TEST REPORT

SCOPE: EMISSIONS, EFFICIENCY AND OUTPUT

FUEL: CORDWOOD

TEST STANDARD: EPA (ASTM WK47329)

MODEL: FP-15 WOOD FIREPLACE

Notice to reader: Our FP-15 wood fireplace was tested as part of our HE350 Series firebox. Therefore, the HE350 Series is referenced throughout the attached test report.

Listing Report for Applicant
Issued: Mar 13 2017 3:43PM

Inspection Tests And Evaluation Of

SBI - HE350 Solid Fuel Factory-Built Fireplace Emissions and efficiency (37849)

RENDERED TO
Stove Builder International Inc.
250, rue de Copenhague
St-Augustin-de-Desmaures, QC G3A 2H3
Canada

GENERAL: This Report gives the results of the inspection, tests and evaluation of the above for compliance with applicable requirements of the following standards : CSA B415.1 (2010) : ASTM E2515 (2010)

Correlation for Multiple Listees

Applicant/Basic Listee:

Stove Builder International Inc.
250, rue de Copenhague
St-Augustin-de-Desmaures, QC G3A 2H3
Canada

Applicant/Manufacturer(s):

Applicant/Manufacturer	Contact
Stove Builder International Inc. (Laguadeloupe)	Contact: Claude Pare Phone: 418-878-3040 ext 255 Fax: 418-878-3001 E-Mail: cpare@sbi-international.com

Parties Authorized to Apply Mark:

Company	Contact

PRODUCT DESCRIPTION

Product Covered:

SBI - HE350 Solid Fuel Factory-Built Fireplace Emissions and efficiency

Product Description:

Product covered:

HE350 Series Factory Built Fireplace

Final emission results are as follows:

Model:	HE350 Series (FP-15 Waterloo, HE350, Horizon & Monaco XL, WFP100)	Units
Rated Output capacity:	43,000	BTU/h
Average Efficiency:	64	% HHV
Average Efficiency:	68	% LHV
PM Emissions Rate:	1.6	g/h
CO Emissions Rate:	157	g/h
Test fuel:	Cordwood	

Testing was also run as per WK47329. See Appendix I of testing report.

Attribute	Value
Criteria	CSA B415.1 (2010)
Criteria	ASTM E2515 (2010)
CSI Code	10 30 00 Fireplaces and Stoves
Intertek Services	Certification
Listed or Inspected	LISTED
Listing Section	SOLID FUEL EMISSIONS AND EFFICIENCY
Report Number	102163747MTL-001

Spec ID	37849
Verification Testing	No

DRAWING INDEX

Certificate of Conformity - HE350 Solid Fuel Factory-Built Fireplace Emissions & Efficiency

Certificate of Conformity - HE350 Solid Fuel Factory-Built Fireplace Emissions & Efficiency

Intertek

Certificate of Conformity

Emissions – Solid Fuel Factory-Built Fireplace

EPA 40 CFR Part 60, Subpart AAA, ASTM E2515-10, EPA 28R, CSA B415.1-2010

Certificate number: WHI16 – 21514302

Organization:

Stove Builder International Inc.
250, rue de Copenhague
St-Augustin–de-Desmaures, Quebec
G3A 2H3
Canada

This is a certificate of conformity to certify that the bearer has successfully completed the requirements of the above scheme which include the testing of products, the initial assessment, and are subject to continuing annual assessments of their compliance and testing of samples of products taken from production (as applicable to the scheme) and has been registered within the scheme for the products detailed.

Product: Models FP-15 Waterloo, HE350, Horizon & Monaco XL, WFP100
Maximum Output: 43,000 Btu/hour
Minimum Output: 10,000
Weighted Average Emissions: 1.6 grams/hour
Weighted Average Efficiency: 64%
Test Fuel Type: Cordwood
Compliance: Certified to comply with 2020 particulate emissions standard.
Report Number: 102163747MTL-001

Certification Body: Intertek Testing Services NA, Inc.
Initial registration: November 9, 2016
Date of expiry: November 9, 2021
Issue status: 1

Dustin Behling Certification Coordination Manager		3/10/2017
Name	Signature	Date

www.intertek.com

Registered address:
Intertek Testing Services NA, Inc. 545 E. Algonquin Rd. Arlington Heights, IL 60005 USA

MANUFACTURING INFORMATION

Product Covered

The Series350 Solid Fuel Factory-Built Fireplaces is manufactured under various brand names owned by Stove Building International Inc.

The various version share the same basic constrution with some subtle esthetic modifications to the face plate and door design.

They will be produced as follows:

FP-15 Waterloo	under the	Valcourt brand name
Horizon	under the	Osburn Brand name
HE350	under the	Ventis Brand name
Monaco XL	under the	Flame Brand name
WFP100	under the	Hearthstone Brand name

Construction is described further in this report and is as follows:

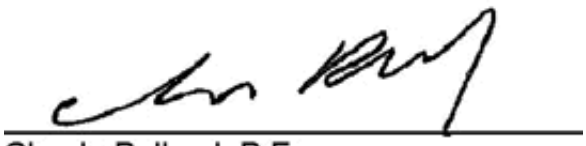
The HE350 is a manually fed constructed of carbon steel with a fire chamber lined with refractory stones. The outer dimensions are 45-inches wide, 40.875-inches high and 28.875-inches deep. It has a firebox volume of 4.28 ft^3. The unit has two front doors with viewing glass and a blower located under the firebox. (See product drawings and component description in Appendix D)

Testing of HE350 also qualifies the following units based on the fact that differences between them is only asthetic: FP-15 Waterloo , Horizon, HE350, Monaco XL

Drawings and manuals are reproduced in the testing section under different appendices.

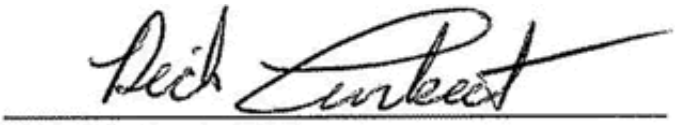
SIGNATURE PAGE

Reported By:



Claude Pelland, P.Eng.
Staff Engineer
Intertek Lachine

Reviewed By:



Rick Curkeet, P.E.
Chief Engineer
Building and Hearth Products Division

TESTING INFORMATION

Test Report 102163747MTL-001

The SBI HE350 has been found to be in compliance with the applicable performance requirements of the ASTM Work Item WK47329 "Standard Method for Determining Particulate Matter Emissions for wood Heaters using Cordwood Test Fuel".

Testing was also conducted as per requirements of WK47329 as per indications of EPA outlined in appendix I of the testing report.

Three runs were conducted as per requirements of standard utilized. Run #2 and #3 were preceded by a high burn rate (similar to run #1)

Testing was performed at client's facility.

In March 2017, a similar unit to the existing ones was introduced. It is called WFP100 which will be branded under the Hearthstone brand name. No testing was deemed necessary for this unit as it is manufactured based on the same construction as the others with esthetical modifications.

SIGNATURE PAGE

Reported By:

Reviewed By:

DRAWING INDEX

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TEST REPORT

REPORT NUMBER: 102163747MTL-001
REPORT DATE: July 8th, 2016

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

RENDERED TO

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

PRODUCT EVALUATED:

Model HE350 Series Solid Fuel Factory-Built Fireplaces

Report of Testing of HE350 Series Solid Fuel Factory-Built Fireplaces for compliance with the applicable requirements of the following criteria: ASTM WK 47329 Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test fuel in conjunction with ASTM E2515.

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Intertek

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I. INTRODUCTION

Intertek Testing Services NA (Intertek) has conducted testing for Stove Builder International (SBI), on the HE350 Series Solid-Fuel Factory-Built Fireplaces[1] 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 Section §60.534 (a) (ii) of 40 CFR Part 60 Subpart AAA, a request was made and authorized by EPA to use ASTM work Item WK47329, titled "Standard Method for Determining Particulate Matter Emissions for Wood Heaters using Cordwood Test Fuel." with some caveat. (See approval letter found in Appendix I) CAN/CSA B415.1-2010 "Performance Testing of Solid-Fuel-Burning Heating Appliances" was used for determination of heat output, efficiency and CO emissions and ASTM E2515-11 "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel" to measure particulate matter emissions. This evaluation was conducted from June 8th to June 10th, 2016.

Test program consisted in three (3) runs all of which started by a high burn rate test.

B. TEST UNIT DESCRIPTION

The HE350 Series is a factory-built fireplace manually fed constructed of carbon steel with a fire chamber lined with refractory stones. The outer dimensions are 45.125-inches wide, 40.875-inches high and 28.875-inches deep. It has a firebox volume of 4.28 ft³. The unit has two front doors with viewing glass and a blower located under the firebox. (See product drawings and component description in Appendix D)

The HE350 Series is comprised of four models which are the FP-15 – Waterloo (Valcourt brand), the Horizon (Osburn brand), the HE350 (Ventis brand) and the Monaco XL (Flame brand). They all share the same critical characteristics like firebox dimensions, air inlets and outlets, flue gas dimension and location, refractory dimensions and locations, etc. (See product drawings and component description in Appendix D)

They differ only by their faceplates and doors' designs.

Tests were conducted using the FP-15 unit as a reference representative of

1 Considered a *built-in wood heater* per Section 60.531 of 40 CFR Part 60, Subpart AAA

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this model line.

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 in accordance with Appendix A-8 to Part 60 Test Methods 26 through 30B. (See data found in Appendix F). 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 June 7th, 2016 the unit was ready for testing.

1. TEST STANDARD

From June 8th to June 10th, 2016, the HE350 Series factory-built fireplace particulate emission rate, burn-rate, heat output, efficiency and CO emission were evaluated using all applicable sections of ASTM WK47329, CSA B415.1-10 and ASTM E2515-11 standards.

2. DEVIATION FROM STANDARD METHOD

Deviations from ASTM WK 47329 and ASTM E2515-11 were performed but were in accordance with the requests made by EPA in the letter dated January 21st, 2016 in Appendix I.

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.

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III. SUMMARY OF TEST RESULTS

RUN #1 (June 8th, 2016). Primary air control was set to fully open. Kindling, start-up fuel and fuel were loaded per manufacturer's instructions. (See owner's Manual Appendix D) Convection blower was on max speed for the full duration of the test. The total fuel load including kindling and start-up fuel weighed 62.88 lb. The main fuel load was loaded with a coal bed of 4.4 lb. Burn time was 320 minutes. The burn rate was 4.08 kg/hr. The particulate emissions were 2.89 g/h.

RUN #2 (June 9th, 2016). Primary air control was set to fully open for the first 7 minutes and completely closed for the remainder of the test. Fuel was loaded by 100 seconds. Convection blower was on max speed for the full duration of the test. The test load weighed 51.83 lb and was loaded with a coal bed of 6.56 lb. Burn time was 770 minutes. The burn rate was 1.49 kg/hr. The particulate emissions were 1.49 g/h. The control so set yielded a low burn-rate as defined by Clause 9.7.1 of WK47329 using the burn time criteria. The procedure described under Run #2 was conducted after a high burn rate like the one described under Run #1

RUN #3 (June 10th, 2016). Primary air control was set to fully open for the first 7 minutes. Following this period, the primary air control was completely closed and the auxiliary air control fully opened (See product drawings). Fuel was loaded by 60 seconds. Convection blower was on max speed for the full duration of the test. The test load weighed 51.38 lb and was loaded with a coal bed of 8.10 lb. Burn time was 680 minutes. The burn rate was 1.67 kg/hr. The particulate emissions were 1.08 g/h. The control so set yielded a medium burn-rate (below mid-point between low and maximum burn-rate). The procedure described under Run #3 was conducted after a high burn rate like the one described under Run #1

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Report No. 102163747MTL-001 Report Date: July 8th, 2016 Page 6 of 15
Client: Stove Builder International Inc. Model: HE350 Series

SECTION 2 – Test Conditions Summary

Model Name(s)/Number(s)	HE350 Series (FP-15)			
Usable Firebox Volume - ft^3	4.276			
Convection Air Fan (No, Standard, Optional)	Standard			
Test Run #	2	3	1	
Date Tested	2016-06-09	2016-06-10	2016-06-08	
Test Run Category (L, M, H)	L	M	H	
Average Barometric Pressure - in Hg	29.70	29.85	29.40	
Max. Observed Ambient Temp - °F	83	80	87	
Min. Observed Ambient Temp - °F	65	70	77	
Max. Observed Filter Temp - °F	87	90	89	
Test Run Air Settings				
Primary (measured up from minimum)	Minimum	Minimum Auxiliary Max	Maximum	
Secondary (measured up from minimum)	Minimum	Minimum	Maximum	
Convection Air Fan Setting	Maximum	Maximum	Maximum	
Test Fuel Load				
Cordwood Fuel Species	Beech	Beech	Beech	
Specific Gravity (from Table 1)	0.67	0.67	0.67	
Higher Heating Value - Btu/lb (from Annex A1)	8088	8088	8088	
Nom. Test Fuel Load Piece Length - in.	16	16	16	
Number of Test Fuel Pieces	7	7	6	
Test Fuel Weight				
Kindling - As Fired lb	na	na	7.56	
Kindling Wt. - As % of Test Fuel Load	na	na	17.5%	
Kindling Moisture - % DB	na	na	10%	
Kindling - kg DB	na	na	3.12	
SU Fuel - As Fired lb	na	na	12.10	
SU Fuel Wt. - As % of Test Fuel Load	na	na	28.0%	
SU Fuel Moisture - % DB	na	na	20.9%	
SU Fuel - kg DB	na	na	4.54	
Test Fuel Load - As Fired lb	51.83	51.38	43.22	
Ave. Test Fuel Load MC % DB	23.1	23.4	21.78	
Test Fuel Load - kg DB	19.09	18.88	16.10	
Test Fuel Loading Density - lb/ft^3	12.12	12.02	10.11	

Intertek

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Report No. 102163747MTL-001 Report Date: July 8th, 2016 Page 7 of 15
Client: Stove Builder International Inc. Model: HE350 Series

SECTION 3 – Test Run Results Summary

Model Name(s)/Number(s)	HE350 Series (FP-15)			
Usable Firebox Volume - ft^3	4.276			
Convection Air Fan (No, Standard, Optional)	Standard			
Test Run #	2	3	1	
Date Tested	6-9-16	6-10-16	6-8-16	
Test Run Category	L	M	H	
Burn Rate - kg/h DB	1.49	1.67	4.08	
Burn Rate - As % of Low to High Midpoint	na	60%	na	
Test Run Duration - h	12.83	11.33	5.33	
Heat Output - Btu/h	16600	19100	43000	
Train 1 - g	19.37	11.96	18.28	
Train 2 - g	18.92	12.57	12.55	
Average	19.145	12.265	15.415	
PM Emission Train Precision - %	1.2%	-2.5%	18.6%	
PM Emission Train Precision - g/kg	0.02	-0.03	0.26	
PM Emission Rate - g/h	1.49	1.08	2.89	
First Hour Emissions - g	11.440	14.400	3.430	
First Hour Emissions - % of Total	60%	117%	22%	
Total CO Emissions - g	2125	1343	911	
CO Emissions Rate - g/h	166	119	219	
Overall Efficiency - CSA B415.1-10				
% HHV Basis	63.5	65.1	62.4	
% LHV Basis	68	69.7	66.8	

SECTION 4 - Weighted Average Summary

Model Name(s)/Number(s)	HE350 Series (FP-15)		
Usable Firebox Volume - ft_3	4.276		
Convection Air Fan (No, Standard, Optional)	Standard		
Average for Each Test Run Category	L	M	H
Burn Rate - kg/h DB	1.49	1.67	4.08
PM Emission Rate - g/h	1.49	1.08	2.89
CO Emissions Rate - g/h	165.6	118.5	218.7
Overall Efficiency - CSA B415.1-10			
% HHV Basis	63.5	65.1	62.4
% LHV Basis	68.0	69.7	66.8
Heat Output - Btu/h	16600	19100	43000
Category Weighting	40%	40%	20%

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ASTM WK47329 Weighted Averages			
PM Emission Rate - g/h	1.6		
CO Emissions Rate - g/h	157		
Overall Efficiency - CSA B415.1-10			
% HHV Basis	64		
% LHV Basis	68		
Heat Output Range - Btu/h	16600	to	43000

IV. PROCESS DESCRIPTION

A. AIR SUPPLY SYSTEM

Primary and secondary combustion air enters on the bottom right side of the outer jacket. This air is then split and fed to two separate 3" diameter flexible pipes. One for primary air and one for secondary air. The primary air is routed to the top of the glass door and pushed down to the ember bed. The secondary air is routed behind the fire chamber and fed the secondary air tube located at the top of the firebox.

These two combustion air are linked together and controlled by one handle located at the bottom right of the faceplate. When not operating at maximum air setting, the system is also controlled by an internal thermostat (snap-disc) that close an electric circuit that is controlling a motor. Therefore, when the control handle is partially or completely closed and when the fireplace is warm enough, the thermostat closes a circuit that affect the position of the primary air control. Until it gets warm, even though the control handle is partially or completely closed, the primary air inlet will remain partially opened for a period of time.

This mechanism prevents the fire from polluting and choking after a reload with high humidity logs or low temperature coal.

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B. TEST FUEL PROPERTIES

The species of fuel used was mainly beech. The fuel was split cordwood of nominal length of 16 inches. The fuel was dried in air to average moisture content between 18% and 28% on a dry basis. Cordwood fuel was loaded from front to back into the firebox per manufacturer's instructions.

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V. SAMPLING SYSTEMS

The sampling procedure used was as specified in ASTM WK47329 & 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 insulated steel chimney section 8 feet ± 6 inches above the scale platform. (See Figure 2.)

