A	N/A	N/A	N/A	N/A	5.94
10	360.24	78.29	124.57	N/A	N/A	N/A	N/A	N/A	5.45
20	334.72	78.31	120.85	N/A	N/A	N/A	N/A	N/A	4.95
30	329.64	78.14	119.19	N/A	N/A	N/A	N/A	N/A	4.46
40	328.12	77.07	118.34	N/A	N/A	N/A	N/A	N/A	3.96
50	327.58	76.46	117.95	N/A	N/A	N/A	N/A	N/A	3.47
60	327.50	76.15	117.98	N/A	N/A	N/A	N/A	N/A	2.97
70	320.08	76.93	117.03	N/A	N/A	N/A	N/A	N/A	2.48
80	317.38	76.55	117.02	N/A	N/A	N/A	N/A	N/A	1.98
90	305.30	75.85	114.52	N/A	N/A	N/A	N/A	N/A	1.49
100	326.99	75.82	116.07	N/A	N/A	N/A	N/A	N/A	0.99
110	334.06	75.90	116.63	N/A	N/A	N/A	N/A	N/A	0.50
120	319.16	75.90	115.71	N/A	N/A	N/A	N/A	N/A	0.00

09-14-2016

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	214.02	77.94	96.05	N/A	N/A	N/A	N/A	N/A	1.48
10	209.86	77.54	95.05	N/A	N/A	N/A	N/A	N/A	1.23
20	202.91	77.18	93.80	N/A	N/A	N/A	N/A	N/A	1.00
30	198.50	77.14	92.92	N/A	N/A	N/A	N/A	N/A	0.79
40	208.92	75.40	93.00	N/A	N/A	N/A	N/A	N/A	0.49
50	204.78	75.22	92.44	N/A	N/A	N/A	N/A	N/A	0.25
60	207.35	74.79	92.22	N/A	N/A	N/A	N/A	N/A	0.00

09-20-2016

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	227.97	71.70	83.41	N/A	N/A	N/A	N/A	N/A	1.17
10	228.29	70.72	83.41	N/A	N/A	N/A	N/A	N/A	0.98
20	226.14	71.34	83.36	N/A	N/A	N/A	N/A	N/A	0.79
30	225.70	71.89	83.88	N/A	N/A	N/A	N/A	N/A	0.58
40	222.54	72.27	83.89	N/A	N/A	N/A	N/A	N/A	0.40
50	229.61	71.63	83.87	N/A	N/A	N/A	N/A	N/A	0.19
60	229.35	73.34	84.90	N/A	N/A	N/A	N/A	N/A	0.00

09-26-2016

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	325.15	70.19	73.52	N/A	N/A	N/A	N/A	N/A	3.76
10	266.10	70.42	72.98	N/A	N/A	N/A	N/A	N/A	3.44
20	254.52	70.26	72.47	N/A	N/A	N/A	N/A	N/A	3.13
30	249.93	69.19	71.45	N/A	N/A	N/A	N/A	N/A	2.82
40	252.53	69.71	72.59	N/A	N/A	N/A	N/A	N/A	2.50
50	246.58	69.83	70.06	N/A	N/A	N/A	N/A	N/A	2.19
60	250.46	69.73	70.39	N/A	N/A	N/A	N/A	N/A	1.88
70	239.39	69.02	69.97	N/A	N/A	N/A	N/A	N/A	1.56
80	238.06	69.83	70.66	N/A	N/A	N/A	N/A	N/A	1.25
90	241.14	69.20	70.44	N/A	N/A	N/A	N/A	N/A	0.94
100	242.22	69.47	71.84	N/A	N/A	N/A	N/A	N/A	0.63
110	243.76	69.80	69.81	N/A	N/A	N/A	N/A	N/A	0.31
120	207.79	69.57	70.66	N/A	N/A	N/A	N/A	N/A	0.00

09-27-2016

Elapsed Time	Flue temp	Room temp	Tunnel dry bulb	top	back	right	left	bottom	scale
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(min)	°F	°F	°F	°F	°F	°F	°F	°F	lbs
0	300.32	70.12	73.04	N/A	N/A	N/A	N/A	N/A	3.99
10	266.92	70.26	72.32	N/A	N/A	N/A	N/A	N/A	3.66
20	256.75	70.05	71.93	N/A	N/A	N/A	N/A	N/A	3.33
30	247.89	69.18	72.51	N/A	N/A	N/A	N/A	N/A	2.99
40	254.72	69.65	68.88	N/A	N/A	N/A	N/A	N/A	2.66
50	255.66	69.64	71.46	N/A	N/A	N/A	N/A	N/A	2.33
60	257.68	69.92	70.37	N/A	N/A	N/A	N/A	N/A	2.00
70	254.48	69.97	68.77	N/A	N/A	N/A	N/A	N/A	1.66
80	259.14	69.71	69.93	N/A	N/A	N/A	N/A	N/A	1.33
90	256.97	70.57	71.52	N/A	N/A	N/A	N/A	N/A	1.00
100	254.24	70.16	69.74	N/A	N/A	N/A	N/A	N/A	0.67
110	255.05	70.27	71.37	N/A	N/A	N/A	N/A	N/A	0.33
120	212.94	70.66	71.65	N/A	N/A	N/A	N/A	N/A	0.00

09-28-2016

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	299.91	71.79	94.15	N/A	N/A	N/A	N/A	N/A	4.26
10	268.92	71.21	89.18	N/A	N/A	N/A	N/A	N/A	3.91
20	265.63	71.26	87.77	N/A	N/A	N/A	N/A	N/A	3.55
30	262.23	70.93	87.28	N/A	N/A	N/A	N/A	N/A	3.20
40	262.26	71.15	87.16	N/A	N/A	N/A	N/A	N/A	2.84
50	259.03	70.95	87.17	N/A	N/A	N/A	N/A	N/A	2.49
60	265.44	71.14	87.30	N/A	N/A	N/A	N/A	N/A	2.13
70	265.08	71.49	87.71	N/A	N/A	N/A	N/A	N/A	1.78
80	267.73	71.01	87.66	N/A	N/A	N/A	N/A	N/A	1.42
90	265.14	71.62	87.71	N/A	N/A	N/A	N/A	N/A	1.07
100	263.80	71.97	87.83	N/A	N/A	N/A	N/A	N/A	0.71
110	260.51	71.96	87.36	N/A	N/A	N/A	N/A	N/A	0.36
120	214.38	71.46	83.92	N/A	N/A	N/A	N/A	N/A	0.00

18-10-2016

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	343.65	74.35	72.88	N/A	N/A	N/A	N/A	N/A	4.43
10	311.15	70.67	71.60	N/A	N/A	N/A	N/A	N/A	4.01
20	292.91	70.31	72.06	N/A	N/A	N/A	N/A	N/A	3.63
30	283.71	70.03	71.16	N/A	N/A	N/A	N/A	N/A	3.23
40	278.21	69.27	70.95	N/A	N/A	N/A	N/A	N/A	2.86
50	277.11	69.28	70.79	N/A	N/A	N/A	N/A	N/A	2.48
60	279.28	69.66	70.78	N/A	N/A	N/A	N/A	N/A	2.07
70	274.19	69.61	71.05	N/A	N/A	N/A	N/A	N/A	1.69
80	271.49	69.12	70.65	N/A	N/A	N/A	N/A	N/A	1.31
90	273.28	69.35	71.16	N/A	N/A	N/A	N/A	N/A	0.92
100	261.58	69.93	70.61	N/A	N/A	N/A	N/A	N/A	0.58
110	269.46	69.59	70.64	N/A	N/A	N/A	N/A	N/A	0.20
120	219.90	69.91	71.22	N/A	N/A	N/A	N/A	N/A	0.00

19-10-2016

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	331.94	70.82	98.68	N/A	N/A	N/A	N/A	N/A	4.51
10	293.34	71.09	95.12	N/A	N/A	N/A	N/A	N/A	4.14
20	280.55	71.40	93.63	N/A	N/A	N/A	N/A	N/A	3.73
30	273.34	71.73	92.64	N/A	N/A	N/A	N/A	N/A	3.35
40	270.95	71.83	92.17	N/A	N/A	N/A	N/A	N/A	2.97
50	262.83	71.71	91.45	N/A	N/A	N/A	N/A	N/A	2.60
60	265.12	71.28	91.40	N/A	N/A	N/A	N/A	N/A	2.21
70	264.80	70.52	91.52	N/A	N/A	N/A	N/A	N/A	1.81
80	263.42	71.57	91.46	N/A	N/A	N/A	N/A	N/A	1.44
90	267.54	71.54	91.63	N/A	N/A	N/A	N/A	N/A	1.02

100	268.92	71.45	91.69	N/A	N/A	N/A	N/A	N/A	0.62
110	266.86	72.07	91.66	N/A	N/A	N/A	N/A	N/A	0.24
120	221.48	72.12	86.47	N/A	N/A	N/A	N/A	N/A	0.00

19-10-2016 & 20-10-2016

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	189.29	69.88	80.77	N/A	N/A	N/A	N/A	N/A	35.29
10	235.58	69.21	85.02	N/A	N/A	N/A	N/A	N/A	34.83
20	249.54	70.10	86.93	N/A	N/A	N/A	N/A	N/A	34.44
30	257.06	68.77	88.20	N/A	N/A	N/A	N/A	N/A	34.06
40	258.92	68.26	88.43	N/A	N/A	N/A	N/A	N/A	33.66
50	256.02	67.91	88.24	N/A	N/A	N/A	N/A	N/A	33.29
60	259.12	68.09	88.44	N/A	N/A	N/A	N/A	N/A	32.91
70	261.24	68.18	88.52	N/A	N/A	N/A	N/A	N/A	32.51
80	258.61	68.17	89.25	N/A	N/A	N/A	N/A	N/A	32.12
90	262.09	67.54	88.96	N/A	N/A	N/A	N/A	N/A	31.74
100	184.62	68.36	83.42	N/A	N/A	N/A	N/A	N/A	31.69
110	127.77	66.97	78.70	N/A	N/A	N/A	N/A	N/A	31.74
120	217.09	67.64	85.16	N/A	N/A	N/A	N/A	N/A	31.28
130	243.75	67.33	88.16	N/A	N/A	N/A	N/A	N/A	30.89
140	247.42	67.14	88.83	N/A	N/A	N/A	N/A	N/A	30.53
150	259.62	68.24	90.20	N/A	N/A	N/A	N/A	N/A	30.13
160	265.52	70.07	91.21	N/A	N/A	N/A	N/A	N/A	29.76
170	268.75	70.81	91.64	N/A	N/A	N/A	N/A	N/A	29.37
180	265.73	71.12	91.63	N/A	N/A	N/A	N/A	N/A	29.04
190	269.45	71.37	91.71	N/A	N/A	N/A	N/A	N/A	28.65
200	266.30	69.39	91.57	N/A	N/A	N/A	N/A	N/A	28.28
210	266.01	66.55	90.53	N/A	N/A	N/A	N/A	N/A	27.84
220	266.68	65.95	90.31	N/A	N/A	N/A	N/A	N/A	27.42
230	265.88	65.61	90.19	N/A	N/A	N/A	N/A	N/A	27.00
240	258.83	68.51	90.35	N/A	N/A	N/A	N/A	N/A	26.63