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B. DILUTION TUNNEL

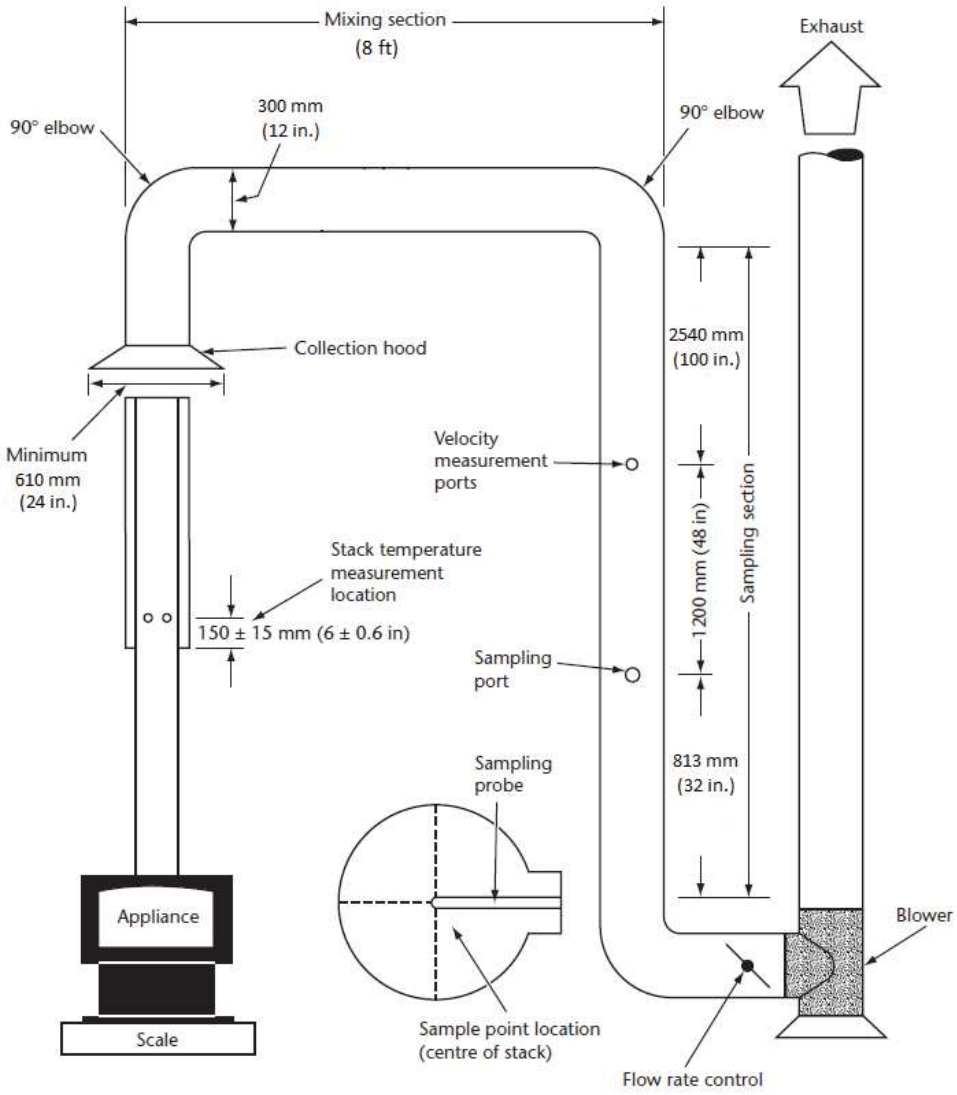

Figure 1- Dilution tunnel

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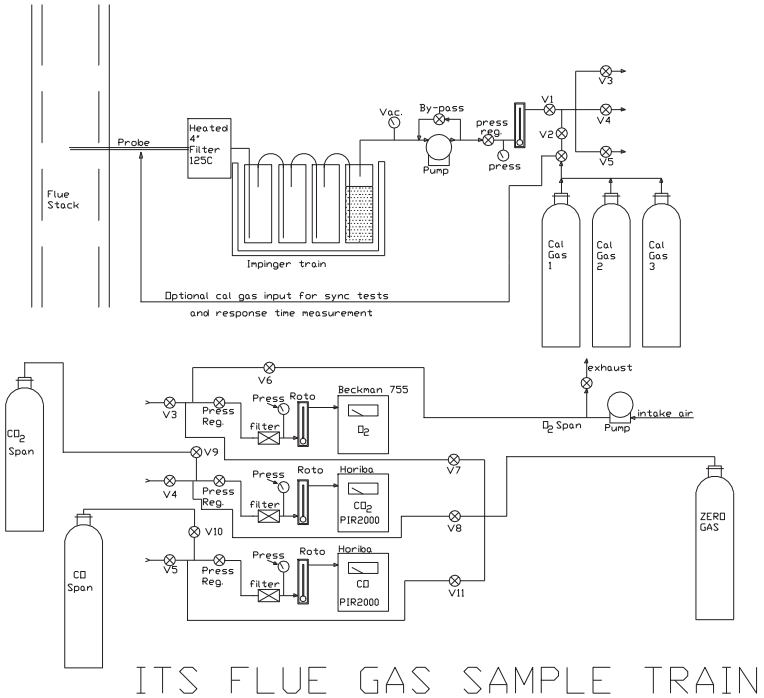
C. STACK GAS SAMPLE TRAIN



ITS FLUE GAS SAMPLE TRAIN

FIGURE 2

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D. DILUTION TUNNEL SAMPLE SYSTEMS

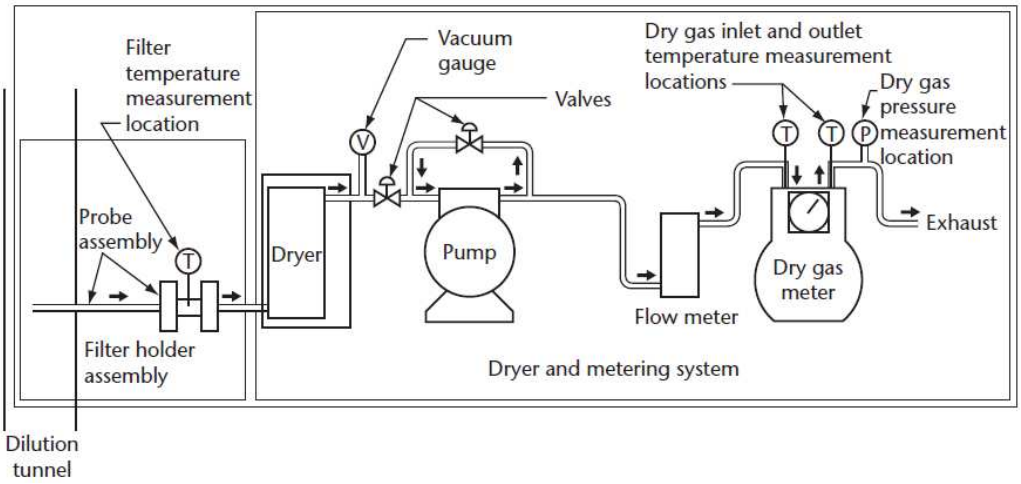

Figure 2 - Sampling trains

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VI. SAMPLING METHODS

A. PARTICULATE SAMPLING

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

VII. QUALITY ASSURANCE

A. INSTRUMENT CALIBRATION

1. DRY GAS METERS

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

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

The standard dry gas meter is calibrated every 12 months using a Spirometer designed by the EPA Emissions Measurement Branch. The process involves sampling the train operation for 1 cubic foot of volume. With readings made to .001 ft^3, 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 rotometer in series with one of the dry gas meters for 10 minutes with the rotometer 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.

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3. GAS ANALYZERS

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

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

B. TEST METHOD PROCEDURES

1. LEAK CHECK PROCEDURES

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

2. TUNNEL VELOCITY/FLOW MEASUREMENT

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

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

3. PM SAMPLING PROPORTIONALITY (ASTM E2515-11)

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

Intertek

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VIII. RESULTS AND OBSERVATIONS

Stove Builder International Inc. model HE350 series Factory-built fireplace 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 1.61 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

Intertek

200- App-A Laboratory Operating Procedure

APPENDIX A
Laboratory Operating Procedure

200- App-A Laboratory Operating Procedure (page 2 of 7)

Intertek

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

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 tracable 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 CO_2 and CO analyzers are "ZEROED" on nitrogen. The O_2 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 (O_2 should be 20.93, CO and CO_2 should equal O).
b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

4. Set-up sample clean-up and water collection train as follows.

a) Load impingers as follows:
Impinger #1: 100 ml distilled water and 5 ml H_2SO_4
Impinger #2: 100 ml distilled water and 5 ml H_2SO_4
Impinger #3: Empty
Impinger #4: 200 – 300 grams silica gel (dry)

200- App-A Laboratory Operating Procedure (page 3 of 7)

Intertek

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

b) Place impingers in container and connect with “U TUBES”. Grease carefully on bottom half of ball joint so that grease will not get into tubes.
c) Connect filter to first impinger and sample line to last impinger.

e. Leak check system as follows.

1) Plug probe.
2) Turn on sample system.
3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
5) Repeat leak check procedure until satisfactory results are obtained.

f) Just prior to starting test, fill impinger container with water and ice and record ambiant 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.

200- App-A Laboratory Operating Procedure (page 4 of 7)

Intertek

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)

c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM_1) and (DGM_2) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM_3, DGM_4). NOTE: If mark, system is leaking too much and all seals should be checked.

d) Calculate leakage rate as follows.

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

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

If CFM_1 or CFM_2 is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM_1 or CFM_2 is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable.

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

200- App-A Laboratory Operating Procedure (page 5 of 7)

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

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 anomometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.

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Intertek

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Client: Stove Builder International inc.

C. Test run

1. When the 15 minutes high fire pre-burn period is completed, the test is to be started as follows:

   a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
   b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
   c) Turn on probe sample systems and stack sampler.
   d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
   e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
   f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must record at each interval the following readings on data form no. 192-v-9904:

      1) Rotometer readings.
      2) Tunnel pitot tube reading. (Zero regularly between readings)
      3) Dry gas meter readings.
      4) Temperature readings.
      5) Draft reading
      6) Test laod weight
      7) CO, CO_2 and O_2 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.

200- App-A Laboratory Operating Procedure (page 7 of 7)

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

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

III. POST TEST PROCEDURES

SAMPLE RECOVERY – FILTER TRAINS

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

Calculation of results

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

Other tests

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

GENERAL

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

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

300- App-B Data and Calculation Forms

Appendix B

Data and calculation Forms

300- App-B Data and Calculation Forms (page 4 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-8-16**		**Average emission rate:(gr/hr)**		**3.4**
Run:	**1**				
Project #:	**QC20160608**		Burn Rate (Dry kg/hr):		N/A
Test Duration: (minutes)	**60**				
PRESSURE FACTOR		0.98262	BAROMETRIC PRESSURE		
			Average:		29.4
TEMPERATURE FACTORS			Start:		29.4
DGM #3:		0.96605	End:		29.4
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #3	Final:	548.904
DGM #3:		8.22709		Initial:	540.123
TOTAL TUNNEL VOLUME (scf):		23498			
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 3:		2856.201		DGM #3:	546.556
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 3 (g):		**3.43**		DGM #3:	0.9870
EMISSION RATES			TUNNEL FLOW RATE:		391.637
Sample Train 3 (g/hr):		**3.43**			
			PARTICULATE CATCH (mg)		
			Total Sample Train 3:		1.2
			Filter and seal Sample Train 3:		1.2
MAX Allowed		N/A			
			Probe Sample Train 3:		0
DEVIATION:		N/A			

	Train 3		Room Particulate Correction		
Cs	0.00014586		Mr	0	Milligram Catch (mg)
Cr	0		Vmr	7.7544	Total Volume Sampled (dscf)
Et	3.43				Rotometer (glass) at 100 flow rate is 0.12924 cfm
Et	AVERAGE		Grams Emissions		

300- App-B Data and Calculation Forms (page 7 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-8-16**		**Average emission rate:(gr/hr)**		**2.9**
Run:	**1**				
Project #:	**QC20160608**		Burn Rate (Dry kg/hr):		4.085
Test Duration: (minutes)	**320**				
PRESSURE FACTOR		0.98262	BAROMETRIC PRESSURE		
				Average:	29.4
TEMPERATURE FACTORS				Start:	29.4
DGM #1:		0.96039		End:	29.4
DGM #2:		0.96973			
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #1	Final:	950.848
DGM #1:		28.26803		Initial:	921.072
DGM #2:		28.43313			
			DGM #2	Final:	1113.538
TOTAL TUNNEL VOLUME (scf):		123057		Initial:	1083.788
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 1:		4353.224		DGM #1:	549.779
Sample Train 2:		4327.946		DGM #2:	544.481
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 1 (g):		**18.28**		DGM #1:	1.0060
Sample Train 2 (g):		**12.55**		DGM #2:	1.0030
EMISSION RATES			TUNNEL FLOW RATE:		384.553
Sample Train 1 (g/hr):		**3.43**			
Sample Train 2 (g/hr):		**2.35**	PARTICULATE CATCH (mg)		
			Total Sample Train 1:		4.2
			Total Sample Train 2:		2.9
			Filter and seal Sample Train 1:		3
MAX Allowed		7.50%	Filter and seal Sample Train 2:		2.9
			Probe Sample Train 1:		1.2
DEVIATION:		37.18%	Probe Sample Train 2:		0

	Train 1	Train 2	Room Particulate Correction		
Cs	0.00014858	0.00010199	Mr	0	Milligram Catch (mg)
Cr	0	0	Vmr	41.3568	Total Volume Sampled (dscf)
Et	18.28	12.55			Rotometer (glass) at 100 flow rate is 0.12924 cfm
Et	AVERAGE	15.42	Grams Emissions		

300- App-B Data and Calculation Forms (page 8 of 92)

November 20 Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method
Cordwood Fuel Load Calculators - 10 lb/ft^3 Nominal Load Density
Core 45-65% of Total Load Weight, Remainder 35-55% of Total Load Weight
Values to be input manually

For All Usable Firebox Volumes - High Fire Test Only						
Nominal Required Load Density (wet basis)	10	lb/ft^3				
Usable Firebox Volume	4.28	ft^3				
Total Nom. Load Wt. Target	42.76	lb				
Total Load Wt. Allowable Range	40.60	to	44.90	lb		
Core Target Wt. Allowable Range	19.20	to	27.80	lb		
Remainder Load Wt. Allowable Range	15.00	to	23.50	lb		
						Mid-Point
Core Load Pc. Wt. Allowable Range	6.40	to	10.70	lb		8.55
Remainder Load Pc. Wt. Allowable Range	4.30	to	23.50	lb		13.90
	Pc. #					
Core Load Piece Wt. Actual	1	7.36	lb		In Range	
	2	8.60	lb		In Range	
	3	8.63	lb		In Range	
Core Load Total. Wt. Actual		24.59	lb		In Range	
	Pc. #					
Remainder Load Piece Wt.	1	7.77	lb		In Range	
(1 to 3 Pcs.)	2	6.06	lb		In Range	
	3	4.80	lb		In Range	
Remainder Load Piece Weight Ratio - Small/Large		62%			In Range	≤ 67%
Remainder Load Tot. Wt. Act		18.63	lb		In Range	
Total Load Wt. Actual		43.22	lb		In Range	
Core % of Total Wt.		57%			In Range	45-65%
Remainder % of Total Wt.		43%			In Range	35-55%
Actual Load % of Nominal Target		101%			In Range	95-105%
Actual Fuel Load Density		10.1	lb/ft^3			
Kindling and Start-up Fuel						
Maximim Kindling Wt. (20% of Tot. Load Wt.)		8.64	lb			
Actual Kindling Wt.		7.56	lb		In Range	17.5%
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)		12.97	lb			
Actual Start-up Fuel Wt.		12.10	lb		In Range	28.0%
Allowable Residual Start-up Fuel Wt. Range	4.3	to	8.6	lb		Mid-Point
Actual Residual Start-up Fuel Wt.		4.40	lb		In Range	6.5
Total Wt. All Fuel Added (wet basis)		62.87	lb			
High Fire Test Run End Point Range	Low		High			Mid-Point
Based on Fuel Load Wt. (w/tares)	3.9	to	4.8	lb		4.3
Actual Fuel Load Ending Wt.		0.0	lb		Out of Range	

300- App-B Data and Calculation Forms (page 9 of 92)

Fuel Piece Moisture Reading (%-dry basis)								
1	2	3	Ave.		Pc. Wt. Dry Basis			
21.5	25.4	13.9	20.3	In Range	6.12	lb	2.78	kg
22.7	21.7	22	22.1	In Range	7.04	lb	3.19	kg
24	17.1	17.1	19.4	In Range	7.23	lb	3.28	kg
23.2	24.2	21.9	23.1	In Range	6.31	lb	2.86	kg
23	24.3	23.5	23.6	In Range	4.90	lb	2.22	kg
32.3	18.6	19.7	23.5	In Range	3.88	lb	1.76	kg
Total Load Ave. MC (%-dry basis)			21.8	In Range				
Total Load Ave. MC % (wet basis)			17.9					
Total Test Load Weight (dry basis) →					35.49	lb	16.09	kg
Kindling Moisture (%-dry basis)								
10	10	10	10.0	In Range	6.87	lb	3.12	kg
Start-up Fuel Moisture Readings (%-dry basis)								
21.2	20.6666667		20.9	In Range	10.01	lb	4.54	kg
Total Wt. All Fuel Added (dry basis) →					52.36	lb	23.75	kg
Total Wt. All Fuel Burned (dry basis) →					48.0	lb	21.7	kg

300- App-B Data and Calculation Forms (page 10 of 92)

Intertek

TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G102163747
Manufacturer:	SBI
Model:	HE350 Series
Sample ID Number:	QC20160608
Test Date:	8-Jun-16
Test Run Number:	1

Calibration Reference ID	SBI-153	
Set meter to Species 1		
Set Temperature to 70F	12%	12%
Set pin setting to 444	22%	22%

PRE-BURN FUEL PROPERTIES

Eq. ID No.:		Time:	9:35	Temp.,°F:	78.9
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
Pre Burn 1		12.1	23.7	19.1	20.8
~~2~~ 3			20.2	19.1	22.7
3					
4					
5					
6					
7					
8					
9					
Kindling 10		7.557	—	10.7	—
11					
12					
Total Weight		0.0	Average, %db		#DIV/0!

Allowable Fuel Load Range: **27** to **32.9**

TEST FUEL LOAD PROPERTIES

Eq. ID No.:	SBI-229		Time:	9:55	Temp.,°F:	78.9
Piece No.	Length, In.	Weight, Lb. 2x4	Weight, Lb. 4x4	Moisture, %, Dry Basis		
1	16	8.127		24.0	17.1	17.1
2	16 1/2	7.772		23.2	28.2	21.9
3	17	8.602		22.7	21.7	22.0
4	16 1/2	7.363		21.5	25.4	13.9
5	16	6.057		23.0	24.3	23.5
6	17	4.796		32.3	18.6	19.7
7						
8						
Totals		0.0	0.0			
% of Weight		#DIV/0!	#DIV/0!			
Total weight, wet, lb.		0.00		Average Moisture, dry		#DIV/0!
Total weight, dry, kg		#DIV/0!		Average Moisture, wet		#DIV/0!

Test Engineer: _____ Date: 8-JUN-2016

300- App-B Data and Calculation Forms (page 11 of 92)

Intertek

Dillution Tunnel Velocity Traverse
EPA Method 5G-3

Project Number: G102163747
Manufacturer: SBI
Model: HE 350 Series
Sample ID Number: QC20160608
Test Date: 8-Jun-16
Test Run Number: 1

	Dilution Tunnel		
	Delta P In. H2O	Temp,°F	Square Root
A1	0.115	76.9	0.0000
A2	0.141	76.8	0.0000
A3	0.139	76.8	0.0000
A4	0.085	77.5	0.0000
A Center	0.136	77.3	0.0000
B1	0.120	76.9	0.0000
B2	0.136	76.9	0.0000
B3	0.130	76.8	0.0000
B4	0.117	77.0	0.0000
B Center	0.140	76.8	0.0000
Averages	#DIV/0!	#DIV/0!	0.0000

Tunnel Diameter **8.000** inches
Tunnel Static 0.209 in. H2O
Tunnel Area 0.34907 Ft2
Pitot Correction #DIV/0! factor
Baro. Pressure 29.40
Pitot Factor **0.84** (0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity #DIV/0! Ft/ Sec
Initial Flow **#DIV/0!** Ft3/min

Test Engineer: C. Pelland

Date: 8-JUN-2016

300- App-B Data and Calculation Forms (page 21 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-9-16**		**Average emission rate:(gr/hr)**		**11.4**
Run:	**2**				
Project #:	**QC20160208**		Burn Rate (Dry kg/hr):		N/A
Test Duration: (minutes)	**60**				
PRESSURE FACTOR		0.99265	BAROMETRIC PRESSURE		
				Average:	29.7
TEMPERATURE FACTORS				Start:	29.6
DGM #3:		0.97164		End:	29.8
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #3	Final:	557.308
DGM #3:		7.99929		Initial:	548.905
TOTAL TUNNEL VOLUME (scf):		22888			
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 3:		2861.209		DGM #3:	543.411
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 3 (g):		**11.44**		DGM #3:	0.9870
EMISSION RATES			TUNNEL FLOW RATE:		381.461
Sample Train 3 (g/hr):		**11.44**			
			PARTICULATE CATCH (mg)		
				Total Sample Train 3:	4
				Filter and seal Sample Train 3:	3.8
				Probe Sample Train 3:	0.2

	Train 3				
Cs	0.00050004	Room Particulate Correction			
Cr	0	Mr	0	Milligram Catch (mg)	
Et	11.44	Vmr	7.7544	Total Volume Sampled (dscf)	
				Rotometer (glass) at 100 flow rate is 0.12924 cfm	
Et	AVERAGE	Grams Emissions			

300- App-B Data and Calculation Forms (page 26 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-9-16**		**Average emission rate:(gr/hr)**		**1.5**
Run:	**2**				
Project #:	**QC20160208**		Burn Rate (Dry kg/hr):		1.467
Test Duration: (minutes)	**770**				
PRESSURE FACTOR		0.99265	BAROMETRIC PRESSURE		
			Average:		29.7
TEMPERATURE FACTORS			Start:		29.6
DGM #1:		0.96545	End:		29.8
DGM #2:		0.97220			
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #1	Final:	1019.206
DGM #1:		65.90085		Initial:	950.851
DGM #2:		70.65781			
			DGM #2	Final:	1186.537
TOTAL TUNNEL VOLUME (scf):		303865		Initial:	1113.539
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 1:		4610.936		DGM #1:	546.898
Sample Train 2:		4300.510		DGM #2:	543.101
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 1 (g):		**19.37**		DGM #1:	1.0060
Sample Train 2 (g):		**18.92**		DGM #2:	1.0030
EMISSION RATES			TUNNEL FLOW RATE:		394.629
Sample Train 1 (g/hr):		**1.51**			
Sample Train 2 (g/hr):		**1.47**	PARTICULATE CATCH (mg)		
			Total Sample Train 1:		4.2
			Total Sample Train 2:		4.4
			Filter and seal Sample Train 1:		3.7
MAX Allowed		7.50%	Filter and seal Sample Train 2:		3.2
			Probe Sample Train 1:		0.5
DEVIATION:		2.32%	Probe Sample Train 2:		1.2

	Train 1	Train 2	Room Particulate Correction		
Cs	6.3732E-05	6.2272E-05	Mr	0	Milligram Catch (mg)
Cr	0	0	Vmr	99.5148	Total Volume Sampled (dscf)
Et	19.37	18.92			Rotometer (glass) at 100 flow rate is 0.12924 cfm
Et AVERAGE		19.14	Grams Emissions		

300- App-B Data and Calculation Forms (page 27 of 92)

Intertek

TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G102163747
Manufacturer:	SBI
Model:	HE350 Series
Sample ID Number:	QC20160608
Test Date:	~~10~~ 9-Jun-16
Test Run Number:	3

Calibration Reference ID	SBI-153	
Set meter to Species 1		
Set Temperature to 70F	12%	12
Set pin setting to 444	22%	22

PRE-BURN FUEL PROPERTIES

Eq. ID No.:		Time:	07:55	Temp.,°F:	76.7
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight		0.0	Average, %db		#DIV/0!