250	263.99	70.14	91.01	N/A	N/A	N/A	N/A	N/A	26.29
260	262.46	70.33	90.94	N/A	N/A	N/A	N/A	N/A	25.92
270	264.52	70.57	90.87	N/A	N/A	N/A	N/A	N/A	25.54
280	265.02	70.85	91.03	N/A	N/A	N/A	N/A	N/A	25.16
290	266.08	71.48	91.49	N/A	N/A	N/A	N/A	N/A	24.78
300	264.91	71.77	91.63	N/A	N/A	N/A	N/A	N/A	24.42
310	265.22	71.21	91.25	N/A	N/A	N/A	N/A	N/A	24.04
320	262.69	71.14	90.95	N/A	N/A	N/A	N/A	N/A	23.66
330	263.40	71.22	91.02	N/A	N/A	N/A	N/A	N/A	23.29
340	260.52	70.96	90.61	N/A	N/A	N/A	N/A	N/A	22.90
350	264.99	71.01	91.02	N/A	N/A	N/A	N/A	N/A	22.52
360	261.83	70.90	90.84	N/A	N/A	N/A	N/A	N/A	22.14
370	256.36	70.92	90.54	N/A	N/A	N/A	N/A	N/A	21.80
380	255.69	71.30	90.42	N/A	N/A	N/A	N/A	N/A	21.41
390	265.34	71.11	90.85	N/A	N/A	N/A	N/A	N/A	21.00
400	264.71	70.60	90.88	N/A	N/A	N/A	N/A	N/A	20.61
410	260.89	70.84	90.64	N/A	N/A	N/A	N/A	N/A	20.24
420	261.95	70.92	90.68	N/A	N/A	N/A	N/A	N/A	19.85
430	267.36	70.72	90.97	N/A	N/A	N/A	N/A	N/A	19.44
440	261.64	71.40	90.58	N/A	N/A	N/A	N/A	N/A	19.06
450	261.98	70.95	90.59	N/A	N/A	N/A	N/A	N/A	18.67
460	269.23	70.53	90.96	N/A	N/A	N/A	N/A	N/A	18.25
470	270.29	70.59	91.06	N/A	N/A	N/A	N/A	N/A	17.87
480	263.69	70.54	90.66	N/A	N/A	N/A	N/A	N/A	17.49
490	261.11	70.52	90.07	N/A	N/A	N/A	N/A	N/A	17.11
500	263.79	71.08	90.45	N/A	N/A	N/A	N/A	N/A	16.70
510	262.51	70.41	90.49	N/A	N/A	N/A	N/A	N/A	16.30
520	262.90	70.01	90.37	N/A	N/A	N/A	N/A	N/A	15.91
530	264.20	70.19	90.36	N/A	N/A	N/A	N/A	N/A	15.52
540	258.13	70.63	89.85	N/A	N/A	N/A	N/A	N/A	15.15
550	261.14	70.62	90.17	N/A	N/A	N/A	N/A	N/A	14.75
560	263.59	70.37	90.15	N/A	N/A	N/A	N/A	N/A	14.35
570	262.16	70.60	90.10	N/A	N/A	N/A	N/A	N/A	13.96
580	262.19	70.73	89.87	N/A	N/A	N/A	N/A	N/A	13.55

590	261.90	70.65	89.67	N/A	N/A	N/A	N/A	N/A	13.16
600	260.74	70.45	89.56	N/A	N/A	N/A	N/A	N/A	12.77
610	260.18	70.41	89.34	N/A	N/A	N/A	N/A	N/A	12.39
620	259.57	70.57	89.46	N/A	N/A	N/A	N/A	N/A	12.00
630	260.17	70.54	89.42	N/A	N/A	N/A	N/A	N/A	11.60
640	258.59	70.69	89.17	N/A	N/A	N/A	N/A	N/A	11.20
650	258.56	70.03	89.19	N/A	N/A	N/A	N/A	N/A	10.83
660	253.46	70.53	88.63	N/A	N/A	N/A	N/A	N/A	10.48
670	256.43	71.37	88.89	N/A	N/A	N/A	N/A	N/A	10.07
680	259.78	70.39	88.98	N/A	N/A	N/A	N/A	N/A	9.68
690	259.69	70.14	88.98	N/A	N/A	N/A	N/A	N/A	9.29
700	258.45	70.34	88.83	N/A	N/A	N/A	N/A	N/A	8.89
710	259.37	70.55	88.69	N/A	N/A	N/A	N/A	N/A	8.50
720	258.69	69.89	88.77	N/A	N/A	N/A	N/A	N/A	8.10
730	251.47	69.94	88.00	N/A	N/A	N/A	N/A	N/A	7.75
740	258.10	69.71	88.35	N/A	N/A	N/A	N/A	N/A	7.36
750	257.81	70.56	88.33	N/A	N/A	N/A	N/A	N/A	6.96
760	260.13	69.55	88.51	N/A	N/A	N/A	N/A	N/A	6.55
770	254.78	69.78	87.97	N/A	N/A	N/A	N/A	N/A	6.20
780	256.57	70.21	88.20	N/A	N/A	N/A	N/A	N/A	5.82
790	262.95	69.34	88.17	N/A	N/A	N/A	N/A	N/A	5.40
800	261.62	69.82	88.46	N/A	N/A	N/A	N/A	N/A	4.99
810	259.50	70.15	88.18	N/A	N/A	N/A	N/A	N/A	4.63
820	258.37	69.51	88.26	N/A	N/A	N/A	N/A	N/A	4.24
830	257.17	69.39	87.96	N/A	N/A	N/A	N/A	N/A	3.87
840	256.30	69.96	87.97	N/A	N/A	N/A	N/A	N/A	3.49
850	255.54	69.57	87.58	N/A	N/A	N/A	N/A	N/A	3.11
860	260.04	69.58	88.01	N/A	N/A	N/A	N/A	N/A	2.71
870	266.12	69.45	88.71	N/A	N/A	N/A	N/A	N/A	2.31
880	266.25	69.65	88.49	N/A	N/A	N/A	N/A	N/A	1.91
890	266.09	69.44	88.65	N/A	N/A	N/A	N/A	N/A	1.52
900	263.95	69.35	88.44	N/A	N/A	N/A	N/A	N/A	1.13
910	254.11	69.61	87.62	N/A	N/A	N/A	N/A	N/A	0.77
920	259.88	69.14	87.73	N/A	N/A	N/A	N/A	N/A	0.35

930	260.25	69.19	88.03	N/A	N/A	N/A	N/A	N/A	0.00
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20-10-2016 & 21-10-2016

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	255.55	68.51	90.86	N/A	N/A	N/A	N/A	N/A	36.01
10	269.82	68.45	91.86	N/A	N/A	N/A	N/A	N/A	35.63
20	269.70	70.90	93.37	N/A	N/A	N/A	N/A	N/A	35.26
30	271.24	70.77	93.50	N/A	N/A	N/A	N/A	N/A	34.90
40	268.75	71.18	93.61	N/A	N/A	N/A	N/A	N/A	34.51
50	271.66	71.02	93.93	N/A	N/A	N/A	N/A	N/A	34.13
60	274.53	71.14	93.82	N/A	N/A	N/A	N/A	N/A	33.76
70	270.10	71.22	93.76	N/A	N/A	N/A	N/A	N/A	33.38
80	272.60	71.12	93.93	N/A	N/A	N/A	N/A	N/A	32.98
90	269.86	71.50	93.83	N/A	N/A	N/A	N/A	N/A	32.60
100	273.63	71.55	94.11	N/A	N/A	N/A	N/A	N/A	32.22
110	264.78	70.97	93.09	N/A	N/A	N/A	N/A	N/A	31.88
120	276.30	71.35	93.79	N/A	N/A	N/A	N/A	N/A	31.47
130	271.50	71.26	93.69	N/A	N/A	N/A	N/A	N/A	31.09
140	271.36	71.51	93.49	N/A	N/A	N/A	N/A	N/A	30.71
150	274.80	71.03	94.05	N/A	N/A	N/A	N/A	N/A	30.31
160	275.42	70.82	93.87	N/A	N/A	N/A	N/A	N/A	29.92
170	279.06	71.05	93.87	N/A	N/A	N/A	N/A	N/A	29.52
180	272.53	70.93	93.63	N/A	N/A	N/A	N/A	N/A	29.13
190	273.41	71.22	93.60	N/A	N/A	N/A	N/A	N/A	28.72
200	281.36	70.83	94.21	N/A	N/A	N/A	N/A	N/A	28.30
210	274.19	70.59	93.72	N/A	N/A	N/A	N/A	N/A	27.93
220	274.16	70.92	93.44	N/A	N/A	N/A	N/A	N/A	27.53
230	271.35	70.98	93.35	N/A	N/A	N/A	N/A	N/A	27.15
240	269.06	70.75	92.74	N/A	N/A	N/A	N/A	N/A	26.78
250	272.92	70.81	93.33	N/A	N/A	N/A	N/A	N/A	26.38
260	259.15	71.30	92.32	N/A	N/A	N/A	N/A	N/A	26.04

270	268.81	70.66	92.98	N/A	N/A	N/A	N/A	N/A	25.61
280	272.22	70.86	93.06	N/A	N/A	N/A	N/A	N/A	25.22
290	268.15	70.42	92.70	N/A	N/A	N/A	N/A	N/A	24.85
300	270.05	71.17	92.88	N/A	N/A	N/A	N/A	N/A	24.47
310	274.85	70.87	92.93	N/A	N/A	N/A	N/A	N/A	24.08
320	274.02	70.50	93.08	N/A	N/A	N/A	N/A	N/A	23.68
330	265.38	70.56	92.63	N/A	N/A	N/A	N/A	N/A	23.33
340	271.48	70.50	92.76	N/A	N/A	N/A	N/A	N/A	22.93
350	277.10	70.59	93.23	N/A	N/A	N/A	N/A	N/A	22.53
360	272.10	70.97	93.21	N/A	N/A	N/A	N/A	N/A	22.16
370	273.24	70.42	92.90	N/A	N/A	N/A	N/A	N/A	21.76
380	275.22	70.58	93.40	N/A	N/A	N/A	N/A	N/A	21.37
390	274.83	70.71	93.03	N/A	N/A	N/A	N/A	N/A	20.99
400	269.56	70.41	92.71	N/A	N/A	N/A	N/A	N/A	20.61
410	277.61	70.37	92.93	N/A	N/A	N/A	N/A	N/A	20.21
420	272.70	70.48	92.90	N/A	N/A	N/A	N/A	N/A	19.83
430	271.18	70.04	92.69	N/A	N/A	N/A	N/A	N/A	19.44
440	274.23	70.10	92.78	N/A	N/A	N/A	N/A	N/A	19.05
450	271.34	70.07	92.37	N/A	N/A	N/A	N/A	N/A	18.67
460	269.33	70.09	92.35	N/A	N/A	N/A	N/A	N/A	18.30
470	270.86	70.01	92.53	N/A	N/A	N/A	N/A	N/A	17.93
480	274.65	69.83	92.65	N/A	N/A	N/A	N/A	N/A	17.53
490	269.34	69.79	92.21	N/A	N/A	N/A	N/A	N/A	17.14
500	277.89	70.20	92.86	N/A	N/A	N/A	N/A	N/A	16.74
510	277.12	69.61	92.86	N/A	N/A	N/A	N/A	N/A	16.33
520	277.31	69.59	92.93	N/A	N/A	N/A	N/A	N/A	15.93
530	278.96	69.28	93.11	N/A	N/A	N/A	N/A	N/A	15.51
540	277.88	69.66	92.69	N/A	N/A	N/A	N/A	N/A	15.11
550	271.90	69.89	92.08	N/A	N/A	N/A	N/A	N/A	14.73
560	273.90	69.54	92.25	N/A	N/A	N/A	N/A	N/A	14.33
570	274.79	69.99	92.44	N/A	N/A	N/A	N/A	N/A	13.93
580	273.03	70.10	92.05	N/A	N/A	N/A	N/A	N/A	13.56
590	271.52	69.35	92.16	N/A	N/A	N/A	N/A	N/A	13.18
600	274.01	68.90	92.23	N/A	N/A	N/A	N/A	N/A	12.79