Allowable Fuel Load Range: **27** to **32.9**

TEST FUEL LOAD PROPERTIES

Eq. ID No.:	SBI-229			Time:	07:55	Temp.,°F:	76.7
Piece No.	Length, In.	Weight, Lb. 2x4	Weight, Lb. 4x4	Moisture, %, Dry Basis			
1	16.5	7.110	-	24.6	24.6	21.9	
2	16 3/4	8.551	-	22.3	33.5	26.3	
3	16 1/2	8.233	-	22.1	26.4	23.8	
4	15 1/2	8.858	-	24.5	20.7	24.3	
5	17	7.821	-	21.3	16.0	19.1	
6	16 1/4	5.554	-	22.8	18.4	24.2	
7	16 1/4	5.707	-	21.5	21.4	24.2	
8	-	-	-	-	-	-	
Totals		0.0	0.0				
% of Weight		#DIV/0!	#DIV/0!				
Total weight, wet, lb.		0.00		Average Moisture, dry		#DIV/0!	
Total weight, dry, kg		#DIV/0!		Average Moisture, wet		#DIV/0!	

Test Engineer: _____ Date: 9- June 2016

300- App-B Data and Calculation Forms (page 28 of 92)

Intertek

TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G102163747
Manufacturer:	SBI
Model:	HE350 Series
Sample ID Number:	QC20160608
Test Date:	9-Jun-16
Test Run Number:	2

Calibration Reference ID	SBI-153	
Set meter to Species 1		
Set Temperature to 70F	12%	12.0
Set pin setting to 444	22%	22.0

PRE-BURN FUEL PROPERTIES

Eq. ID No.: | Time: 5:15 | Temp.,°F: 76.6

Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1		7.717			
2		12.077	24.3	22.3	20.4
3		12.077	24.3	19.6	18.9
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight	0.0	Average, %db			#DIV/0!

Kidling: START — 12.077 (4 pieces)

Allowable Fuel Load Range: 27 to 32.9

TEST FUEL LOAD PROPERTIES

Eq. ID No.: SBI-229 | Time: | Temp.,°F: 76.6

Piece No.	Length, In.	Weight, Lb. 2x4	Weight, Lb. 4x4	Moisture, %, Dry Basis		
1	17	8.613	-	23.5	17.6	28.6
2	17	8.827	-	24.0	25.8	24.5
3	16 1/2	7.189	-	26.8	19.2	25.1
4	16 3/4	6.539	-	26.0	21.4	19.0
5	16 3/4	6.359	-	24.9	33.7	16.4
6	17	4.782	-	20.5	18.4	17.8
7						
8						
Totals		0.0	0.0			
% of Weight		#DIV/0!	#DIV/0!			
Total weight, wet, lb.		0.00		Average Moisture, dry		#DIV/0!
Total weight, dry, kg		#DIV/0!		Average Moisture, wet		#DIV/0!

Test Engineer: _____ Date: 9-Jun-2016

300- App-B Data and Calculation Forms (page 29 of 92)

Intertek

Dillution Tunnel Velocity Traverse
EPA Method 5G-3

Project Number: G102163747
Manufacturer: SBI
Model: HE350 Series
Sample ID Number: QC20160608
Test Date: 9-Jun-16
Test Run Number: 2

	Dilution Tunnel		
	Delta P In. H2O	Temp,°F	Square Root
A1	0.110	100.4	0.0000
A2	0.127	100.7	0.0000
A3	0.125	100.8	0.0000
A4	0.122	96.6	0.0000
A Center	0.131	101.2	0.0000
B1	0.117	99.7	0.0000
B2	0.132	100.0	0.0000
B3	0.125	99.9	0.0000
B4	0.1094	98.3	0.0000
B Center	0.133	99.6	0.0000
Averages	#DIV/0!	#DIV/0!	0.0000

Tunnel Diameter	8.000	inches
Tunnel Static	0.198	in. H2O
Tunnel Area	0.34907	Ft2
Pitot Correction	#DIV/0!	factor
Baro. Pressure	29.40	
Pitot Factor	0.84	(0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity	#DIV/0!	Ft/ Sec
Initial Flow	**#DIV/0!**	Ft3/min

Test Engineer: _____ Date: 9-Jun-2016

300- App-B Data and Calculation Forms (page 51 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-10-16**		**Average emission rate:(gr/hr)**		**14.4**
Run:	**3**				
Project #:	**QC20160208**		Burn Rate (Dry kg/hr):		N/A
Test Duration: (minutes)	**60**				
PRESSURE FACTOR		0.99766	BAROMETRIC PRESSURE		
			Average:		29.85
TEMPERATURE FACTORS			Start:		29.8
DGM #3:		0.97408	End:		29.9
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #3	Final:	565.410
DGM #3:		7.76444		Initial:	557.315
TOTAL TUNNEL VOLUME (scf):		27266			
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 3:		3511.708	DGM #3:		542.051
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 3 (g):		**14.40**	DGM #3:		0.9870
EMISSION RATES			TUNNEL FLOW RATE:		454.441
Sample Train 3 (g/hr):		**14.40**			
			PARTICULATE CATCH (mg)		
			Total Sample Train 3:		4.1
			Filter and seal Sample Train 3:		3.2
MAX Allowed		N/A			
			Probe Sample Train 3:		0.9
DEVIATION:		N/A			

	Train 3		Room Particulate Correction		
Cs	0.00052805		Mr	0	Milligram Catch (mg)
Cr	0		Vmr	7.7544	Total Volume Sampled (dscf)
Et	14.40				Rotometer (glass) at 100 flow rate is 0.12924 cfm
Et	AVERAGE		Grams Emissions		

300- App-B Data and Calculation Forms (page 56 of 92)

Intertek Testing Services

Manufacturer:	**SBI**		RESULTS		
Model:	**HE350 Series (FP-15)**				
Date:	**6-10-16**		**Average emission rate:(gr/hr)**		**1.1**
Run:	**3**				
Project #:	**QC20160208**		Burn Rate (Dry kg/hr):		1.643
Test Duration: (minutes)	**680**				
PRESSURE FACTOR		0.99766	BAROMETRIC PRESSURE		
				Average:	29.85
TEMPERATURE FACTORS				Start:	29.8
DGM #1:		0.96551		End:	29.9
DGM #2:		0.97334			
			DRY GAS METER VALUES		
VOLUMES SAMPLED			DGM #1	Final:	1082.718
DGM #1:		61.58495		Initial:	1019.165
DGM #2:		60.75557			
			DGM #2	Final:	1249.071
TOTAL TUNNEL VOLUME (scf):		272829		Initial:	1186.692
SAMPLE RATIOS			TEMPERATURES (DEG. RANKIN)		
Sample Train 1:		4430.132		DGM #1:	546.860
Sample Train 2:		4490.608		DGM #2:	542.463
TOTAL EMISSIONS			CALIBRATION FACTORS		
Sample Train 1 (g):		**11.96**		DGM #1:	1.0060
Sample Train 2 (g):		**12.57**		DGM #2:	1.0030
EMISSION RATES			TUNNEL FLOW RATE:		401.220
Sample Train 1 (g/hr):		**1.06**			
Sample Train 2 (g/hr):		**1.11**	PARTICULATE CATCH (mg)		
			Total Sample Train 1:		2.7
			Total Sample Train 2:		2.8
			Filter and seal Sample Train 1:		2.5
MAX Allowed		7.50%	Filter and seal Sample Train 2:		2.7
			Probe Sample Train 1:		0.2
DEVIATION:		4.99%	Probe Sample Train 2:		0.1

	Train 1	Train 2	Room Particulate Correction		
Cs	4.3842E-05	4.6086E-05	Mr	0	Milligram Catch (mg)
Cr	0	0	Vmr	87.8832	Total Volume Sampled (dscf)
Et	11.96	12.57			Rotometer (glass) at 100 flow rate is 0.12924 cfm
Et	AVERAGE	12.27	Grams Emissions		

300- App-B Data and Calculation Forms (page 57 of 92)

Intertek

TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G102163747
Manufacturer:	SBI
Model:	HE350 Series
Sample ID Number:	QC20160608
Test Date:	10-Jun-16
Test Run Number:	3

Calibration Reference ID		SBI-153
Set meter to Species 1		
Set Temperature to 70F	12%	12.0
Set pin setting to 444	22%	22.0

PRE-BURN FUEL PROPERTIES

Eq. ID No.:		Time:		Temp.,°F:	
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight		0.0	Average, %db		#DIV/0!

Allowable Fuel Load Range: 27 to 32.9

TEST FUEL LOAD PROPERTIES

Eq. ID No.:	SBI-229		Time:	05:26	Temp.,°F:	75.5
Piece No.	Length, In.	Weight, Lb. 2x4	Weight, Lb. 4x4	Moisture, %, Dry Basis		
1	16 1/2	8.780	-	21.6	21.7	20.0
2	16 3/4	~~16 1/2~~	-	23.5	26.0	22.8
3	16 3/4	8.546	-	24.0	23.5	25.3
4	17	8.406	-	26.8	18.2	22.3
5	16 1/4	6.695	-	28.4	24.2	23.5
6	16 1/2	5.134	-	24.7	21.4	21.8
7	16 1/4	5.801	-	24.3	21.0	27.6
8				-	-	-
Totals		0.0	0.0			
% of Weight		#DIV/0!	#DIV/0!			
Total weight, wet, lb.		0.00		Average Moisture, dry		#DIV/0!
Total weight, dry, kg		#DIV/0!		Average Moisture, wet		#DIV/0!

8.021

Test Engineer: _____

Date: 10-JUN-2016

300- App-B Data and Calculation Forms (page 58 of 92)

Intertek

TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G102163747
Manufacturer:	SBI
Model:	HE350 Series
Sample ID Number:	QC20160608
Test Date:	10-Jun-16
Test Run Number:	3

Calibration Reference ID	SBI-153	
Set meter to Species 1		
Set Temperature to 70F	12%	12.0
Set pin setting to 444	22%	22.0

PRE-BURN FUEL PROPERTIES

Eq. ID No.:	SBI-214	Time:	2:10	Temp.,°F:	75
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
Kindling 1	16	8.275	10		
2					
3					
4					
5					
Start-up fuel 6	16 1/2	12.187	21.2	18.1	18.3
7	16 1/2		26.7	28.0	21.8
8					
9					
10					
11					
12					
Total Weight	0.0	Average, %db	#DIV/0!		

Allowable Fuel Load Range: **27** to **32.9**

TEST FUEL LOAD PROPERTIES

Eq. ID No.:	SBI-229		Time:		Temp.,°F:	
Piece No.	Length, In.	Weight, Lb. 2x4	Weight, Lb. 4x4	Moisture, %, Dry Basis		
1	17		6.401	26.1	26.4	22.3
2	16 1/2		4.817	18.6	19.2	25.7
3	17 1/2		8.683	21.9	22.7	24.5
4	16 1/2		6.031	18.5	21.8	24.2
5	17 3/4		6.980	21.3	24.8	23.4
6	17 1/4		8.796	20.4	22.4	26.5
7						
8						
Totals		0.0	0.0			
% of Weight		#DIV/0!	#DIV/0!			
Total weight, wet, lb.		0.00		Average Moisture, dry		#DIV/0!
Total weight, dry, kg		#DIV/0!		Average Moisture, wet		#DIV/0!

Test Engineer: _____ Date: 10-Jun-2016

300- App-B Data and Calculation Forms (page 59 of 92)

Intertek

Dillution Tunnel Velocity Traverse
EPA Method 5G-3

Project Number: G102163747
Manufacturer: SBI
Model: HE350 Series
Sample ID Number: QC20160608
Test Date: 10-Jun-16
Test Run Number: 3

	Dilution Tunnel		
	Delta P In. H2O	Temp,°F	Square Root
A1	0.116	97.3	0.0000
A2	0.126	97.7	0.0000
A3	0.118	97.6	0.0000
A4	0.120	94.2	0.0000
A Center	0.128	97.4	0.0000
B1	0.100	98.3	0.0000
B2	0.131	98.5	0.0000
B3	0.125	98.9	0.0000
B4	0.110	96.9	0.0000
B Center	0.133	99.3	0.0000
Averages	#DIV/0!	#DIV/0!	0.0000

Tunnel Diameter	8.000	inches
Tunnel Static	0.193	in. H2O
Tunnel Area	0.34907	Ft2
Pitot Correction	#DIV/0!	factor
Baro. Pressure	29.50	
Pitot Factor	0.84	(0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity	#DIV/0!	Ft/ Sec
Initial Flow	#DIV/0!	Ft3/min

Test Engineer: _____ Date: 10-Jun 2016

400- App-C Calibration Documents

Appendix C

Calibration documents

400- App-C Calibration Documents (page 2 of 64)

Rapport d'étalonnage No. CA0003-509-040116
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.

Jeu de poids no :	*Traçabilité NIST No.:*	*Classe ASTM/OIML*	*Date d'étalonnage :*	*Date proch. étalonnage*
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

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 3 of 64)

Rapport d'étalonnage No. CA0003-509-040116

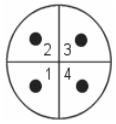
METTLER TOLEDO

Résultats de mesure

La température : 22 °C

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

Test de variation



		Avant Réglage
Poids Appliqués	*Position*	*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					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
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**

Version Logiciel : 4.6.2.10

Page 2 sur 3

400- App-C Calibration Documents (page 4 of 64)

Rapport d'étalonnage No. CA0003-509-040116

METTLER TOLEDO

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.

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 5 of 64)

ULRICH

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

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

ACCREDITATION ISO 17025

CALIBRATION CERTIFICATE

Certificate no.:	496310	**Calibration date:**	October 14, 2015
Identification:	SBI-213	**Certificate issued:**	October 14, 2015
Description:	THERMO-HYGROMETER, AMPROBE TH-3	**Interval:**	12 months
Manufacturer:	AMPROBE	**Due date:**	October 14, 2016
Model no.:	TH-3	**Procedure no.:**	MET/CAL
Serial no.:	101004044	**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-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 CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

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

CALIBRATION DATA

See next page for measurement results.

Notes:

EQUIPMENT RECEIVED OUT OF SPECIFICATIONS:

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

LIMITED CALIBRATION

226673L

400- App-C Calibration Documents (page 6 of 64)

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

Tél. (514) 631-6663
Fax (514) 631-6122
info@ulrich.ca
www.ulrich.ca

CALIBRATION DATA

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

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

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

MEASUREMENT RESULTS (Per MET/CAL)

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

End of Test Data

400- App-C Calibration Documents (page 7 of 64)

Rapport d'étalonnage No. CA0003-504-040116

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 :	Ohaus	*Modèle de terminal :*	N/A
Modèle :	FD15	*# série du terminal:*	N/A
No de série :	B144397174	*# série de l'imprimant*	N/A
Capacité :	15000 g		N/A
Résolution :	1 g	*Nbre de Divisions:*	15000
Classe :	III	*Procédure utilisée :*	NIST Handbook 44
No./ID d'inventaire:	SBI-222		
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.

Jeu de poids no :	*Traçabilité NIST No.:*	*Classe ASTM/OIML*	*Date d'étalonnage :*	*Date proch. étalonnage*
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

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 8 of 64)

Rapport d'étalonnage No. CA0003-504-040116

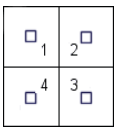
METTLER TOLEDO

Résultats de mesure

La température : 22 °C

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

Test de variation



		Avant Réglage
Poids Appliqués	*Position*	*Valeur lue*
1: 5000 g	*Position 1*	5000 g
2: 5000 g	*Position 2*	5000 g
3: 5000 g	*Position 3*	5000 g
4: 5000 g	*Position 4*	5000 g
Erreur maximum :		0 g
Max Erreur Admissible :		5 g

Linéarité

	Avant réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0 g	0 g	0 g	0 d	1 d	OUI
2,00	200 g	200 g	0 g	0 d	1 d	OUI
3,00	1000 g	1000 g	0 g	0 d	2 d	OUI
4,00	5000 g	5000 g	0 g	0 d	5 d	OUI
5,00	10000 g	10000 g	0 g	0 d	5 d	OUI
Max 6,00	15000 g	15000 g	0 g	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**

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 9 of 64)

Rapport d'étalonnage No. CA0003-504-040116

METTLER TOLEDO

Répétabilité

Poids appliqués : 5000 g

	Chargé	*Vide*	*Différence*
1	5000 g	0 g	5000 g
2	5000 g	0 g	5000 g
3	5000 g	0 g	5000 g
	Erreur maximale :	0 g	0,0 d
	Tolérance :	5 g	5 d

Incertitude

Mesure de l'incertitude = 0,60 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.

Version Logiciel : 4.6.2.10

Page 3 sur 4

400- App-C Calibration Documents (page 10 of 64)

Rapport d'étalonnage No. CA0003-504-040116

METTLER TOLEDO

Certificat de Pesée Minimale

Incertitude de mesure élargie

U = Uo
Ur1 = 1 g

Exemple d'incertitudes élargies pour différentes valeurs de poids net :

Poids Net Affiché	*Incertitude de mesure élargie*	
15 g	1 g	4,00000 %
150 g	1 g	0,40000 %
1500 g	1 g	0,04000 %
7500 g	1 g	0,00800 %
15000 g	1 g	0,00400 %

Explication sur le tableau de pesée minimale

Les valeurs du poids net affiché indiquées dans le tableau suivant sont les valeurs des pesées minimales. Pour ces valeurs, l'incertitude élargie de mesure, multipliée par un Facteur de Sécurité (1, 2, 3 ou 5) est inférieure ou égale à l'Erreur Relative R

Tableau des Pesées Minimales pour différentes Erreurs Relatives et différents Facteurs de Sécurité

	Facteur de Sécurité FS			
Erreur Relative Requise	*1x FS = 1*	*2x FS = 2*	*3x FS = 3*	*5x FS = 5*
0.1 %	600 g	1200 g	1800 g	3000 g
0.2 %	300 g	600 g	900 g	1500 g
0.5 %	120 g	240 g	360 g	600 g
1 %	60 g	120 g	180 g	300 g
2 %	30 g	60 g	90 g	150 g
5 %	12 g	24 g	36 g	60 g

Remarques sur les valeurs de pesée minimale du tableau ci-dessus :

1. "N/A" est indiqué dans le tableau quand aucune valeur appropriée n'a pu être calculée.
2. Pour les instrument à étendues et échelons multiples, les valeurs indiquées dans le tableau ci-dessus s'appliquent à la plus petite étendue de mesure.
3. METTLER TOLEDO ne peut être tenu pour responsable du choix retenu concernant la sélection de l'Erreur Relative Requise ou du Facteur de Sécurité.
4. Le client veille à ce que les paramètres de réglage restent identiques à ceux utilisés pour l'établissement de ce Constat de Vérification Standard.
5. Le client veille à ce que l'environnement demeure identique aux conditions de travail retenues pour l'établissement de ce Constat de Vérification Standard.

Remarques

Aucune.

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 11 of 64)

MICRO PRECISION CALIBRATION INC.

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

ilac-MRA A2LA ACCREDITED
Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Jun 10, 2015 **Cert No.** 222008122545130

Customer:
STOVE BUILDERS INTERNATIONAL INC.
PORTES 11-12
250 DE COPENHAGUE
SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

MPC Control #:	DA0649	Work Order #:	SAC-70072244
Asset ID:	SBI-239	Purchase Order #:	44831
Gage Type:	PITOT STATIC TUBE	Serial Number:	160S-24A20W
Manufacturer:	DWYER INSTRUMENTS, INC.	Department:	N/A
Model Number:	160S-24	Performed By:	BARRY MORRIS
Size:	N/A	Received Condition:	IN TOLERANCE
Temp/RH:	69°F / 41 %	Returned Condition:	IN TOLERANCE
		Cal. Date:	June 09, 2015
		Cal. Interval:	12 MONTHS
		Cal. Due Date:	June 09, 2016

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 4, 2016	222008122539739
AW4419	MULTI-FUNCTION PRESSURE INDICATOR	DPI 145	14501283	DRUCK	Nov 19, 2015	2008120226860

Procedures Used in this Event

Procedure Name	Description
MPC-00062	Pressure and Vacuum

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.

Page 1 of 1 (CERT, Rev 3)

400- App-C Calibration Documents (page 12 of 64)

MICRO PRECISION CALIBRATION INC.

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

ilac-MRA A2LA ACCREDITED Calibration Laboratory CERT # 935.01

Certificate of Calibration

Date: Jun 11, 2015 **Cert No.** 222008122546708

Customer:
STOVE BUILDERS INTERNATIONAL INC.
PORTES 11-12
250 DE COPENHAGUE
SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

		Work Order #:	SAC-70072244
		Purchase Order #:	44831
MPC Control #:	DA0650	Serial Number:	16425450039
Asset ID:	SBI-241	Department:	N/A
Gage Type:	DIGITAL VANE/HOT-WIRE ANEMOMETER	Performed By:	BARRY MORRIS
Manufacturer:	TPI, INC.	Received Condition:	IN TOLERANCE
Model Number:	575	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	June 09, 2015
Temp/RH:	69°F / 41 %	Cal. Interval:	12 MONTHS
		Cal. Due Date:	June 09, 2016

Calibration Notes:

Test Points

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result	Uncertainty
1	Velocity (Vane)	200	193	207	199	199	ft/min	Passed	0.07
2	Vane:	400	389	411	402	402	ft/min	Passed	0.13
3	Vane:	600	585	615	604	604	ft/min	Passed	0.2
4	Vane	800	781	819	804	804	ft/min	Passed	0.26
5	Velocity (Hot Wire)	200	187	213	203	203	ft/min	Passed	0.07
6	Hot Wire:	400	377	423	405	405	ft/min	Passed	0.13
7	Hot Wire:	600	567	633	608	608	ft/min	Passed	0.2
8	Hot Wire:	800	757	843	807	807	ft/min	Passed	0.26
9	Temperature:	68.00	66.30	69.70	68.00	68.00	Deg F	Passed	0.01
10	Temperature:	100.00	98.00	102.00	100.20	100.20	Deg F	Passed	0.01

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	Nov 21, 2015	222008122317577

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.

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400- App-C Calibration Documents (page 13 of 64)

MICRO PRECISION CALIBRATION INC.

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

ilac-MRA A2LA ACCREDITED
Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Jun 11, 2015 **Cert No. 222008122546708**

				INSTRUMENTS		
AE2821	ANEMOMETER	AM-4822	N272316	LANDTEK	Nov 12, 2015	220081202197887
AV5000	ENVIRONMENTAL CHAMBER	BTX-475	0612421	ESPEC	Dec 15, 2015	222008122342880
CL7456	STANDARD PLATINUM RESISTANCE THERMOMETER PROBE	5681	1595	FLUKE	Dec 4, 2015	A7B16006

Procedures Used in this Event

Procedure Name	Description
MPC-00132	Anemometers Calibration Procedure

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.

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400- App-C Calibration Documents (page 14 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration

As Found

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 1 of 4

UUT

Made by:	Dwyer
Model:	MS-121-LCD
Serial No.:	E52U0100523
ID No.:	SBI-250
Description:	Digital Pressure Gauge

Calibration

Report No.:	AC15081457-E52U0100523
Adjusted:	No
Condition:	Out of Tolerance
Calibration Date:	3-Sep-2015

Customer

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

Environment

Temperature:	25.3ºC
Humidity:	58%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	1500171325/15000171326	1-Oct-2015
Multimeter	Fluke 8845A	ELC-MTR-04	AC14121527-9366020	16-Jan-2016

REMARKS:

Calibrated in vertical position.

Performed by: Ben Lemelin

Reviewed by: Anthony Morra

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

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

Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 15 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Found

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 2 of 4

UUT
Made by: Dwyer
Model: MS-121-LCD
Serial No.: E52U0100523
ID No.: SBI-250
Description: Digital Pressure Gauge

Calibration
Report No.: AC15081457-E52U0100523
Adjusted: No
Condition: Out of Tolerance
Calibration Date: 3-Sep-2015

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		-0.0076					
Output @ 0.0000 inH2O, mA		3.497					
0.000 inH2O	0.0000	-0.0031	-0.0031	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0176					
Output @ 0.025 inH2O, mA		6.831					
0.025 inH2O	0.0250	0.0183	-0.0067	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0430					
Output @ 0.050 inH2O, mA		10.934					
0.050 inH2O	0.0500	0.0433	-0.0067	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0684					
Output @ 0.075 inH2O, mA		14.954					
0.075 inH2O	0.0750	0.0685	-0.0065	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0938					
Output @ 0.100 inH2O, mA		19.018					
0.100 inH2O	0.1000	0.0939	-0.0061	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0688					
Output @ 0.075 inH2O, mA		15.027					
0.075 inH2O	0.0750	0.0689	-0.0061	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0439					
Output @ 0.050 inH2O, mA		11.003					
0.050 inH2O	0.0500	0.0438	-0.0062	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0186					
Output @ 0.025 inH2O, mA		6.986					
0.025 inH2O	0.0250	0.0187	-0.0063	±0.0020	inH2O	Fail	1.5e-04
Display Reading		0.0063					
Output @ 0.0000 inH2O, mA		3.497					
0.000 inH2O	0.0000	-0.0031	-0.0031	±0.0020	inH2O	Fail	1.5e-04
Range: 0 to 0.25 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		-0.0063					
Output @ 0.0000 inH2O, mA		3.582					
0.0000 inH2O	0.0000	-0.0000	0.0000	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0562					
Output @ 0.0625 inH2O, mA		7.613					
0.0625 inH2O	0.0625	0.0565	-0.0060	±0.0025	inH2O	Fail	1.5e-04
Display Reading		0.1182					
Output @ 0.1250 inH2O, mA		11.595					
0.1250 inH2O	0.1250	0.1187	-0.0063	±0.0025	inH2O	Fail	1.5e-04

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Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 16 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Found

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520Ip 8845A: Rev.1.0.A Page 3 of 4

UUT
Made by: Dwyer
Model: MS-121-LCD
Serial No.: E52U0100523
ID No.: SBI-250
Description: Digital Pressure Gauge

Calibration
Report No.: AC15081457-E52U0100523
Adjusted: No
Condition: Out of Tolerance
Calibration Date: 3-Sep-2015

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1824					
Output @ 0.1875 inH2O, mA		15.648					
0.1875 inH2O	0.1875	0.1820	-0.0055	±0.0025	inH2O	Fail	1.5e-04
Display Reading		0.2456					
Output @ 0.2500 inH2O, mA		19.714					
0.2500 inH2O	0.2500	0.2455	-0.0045	±0.0025	inH2O	Fail	1.5e-04
Display Reading		0.1829					
Output @ 0.1875 inH2O, mA		15.699					
0.1875 inH2O	0.1875	0.1828	-0.0047	±0.0025	inH2O	Fail	1.5e-04
Display Reading		0.1196					
Output @ 0.1250 inH2O, mA		11.681					
0.1250 inH2O	0.1250	0.1200	-0.0050	±0.0025	inH2O	Fail	1.5e-04
Display Reading		0.0566					
Output @ 0.0625 inH2O, mA		7.665					
0.0625 inH2O	0.0625	0.0573	-0.0052	±0.0025	inH2O	Fail	1.5e-04
Display Reading		-0.0056					
Output @ 0.0000 inH2O, mA		3.651					
0.0000 inH2O	0.0000	-0.0055	-0.0055	±0.0025	inH2O	Fail	1.5e-04
Range: 0 to 0.5 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		-0.0056					
Output @ 0.0000 inH2O, mA		3.822					
0.0000 inH2O	0.0000	-0.0056	-0.0056	±0.0050	inH2O	Fail	1.5e-04
Display Reading		0.1184					
Output @ 0.1250 inH2O, mA		7.822					
0.1250 inH2O	0.1250	0.1194	-0.0056	±0.0050	inH2O	Fail	1.5e-04
Display Reading		0.2446					
Output @ 0.2500 inH2O, mA		11.855					
0.2500 inH2O	0.2500	0.2455	-0.0045	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.3721					
Output @ 0.3750 inH2O, mA		15.942					
0.3750 inH2O	0.3750	0.3732	-0.0018	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.4995					
Output @ 0.5000 inH2O, mA		20.028					
0.5000 inH2O	0.5000	0.5009	0.0009	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.3752					
Output @ 0.3750 inH2O, mA		16.028					
0.3750 inH2O	0.3750	0.3759	0.0009	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.2485					
Output @ 0.2500 inH2O, mA		11.975					
0.2500 inH2O	0.2500	0.2492	-0.0008	±0.0050	inH2O	Pass	1.5e-04

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

Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 17 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Found

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 4 of 4

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E52U0100523
ID No.: SBI-250
Description: Digital Pressure Gauge

Calibration

Report No.: AC15081457-E52U0100523
Adjusted: No
Condition: Out of Tolerance
Calibration Date: 3-Sep-2015

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1213					
Output @ 0.1250 inH2O, mA		7.908					
0.1250 inH2O	0.1250	0.1221	-0.0029	±0.0050	inH2O	Pass	1.5e-04
Display Reading		-0.0034					
Output @ 0.0000 inH2O, mA		3.891					
0.000 inH2O	0.0000	-0.0034	-0.0034	±0.0050	inH2O	Pass	1.5e-04

END OF REPORT

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

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Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 18 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration

As Left

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 1 of 4

UUT

Made by:	Dwyer
Model:	MS-121-LCD
Serial No.:	E52U0100523
ID No.:	SBI-250
Description:	Digital Pressure Gauge

Calibration

Report No.:	AC15081457-E52U0100523
Adjusted:	Yes
Condition:	In Tolerance
Calibration Date:	3-Sep-2015
Calibration Due:	3-Sep-2016

Customer

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

Environment

Temperature:	25.9°C
Humidity:	56%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	1500171325/15000171326	1-Oct-2015
Multimeter	Fluke 8845A	ELC-MTR-04	AC14121527-9366020	16-Jan-2016

REMARKS:

Adjusted trim pots.

Calibrated in vertical position.

Performed by: Ben Lemelin

Reviewed by: Anthony Morra

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

Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 19 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Left

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 2 of 4

UUT

Made by:	Dwyer
Model:	MS-121-LCD
Serial No.:	E52U0100523
ID No.:	SBI-250
Description:	Digital Pressure Gauge

Calibration

Report No.:	AC15081457-E52U0100523
Adjusted:	Yes
Condition:	In Tolerance
Calibration Date:	3-Sep-2015
Calibration Due:	3-Sep-2016

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		0.0005					
Output @ 0.0000 inH2O, mA		4.08					
0.000 inH2O	0.0000	0.0005	0.0005	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0251					
Output @ 0.025 inH2O, mA		8.030					
0.025 inH2O	0.0250	0.0252	0.0002	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0503					
Output @ 0.050 inH2O, mA		12.099					
0.050 inH2O	0.0500	0.0506	0.0006	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0757					
Output @ 0.075 inH2O, mA		16.135					
0.075 inH2O	0.0750	0.0758	0.0008	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0994					
Output @ 0.100 inH2O, mA		20.048					
0.100 inH2O	0.1000	0.1003	0.0003	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0754					
Output @ 0.075 inH2O, mA		16.029					
0.075 inH2O	0.0750	0.0752	0.0002	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0503					
Output @ 0.050 inH2O, mA		12.063					
0.050 inH2O	0.0500	0.0504	0.0004	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0254					
Output @ 0.025 inH2O, mA		8.03					
0.025 inH2O	0.0250	0.0252	0.0002	±0.0020	inH2O	Pass	1.5e-04
Display Reading		0.0005					
Output @ 0.0000 inH2O, mA		4.08					
0.000 inH2O	0.0000	0.0005	0.0005	±0.0020	inH2O	Pass	1.5e-04
Range: 0 to 0.25 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0005					
Output @ 0.0000 inH2O, mA		4.028					
0.0000 inH2O	0.0000	0.0004	0.0004	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0623					
Output @ 0.0625 inH2O, mA		7.996					
0.0625 inH2O	0.0625	0.0624	-0.0001	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1233					
Output @ 0.1250 inH2O, mA		11.907					
0.1250 inH2O	0.1250	0.1235	-0.0015	±0.0025	inH2O	Pass	1.5e-04

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Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 20 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Left

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520lp 8845A: Rev.1.0.A Page 3 of 4

UUT

Made by: Dwyer
Model: MS-121-LCD
Serial No.: E52U0100523
ID No.: SBI-250
Description: Digital Pressure Gauge

Calibration

Report No.: AC15081457-E52U0100523
Adjusted: Yes
Condition: In Tolerance
Calibration Date: 3-Sep-2015
Calibration Due: 3-Sep-2016

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1853					
Output @ 0.1875 inH2O, mA		15.874					
0.1875 inH2O	0.1875	0.1855	-0.0020	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.2476					
Output @ 0.2500 inH2O, mA		19.873					
0.2500 inH2O	0.2500	0.2480	-0.0020	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1853					
Output @ 0.1875 inH2O, mA		15.892					
0.1875 inH2O	0.1875	0.1858	-0.0017	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1243					
Output @ 0.1250 inH2O, mA		11.958					
0.1250 inH2O	0.1250	0.1243	-0.0007	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0627					
Output @ 0.0625 inH2O, mA		8.065					
0.0625 inH2O	0.0625	0.0635	0.0010	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0007					
Output @ 0.0000 inH2O, mA		4.046					
0.0000 inH2O	0.0000	0.0007	0.0007	±0.0025	inH2O	Pass	1.5e-04
Range: 0 to 0.5 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading		0.0005					
Output @ 0.0000 inH2O, mA		4.011					
0.0000 inH2O	0.0000	0.0003	0.0003	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.1233					
Output @ 0.1250 inH2O, mA		7.960					
0.1250 inH2O	0.1250	0.1238	-0.0012	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.2468					
Output @ 0.2500 inH2O, mA		11.924					
0.2500 inH2O	0.2500	0.2476	-0.0024	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.3735					
Output @ 0.3750 inH2O, mA		15.978					
0.3750 inH2O	0.3750	0.3743	-0.0007	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.4995					
Output @ 0.5000 inH2O, mA		20.031					
0.5000 inH2O	0.5000	0.5010	0.0010	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.3752					
Output @ 0.3750 inH2O, mA		16.029					
0.3750 inH2O	0.3750	0.3759	0.0009	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.2488					
Output @ 0.2500 inH2O, mA		11.958					
0.2500 inH2O	0.2500	0.2487	-0.0013	±0.0050	inH2O	Pass	1.5e-04

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Form: ROC101 Rev 8 *data: MMC*

400- App-C Calibration Documents (page 21 of 64)

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Report of Calibration
As Left

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25;0.5 inH2O/7520Ip 8845A: Rev.1.0.A **Page 4 of 4**

UUT

Made by:	Dwyer
Model:	MS-121-LCD
Serial No.:	E52U0100523
ID No.:	SBI-250
Description:	Digital Pressure Gauge

Calibration

Report No.:	AC15081457-E52U0100523
Adjusted:	Yes
Condition:	In Tolerance
Calibration Date:	3-Sep-2015
Calibration Due:	3-Sep-2016

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1252					
Output @ 0.1250 inH2O, mA		8.012					
0.1250 inH2O	0.1250	0.1254	0.0004	±0.0050	inH2O	Pass	1.5e-04
Display Reading		0.0010					
Output @ 0.0000 inH2O, mA		4.028					
0.000 inH2O	0.0000	0.0009	0.0009	±0.0050	inH2O	Pass	1.5e-04

END OF REPORT

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400- App-C Calibration Documents (page 22 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration

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ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

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-DESMAURES, QC
G3A 2H3

Environment

Temperature:	20.9°C
Humidity:	29%RH

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

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

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

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STANDARDS

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

REMARKS:

Calibrated in vertical position.

Performed by: Tony Wheaton — Tony Wheaton

Reviewed by: Slava Peciurov

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400- App-C Calibration Documents (page 23 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
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ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH2O/7520Ip 8845A: Rev.1.0.A Page 2 of 3

UUT

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

Calibration

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

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

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400- App-C Calibration Documents (page 24 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Found / As Left

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH2O/7520lp 8845A: Rev.1.0.A Page 3 of 3

UUT

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

Calibration

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

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
Display Reading		0.1860					
Output @ 0.1875 inH2O, mA		15.906					
0.1875 inH2O	0.1875	0.1860	-0.0015	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.2490					
Output @ 0.2500 inH2O, mA		19.940					
0.2500 inH2O	0.2500	0.2491	-0.0009	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1868					
Output @ 0.1875 inH2O, mA		15.959					
0.1875 inH2O	0.1875	0.1869	-0.0006	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.1245					
Output @ 0.1250 inH2O, mA		11.960					
0.1250 inH2O	0.1250	0.1244	-0.0006	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0618					
Output @ 0.0625 inH2O, mA		7.943					
0.0625 inH2O	0.0625	0.0616	-0.0009	±0.0025	inH2O	Pass	1.5e-04
Display Reading		0.0000					
Output @ 0.0000 inH2O, mA		3.998					
0.0000 inH2O	0.0000	0.0000	0.0000	±0.0025	inH2O	Pass	1.5e-04

END OF REPORT

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Form: ROC101 Rev 8 *data: MMC*

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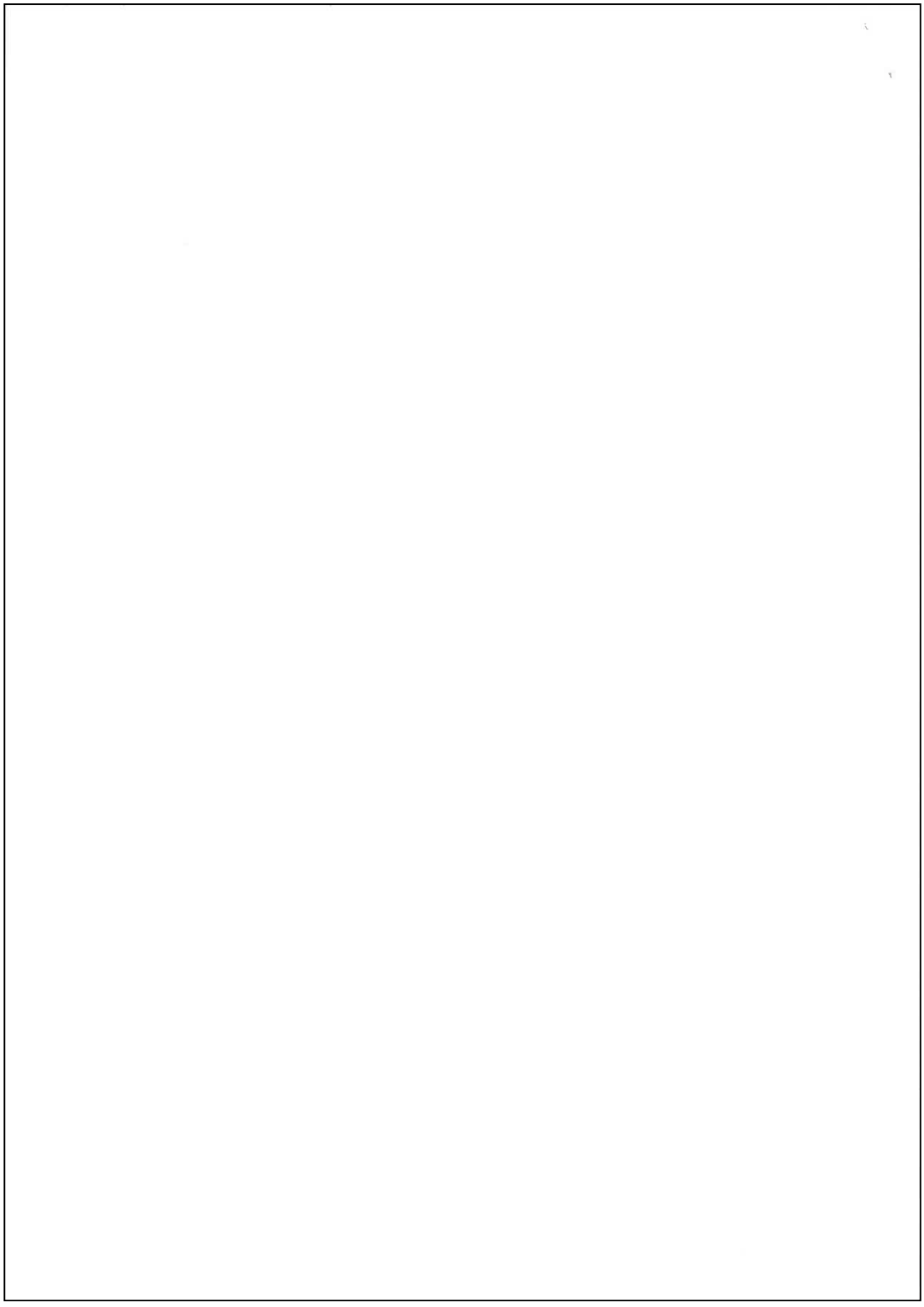

400- App-C Calibration Documents (page 26 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration

As Found

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 1 of 2

UUT

Made by:	Aalborg
Model:	GFC37
Serial No.:	251111-5
ID No.:	SBI-259
Description:	Mass Flow Controller

Customer

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

Calibration

Report No.:	AC15081457-251111-5
Adjusted:	No
Condition:	Out of Tolerance
Calibration Date:	3-Sep-2015

Environment

Temperature:	25.7°C
Humidity:	58%RH

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

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

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

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STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-01	1500183748	26-Jun-2016
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-02	1500183749	27-Jun-2016
Process Calibrator	Fluke 744	ELC-CAL-02	AC14101571-8223003	10-Nov-2015
Multimeter	Fluke 87 V	ELC-MTR-05	AC15031661-96010221	25-Mar-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

LCD readings: 0.0, 5.1, 10.0, 15.1, 20.0

Cleaned filter.