610	274.10	69.57	92.20	N/A	N/A	N/A	N/A	N/A	12.40
620	261.74	69.62	91.21	N/A	N/A	N/A	N/A	N/A	12.06
630	263.55	69.84	91.38	N/A	N/A	N/A	N/A	N/A	11.69
640	264.76	69.65	91.54	N/A	N/A	N/A	N/A	N/A	11.32
650	267.36	69.86	91.43	N/A	N/A	N/A	N/A	N/A	10.93
660	268.69	69.66	91.89	N/A	N/A	N/A	N/A	N/A	10.54
670	273.14	70.17	92.21	N/A	N/A	N/A	N/A	N/A	10.14
680	270.02	70.20	91.58	N/A	N/A	N/A	N/A	N/A	9.78
690	270.07	70.06	91.97	N/A	N/A	N/A	N/A	N/A	9.40
700	270.25	70.31	91.85	N/A	N/A	N/A	N/A	N/A	9.02
710	272.92	69.79	92.21	N/A	N/A	N/A	N/A	N/A	8.62
720	267.40	69.54	91.78	N/A	N/A	N/A	N/A	N/A	8.25
730	271.49	69.88	91.95	N/A	N/A	N/A	N/A	N/A	7.86
740	272.39	70.48	92.14	N/A	N/A	N/A	N/A	N/A	7.47
750	273.37	70.20	92.39	N/A	N/A	N/A	N/A	N/A	7.09
760	272.45	70.74	92.34	N/A	N/A	N/A	N/A	N/A	6.69
770	273.82	70.10	92.24	N/A	N/A	N/A	N/A	N/A	6.30
780	272.33	70.12	92.24	N/A	N/A	N/A	N/A	N/A	5.92
790	276.86	69.70	92.45	N/A	N/A	N/A	N/A	N/A	5.50
800	273.18	69.84	92.27	N/A	N/A	N/A	N/A	N/A	5.12
810	277.12	69.93	92.64	N/A	N/A	N/A	N/A	N/A	4.71
820	271.10	70.50	92.33	N/A	N/A	N/A	N/A	N/A	4.32
830	275.69	70.42	92.45	N/A	N/A	N/A	N/A	N/A	3.90
840	273.84	70.10	92.06	N/A	N/A	N/A	N/A	N/A	3.52
850	271.37	70.10	91.96	N/A	N/A	N/A	N/A	N/A	3.13
860	276.12	70.31	92.37	N/A	N/A	N/A	N/A	N/A	2.73
870	269.26	70.09	91.77	N/A	N/A	N/A	N/A	N/A	2.35
880	269.06	69.79	91.61	N/A	N/A	N/A	N/A	N/A	1.96
890	268.85	69.91	91.63	N/A	N/A	N/A	N/A	N/A	1.58
900	270.40	69.48	91.46	N/A	N/A	N/A	N/A	N/A	1.21
910	274.59	69.12	91.87	N/A	N/A	N/A	N/A	N/A	0.80
920	270.96	69.76	91.69	N/A	N/A	N/A	N/A	N/A	0.41
930	271.25	69.22	92.01	N/A	N/A	N/A	N/A	N/A	0.00

21-10-2016

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	325.37	67.77	96.84	N/A	N/A	N/A	N/A	N/A	4.14
10	287.71	66.78	93.02	N/A	N/A	N/A	N/A	N/A	3.79
20	271.26	66.98	91.11	N/A	N/A	N/A	N/A	N/A	3.44
30	272.67	67.14	90.70	N/A	N/A	N/A	N/A	N/A	3.08
40	267.72	67.74	90.76	N/A	N/A	N/A	N/A	N/A	2.73
50	262.02	67.55	90.05	N/A	N/A	N/A	N/A	N/A	2.38
60	262.31	67.20	89.84	N/A	N/A	N/A	N/A	N/A	2.03
70	265.35	67.56	89.95	N/A	N/A	N/A	N/A	N/A	1.65
80	266.20	67.61	90.24	N/A	N/A	N/A	N/A	N/A	1.28
90	265.33	67.74	90.38	N/A	N/A	N/A	N/A	N/A	0.93
100	266.89	68.23	90.50	N/A	N/A	N/A	N/A	N/A	0.56
110	268.83	67.90	90.52	N/A	N/A	N/A	N/A	N/A	0.20
120	217.66	68.50	86.04	N/A	N/A	N/A	N/A	N/A	0.00

24-10-2016

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	325.37	67.77	96.84	N/A	N/A	N/A	N/A	N/A	4.14
10	287.71	66.78	93.02	N/A	N/A	N/A	N/A	N/A	3.79
20	271.26	66.98	91.11	N/A	N/A	N/A	N/A	N/A	3.44
30	272.67	67.14	90.70	N/A	N/A	N/A	N/A	N/A	3.08
40	267.72	67.74	90.76	N/A	N/A	N/A	N/A	N/A	2.73
50	262.02	67.55	90.05	N/A	N/A	N/A	N/A	N/A	2.38
60	262.31	67.20	89.84	N/A	N/A	N/A	N/A	N/A	2.03
70	265.35	67.56	89.95	N/A	N/A	N/A	N/A	N/A	1.65
80	266.20	67.61	90.24	N/A	N/A	N/A	N/A	N/A	1.28
90	265.33	67.74	90.38	N/A	N/A	N/A	N/A	N/A	0.93

100	266.89	68.23	90.50	N/A	N/A	N/A	N/A	N/A	0.56
110	268.83	67.90	90.52	N/A	N/A	N/A	N/A	N/A	0.20
120	217.66	68.50	86.04	N/A	N/A	N/A	N/A	N/A	0.00

27-10-2016

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	318.16	67.74	96.70	N/A	N/A	N/A	N/A	N/A	2.16
10	291.25	67.26	93.86	N/A	N/A	N/A	N/A	N/A	1.80
20	280.38	66.98	92.58	N/A	N/A	N/A	N/A	N/A	1.43
30	275.98	68.27	92.11	N/A	N/A	N/A	N/A	N/A	1.06
40	266.86	68.14	91.52	N/A	N/A	N/A	N/A	N/A	0.73
50	263.81	68.23	90.77	N/A	N/A	N/A	N/A	N/A	0.36
60	265.48	68.36	89.65	N/A	N/A	N/A	N/A	N/A	0.00

Appendix G
Stack-loss Efficiency data results

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-10. In general the column headings correspond to the variables used in the Standard.

All data from a test run are entered on the "Data" sheet. The cells requiring data entry are highlighted. Please note that input data can be entered in either yard/pound or SI units. Select the units in cells F4 and F5 of the "Data" sheet.

Particulate emissions determined using the dilution tunnel method should be entered in cell C13 of the "Data" sheet as total grams of emissions.

Since oxygen concentrations are calculated for the efficiency determination, entry of measured oxygen data is optional. However, it might be useful to include the measured oxygen values for comparison to the calculated values for diagnostic purposes. A deviation of more than 1 or 2 percentage points can indicate inaccurate CO, CO₂, or fuel composition input data.

Selection of an appliance type in cell F2 of the "Data" sheet is needed for the air/fuel ratio calculation in accordance with Clause 16.3.5 of the Standard.

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-10. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.

The "CSA B415.1 Calculations" sheet is locked and password protected to prevent inadvertent modifications.

The "Chart" sheet includes a chart of flue gas composition data and fuel consumption. The range of cells in the "CSA B415.1 Calculations" sheet to be charted or plotted might need to be adjusted to correspond to the number of data points entered.

Please report any errors or problems to Tony Joseph at CSA.

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Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.4 15 April 2010

VERSION: 2.4 2010-04-15

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 360
 Output Category: Integ

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): 12.71
 Burn Rate (dry kg/h): 0.92
 Total Particulate Emissions: 5.78 g

Fuel Data

	D. Fir	
HHV	20,236	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 0.02 3.02 17.90 253.65 72.31

Temp. (°F)

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

0	12.71	0.01	6.13	14.65	373.1	71.2
10	11.92	0.02	6.33	13.98	376.1	76.6
20	11.16	0.01	6.42	14.37	371.7	72.2
30	10.38	0.01	6.21	15.29	370.4	73.3
40	9.61	0.01	6.61	13.85	375.6	73.3
50	8.78	0.01	6.78	13.62	379.4	77.5
60	7.99	0.01	6.75	13.94	377.6	72.9
70	7.57	0.02	4.85	17.62	320.0	72.2
80	7.21	0.02	3.24	18.05	287.6	69.1
90	6.82	0.01	2.91	17.78	280.7	68.1
100	6.46	0.01	2.79	18.01	271.3	69.9
110	6.14	0.02	2.60	17.95	268.4	71.4
120	5.80	0.02	2.66	18.46	266.1	72.0
130	5.43	0.02	2.84	18.11	266.2	72.2
140	5.07	0.01	2.73	17.98	265.3	72.5
150	4.69	0.02	2.69	18.00	269.5	72.5
160	4.32	0.02	2.83	18.08	271.9	72.7
170	3.95	0.03	2.94	18.37	271.1	72.6
180	3.57	0.02	2.86	18.09	273.5	73.0

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 360 min

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.

	HHV	LHV
Eff	70.27%	75.82%
Comb Eff	99.50%	99.50%
HT Eff	70.62%	76.20%
Output	13,052	kJ/h
Burn Rate	0.92	kg/h
Grams CO	46	g
Input	18,574	kJ/h
MC wet	4.50	
Averages	0.02	3.02

Ultimate CO₂
 CO_{2-ult} 19.63
 F₀
 1.054

		Air Fuel Ratio (A/F)		
Overall Heating Efficiency:	70.27%	Dry Molecular Weight (M _d)	29.19	
Combustion Efficiency:	99.50%	Dry Moles Exhaust Gas (N _g):	1105.08	%HC
Heat Transfer Efficiency:	70.62%	Air Fuel Ratio (A/F)	31.75	0.8

Heat Output:	12,381 Btu/h	13,052 kJ/h
Heat Input:	17,620 Btu/h	18,574 kJ/h
Burn Duration:	6.00	h
Burn Rate:	2.02	lb/h 0.918 kg/h
Stack Temp:	250.3 Deg. F	121.3 Deg. C

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Total	Carbon
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)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x	Now Wt _{dn}	Consumed y	Input	/12= [a]
0	5.77	0.01	6.13	219.6%	20.53	14.39	189.5	21.8	100.5%	74.4%	74.8%	19.4	5.77	0.00	5.51	0.00	0	4.06
10	5.41	0.02	6.33	209.2%	20.52	14.18	191.2	24.8	100.4%	75.0%	75.3%	18.7	5.41	6.22	5.16	6.22	10259	4.06
20	5.06	0.01	6.42	205.2%	20.51	14.08	188.7	22.3	100.5%	75.2%	75.6%	18.5	5.06	12.20	4.84	12.20	6752	4.06
30	4.71	0.01	6.21	215.4%	20.52	14.31	188.0	23.0	100.5%	74.9%	75.2%	19.1	4.71	18.33	4.50	18.33	6795	4.06
40	4.36	0.01	6.61	196.4%	20.50	13.88	190.9	23.0	100.4%	75.5%	75.9%	18.0	4.36	24.39	4.16	24.39	7015	4.06
50	3.98	0.01	6.78	189.0%	20.49	13.70	193.0	25.3	100.4%	75.9%	76.2%	17.5	3.98	30.92	3.80	30.92	7102	4.06

Moisture Content M_{Cwb} : 4.5

Combustion Efficiency:	99.50%	Moisture of Wood (wet basis):	4.5	Dry kg :	5.51
Total Input (kJ):	111,445 105,701 (Btu)	Initial Dry Weight $W_{t_{do}}$ (kg):	5.51	CA:	48.73
Total Output (kJ):	78,310 74,273 (Btu)	Moisture Content Dry	4.71	HY:	6.87
Efficiency:	70.27%			OX:	43.785
Total CO (g):	45.81				

Load Weight (kg):	5.77				
Fuel Heating	HHV	LHV	HHV	LHV	
Value in kJ/kg - CV:	20,236	18,755	Btu/lb	8705.8	8068.5

6.87	2.74	20236.00	4.50	79.25	21.02	0.74	2.61	-0.03	0.07	40.92	321.25	0.40	-0.46	1381.12	35.48	2.62	396.29	4008.65	3018.66	2935.88	2903.24
Fuel Properties			Mw	Mass Balance					kg Wood per	Moles per kg of Dry Wood						Moisture	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)					100 mole dffp	Flue Gas Constituent						Present		CO ₂	O ₂	CO	N ₂
				[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂	CO	HC	N ₂	H ₂ O						
6.87	2.74	20236.00	4.50	79.46	21.08	1.51	5.22	-0.02	0.15	40.92	96.09	0.08	-0.14	530.46	34.85	2.62	462.63	6795.33	5062.54	4910.30	4858.54
6.87	2.74	20236.00	4.50	79.47	21.08	1.56	5.39	-0.02	0.15	40.88	91.55	0.11	-0.13	513.20	34.82	2.62	464.30	6753.01	5026.11	4873.76	4822.63
6.87	2.74	20236.00	4.50	79.48	21.08	1.58	5.47	-0.02	0.16	40.92	89.76	0.08	-0.13	506.55	34.83	2.62	461.88	6743.89	5024.46	4873.43	4822.04
6.87	2.74	20236.00	4.50	79.47	21.08	1.53	5.29	-0.02	0.15	40.91	94.26	0.09	-0.14	523.55	34.84	2.62	461.17	6688.35	4983.15	4833.38	4782.41
6.87	2.74	20236.00	4.50	79.50	21.09	1.63	5.63	-0.02	0.16	40.91	85.91	0.08	-0.13	491.98	34.82	2.62	464.04	6811.54	5071.88	4918.68	4866.97
6.87	2.74	20236.00	4.50	79.51	21.09	1.67	5.77	-0.02	0.17	40.91	82.67	0.07	-0.12	479.74	34.81	2.62	466.15	6814.37	5069.33	4915.05	4863.62

			SUMS							AVERAGE	SUMS						
3854.87	3513.39	295.54	6069.68	29491.90	4242.50	125252.55	-15161.54	62312.43	4599.12	5859.64	31300.19	-1278.40	32578.6	80890.5	-1278.4	45.8	-31.3
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							CO	HC
6654.18	5871.95	294.94	278.07	486.45	23.44	2577.27	-128.12	1736.87	130.47	5104.47	0.00	0	0.00	0	0	0.00	0.00
6623.45	5827.86	297.94	276.03	460.14	33.09	2474.97	-117.18	1734.12	130.36	4991.54	2530.53	-42	2573.01	7728	-42	1.63	-1.06
6603.27	5827.87	295.46	275.93	451.01	22.38	2442.61	-119.46	1734.37	130.36	4937.20	1647.26	-32	1679.49	5104	-32	0.73	-0.71
6548.74	5779.98	296.11	273.64	469.74	24.84	2503.84	-124.83	1733.30	130.23	5010.76	1682.66	-33	1716.08	5113	-33	0.81	-0.75
6676.05	5881.75	296.12	278.65	435.73	22.63	2394.46	-113.79	1735.62	130.50	4883.79	1692.93	-31	1724.37	5322	-31	0.76	-0.70
6689.02	5877.04	298.42	278.77	419.08	20.85	2333.26	-109.92	1735.03	130.49	4807.55	1687.33	-31	1718.43	5415	-31	0.71	-0.69

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 360
Output Category: Integ

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	70.3%	75.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	71%	76.2%

Output Rate (kJ/h)	13,052	12,381	(Btu/h)
Burn Rate (kg/h)	0.92	2.02	(lb/h)
Input (kJ/h)	18,574	17,620	(Btu/h)

Test Load Weight (dry kg)	5.51	12.14	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	46		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.07	0.58
g/kg Dry Fuel	1.05	8.32
g/h	0.96	7.64
lb/MM Btu Output	0.17	1.36

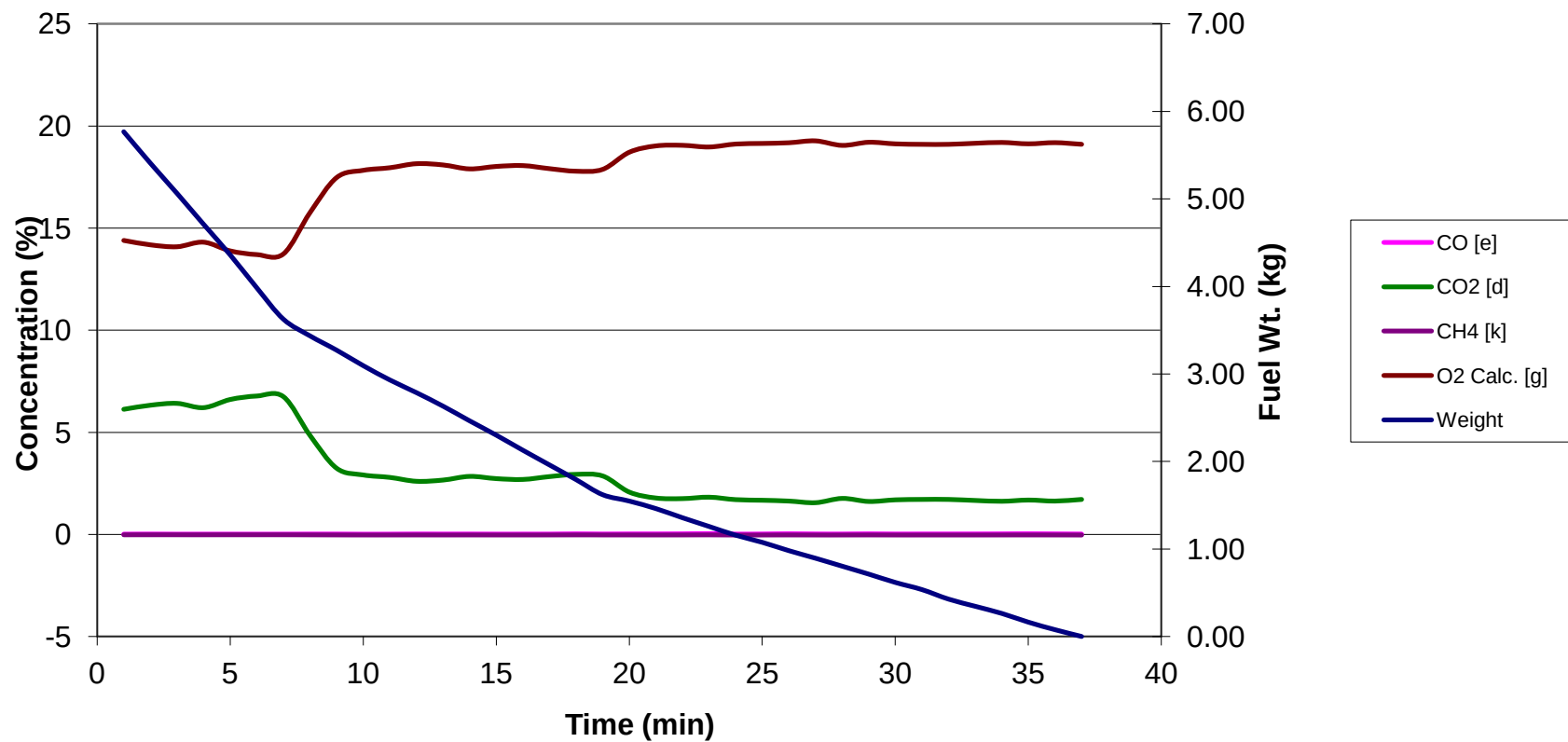
Air/Fuel Ratio (A/F)	31.75
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VERSION:

2.4

2010-04-15

Run: 1



Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-10. In general the column headings correspond to the variables used in the Standard.

All data from a test run are entered on the "Data" sheet. The cells requiring data entry are highlighted. Please note that input data can be entered in either yard/pound or SI units. Select the units in cells F4 and F5 of the "Data" sheet.

Particulate emissions determined using the dilution tunnel method should be entered in cell C13 of the "Data" sheet as total grams of emissions.

Since oxygen concentrations are calculated for the efficiency determination, entry of measured oxygen data is optional. However, it might be useful to include the measured oxygen values for comparison to the calculated values for diagnostic purposes. A deviation of more than 1 or 2 percentage points can indicate inaccurate CO, CO₂, or fuel composition input data.

Selection of an appliance type in cell F2 of the "Data" sheet is needed for the air/fuel ratio calculation in accordance with Clause 16.3.5 of the Standard.

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-10. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.

The "CSA B415.1 Calculations" sheet is locked and password protected to prevent inadvertent modifications.

The "Chart" sheet includes a chart of flue gas composition data and fuel consumption. The range of cells in the "CSA B415.1 Calculations" sheet to be charted or plotted might need to be adjusted to correspond to the number of data points entered.

Please report any errors or problems to Tony Joseph at CSA.

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Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.4 15 April 2010

2010-04-15

Model: ECO-55

Date: 01-11-2016

Run: 1

Control #: G102747001

Test Duration: 60

Output Category: Max

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

Temp. Units (F or C)

Weight Units	lb	(kg or lb)
---------------------	----	------------

Default Fuel Values

D. Fir

Oak

HHV (kJ/kg)

48.73

6.87

%O 43.9

%Ash	0.5
------	-----

Wood Moisture (% wet): 4.50

Load Weight (lb wet): 4.72

Burn Rate (dry kg/h): 2.04

Total Particulate Emissions: 1.04 g

Fuel Data

D. Fir

HHV	20,236	kJ/kg
-----	--------	-------

%C	48.73
----	-------

%H 6.87

%O 43.785

%Ash	0.615
------	-------

Averages

0.01

6.46

14.24

374.85

73.86

Temp. (°F)

**Elapsed
Time (min)**

**Fuel Weight
Remaining (lb)**

Flue Gas Composition (%)		
CO	CO ₂	O ₂

**Flue
Gas**

Room
Temp[illegible]

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.