Performed by: Slava Peciurov

Reviewed by: Anthony Morra

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Form: ROC101 Rev 8 *data: C4P*

400- App-C Calibration Documents (page 27 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Found

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 2 of 2

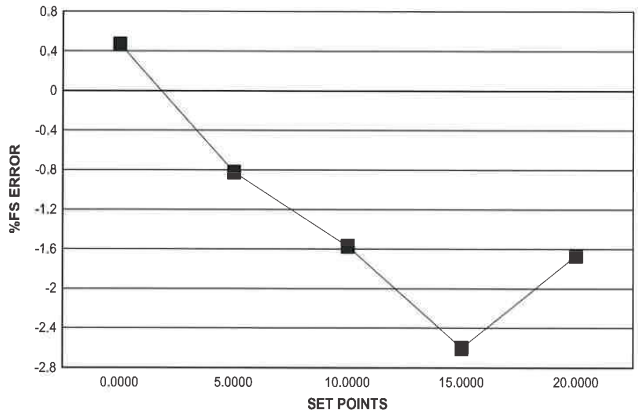
UUT

Made by: Aalborg
Model: GFC37
Serial No.: 251111-5
ID No.: SBI-259
Description: Mass Flow Controller

Calibration

Report No.: AC15081457-251111-5
Adjusted: No
Condition: Out of Tolerance
Calibration Date: 3-Sep-2015

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.024V	0.0023	0.10	0.47	±1.00	slm@70.0F	Pass
5.0000	1.269V	5.2406	5.08	-0.82	±1.00	slm@70.0F	Pass
10.0000	2.522V	10.4025	10.09	-1.57	±1.00	slm@70.0F	Fail
15.0000	3.775V	15.6205	15.10	-2.60	±1.00	slm@70.0F	Fail
20.0000	5.030V	20.4539	20.12	-1.67	±1.00	slm@70.0F	Fail



Calibration Gas: N2
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg

END OF REPORT

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

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Form: ROC101 Rev 8 *data: C4P*

400- App-C Calibration Documents (page 28 of 64)

alpha CONTROLS & INSTRUMENTATION

Report of Calibration

As Left

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 1 of 2

UUT

Made by:	Aalborg
Model:	GFC37
Serial No.:	251111-5
ID No.:	SBI-259
Description:	Mass Flow Controller

Calibration

Report No.:	AC15081457-251111-5
Adjusted:	Yes
Condition:	In Tolerance
Calibration Date:	3-Sep-2015
Calibration Due:	3-Sep-2016

Customer

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

Environment

Temperature:	26.1°C
Humidity:	53%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.

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STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-01	1500183748	26-Jun-2016
Molbloc-L Laminar Element	Fluke 3E4	FLOW-3E4-02	1500183749	27-Jun-2016
Process Calibrator	Fluke 744	ELC-CAL-02	AC14101571-8223003	10-Nov-2015
Multimeter	Fluke 87 V	ELC-MTR-05	AC15031661-96010221	25-Mar-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

LCD readings: 0.0, 5.1, 10.0, 15.1, 20.0

Adjusted trim pots.

Performed by: Slava Peciurov

Reviewed by: Anthony Morra

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

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

Form: ROC101 Rev 8 *data: C4P*

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alpha CONTROLS & INSTRUMENTATION

Report of Calibration
As Left

ilac-MRA A2LA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 2 of 2

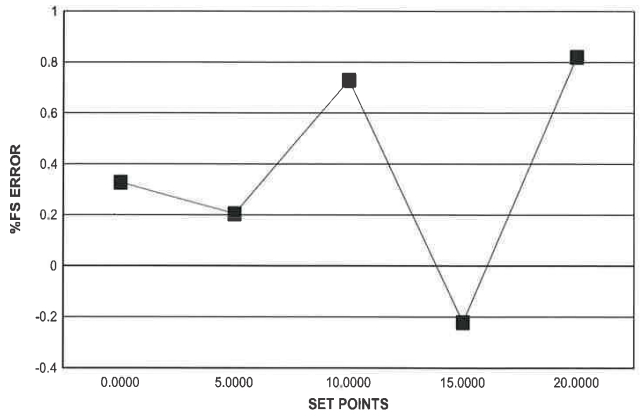
UUT

Made by:	Aalborg
Model:	GFC37
Serial No.:	251111-5
ID No.:	SBI-259
Description:	Mass Flow Controller

Calibration

Report No.:	AC15081457-251111-5
Adjusted:	Yes
Condition:	In Tolerance
Calibration Date:	3-Sep-2015
Calibration Due:	3-Sep-2016

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.017V	0.0025	0.07	0.33	±1.00	slm@70.0F	Pass
5.0000	1.271V	5.0431	5.08	0.20	±1.00	slm@70.0F	Pass
10.0000	2.524V	9.9500	10.10	0.73	±1.00	slm@70.0F	Pass
15.0000	3.775V	15.1443	15.10	-0.22	±1.00	slm@70.0F	Pass
20.0000	5.027V	19.9439	20.11	0.82	±1.00	slm@70.0F	Pass



Calibration Gas: N2
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg

END OF REPORT

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

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Form: ROC101 Rev 8 *data: C4P*

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alpha CONTROLS & INSTRUMENTATION

Report of Calibration

As Found / As Left

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 1 of 2

UUT

Made by:	Aalborg
Model:	GFC37
Serial No.:	251111-3
ID No.:	SBI-260
Description:	Mass Flow Controller

Calibration

Report No.:	AC15101171-251111-3
Adjusted:	No
Condition:	In Tolerance
Calibration Date:	15-Oct-2015
Calibration Due:	15-Oct-2016

Customer

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

Environment

Temperature:	22.4°C
Humidity:	34%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
Thermohygrometer Probe	Hart Scientific 2626-S	TRH-PRB-02	AC14121193-A71035	6-Jan-2016
Mass Flow Terminal	Fluke Molbox1+	FLOW-CAL-01	1500183843	30-Jun-2016

REMARKS:

None

Performed by: Slava Peciurov

Reviewed by: Anthony Morra

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

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

Form: ROC101 Rev 8 *data: C4P*

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alpha CONTROLS & INSTRUMENTATION

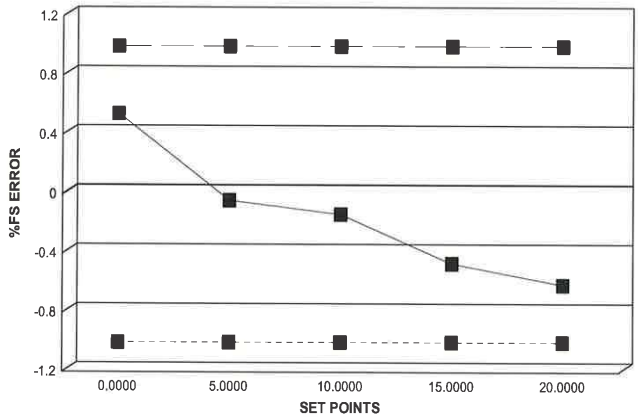
Report of Calibration
As Found / As Left

ilac-MRA ACCREDITED CALIBRATION CERT #2260.01

Procedure: Mass Flow Meter/Controller: 5pts: Rev. 1.0.A Page 2 of 2

UUT		***Calibration***	
Made by:	Aalborg	Report No.:	AC15101171-251111-3
Model:	GFC37	Adjusted:	No
Serial No.:	251111-3	Condition:	In Tolerance
ID No.:	SBI-260	Calibration Date:	15-Oct-2015
Description:	Mass Flow Controller	Calibration Due:	15-Oct-2016

Test Description	Output	STD	UUT	Error (%FS)	Tolerance (%FS)	Units	P/F
0.0000	0.044V	0.0671	0.18	0.54	±1.00	slm@70.0F	Pass
5.0000	1.280V	5.1280	5.12	-0.04	±1.00	slm@70.0F	Pass
10.0000	2.534V	10.1627	10.14	-0.13	±1.00	slm@70.0F	Pass
15.0000	3.787V	15.2411	15.15	-0.47	±1.00	slm@70.0F	Pass
20.0000	5.042V	20.2898	20.17	-0.61	±1.00	slm@70.0F	Pass



Calibration Gas: N2
Standard Pressure Conditions: 1 atm
Standard Temperature Conditions: see Units
Estimated Measurement Uncertainty: +/-0.3% rdg

END OF REPORT

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

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Form: ROC101 Rev 8 *data: C4P*

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Thermal Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

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

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

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 ("H2O)	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 = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-276_06-2016

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AIR LIQUIDE

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	No de série:	SG-140107-A
Code de produit:	SPG-4MX0024334	No d`ordre de fabrication:	16-SGM-1725
Qualité:	CERTIFIE	Pression:	6750 kPa (15°C)
Taille:	7AL		1000 psi (21°C)
Raccord de sortie du robinet:	CGA 590	Volume:	0,485 m3
		Date d'expiration:	03/05/2019

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

Analyse réalisée par:

FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

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

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

PRÉCISION ANALYTIQUE:

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

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13/06/2016

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AIR LIQUIDE

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	No de série:	SG-130251-A
Code de produit:	SPG-2MX0014570	No d`ordre de fabrication:	16-SGM-1718
Qualité:	CERTIFIE	Pression:	13500 kPa (15°C)
Taille:	7AL		2000 psi (21°C)
Raccord de sortie du robinet:	CGA 350	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 choisi 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.

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AIR LIQUIDE

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	No de série:	SG-130201-A
Code de produit:	SPG-2MX0024331	No d`ordre de fabrication:	16-SGM-1727
Qualité:	CERTIFIE	Pression:	13500 kPa (15°C)
Taille:	7AL		2000 psi (21°C)
Raccord de sortie du robinet:	CGA 350	Volume:	812,0 L
		Date d'expiration:	03/05/2019

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

Analyse réalisée par:

FREDERIC GAGNON-B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi 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.

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AIR LIQUIDE

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	No de série:	SG090157A
Code de produit:	SPG-2MX0024332	No d`ordre de fabrication:	16-SGM-1726
Qualité:	CERTIFIE	Pression:	7571,5 kPa (15°C)
Taille:	7AL		1121 psi (21°C)
Raccord de sortie du robinet:	CGA 580	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 choisi 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.

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AIR LIQUIDE

CERTIFICAT D'ANALYSE

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

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

Date d'analyse:	02/05/2016	No de série:	S980151E
Code de produit:	SPG-2MX0007686	No d`ordre de fabrication:	16-SGM-1717
Qualité:	CERTIFIE	Pression:	13500 kPa (15°C)
Taille:	7AL		2000 psi (21°C)
Raccord de sortie du robinet:	CGA 580	Volume:	860,337 L
		Date d'expiration:	02/05/2019

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

Analyse réalisée par:

SAMIA AMRANI B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi 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.

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Date: 2016-02-04

Equipment: Test bench #4
T2 (Ambiant)

Accuracy: 0.01

Reference: SBI-096

Temperature: 68 F

R.H.: 18%

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.	0.00	%	
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.	0.01	%	
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	**0.02**	**%**	
	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	

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	

Vincent Pelletier

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	

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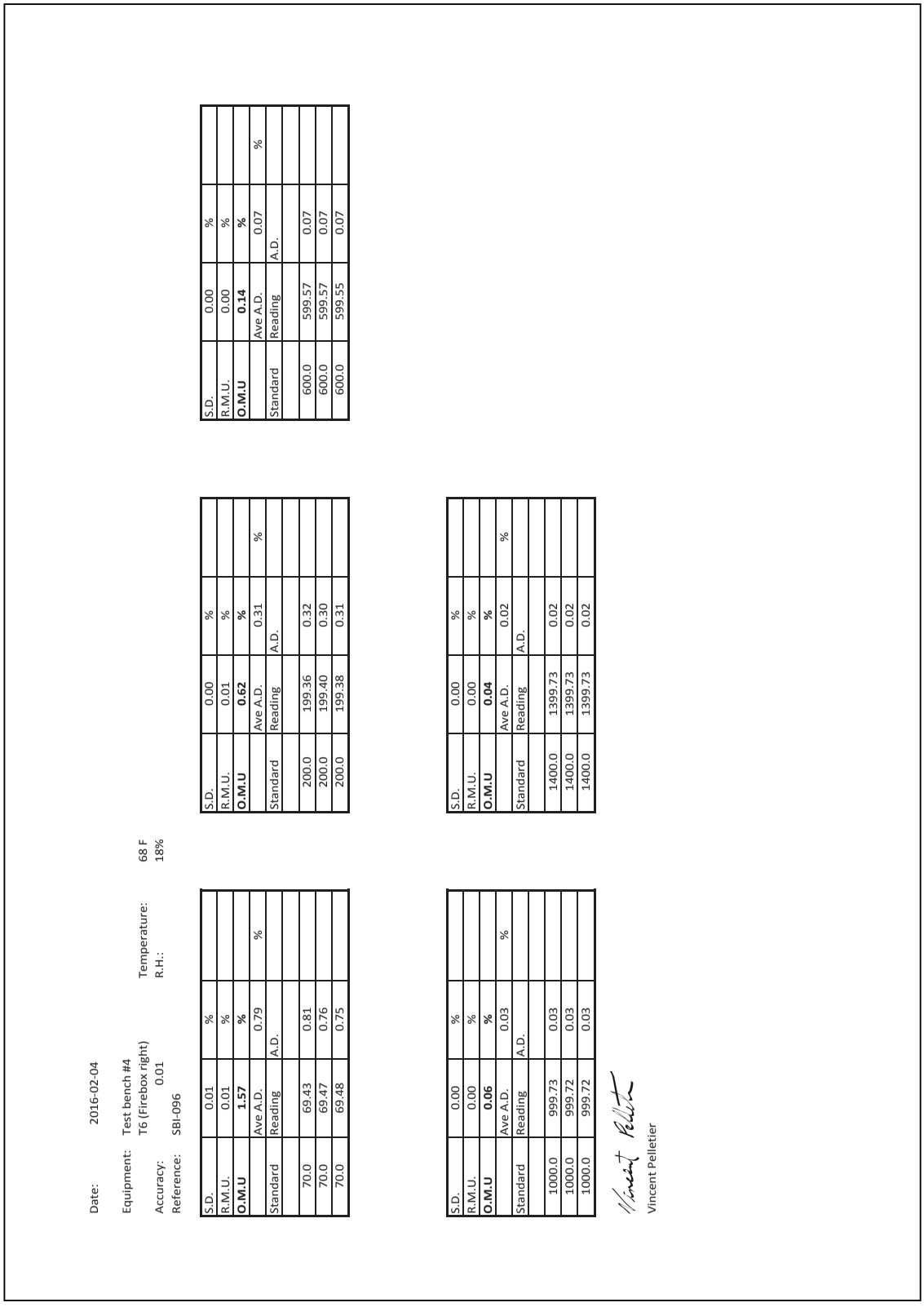
400- App-C Calibration Documents (page 42 of 64)



Date: 2016-02-04

Equipment: Test bench #4 — Temperature: 68 F

T6 (Firebox right) — R.H.: 18%

Accuracy: 0.01

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.	0.00	%	
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.	0.01	%	
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	**0.04**	**%**	
	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	

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	

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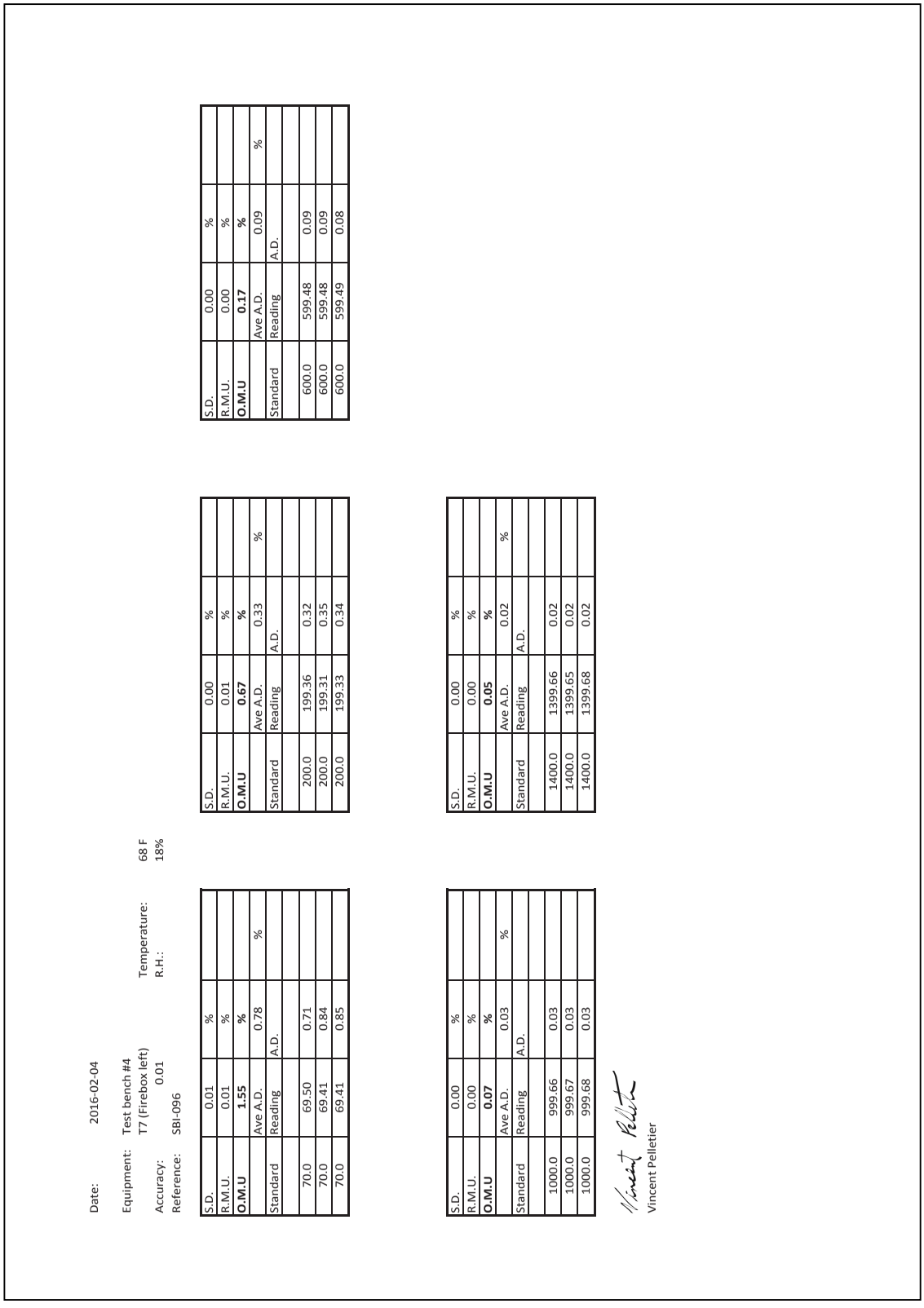
400- App-C Calibration Documents (page 43 of 64)



Date: 2016-02-04

Equipment: Test bench #4 — Temperature: 68 F

T7 (Firebox left) — R.H.: 18%

Accuracy: 0.01

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.	0.00	%	
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.	0.01	%	
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	**0.05**	**%**	
	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	