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 60 min

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
 1.061

		Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	72.70%	Dry Molecular Weight (M _d):	29.60
Combustion Efficiency:	99.50%	Dry Moles Exhaust Gas (N _g):	584.22
Heat Transfer Efficiency:	73.06%	Air Fuel Ratio (A/F)	16.78
		0.8 %HC	

Heat Output:	28,540 Btu/h	30,086 kJ/h
Heat Input:	39,260 Btu/h	41,386 kJ/h
Burn Duration:	1.00 h	
Burn Rate:	4.51 lb/h	2.045 kg/h
Stack Temp:	375.1 Deg. F	190.6 Deg. C

	Averages	0.01	6.46	2.04	20.51	14.04	190.47	23.25	100.5%	75.2%	75.6%	18.39	1.07	50.00	1.02	50.00	44835	4.06
INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %	Air Fuel Ratio	Wet Wt Now	% Wet Consumed	Dry Wt. Now	% Dry Consumed	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	2.14	0.01	6.13	219.6%	20.53	14.39	189.5	21.8	100.5%	74.4%	74.8%	19.4	2.14	0.00	2.05	0.00	0	4.06
10	1.78	0.02	6.33	209.2%	20.52	14.18	191.2	24.8	100.4%	75.0%	75.3%	18.7	1.78	16.67	1.70	16.67	10347	4.06
20	1.43	0.01	6.42	205.2%	20.51	14.08	188.7	22.3	100.5%	75.2%	75.6%	18.5	1.43	33.33	1.36	33.33	6898	4.06
30	1.07	0.01	6.21	215.4%	20.52	14.31	188.0	23.0	100.5%	74.9%	75.2%	19.1	1.07	50.00	1.02	50.00	6898	4.06
40	0.71	0.01	6.61	196.4%	20.50	13.88	190.9	23.0	100.4%	75.5%	75.9%	18.0	0.71	66.67	0.68	66.67	6898	4.06
50	0.36	0.01	6.78	189.0%	20.49	13.70	193.0	25.3	100.4%	75.9%	76.2%	17.5	0.36	83.33	0.34	83.33	10347	4.06

Moisture Content M_{Cwb} : 4.5

Combustion Efficiency:	99.50%			Moisture of Wood (wet basis):	4.5	Dry kg :	2.05
Total Input (kJ):	41,386	39,253 (Btu)		Initial Dry Weight $W_{t_{d0}}$ (kg):	2.05	CA:	48.73
Total Output (kJ):	30,086	28,535 (Btu)		Moisture Content Dry	4.71	HY:	6.87
Efficiency:	72.70%					OX:	43.785
Total CO (g):	5.37						

Load Weight (kg):	2.14				
Fuel Heating	HHV	LHV		HHV	LHV
Value in kJ/kg - CV:	20,236	18,755	Btu/lb	8705.8	8068.5

6.87	2.74	20236.00	4.50	79.49	21.08	1.59	5.50	-0.02	0.16	40.91	89.07	0.08	-0.13	503.90	34.82	2.62	463.62	6782.39	5050.30	4897.79	4846.29
Fuel Properties			Mw	Mass Balance					kg Wood per	Moles per kg of Dry Wood							Stack	Heat Content Change - Ambient to Stack			
Hydrogen	Oxygen	Calorific	Moisture	(moles/100 mole dry flue gas)					100 mole dffp							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	20236.00	4.50	79.46	21.08	1.51	5.22	-0.02	0.15	40.92	96.09	0.08	-0.14	530.46	34.85	2.62	462.63	6795.33	5062.54	4910.30	4858.54
6.87	2.74	20236.00	4.50	79.47	21.08	1.56	5.39	-0.02	0.15	40.88	91.55	0.11	-0.13	513.20	34.82	2.62	464.30	6753.01	5026.11	4873.76	4822.63
6.87	2.74	20236.00	4.50	79.48	21.08	1.58	5.47	-0.02	0.16	40.92	89.76	0.08	-0.13	506.55	34.83	2.62	461.88	6743.89	5024.46	4873.43	4822.04
6.87	2.74	20236.00	4.50	79.47	21.08	1.53	5.29	-0.02	0.15	40.91	94.26	0.09	-0.14	523.55	34.84	2.62	461.17	6688.35	4983.15	4833.38	4782.41
6.87	2.74	20236.00	4.50	79.50	21.09	1.63	5.63	-0.02	0.16	40.91	85.91	0.08	-0.13	491.98	34.82	2.62	464.04	6811.54	5071.88	4918.68	4866.97
6.87	2.74	20236.00	4.50	79.51	21.09	1.67	5.77	-0.02	0.17	40.91	82.67	0.07	-0.12	479.74	34.81	2.62	466.15	6814.37	5069.33	4915.05	4863.62

			SUMS							AVERAGE	SUMS						
6647.18	5856.78	296.40	1942.12	3147.78	169.39	17091.04	-823.43	12146.24	913.05	4940.88	10892.62	-200.81	11093.4	33942.7	-200.8	5.4	-4.6
Temperature		Room Temp K	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		CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
6654.18	5871.95	294.94	278.07	486.45	23.44	2577.27	-128.12	1736.87	130.47	5104.47	0.00	0	0.00	0	0	0.00	0.00
6623.45	5827.86	297.94	276.03	460.14	33.09	2474.97	-117.18	1734.12	130.36	4991.54	2552.16	-43	2595.00	7794	-43	1.65	-1.07
6603.27	5827.87	295.46	275.93	451.01	22.38	2442.61	-119.46	1734.37	130.36	4937.20	1682.92	-33	1715.84	5215	-33	0.74	-0.73
6548.74	5779.98	296.11	273.64	469.74	24.84	2503.84	-124.83	1733.30	130.23	5010.76	1707.99	-34	1741.91	5190	-34	0.82	-0.76
6676.05	5881.75	296.12	278.65	435.73	22.63	2394.46	-113.79	1735.62	130.50	4883.79	1664.71	-31	1695.63	5233	-31	0.75	-0.69
6689.02	5877.04	298.42	278.77	419.08	20.85	2333.26	-109.92	1735.03	130.49	4807.55	2458.09	-45	2503.40	7889	-45	1.04	-1.00

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 60
Output Category: Max

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.7%	78.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	78.8%

Output Rate (kJ/h)	30,086	28,540	(Btu/h)
Burn Rate (kg/h)	2.05	4.51	(lb/h)
Input (kJ/h)	41,386	39,260	(Btu/h)

Test Load Weight (dry kg)	2.05	4.51	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	1.04		
CO (g)	5		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.03	0.18
g/kg Dry Fuel	0.51	2.62
g/h	1.04	5.37
lb/MM Btu Output	0.08	0.41

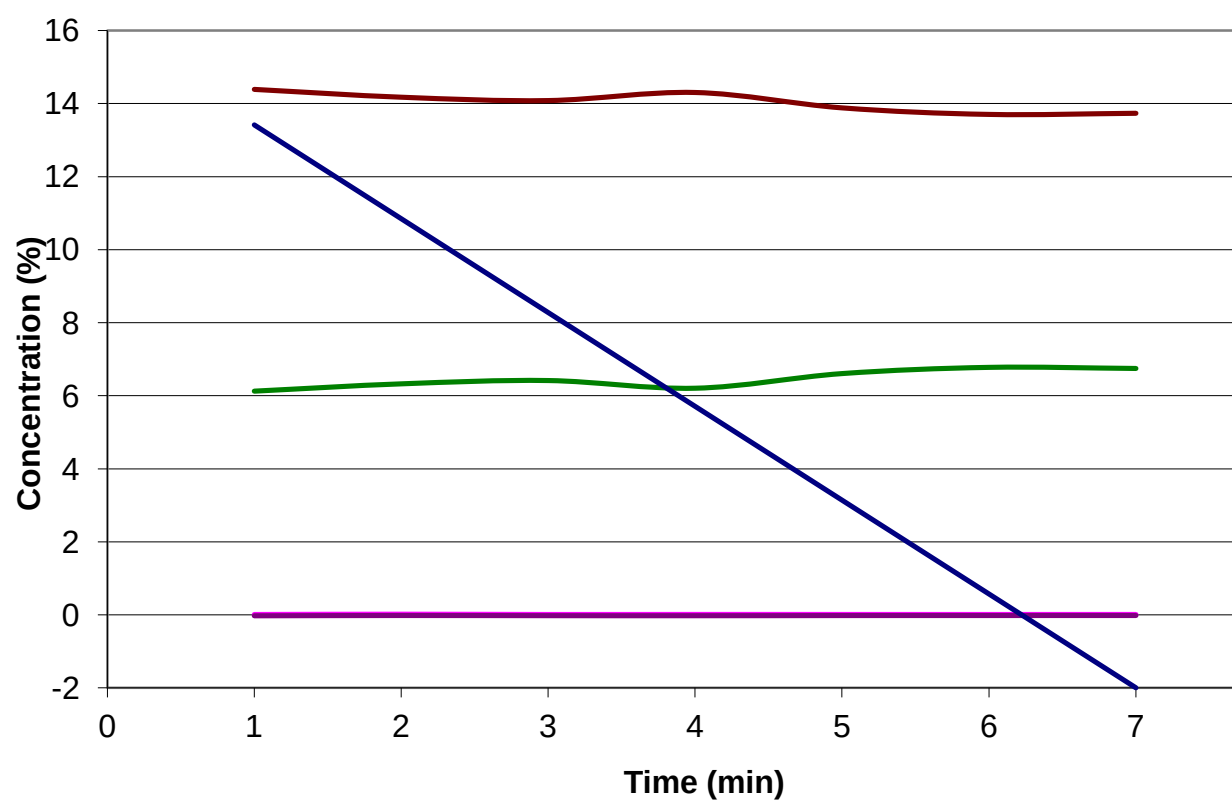
Air/Fuel Ratio (A/F)	16.78
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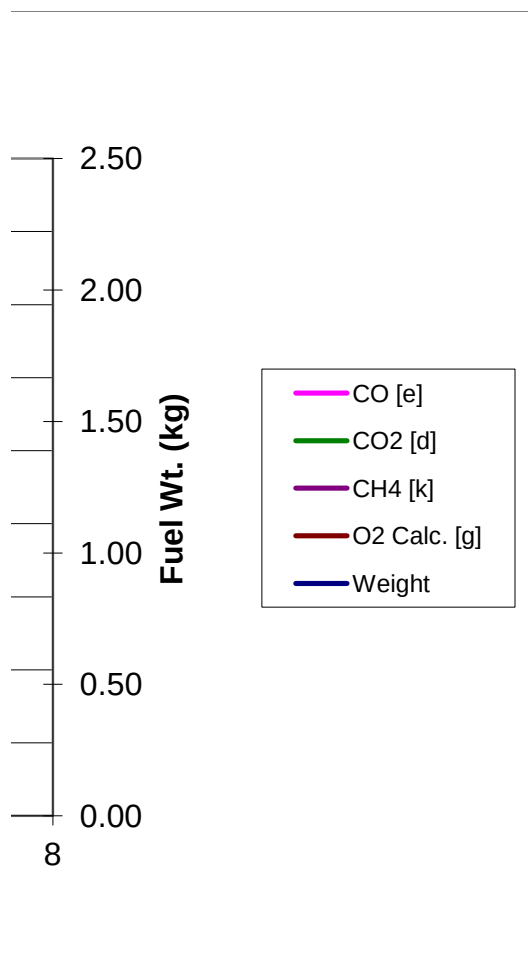
VERSION:

2.4

2010-04-15

Run: 1





Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-10. In general the column headings correspond to the variables used in the Standard.