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	

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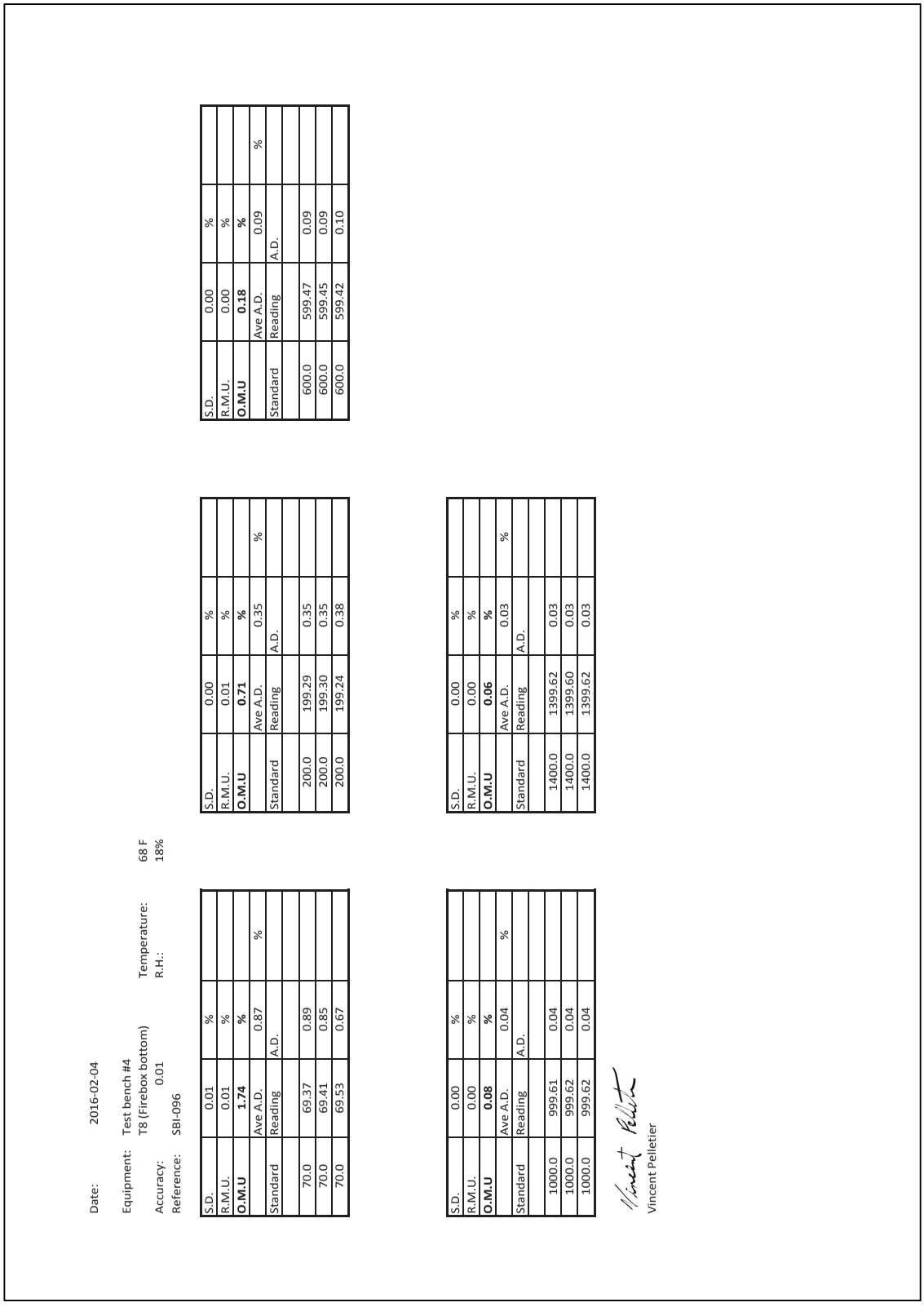
400- App-C Calibration Documents (page 44 of 64)



Date: 2016-02-04

Equipment: Test bench #4 — Temperature: 68 F

T8 (Firebox bottom) — R.H.: 18%

Accuracy: 0.01

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.	0.00	%	
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.	0.01	%	
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	**0.06**	**%**	
	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	

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	

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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	

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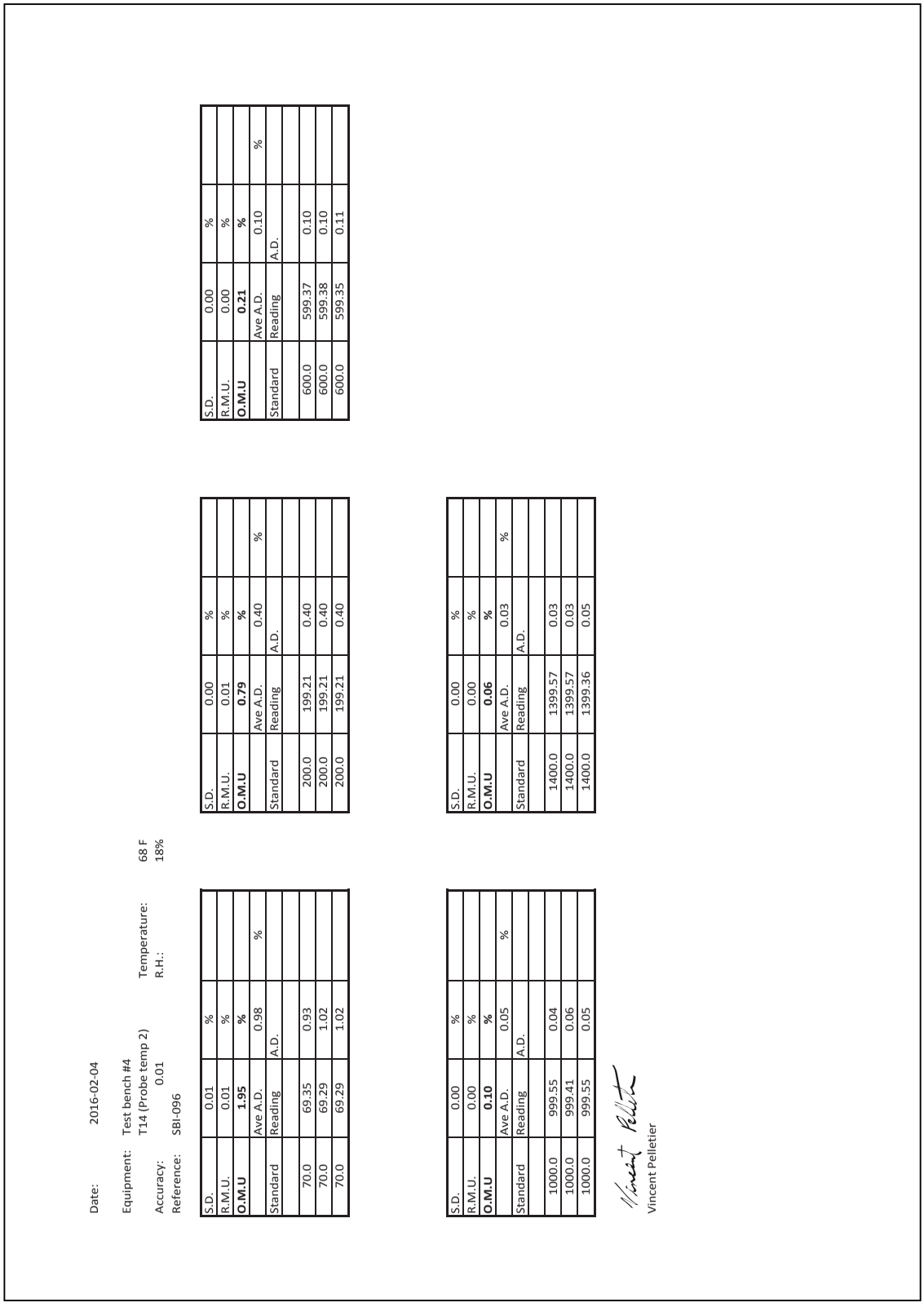

Date: 2016-02-04

Equipment: Test bench #4
T14 (Probe temp 2)

Accuracy: 0.01

Reference: SBI-096

Temperature: 68 F

R.H.: 18%

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.	0.00	%	
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.	0.01	%	
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	**0.06**	**%**	
	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	

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	

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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	

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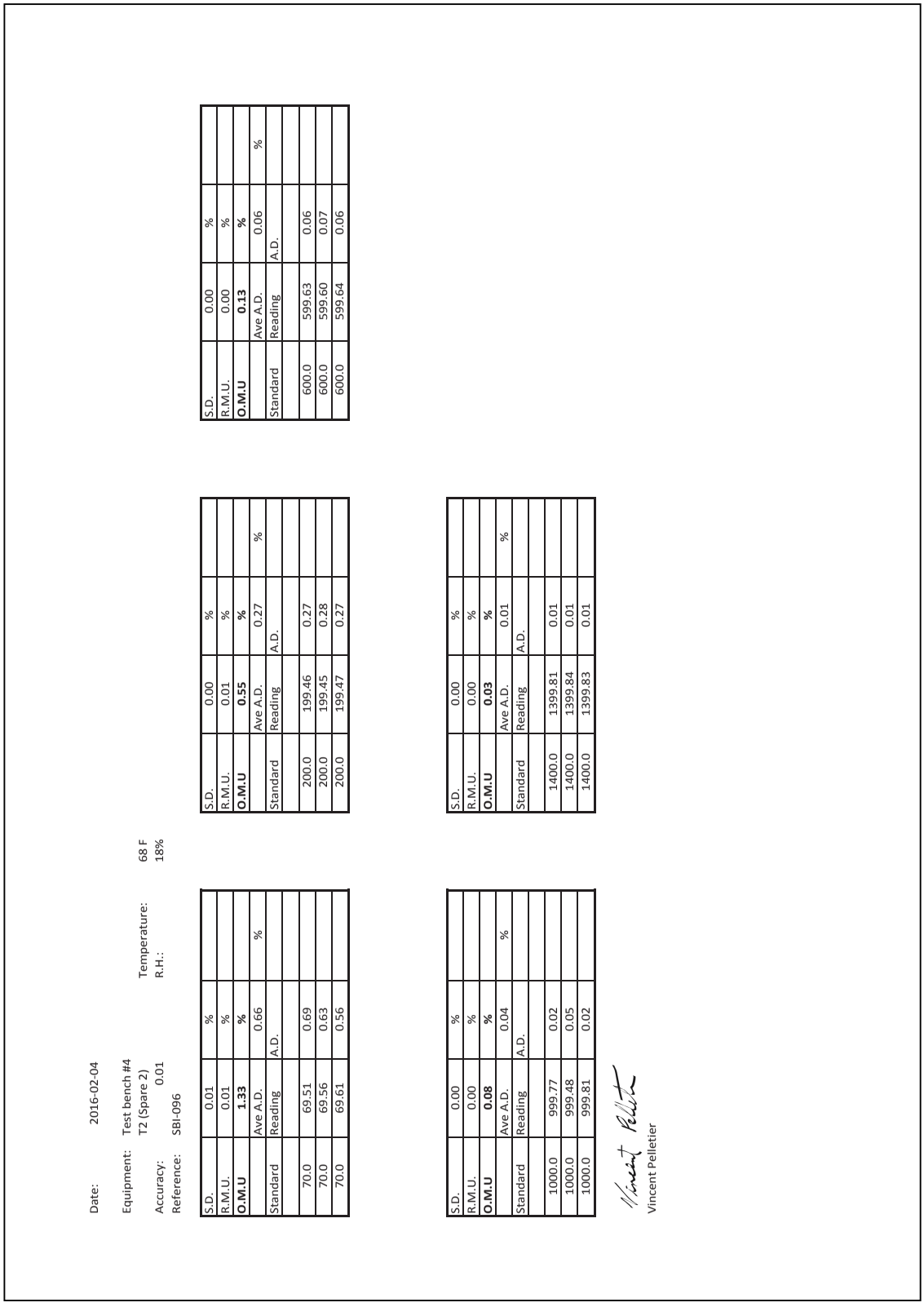
400- App-C Calibration Documents (page 48 of 64)



Date: 2016-02-04

Equipment: Test bench #4
T2 (Spare 2)

Accuracy: 0.01

Reference: SBI-096

Temperature: 68 F

R.H.: 18%

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.	0.00	%	
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.	0.01	%	
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	**0.03**	**%**	
	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	

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	

Vincent Pelletier

400- App-C Calibration Documents (page 49 of 64)

Rapport d'étalonnage No. CA0003-506-040116

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

Jeu de poids no :	*Traçabilité NIST No.:*	*Classe ASTM/OIML*	*Date d'étalonnage :*	*Date proch. étalonnage*
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

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 50 of 64)

Rapport d'étalonnage No. CA0003-506-040116

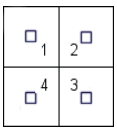
METTLER TOLEDO

Résultats de mesure

La température : 22 °C

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

Test de variation



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

Linéarité

	Avant réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0,00 kg	0,00 kg	0,00 kg	0 d	1 d	OUI
2,00	40,00 kg	40,00 kg	0,00 kg	0 d	2 d	OUI
3,00	80,00 kg	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

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 51 of 64)

Rapport d'étalonnage No. CA0003-506-040116

METTLER TOLEDO

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

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis
Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

☑ **OUI** ☐ **NON**

Répétabilité

Poids appliqués : 100,00 kg

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

Incertitude

Mesure de l'incertitude = 0,012 kg

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

Remarques

Aucune.

Version Logiciel : 4.6.2.10

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400- App-C Calibration Documents (page 52 of 64)

Dry Gas Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

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

Average Gas Meter y Factor
1.003

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

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.023
Acceptance	Acceptable

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 ("H2O)	0.00	0.00	0.00
Initial Reference Meter	579.840	584.385	589.425
Final Reference Meter	584.385	589.425	614.643
Initial DGM	467.453	471.857	476.954
Final DGM	471.857	476.954	501.989
Temp. Ref. Meter (°F), Tr	66.6	70.9	71.9
Temperature DGM (°F), Td	67.0	69.5	73.4
Time (Minutes)	102.0	40.0	91.0
Net Volume Ref. Meter, Vr	4.545	5.040	25.218
Net Volume DGM, Vd	4.404	5.097	25.035
Gas Meter y Factor =	**1.026**	**0.979**	**1.003**
Gas Meter y Factor Deviation (from avg.)	0.023	0.023	0.000
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.043176471

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-046_03-2016

400- App-C Calibration Documents (page 53 of 64)

Intertek

Dry Gas Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

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

Average Gas Meter y Factor
1.006

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

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.014
Acceptance	Acceptable

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

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	614.643	667.231	672.581
Final Reference Meter	667.231	672.581	692.897
Initial DGM	956.596	1008.026	1013.254
Final DGM	1008.026	1013.254	1033.598
Temp. Ref. Meter (°F), Tr	73.3	72.2	69.0
Temperature DGM (°F), Td	73.8	69.4	69.2
Time (Minutes)	1028.0	35.0	67.0
Net Volume Ref. Meter, Vr	52.588	5.350	20.316
Net Volume DGM, Vd	51.43	5.228	20.344
Gas Meter y Factor =	**1.016**	**1.011**	**0.992**
Gas Meter y Factor Deviation (from avg.)	0.010	0.004	0.014
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.050029183

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-047_03-2016

400- App-C Calibration Documents (page 54 of 64)

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www.ulrich.ca

CLAS NRC CNRC CLAS 1664-01

ACCREDITATION ISO 17025
SCC Scope Number 220

CALIBRATION CERTIFICATE

Certificate no.:	525294	**Calibration date:**	April 07, 2016
Identification:	SBI-096	**Certificate issued:**	April 07, 2016
Description:	CALIBRATOR, OMEGA CL23A	**Interval:**	12 months
Size:	TC K/J/T	**Due date:**	April 07, 2017
Manufacturer:	OMEGA	**Procedure no.:**	MET/CAL
Model no.:	CL23A	**Environment:**	CLAS Type 2 Laboratory
Serial no.:	T-256137	**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 CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

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

CALIBRATION DATA

See next page for measurement results.

Notes:

9V battery replaced.

166727P

400- App-C Calibration Documents (page 55 of 64)

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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

400- App-C Calibration Documents (page 56 of 64)

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www.ulrich.ca

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

Calibration Data for Certificate No. 525294 RtrsII01 Page 2 of 2

400- App-C Calibration Documents (page 57 of 64)

MICRO PRECISION CALIBRATION INC.

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

ilac-MRA A2LA ACCREDITED
Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Apr 22, 2016 **Cert No.** 222200812318776

Customer:
STOVE BUILDERS INTERNATIONAL INC.
PORTES 11-12
250 DE COPENHAGUE
SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

		Work Order #:	SAC-70078354
		Purchase Order #:	REWORK
MPC Control #:	DA5991	Serial Number:	79977
Asset ID:	SBI-097	Department:	N/A
Gage Type:	ANEMOMETER	Performed By:	ERICK CONKLIN
Manufacturer:	EUROTRON INSTRUMENTS	Received Condition:	IN TOLERANCE
Model Number:	VT 50	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	April 22, 2016
Temp/RH:	68.0°F / 43.0%	Cal. Interval:	12 MONTHS
		Cal. Due Date:	April 22, 2017

Calibration Notes:

Test Points

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

Calibrating Technician: Erick Conklin
ERICK CONKLIN

QC Approval: Robert S Means
Robert Means

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

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

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

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400- App-C Calibration Documents (page 58 of 64)

MICRO PRECISION CALIBRATION INC.

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

ilac-MRA A2LA ACCREDITED
Calibration Laboratory
CERT # 935.01

Certificate of Calibration

Date: Apr 22, 2016 **Cert No. 222200812318776**

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CR6800	HUMIDITY GENERATOR/ ENVIRONMENTAL CHAMBER	2500	0012263	THUNDER SCIENTIFIC CORPORATION	Aug 7, 2016	222008122801952
CL7456	STANDARD PLATINUM RESISTANCE THERMOMETER PROBE	5681	1595	FLUKE	Dec 4, 2016	A7B16006
CL7223	BLACK STACK	1560/2560	A07486/A07485/A07728	HART SCIENTIFIC, INC.	Nov 2, 2016	222008122718022
CJ5100	WIND TUNNEL WITH CONTROLLER	JS-500	375/305	INTERACTIVE INSTRUMENTS	Oct 29, 2016	222008122715516
AE2821	ANEMOMETER	AM-4822	N272316	LANDTEK	Oct 29, 2016	222008122715506

Procedures Used in this Event

Procedure Name	Description
CUSTOMER SPECIFICATIONS	Customer Specifications

Calibrating Technician: Erick Conklin
ERICK CONKLIN

QC Approval: Robert S Means
Robert Means

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

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

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

Page 2 of 2 (CERT, Rev 3)

400- App-C Calibration Documents (page 59 of 64)

CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 51068

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

Customer Information

Customer: SBI St-Augustin

Address : 250, De Copenhague
Doors 11-12 Customer PO #: 45864
St-Augustin-de-Desmaures

Calibration Procedure Information

Procedure ID: GTP FLOW_INDI Revision #: 7 Revision Date: 1/6/2013

Calibration Standards Information

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

Sensor Information

Manufacturer: American Meter Description: Gas Meter Method Used: Laminar
Model #: DTM-200A Rated Accuracy: ± 1 % of Reading Accuracy Specified By: AmericanMeter
Instrument ID#: SBI-103 Range: 0 to 250 scfh Condition: Functional
Serial #: 07J264834
Comments: Calibration Date: 09/02/2015

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

Performed By: _____ Date: 9/2/2015
I.B. Caoili
Calibration Technician

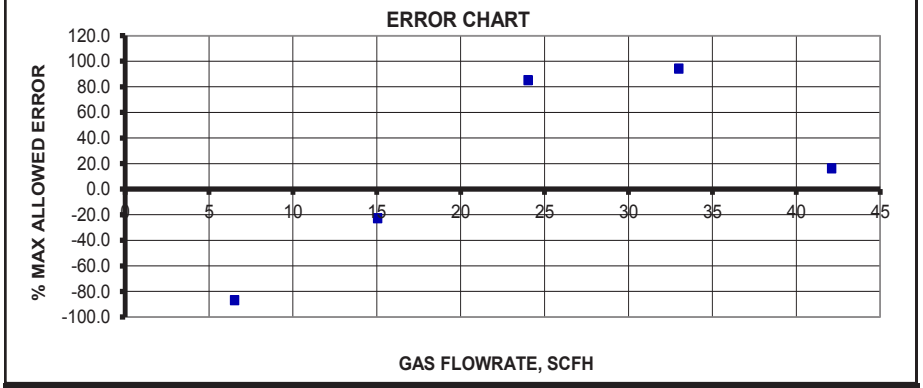
Page 1 of 2

GRAFTEL, LLC. 870 Cambridge Drive, Elk Grove Village, IL 60007 847.364.2600
www.graftel.com

400- App-C Calibration Documents (page 60 of 64)

ATTACHMENT TO CALIBRATION CERTIFICATE 51068
AS FOUND / AS LEFT DATA
Page 2 of 2

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



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

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

NIST Traceable Calibration Data Sheet

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

www.graftel.com

400- App-C Calibration Documents (page 61 of 64)

Date: 2016-04-19

Equipment: SBI-153 Temperature: 70.2°F

Accuracy: 0.001 1 R.H.: 32.7%

Reference: SBI-194

S.D.	0.00	%		
R.M.U.	0.09	%		
O.M.U	**0.58**	**%**		
	Ave A.D.	0.27	%	
Standard	Reading	A.D.		
MΩ				
1.100	1.097	0.27		
1.100	1.097	0.27		
1.100	1.097	0.27		

S.D.	0.01	%		
R.M.U.	0.83	%		
O.M.U	**2.00**	**%**		
	Ave A.D.	0.56	%	
Standard	Reading	A.D.		
120	119	0.83		
120	120	0.00		
120	119	0.83		

Technician: Vincent Pelletier

400- App-C Calibration Documents (page 62 of 64)

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CLAS ARC CMRC CLAS 1004-01

ACCREDITATION ISO 17025
SCC Scope Number 220

CALIBRATION CERTIFICATE

Certificate no.:	525229	**Calibration date:**	April 07, 2016
Identification:	SBI-194	**Certificate issued:**	April 07, 2016
Description:	MULTIMETER, RADIO SHACK 22-168A	**Interval:**	12 months
Manufacturer:	RADIO SHACK	**Due date:**	April 07, 2017
Model no.:	22-168A	**Procedure no.:**	MET/CAL
Serial no.:	FC388201	**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-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 CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

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

CALIBRATION DATA

See next page for measurement results.