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Particulate emissions determined using the dilution tunnel method should be entered in cell C13 of the "Data" sheet as total grams of emissions.

Since oxygen concentrations are calculated for the efficiency determination, entry of measured oxygen data is optional. However, it might be useful to include the measured oxygen values for comparison to the calculated values for diagnostic purposes. A deviation of more than 1 or 2 percentage points can indicate inaccurate CO, CO₂, or fuel composition input data.

Selection of an appliance type in cell F2 of the "Data" sheet is needed for the air/fuel ratio calculation in accordance with Clause 16.3.5 of the Standard.

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-10. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.

The "CSA B415.1 Calculations" sheet is locked and password protected to prevent inadvertent modifications.

The "Chart" sheet includes a chart of flue gas composition data and fuel consumption. The range of cells in the "CSA B415.1 Calculations" sheet to be charted or plotted might need to be adjusted to correspond to the number of data points entered.

Please report any errors or problems to Tony Joseph at CSA.

Tony Joseph
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Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.4 15 April 2010

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 120 min

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.

	HHV	LHV
Eff	67.88%	73.24%
Comb Eff	99.50%	99.50%
HT Eff	68.22%	73.61%
Output	13,154	kJ/h
Burn Rate	0.96	kg/h
Grams CO	13	g
Input	19,378	kJ/h
MC wet	4.50	
Averages	0.02	3.28

Ultimate CO₂
 CO_{2-ult} 19.63
 F₀
 1.055

Overall Heating Efficiency:	67.88%	Air Fuel Ratio (A/F)	
Combustion Efficiency:	99.50%	Dry Molecular Weight (M _d)	29.22
Heat Transfer Efficiency:	68.22%	Dry Moles Exhaust Gas (N _g):	1036.28
		Air Fuel Ratio (A/F)	29.77

%HC
 0.8

Heat Output:	12,478 Btu/h	13,154 kJ/h
Heat Input:	18,382 Btu/h	19,378 kJ/h
Burn Duration:	2.00 h	
Burn Rate:	2.11 lb/h	0.958 kg/h
Stack Temp:	276.0 Deg. F	135.5 Deg. C

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Total	Carbon
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)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x	Now Wt _{dn}	Consumed y	Input	/12= [a]
0	2.01	0.01	6.75	190.3%	20.49	13.73	189.5	21.8	100.4%	75.9%	76.2%	17.6	2.01	0.00	1.92	0.00	0	4.06
10	1.84	0.02	4.85	303.3%	20.62	15.76	160.0	22.3	100.6%	74.1%	74.6%	24.4	1.84	8.33	1.76	8.33	4844	4.06
20	1.67	0.02	3.24	502.6%	20.72	17.47	142.0	20.6	101.1%	69.1%	69.8%	36.6	1.67	16.67	1.60	16.67	3230	4.06
30	1.50	0.01	2.91	572.1%	20.75	17.83	138.2	20.1	101.5%	67.3%	68.3%	40.8	1.50	25.00	1.44	25.00	3230	4.06
40	1.34	0.01	2.79	600.3%	20.75	17.96	132.9	21.0	101.5%	67.7%	68.6%	42.6	1.34	33.33	1.28	33.33	3230	4.06
50	1.17	0.02	2.60	648.9%	20.77	18.15	131.3	21.9	101.3%	66.5%	67.4%	45.5	1.17	41.67	1.12	41.67	3230	4.06

Moisture Content M_{Cwb} : 4.5

Combustion Efficiency:	99.50%		Moisture of Wood (wet basis):	4.5	Dry kg :	1.92
Total Input (kJ):	38,756	36,758 (Btu)	Initial Dry Weight $W_{t_{do}}$ (kg):	1.92	CA:	48.73
Total Output (kJ):	26,308	24,952 (Btu)	Moisture Content Dry	4.71	HY:	6.87
Efficiency:	67.88%				OX:	43.785
Total CO (g):	13.04					

Load Weight (kg):	2.01			
Fuel Heating	HHV	LHV	HHV	LHV
Value in kJ/kg - CV:	20,236	18,755	Btu/lb	8705.8 8068.5

6.87	2.74	20236.00	4.50	79.27	21.03	0.81	2.82	-0.03	0.08	40.97	237.27	0.24	-0.35	1063.99	35.26	2.62	412.83	4690.61	3529.68	3432.26	3394.24
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 dff	Moles per kg of Dry Wood						Moisture	Temp	Flue Gas Constituent			
/l= [b]	/l6= [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	20236.00	4.50	79.50	21.09	1.66	5.74	-0.02	0.17	40.91	83.22	0.08	-0.12	481.80	34.81	2.62	462.63	6795.57	5062.71	4910.47	4858.70
6.87	2.74	20236.00	4.50	79.38	21.05	1.19	4.14	-0.02	0.12	40.90	132.89	0.15	-0.19	669.45	34.95	2.62	433.17	5521.43	4138.56	4020.34	3976.64
6.87	2.74	20236.00	4.50	79.27	21.03	0.80	2.78	-0.03	0.08	40.96	220.92	0.22	-0.32	1002.19	35.21	2.62	415.14	4832.96	3637.78	3537.63	3498.39
6.87	2.74	20236.00	4.50	79.25	21.02	0.71	2.50	-0.03	0.07	41.10	251.79	0.15	-0.38	1119.17	35.33	2.62	411.33	4695.82	3537.88	3441.29	3402.95
6.87	2.74	20236.00	4.50	79.24	21.02	0.68	2.40	-0.03	0.07	41.06	264.27	0.20	-0.40	1166.19	35.36	2.62	406.09	4441.97	3349.69	3259.00	3222.53
6.87	2.74	20236.00	4.50	79.22	21.01	0.64	2.25	-0.03	0.06	40.94	285.85	0.33	-0.41	1247.40	35.39	2.62	404.48	4343.50	3275.98	3187.41	3151.71

			SUMS							AVERAGE	SUMS						
4516.19	4107.23	295.09	2498.15	10518.79	877.64	45616.95	-4043.34	22034.68	1636.12	6087.61	11773.93	-480.25	12254.2	26982.0	-480.3	13.0	-11.0
Temperature		Room Temp K	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		CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
6654.43	5872.15	294.94	277.98	421.31	22.15	2340.95	-110.12	1734.88	130.48	4817.63	0.00	0	0.00	0	0	0.00	0.00
5351.80	4809.67	295.49	225.85	549.97	42.36	2662.17	-172.36	1704.69	127.69	5140.37	1230.61	-31	1261.62	3614	-31	0.99	-0.74
4651.06	4233.39	293.77	197.97	803.67	63.03	3506.06	-289.63	1697.20	126.19	6104.50	974.28	-36	1010.33	2255	-36	0.98	-0.83
4511.83	4118.37	293.21	192.98	890.82	42.47	3808.47	-343.43	1698.94	125.88	6416.14	1024.02	-48	1071.85	2206	-48	0.66	-0.98
4261.21	3900.44	294.18	182.39	885.21	56.03	3758.09	-355.10	1692.50	125.31	6344.44	1012.57	-48	1060.14	2217	-48	0.87	-1.01
4165.55	3814.81	295.02	177.81	936.42	95.53	3931.45	-368.13	1690.87	125.09	6589.04	1051.61	-43	1095.01	2178	-43	1.49	-1.05

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 120
Output Category: Med

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	67.9%	73.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	68%	73.6%

Output Rate (kJ/h)	13,154	12,478	(Btu/h)
Burn Rate (kg/h)	0.96	2.11	(lb/h)
Input (kJ/h)	19,378	18,382	(Btu/h)

Test Load Weight (dry kg)	1.92	4.22	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	13		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.22	0.50
g/kg Dry Fuel	3.02	6.81
g/h	2.89	6.52
lb/MM Btu Output	0.51	1.15

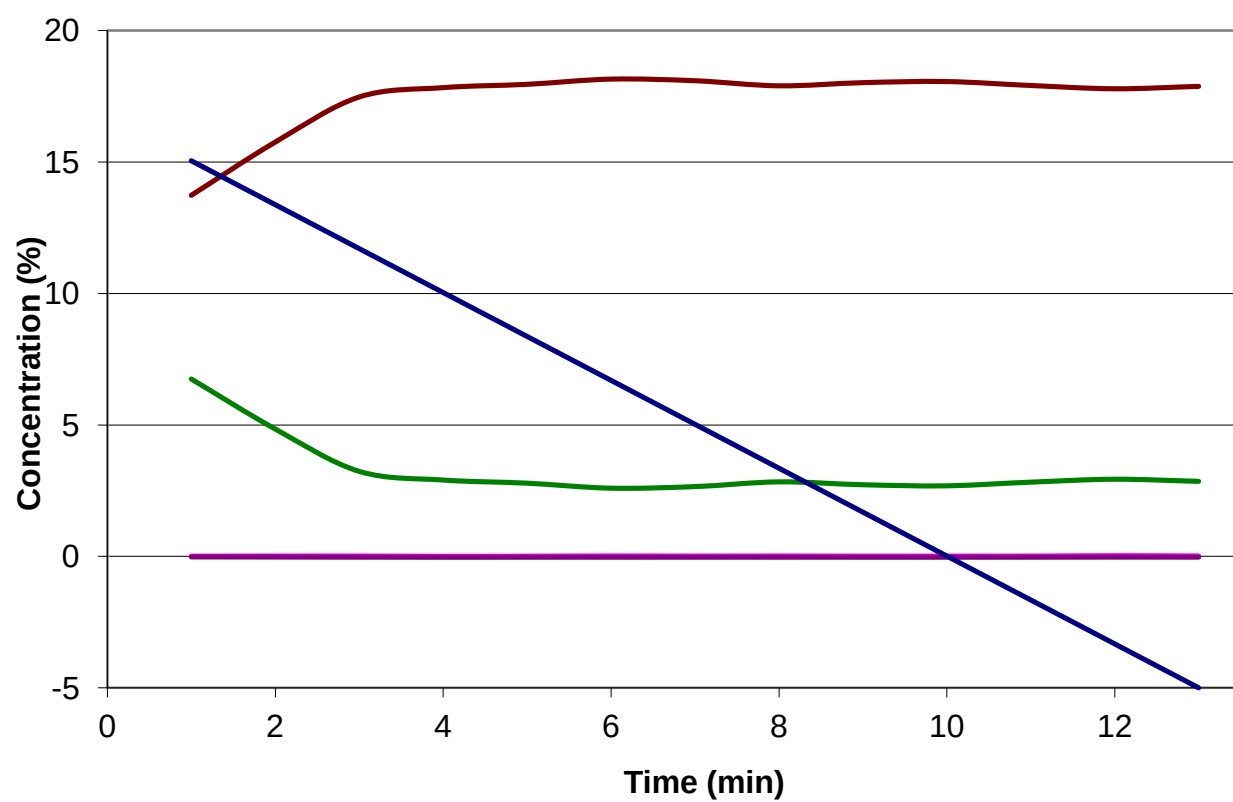
Air/Fuel Ratio (A/F)	29.77
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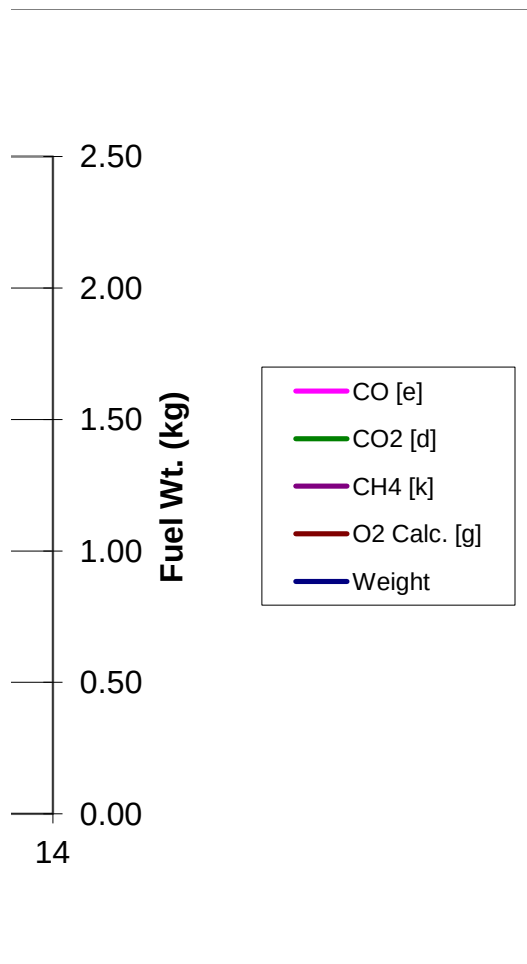
VERSION:

2.4

2010-04-15

Run: 1





Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-10. In general the column headings correspond to the variables used in the Standard.