Notes:

1.5A fuse was received blown. It was replaced.

248501P

Page 1 of 1

400- App-C Calibration Documents (page 63 of 64)

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Montréal (Québec) H8T 1A1

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Fax (514) 631-8122
info@ulrich.ca
www.ulrich.ca

CALIBRATION DATA

Certificate no.: 525229
Identification: SBI-194
Description: MULTIMETER
Serial no.: FC388201
Procedure: MICRONTA 22-168A: 5520A-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
8608002	CALIBRATOR	FLUKE	5520A	2016/03/02	2017/03/31

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
DC VOLTAGE CALIBRATION						
200 mV Range						
190.0mV		189.9	187.8	192.2	PASS	
2V Range						
1.900V		1.898	1.878	1.922	PASS	
-1.900V		-1.897	-1.922	-1.878	PASS	
20V Range						
19.00V		18.99	18.78	19.22	PASS	
200V Range						
190.0V		190.1	187.8	192.2	PASS	
1000V Range						
950V		950	938	962	PASS	
AC VOLTAGE CALIBRATION						
200 mV Range						
190.0mV @ 60Hz		187.3	185.8	194.2	PASS	
2V Range						
1.900V @ 60Hz		1.872	1.858	1.942	PASS	
20V Range						
19.00V @ 60Hz		18.73	18.58	19.42	PASS	
200V Range						
190.0V @ 60Hz		187.6	185.8	194.2	PASS	
750V Range						
700V @ 60Hz		691	678	723	PASS	
FREQUENCY CALIBRATION						
1.900kHz @ 5V		1.904	1.809	1.990	PASS	
RESISTANCE CALIBRATION						
200 Ohm Range						
190.0 Ohm		190.3	186.8	193.2	PASS	
2 kOhm Range						
1.900 kOhm		1.900	1.870	1.930	PASS	
20 kOhm Range						
19.00 kOhm		18.98	18.70	19.30	PASS	
200 kOhm Range						
190.0 kOhm		190.1	187.0	193.0	PASS	
2 MOhm Range						

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ULRICH
Ulrich Métrologie inc.
Ulrich Metrology inc.
9912, Côte-de-Liesse
Montréal (Québec) H8T 1A1
Tél. (514) 631-6653
Fax (514) 631-6122
info@ulrich.ca
www.ulrich.ca

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
1.900 MOhm		1.901	1.870	1.930	PASS	
20 MOhm Range						
19.00 MOhm		19.01	18.50	19.50	PASS	
2000 MOhm Range						
1100 MOhm		1107	935	1266	PASS	
CONTINUITY CALIBRATION						
Is the beeper on when 30 Ohms resistance is applied?						
Result of Operator Evaluation					PASS	
Is the beeper off when 100 Ohms resistance is applied?						
Result of Operator Evaluation					PASS	
DC CURRENT CALIBRATION						
200 µA Range						
190.0uA		189.7	187.0	193.0	PASS	
2 mA Range						
1.900mA		1.899	1.870	1.930	PASS	
20 mA Range						
19.00mA		19.06	18.47	19.54	PASS	
200 mA Range						
190.0mA		191.7	184.7	195.3	PASS	
20 A Range						
10.00A		9.89	9.30	10.70	PASS	
AC CURRENT CALIBRATION						
200 µA Range						
190.0uA @ 60Hz		187.0	184.8	195.2	PASS	
2 mA Range						
1.900mA @ 60Hz		1.897	1.848	1.952	PASS	
20 mA Range						
19.00mA @ 60Hz		18.80	18.15	19.85	PASS	
200 mA Range						
190.0mA @ 60Hz		188.9	181.5	198.5	PASS	
20 A Range						
10.00A @ 60Hz		9.92	8.98	11.02	PASS	
CAPACITANCE CALIBRATION						
200 nF Range						
190.0nF		188.8	180.9	199.1	PASS	
20 µF Range						
19.00uF		18.48	17.30	20.70	PASS	
200 µF Range						
190.0uF		183.6	172.9	207.1	PASS	

End of Test Data

Calibration Data for Certificate No. 525229 Rtrslt01 Page 2 of 2

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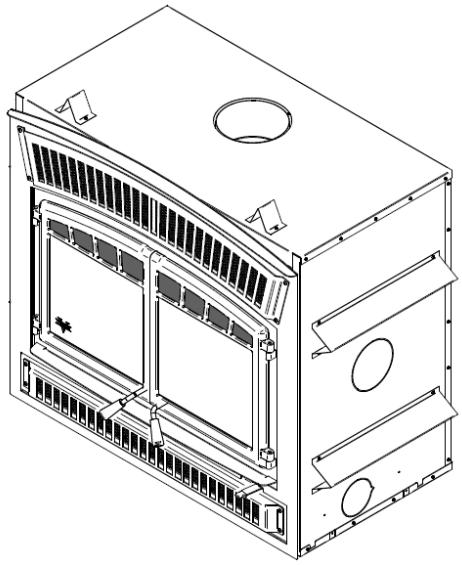
VENTIS®

INSTALLATION AND OPERATION MANUAL

HE350 (VB00005 model)



www.occanada.com

Manufactured by:
Stove Builder International Inc.
250 rue Copenhague, Saint-Augustin-de-Desmaures (Quebec), Canada, G3A 2H3
After-sale service: 418-908-8002 E-mail: tech@sbi-international.com

READ AND KEEP THIS MANUAL FOR REFERENCE

45704A
Printed in Canada 09-11-2015

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THANK YOU FOR CHOOSING THIS VENTIS WOOD FIREPLACE

As one of North America's largest and most respected wood stove and fireplace manufacturers, Stove Builder International takes pride in the quality and performance of all its products. We want to help you get maximum satisfaction as you use this product.

In the pages that follow you will find general advice on wood heating, detailed instructions for safe and effective installation, and guidance on how to get the best performance from this fireplace as you build and maintain fires, and maintain your wood heating system.

We recommend that our wood burning hearth products be installed and serviced by professionals who are certified in the United States by NFI (National Fireplace Institute®) or in Canada by WETT (Wood Energy Technology Transfer) or in Quebec by APC (Association des Professionnels du Chauffage).

Congratulations on making a wise purchase.

If this fireplace is not properly installed, combustible materials near it may overheat. To reduce the risk of fire, follow the installation instructions in this manual exactly. Contact local building or fire officials about restrictions and installation inspection requirements in your area.

Please read this entire manual before you install and use your new fireplace. You may need to get a building permit for the installation of this fireplace and the chimney that it is connected to. Consult your municipal building department or fire department before installation. We recommend that you also inform your home insurance company to find out if the installation will affect your policy.

This heating unit is designed to serve as a supplementary heat source. We recommend that a primary heat source also be available in the home. The manufacturer cannot be responsible for costs associated with the use of another heating system.

CAUTION: Do not attempt to modify or alter the construction of the fireplace or its components. Any modification or alteration of construction may void the warranty, listings and approvals of this system. In that case, Stove Builder International (SBI) will not be responsible for damages. Install the fireplace only as described in these instructions.

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REGISTER YOUR WARRANTY ONLINE

To receive full warranty coverage, you will need to show evidence of the date you purchased your unit. Keep your sales invoice. We also recommend that you register your warranty online at http://www.occanada.com/en/service-support/warranty-registration

Registering your warranty online will help us track rapidly the information we need on your unit.

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PART A - OPERATION AND MAINTENANCE

Please see Part B for installation instructions.

1 SAFETY INFORMATION

1.1 Summary of Operation and Maintenance Cautions and Warnings

- **HOT WHILE IN OPERATION, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. GLOVES MAY BE NEEDED FOR FIREPLACE OPERATION.**
- **USING A FIREPLACE WITH CRACKED OR BROKEN COMPONENTS, SUCH AS GLASS OR FIREBRICKS OR BAFFLES MAY PRODUCE AN UNSAFE CONDITION AND MAY DAMAGE THE FIREPLACE.**
- **OPERATE ONLY WITH DOOR FULLY CLOSED. IF DOOR IS LEFT PARTLY OPEN, GAS AND FLAME MAY BE DRAWN OUT OF THE OPENING, CREATING RISKS FROM BOTH FIRE AND SMOKE.**
- **OPEN THE AIR CONTROL FULLY BEFORE OPENING THE LOADING DOOR.**
- **DO NOT INSTALL THE FIREPLACE OUTDOORS.**
- **THE FIREPLACE AND CHIMNEY MUST BE IN AN ENCLOSURE UP TO THE ATTIC.**
- **NEVER USE GASOLINE, LANTERN FUEL (NAPHTHA), FUEL OIL, MOTOR OIL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS OR AEROSOLS TO START A FIRE IN THIS FIREPLACE. KEEP ALL SUCH LIQUIDS OR AEROSOLS WELL AWAY FROM THE FIREPLACE WHILE IT IS IN USE.**
- **DO NOT STORE FUEL WITHIN HEATER MINIMUM INSTALLATION CLEARANCES.**
- **BURN ONLY SEASONED NATURAL FIREWOOD.**
- **DO NOT BURN:**
    - **GARBAGE OF ANY KIND,**
    - **COAL OR CHARCOAL,**
    - **TREATED, PAINTED OR COATED WOOD,**
    - **PLYWOOD OR PARTICLE BOARD,**
    - **FINE PAPER, COLORED PAPER OR CARDBOARD,**
    - **SALT WATER DRIFTWOOD,**
    - **MANUFACTURED LOGS CONTAINING WAX OR CHEMICAL ADDITIVES,**
    - **RAILROAD TIES OR**
    - **LIQUIDS SUCH AS KEROSCENE OR DIESEL FUEL TO START A FIRE.**
- **THIS APPLIANCE SHOULD BE MAINTAINED AND OPERATED AT ALL TIMES IN ACCORDANCE WITH THESE INSTRUCTIONS.**
- **DO NOT ELEVATE THE FIRE BY MEANS OF GRATES, ANDIRONS OR OTHER MEANS.**
- **SOME JURISDICTIONS IN THE USA REQUIRE A SUPPLY OF OUTDOOR COMBUSTION AIR FOR THE FIREPLACE. IN CANADA, AN OUTDOOR AIR SUPPLY IS NOT REQUIRED, IF A CARBON MONOXIDE (CO) DETECTOR/ALARM IS LOCATED IN THE ROOM IN WHICH THE FIREPLACE IS INSTALLED. THE CO**

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DETECTOR WILL PROVIDE WARNING IF FOR ANY REASON THE WOOD FIREPLACE FAILS TO FUNCTION CORRECTLY. IF YOU ARE REQUIRED TO INSTALL AN OUTDOOR AIR SUPPLY, WE RECOMMEND THAT YOU ALSO INSTALL A CO DETECTOR/ALARM TO PROVIDE WARNING IF SMOKE SPILLAGE FROM THE FIREPLACE OCCURS.

CAUTION: **KEEP COMBUSTIBLE MATERIALS AT LEAST 48 INCHES AWAY FROM THE FRONT OF THE FIREPLACE OPENING.**

CAUTION: **DO NOT USE A FIREPLACE INSERT AND OTHER PRODUCTS NOT SPECIFIED FOR USE WITH THIS FIREPLACE.**

CAUTION: **DO NOT OBSTRUCT AIR INTLETS. THIS FIREPLACE NEEDS AIR FOR ITS GOOD OPERATION.**

CAUTION: **DO NOT BLOCK THE HOT AIR VENTS TO THE FIREPLACE AS THIS WILL CAUSE THE FIREPLACE TO OVERHEAT.**

WARNING: **DO NOT USE MATERIALS OTHER THAN THOSE LISTED IN THE REPLACEMENT PARTS SECTION DURING INSTALLATION AS THEY MAY BE SAFETY HAZARDS AND A FIRE COULD RESULT.**

WARNING: **THIS FIREPLACE HAS NOT BEEN TESTED WITH AN UNVENTED OR VENTED GAS LOG SET. TO REDUCE RISK OF FIRE OR INJURY, DO NOT INSTALL AN UNVENTED GAS LOG SET INTO THIS FIREPLACE.**

CAUTION: **DO NOT INSTALL IN A MOBILE HOME (CANADA) OR MANUFACTURED HOME* (USA).**

* The US department of Housing and Urban Development describes “manufactured homes” better known as “mobile home” as followed; Buildings built on fixed wheels and those transported on temporary wheels/axles and set on a permanent foundation.

PLEASE NOTE THAT THE PICTURES SHOWN IN THIS MANUAL ARE GENERIC AND MAY NOT MATCH EXACTLY THE LOOK OF YOUR FIREPLACE.

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2 GENERAL INFORMATION

2.1 Appliance performance(1)

Fuel type	Dry cordwood	
Recommended heating area[*]	500 to 2,800 ft^2 (47 to 195 m^2)	
Firebox volume	4.3 ft^3 (0.122 m^3)	
Maximum burn time[*]	12 h	
Maximum heat output(2) (dry cordwood)	95,000 BTU/h (27.8 kW)	
Overall heat output rate (min. to max.)(2)(3)	16,600 BTU/h to 43,000 BTU/h (4.9 kW to 12.6 kW)	
Average overall efficiency(3) - Dry cordwood	63.9% (HHV(4))	68.4% (LHV(5))
Optimum efficiency(2)(6)	69.7%	
Average particulate emissions rate(7)	1.6 g/h (EPA / CSA B415.1-10)	
Average CO(8)	157.4 g/h (CSA B415.1-10)	

[*] Recommended heating area and maximum burn time may vary subject to location in home, chimney draft, heat loss factors, climate, fuel type and other variables. The recommended heated area for a given appliance is defined by the manufacturer as its capacity to maintain a minimum acceptable temperature in the designated area in case of a power failure.

(1) Values are as measured per test method, except for the recommended heating area, firebox volume, maximum burn time and maximum heat output.

(2) The maximum heat output (dry cordwood) is based on a loading density varying between 15 lb/ft^3 and 20 lb/ft^3. Other performances are based on a fuel load prescribed by the standard. The specified loading density varies between 7 lb/ft^3 and 12 lb/ft^3. The moisture content is between 19% and 25%.

(3) As measured per CSA B415.1-10 stack loss method.

(4) Higher Heating Value of the fuel.

(5) Lower Heating Value of the fuel.

(6) Optimum overall efficiency at a specific burn rate (LHV).

(7) This appliance is officially tested and certified by an independent agency.

(8) Carbon monoxide

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2.2 General Feature

Recommended log length	16 po (406 mm) north-south**
Flue outlet diameter	8 in (203 mm)
Chimney diameter	8 in (203 mm) ***See section 8.6: Chimney Installation Instructions***
Type of chimney	CAN/ULC S604, UL 103 (1700 °F) CAN/ULC S629, UL 103 HT (2100 °F)
Baffle material	C-cast
Approved for alcove installation	Not approved
Approved for mobile home installation‡	Not approved
Shipping weight (without option)	510 lb (232 kg)
Type of door	Double, glass, with cast iron frame
Type of glass	Ceramic glass
Blower	Included (up to 176 CFM)
Particulate emission standard	ASTM WK 47329
USA standard (safety)	UL 127
Canadian standard (safety)	ULC-S610

** *East-west: through the door you see the longitudinal sides of the logs; north-south: through the door you see the tips of the logs.*

‡ *Mobiles homes are buildings made (or substantially made) in a factory and transported to another location. They include both homes built on fixed wheels and those transported on temporary wheels/axles and set on a permanent foundation. Travel trailers and recreational vehicles not intended to be permanently located on site are considered RV's and are not considered mobile homes. Also, a house for which the walls and other components would be manufactured in a factory to be then assembled on site would not be considered a manufactured home since it would not be substantially made in a factory.*

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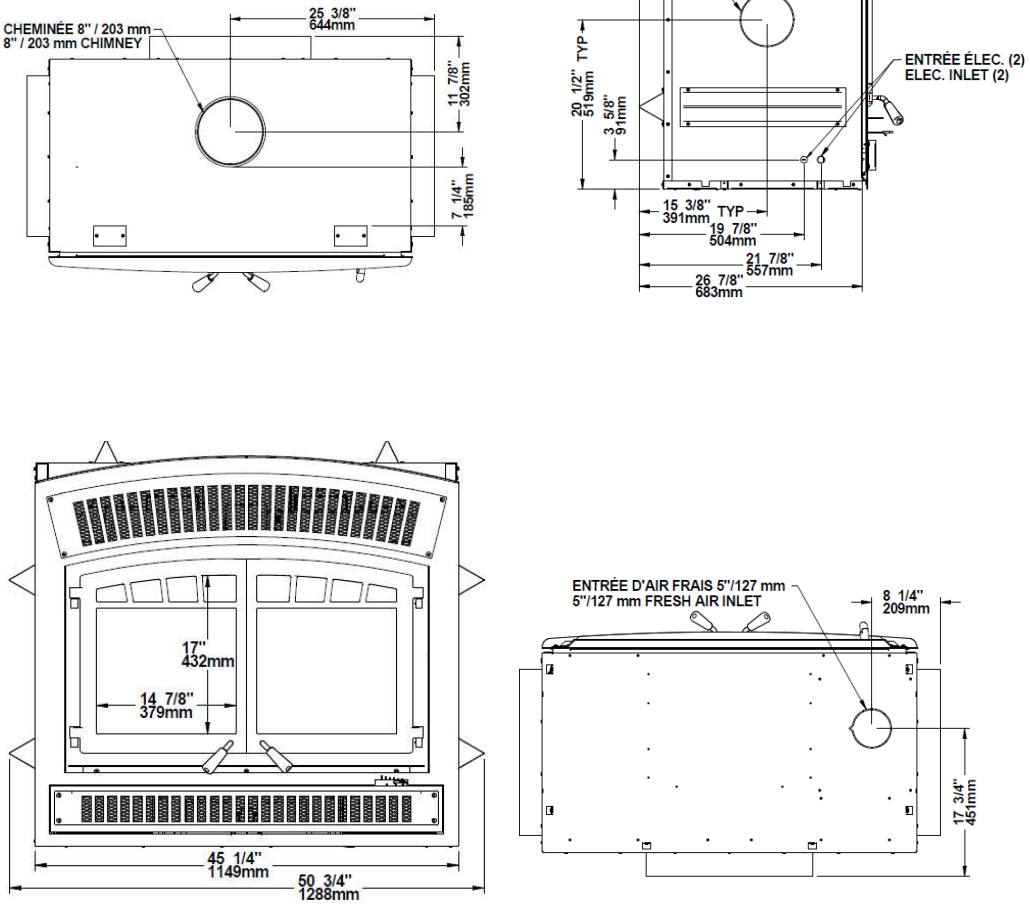

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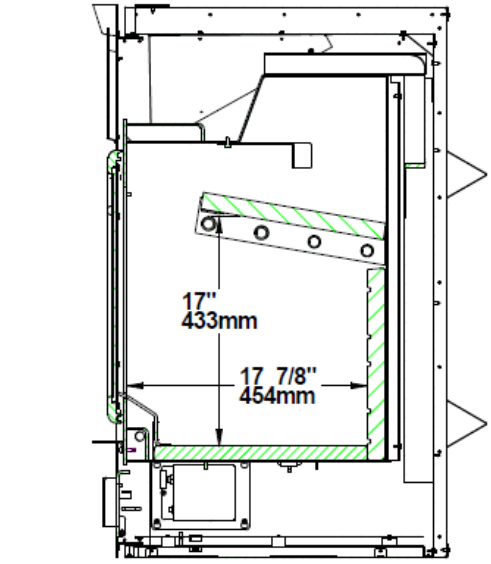

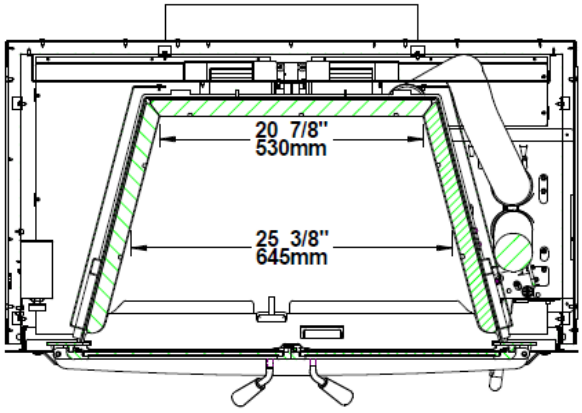

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2.3 Zone Heating and How to Make it Work for You

Your new HE350 wood fireplace is a space heater, which means it is intended to heat the area it is installed in, as well as spaces that connect to that area, although to a lower temperature. This is called zone heating and it is an increasingly popular way to heat homes or spaces within homes.