All data from a test run are entered on the "Data" sheet. The cells requiring data entry are highlighted. Please note that input data can be entered in either yard/pound or SI units. Select the units in cells F4 and F5 of the "Data" sheet.

Particulate emissions determined using the dilution tunnel method should be entered in cell C13 of the "Data" sheet as total grams of emissions.

Since oxygen concentrations are calculated for the efficiency determination, entry of measured oxygen data is optional. However, it might be useful to include the measured oxygen values for comparison to the calculated values for diagnostic purposes. A deviation of more than 1 or 2 percentage points can indicate inaccurate CO, CO₂, or fuel composition input data.

Selection of an appliance type in cell F2 of the "Data" sheet is needed for the air/fuel ratio calculation in accordance with Clause 16.3.5 of the Standard.

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-10. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.

The "CSA B415.1 Calculations" sheet is locked and password protected to prevent inadvertent modifications.

The "Chart" sheet includes a chart of flue gas composition data and fuel consumption. The range of cells in the "CSA B415.1 Calculations" sheet to be charted or plotted might need to be adjusted to correspond to the number of data points entered.

Please report any errors or problems to Tony Joseph at CSA.

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Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.4 15 April 2010

VERSION: 2.4 2010-04-15

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 180
 Output Category: Min

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): 3.57
 Burn Rate (dry kg/h): 0.52
 Total Particulate Emissions: 5.78 g

Fuel Data

	D. Fir	
HHV	20,236	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		0.03	1.77	19.16	195.96	72.28
		Temp. (°F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	3.57	0.02	2.86	18.09	273.5	73.0
10	3.41	0.03	2.07	18.83	212.5	72.7
20	3.22	0.03	1.78	19.19	195.8	72.5
30	2.99	0.03	1.75	19.28	196.7	72.4
40	2.77	0.05	1.82	19.64	197.3	72.3
50	2.55	0.02	1.70	18.94	195.0	72.8
60	2.37	0.02	1.67	18.80	186.5	72.0
70	2.16	0.04	1.63	19.47	190.9	72.1
80	1.97	0.02	1.55	19.07	181.9	71.8
90	1.77	0.02	1.76	19.12	193.0	71.9
100	1.57	0.03	1.61	19.42	189.4	72.3
110	1.36	0.02	1.69	19.25	192.9	72.5
120	1.18	0.02	1.71	19.18	184.0	72.0
130	0.94	0.02	1.71	19.12	195.3	72.4
140	0.76	0.02	1.66	19.42	187.5	72.1
150	0.58	0.03	1.62	19.35	180.8	72.2
160	0.36	0.03	1.68	19.43	195.1	72.1
170	0.17	0.03	1.63	19.32	185.5	71.8
180	0.00	0.02	1.71	19.12	189.7	72.4

Manufacturer: SBI
 Model: ECO-55
 Date: 01-11-2016
 Run: 1
 Control #: G102747001
 Test Duration: 180 min

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
 1.044

		Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	67.16%	Dry Molecular Weight (M _d)	29.04
Combustion Efficiency:	99.50%	Dry Moles Exhaust Gas (N _g):	1637.88
Heat Transfer Efficiency:	67.50%	Air Fuel Ratio (A/F)	47.06
		0.8 %HC	

Heat Output:	6,648 Btu/h	7,008 kJ/h
Heat Input:	9,898 Btu/h	10,434 kJ/h
Burn Duration:	3.00	h
Burn Rate:	1.14	lb/h 0.516 kg/h
Stack Temp:	191.7 Deg. F	88.7 Deg. C

	Averages	0.03	1.77	10.12	20.82	19.04	91.09	22.38	101.9%	69.0%	70.3%	67.90	0.80	50.32	0.77	50.32	32048	4.06
INPUT DATA				Oxygen Calculation			Input Data		Combust Eff %	Heat Transfer %	Net Eff %	Air Fuel Ratio	Wet Wt Now	% Wet Consumed x	Dry Wt. Now Wt _{dn}	% Dry Consumed 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	0.02	2.86	581.6%	20.75	17.88	134.2	22.8	101.2%	68.3%	69.2%	41.4	1.62	0.00	1.55	0.00	0	4.06
10	1.55	0.03	2.07	836.7%	20.80	18.72	100.3	22.6	101.6%	69.6%	70.7%	57.1	1.55	4.48	1.48	4.48	2236	4.06
20	1.46	0.03	1.78	986.8%	20.82	19.03	91.0	22.5	101.9%	69.2%	70.5%	66.3	1.46	9.80	1.40	9.80	1841	4.06
30	1.36	0.03	1.75	1001.6%	20.82	19.06	91.5	22.5	101.6%	68.6%	69.8%	67.2	1.36	16.25	1.30	16.25	1973	4.06
40	1.26	0.05	1.82	952.4%	20.82	18.97	91.8	22.4	100.9%	69.4%	70.0%	64.1	1.26	22.41	1.20	22.41	1929	4.06
50	1.16	0.02	1.70	1044.6%	20.83	19.12	90.5	22.6	102.5%	68.4%	70.1%	70.0	1.16	28.57	1.10	28.57	1754	4.06

Moisture Content M_{Cwb} : 4.5

Combustion Efficiency:	99.50%		Moisture of Wood (wet basis):	4.5	Dry kg :	1.55
Total Input (kJ):	31,303	29,689 (Btu)	Initial Dry Weight $W_{t_{do}}$ (kg):	1.55	CA:	48.73
Total Output (kJ):	21,023	19,939 (Btu)	Moisture Content Dry	4.71	HY:	6.87
Efficiency:	67.16%				OX:	43.785
Total CO (g):	28.23					

Load Weight (kg):	1.62				
Fuel Heating	HHV	LHV		HHV	LHV
Value in kJ/kg - CV:	20,236	18,755	Btu/lb	8705.8	8068.5

6.87	2.74	20236.00	4.50	79.17	21.00	0.44	1.55	-0.03	0.04	40.88	448.29	0.61	-0.63	1860.97	35.83	2.62	364.24	2688.81	2044.78	1993.62	1970.43
Fuel Properties			Mw	Mass Balance					kg Wood per	Moles per kg of Dry Wood						Moisture	Stack	Heat Content Change - Ambient to Stack			
Hydrogen	Oxygen	Calorific	Moisture	(moles/100 mole dry flue gas)					100 mole dff							Present	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		K	CO ₂	O ₂	CO	N ₂
6.87	2.74	20236.00	4.50	79.24	21.02	0.70	2.47	-0.03	0.07	40.94	255.94	0.29	-0.37	1134.43	35.30	2.62	407.34	4426.34	3335.74	3244.89	3208.69
6.87	2.74	20236.00	4.50	79.19	21.00	0.51	1.80	-0.03	0.05	40.88	369.61	0.51	-0.52	1563.68	35.61	2.62	373.40	3047.41	2313.60	2254.78	2228.74
6.87	2.74	20236.00	4.50	79.17	21.00	0.44	1.56	-0.03	0.04	40.87	436.90	0.60	-0.62	1817.91	35.79	2.62	364.17	2678.66	2037.80	1986.99	1963.84
6.87	2.74	20236.00	4.50	79.16	21.00	0.43	1.54	-0.03	0.04	40.72	443.39	0.74	-0.61	1842.03	35.77	2.62	364.66	2700.61	2054.30	2003.03	1979.70
6.87	2.74	20236.00	4.50	79.16	21.00	0.45	1.61	-0.02	0.05	40.39	421.04	1.00	-0.53	1756.71	35.63	2.62	364.99	2716.31	2066.12	2014.53	1991.07
6.87	2.74	20236.00	4.50	79.17	21.00	0.42	1.48	-0.03	0.04	41.19	463.21	0.36	-0.69	1918.13	35.95	2.62	363.68	2654.83	2019.83	1969.52	1946.56

			SUMS							AVERAGE	SUMS							
2541.84	2387.35	295.53	2088.62	17100.40	3299.57	68525.54	-10736.16	31555.74	2305.70	6007.34	9500.93	-622.47	10123.4	22547.3	-622.5	28.2	-16.3	
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									
4250.94	3883.39	295.95	181.23	853.74	81.95	3640.03	-331.28	1689.35	125.27	6240.29	0.00	0	0.00	0	0.00	0.00		
2889.33	2699.78	295.74	124.56	855.12	144.20	3485.04	-465.69	1661.66	122.17	5927.06	654.89	-35	690.38	1581	-35	1.56	-0.92	
2530.63	2379.47	295.67	109.49	890.31	171.45	3570.07	-549.73	1659.01	121.33	5971.94	543.41	-34	577.80	1298	-34	1.53	-0.90	
2551.80	2398.66	295.62	109.97	910.85	212.21	3646.66	-540.45	1658.73	121.38	6119.36	596.60	-32	628.59	1376	-32	2.03	-0.94	
2566.91	2412.42	295.56	109.71	869.91	285.88	3497.73	-474.65	1652.38	121.42	6062.37	577.91	-18	595.96	1351	-18	2.68	-0.81	
2507.76	2358.55	295.79	109.35	935.61	103.56	3733.75	-618.56	1665.40	121.28	6050.39	524.33	-45	568.87	1229	-45	0.88	-0.96	

Intertek Testing Services

Manufacturer: SBI
Model: ECO-55
Date: 01-11-2016
Run: 1
Control #: G102747001
Test Duration: 180
Output Category: Min

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	67.2%	72.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	67%	72.8%

Output Rate (kJ/h)	7,008	6,648	(Btu/h)
Burn Rate (kg/h)	0.52	1.14	(lb/h)
Input (kJ/h)	10,434	9,898	(Btu/h)

Test Load Weight (dry kg)	1.55	3.41	dry lb
MC wet (%)	4.5		
MC dry (%)	4.71		
Particulate (g)	5.78		
CO (g)	28		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.27	1.34
g/kg Dry Fuel	3.74	18.25
g/h	1.93	9.41
lb/MM Btu Output	0.64	3.12

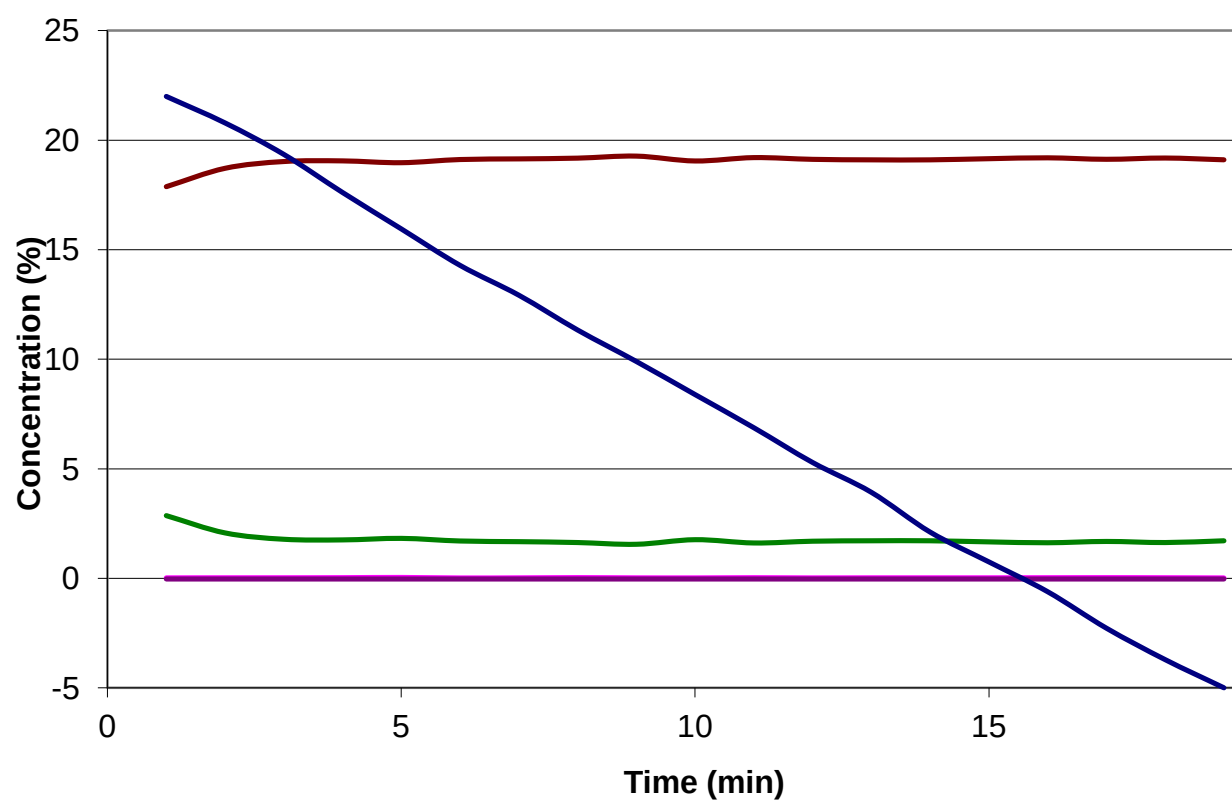
Air/Fuel Ratio (A/F)	47.06
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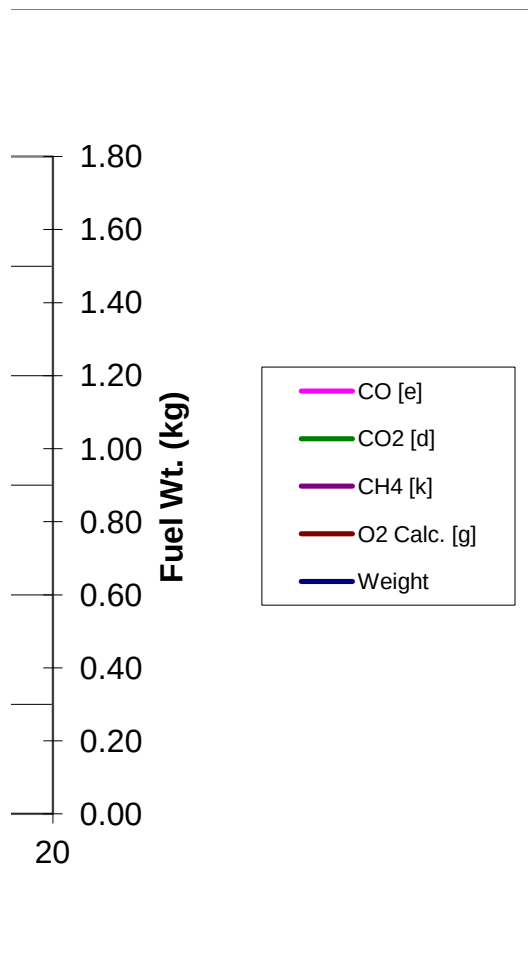
VERSION:

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2010-04-15

Run: 1



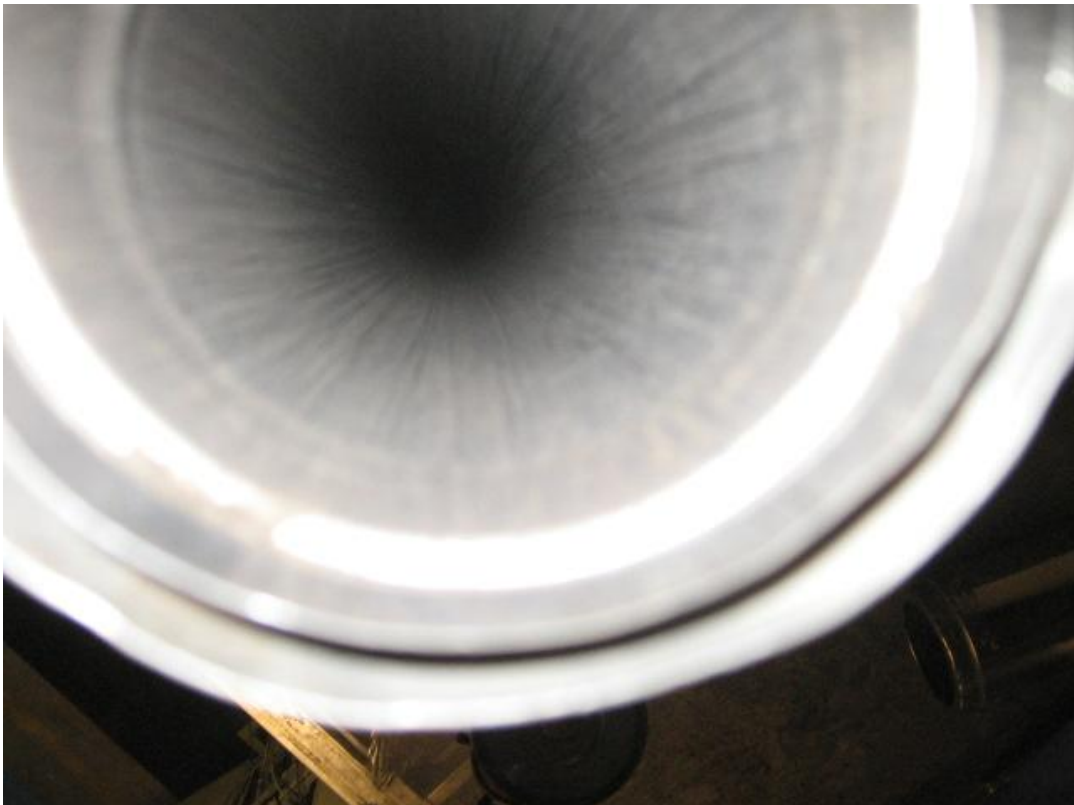


Note: In the legend, [d], [e], [g], and [k] refer to their respective variables in Clauses 13.7.3 and 13.7.5

Appendix H

Tunnel Cleaning and Test Load Photographs

Date: October 25th, 2016









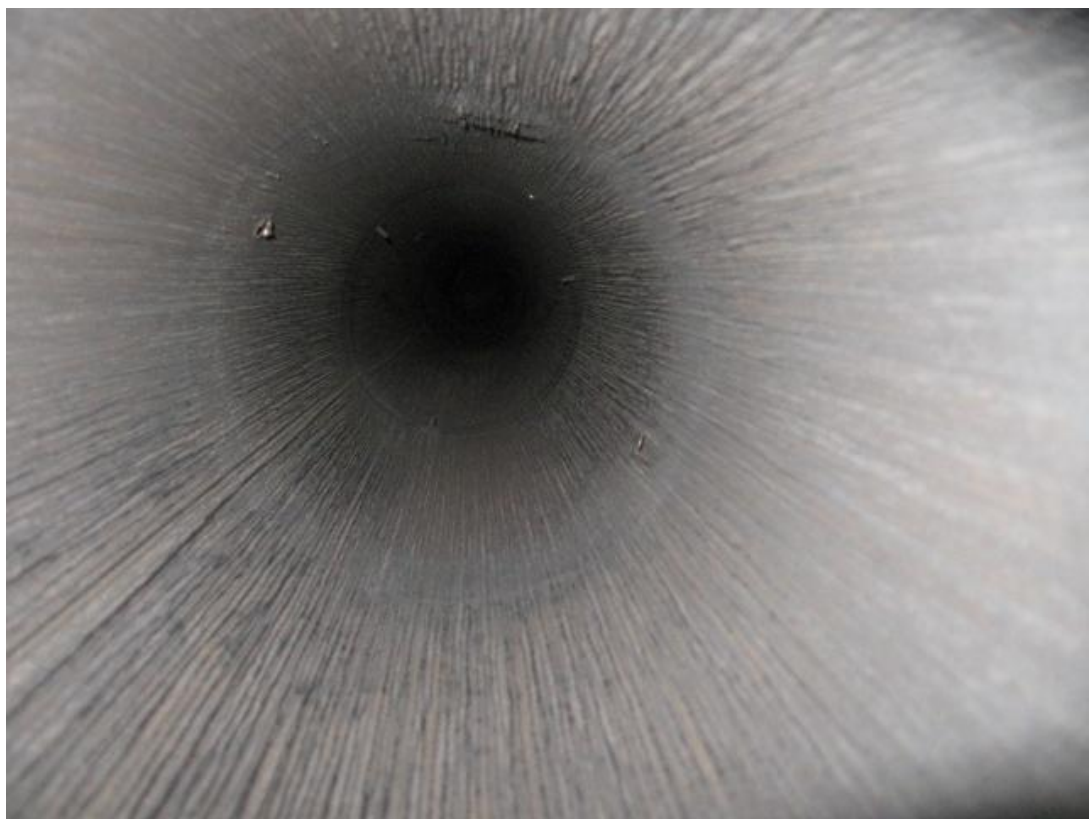


























Appendix I
EPA Correspondence



September 29th, 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 **ECO-55**

Dear Mr. Sanchez

The model line **ECO-55** and equivalent model ECO-55 ST 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 October 31th, 2016. This certification program is planned to end on November 1th, 2016.

We would like to inform you that we'll be using Test method ASTM E2779 in conjunction with ASTM E2515-11 and CSA B415.1-10 for certification of this model line.

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:

Nicolas Gagnon, P.Eng.
ngagnon@sbi-international.com

Should you need additional documents, please let us know.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nicolas Gagnon', written over a horizontal line.

Nicolas Gagnon, P.Eng.
Product Line Engineer
Stove Builder International Inc.