Zone heating can be used to supplement another heating system by heating a particular space within a home, such as a basement family room or an addition that lacks another heat source.

Houses of moderate size and relatively new construction can be heated with a properly sized and located wood fireplace. Whole house zone heating works best when the fireplace is located in the part of the house where the family spends most of its time. This is normally the main living area where the kitchen, dining and living rooms are located. By locating the fireplace in this area, you will get the maximum benefit of the heat it produces and will achieve the highest possible heating efficiency and comfort. The space where you spend most of your time will be warmest, while bedrooms and basement (if there is one) will stay cooler. In this way, you will burn less wood than with other forms of heating.

Although the fireplace may be able to heat the main living areas of your house to an adequate temperature, we strongly recommend that you also have a conventional oil, gas or electric heating system to provide backup heating.

Your success with zone heating will depend on several factors, including the correct sizing and location of the fireplace, the size, layout and age of your home and your climate zone. Three-season vacation homes can usually be heated with smaller fireplaces than houses that are heated all winter.

2.4 The Benefits of Low Emissions and High Efficiency

The low smoke emissions produced by the special features inside the HE350 firebox mean that your household will release up to 90 percent less smoke into the outside environment than if you used an older conventional stove. But there is more to the emission control technologies than protecting the environment.

The smoke released from wood when it is heated contains about half of the energy content of the fuel. By burning the wood completely, your fireplace releases all the heat energy from the wood instead of wasting it as smoke up the chimney. Also, the features inside the firebox allow you to reduce the air supply to control heat output, while maintaining clean and efficient flaming combustion, which boosts the efficient delivery of heat to your home.

The emission control and advanced combustion features of your fireplace can only work properly if your fuel is in the correct moisture content range of 15 to 20 percent. See **Section 3: Fuel** of this manual for suggestions on preparing fuelwood and judging its moisture.

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2.5 The Olympia Chimney Commitment to You and the Environment

The Olympia Chimney team is committed to protecting the environment, so we do everything we can to use only materials in our products that will have no lasting negative impact on the environment.

2.5.1 What is Your New Fireplace Made Of?

The body of your fireplace, which is most of its weight, is carbon steel. Should it ever become necessary many years in the future, almost the entire fireplace can be recycled into new products, thus eliminating the need to mine new materials.

The paint coating on your fireplace is very thin. Its VOC content (Volatile Organic Compounds) is very low. VOCs can be responsible for smog, so all the paint used during the manufacturing process meets the latest air quality requirements regarding VOC reduction or elimination.

The air tubes are stainless steel, which can also be recycled.

The C-Cast baffle is made of an aluminosilicate fibre material that is compressed with a binder to form a rigid board. C-Cast can withstand temperatures above 2,000 °F. It is not considered hazardous waste. Disposal at a landfill is recommended.

Moulded refractory bricks are mainly composed of silicon dioxide, also known as silica, a product processed from a mined mineral. It is most commonly found in nature in the form of sand and clay. Disposal at a landfill is recommended. The steel mesh contained in some refractory bricks can be recycled.

The door and glass gaskets are fibreglass which is spun from melted sand. Black gaskets have been dipped into a solvent-free solution. Disposal at a landfill is recommended.

The door glass is a 5 mm thick ceramic material that contains no toxic chemicals. It is made of natural raw materials such as sand and quartz that are combined in such a way to form a high temperature glass. Ceramic glass cannot be recycled in the same way as normal glass, so it should not be disposed of with your regular household products. Disposal at a landfill is recommended.

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3 FUEL

3.1 Materials That Should Not be Burned

- **GARBAGE OF ANY KIND,**
- **COAL OR CHARCOAL,**
- **TREATED, PAINTED OR COATED WOOD,**
- **PLYWOOD OR PARTICLE BOARD,**
- **FINE PAPER, COLORED PAPER OR CARDBOARD,**
- **SALT WATER DRIFTWOOD,**
- **MANUFACTURED LOGS CONTAINING WAX OR CHEMICAL ADDITIVES,**
- **RAILROAD TIES,**
- **LIQUIDS SUCH AS KEROSENE OR DIESEL FUEL TO START A FIRE.**

WARNING: **DO NOT POKE OR STIR THE LOGS WHILE THEY ARE BURNING. USE ONLY FIRELOGS THAT HAVE BEEN TESTED FOR USE IN FIREPLACES (SEE ULC/ORD-C127, COMPOSITE FIRELOGS) AND PRIOR TO USE, REFER TO FIRELOG WARNINGS AND CAUTIONS MARKINGS ON PACKAGING.**

3.2 How to Prepare or Buy Good Firewood

3.2.1 What is Good Firewood?

Good firewood has been cut to the correct length for the fireplace, split to a range of sizes and stacked in the open until its moisture content is reduced to 15 to 20 per cent.

3.2.2 Tree Species

The tree species the firewood is produced from is less important than its moisture content. The main difference in firewood from various tree species is the density of the wood. Hardwoods are denser than softwoods. People who live in the coldest regions of North America usually have only spruce, birch and poplar, other low-density species to burn and yet they can heat their homes successfully.

Homeowners with access to both hardwood and softwood fuel sometimes use both types for different purposes. For example, softer woods make good fuel for relatively mild weather in spring and fall because they light quickly and produce less heat Softwoods are not as dense as hardwoods so a given volume of wood contains less energy. Using softwoods avoids overheating the house, which can be a common problem with wood heating in moderate weather. Harder woods are best for colder winter weather when more heat and longer burn cycles are desirable.

Note that hardwood trees like oak, maple, ash and beech are slower growing and longer lived than softer woods like poplar and birch. That makes hardwood trees more valuable. The advice that only hardwoods are good to burn is outdated. Old, leaky cast iron stoves wouldn't hold a fire overnight unless they were fed large pieces of hardwood. That is no longer true. You can successfully heat your home by using the less desirable tree species and give the forest a break at the same time.

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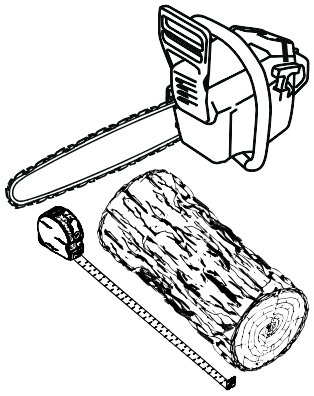
3.2.3 Log Length

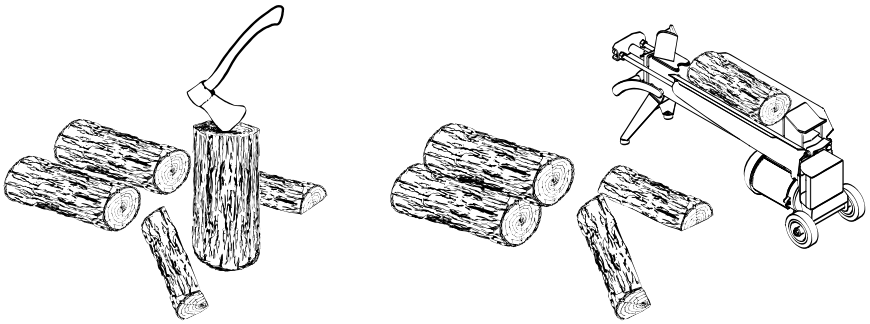
Logs should be cut at least 1” (25 mm) shorter than the firebox so they fit in easily. Pieces that are even slightly too long make loading the fireplace very difficult. The most common standard length of firewood is 16” (406 mm).

The pieces should be a consistent length, with a maximum of 1” (25 mm) variation from piece to piece.



3.2.4 Piece Size

Firewood dries more quickly when it is split. Large unsplit rounds can take years to dry enough to burn. Even when dried, unsplit logs are difficult to ignite because they don’t have the sharp edges where the flames first catch. Logs as small as 3” (75 mm) should be split to encourage drying.



Wood should be split to a range of sizes, from about 3” to 6” (75 mm to 150 mm) in cross section. Having a range of sizes makes starting and rekindling fires much easier. Often, the firewood purchased from commercial suppliers is not split finely enough for convenient stoking. It is sometimes advisable to resplit the wood before stacking to dry.

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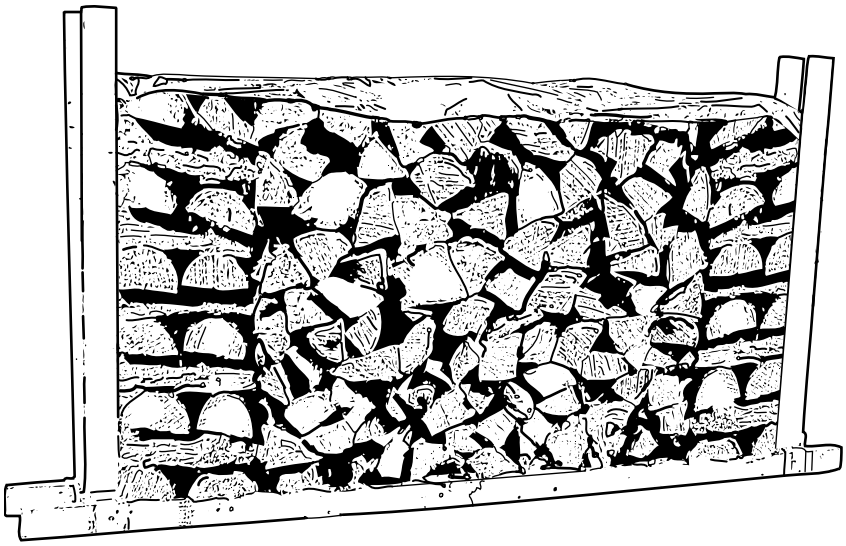
3.2.5 How to Dry Firewood

Firewood that is not dry enough to burn is the cause of most complaints about wood fireplaces. Continually burning green or unseasoned wood produces more creosote and involves lack of heat and dirty glass door. See **Section 5:** ***Maintaining your wood heating system*** for concerns about creosote.



Here are some things to consider in estimating drying time:

- firewood takes a long time to dry
- firewood bought from a dealer is rarely dry enough to burn, so it is advisable to buy the wood in spring and dry it yourself
- drying happens faster in dry weather than in damp, maritime climates
- drying happens faster in warm summer weather than in winter weather
- small pieces dry more quickly than large pieces
- split pieces dry more quickly than unsplit rounds
- softwoods take less time to dry than hardwoods
- softwoods like pine, spruce, and poplar/aspen can be dry enough to burn after being stacked in the open for only the summer months
- hardwoods like oak, maple and ash can take one, or even two years to dry fully, especially if the pieces are big
- firewood dries more quickly when stacked in the open where it is exposed to sun and wind; it takes much longer to dry when stacked in a wood shed
- firewood that is ready to burn has a moisture content between15 and 20% by weight and will allow your fireplace to produce its highest possible efficiency

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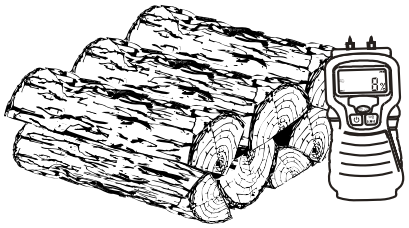
3.2.6 Judging Firewood Moisture Content

You can find out if some firewood is dry enough to burn by using these guidelines:

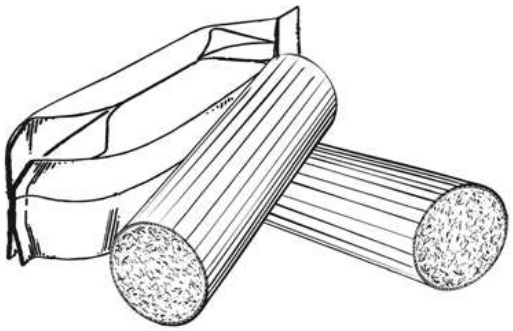
- cracks form at the ends of logs as they dry
- as it dries in the sun, the wood turns from white or cream colored to grey or yellow,
- bang two pieces of wood together; seasoned wood sounds hollow and wet wood sounds dull,
- dry wood is much lighter in weight than wet wood,
- split a piece, and if the fresh face feels warm and dry it is dry enough to burn; if it feels damp, it is too wet,
- burn a piece; wet wood hisses and sizzles in the fire and dry wood does not.



You could buy a wood moisture meter to test your firewood.

3.3 Manufactured Logs

Do not burn manufactured logs made of wax impregnated sawdust or logs with any chemical additives. Manufactured logs made of 100% compressed sawdust can be burned, but use caution in the number of these logs burned at one time. Start with one manufactured log and see how the fireplace reacts. Never use more than two manufactured logs at a time.



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4 OPERATING YOUR FIREPLACE

4.1 Your First Fires

Two things will happen as you burn your first few fires; the paint cures and the internal components of the fireplace are conditioned.

As the paint cures, some of the chemicals vaporize. The vapors are not poisonous, but they do smell bad. Fresh paint fumes can also cause false alarms in smoke detectors. So, when you first light your fireplace, be prepared by opening doors and/or windows to ventilate the house. As you burn hotter and hotter fires, more of the painted surfaces reach the curing temperature of the paint. The smell of curing paint does not disappear until you have burned one or two very hot fires.

Burn one or two small fires to begin the curing and conditioning process. Then build bigger and hotter fires until there is no longer any paint smell from the fireplace. Once the paint smell disappears, your fireplace is ready for serious heating.

4.2 Lighting Fires

Each person who heats with wood develops their own favorite way to light fires. Whatever method you choose, your goal should be to get a hot fire burning quickly. A fire that starts fast produces less smoke and deposits less creosote in the chimney. Here are three popular and effective ways to start wood fires.

4.2.1 BEST PRACTICE: The Top Down Fire

The top down fire starting method solves two problems with the conventional method: first, it does not collapse and smother itself as it burns; and second, it's cleaner. The top down method only works properly if the wood is well-seasoned.

Start by crisscrossing around 10 finely split and dry kindling (0.5 to 1 in) leaving air space between the pieces. Then put at least 5 news paper sheets to the top of the pieces. The best way to have your ignition clean and environmentally friendly is to roll the news papers to make a long cylinder, then to make 2 knots with it. The goal is to have the news papers as compact as possible to make it burn slowly. After the ignition of the news paper, let the door open of 1 in for 5-10 minutes. The air control should be open.

When you have a small coal bed, it's the time to crisscross three or four medium-sized split pieces (2-3 in) of dry firewood in the firebox. You can close the door as soon as you loaded the pieces. Let burn until you have a good coal bed. You are now ready for the main load.

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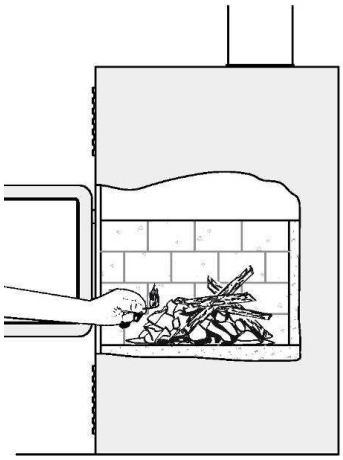
4.2.2 Conventional Fire Starting

The conventional way to build a wood fire is to bunch up 5 to 10 sheets of plain newspaper and place them in the firebox. Next, place 10 or so pieces of fine kindling on the newspaper. This kindling should be very thin; less than 1" (25 mm). Next, place some larger kindling pieces on the fine kindling. Open the air control fully and light the newspaper. Once the fire has ignited, close the door and leave the air control fully open.



A conventional kindling fire with paper under finely split wood.

DO NOT LEAVE THE FIREPLACE UNATTENDED WHEN THE DOOR IS SLIGHTLY OPENED. ALWAYS CLOSE AND LATCH THE DOOR AFTER THE FIRE IGNITES.

After the kindling fire has mostly burned, you can add standard firewood pieces until you have a fire of the right size for the conditions.

CAUTION: PLACE THE WOOD LOGS IN THE NORTH-SOUTH POSITION TO ALLOW PROPER PRIMARY AIR FLOW (FROM THE FRONT TO THE BACK OF THE STOVE).

4.2.3 Two Parallel Logs

Place two split logs in the firebox in a north-south orientation. Place a few sheets of twisted newspaper between the logs. Now place some fine kindling across the two logs and some larger kindling across those, log cabin style. Light the newspaper.

4.2.4 Using Fire Starters

Many people like to use commercial fire starters instead of newspaper. Some of these starters are made of sawdust and wax and others are specialized flammable solid chemicals. Follow the package directions for use.

Gel starter may be used but only if there are no hot embers present. Use only in a cold firebox to start a fire.

DO NOT USE FLAMMABLE LIQUIDS SUCH AS GASOLINE, NAPHTHA, FUEL OIL, MOTOR OIL, OR AEROSOLS TO START OR REKINDLE THE FIRE.

4.3 Maintaining Wood Fires

4.3.1 General Advice

Wood heating with a space heater is very different than other forms of heating. There will be variations in the temperature in different parts of the house and there will be variations in temperature throughout the day and night. This is normal, and for experienced wood burners these are advantages of zone heating with wood.

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Do not expect steady heat output from your fireplace. It is normal for its surface temperature to rise after a new load of wood is ignited and for its temperature to gradually decline as the fire progresses. This rising and falling of temperature can be matched to your household routines. For example, the area temperature can be cooler when you are active, such as when doing housework or cooking, and it can be warmer when you are inactive, such as when reading or watching television.

IMPORTANT: Wood burns best in cycles. A cycle starts when a new load of wood is ignited by hot coals and ends when that load has been consumed down to a bed of charcoal about the same size as it was when the wood was loaded. Do not attempt to produce a steady heat output by placing a single log on the fire at regular intervals. Always place at least 5 to 8 pieces on the fire at a time in the North-South orientation so that the heat radiated from one piece helps to ignite the pieces next to it. Each load of wood should provide several hours of heating. The size of each load can be matched to the amount of heat needed.

When you burn in cycles, you rarely need to open the fireplace's loading door while the wood is flaming. This is an advantage because there is more chance that smoke will leak from the fireplace when the door is opened as a full fire is burning.

IF YOU MUST OPEN THE DOOR WHILE THE FUEL IS FLAMING, OPEN THE AIR CONTROL FULLY FOR A FEW MINUTES, THEN UNLATCH AND OPEN THE DOOR SLOWLY.

4.3.2 Ash Removal

Ash should be removed from the firebox every two or three days of full time heating. Do not let the ash build up in the firebox because it will interfere with proper fire management.

The best time to remove ash is after an overnight fire when the fireplace is relatively cool, but there is still some chimney draft to draw the ash dust into the fireplace and prevent it from coming into the room.

After ashes have been removed from the fireplace and placed in a tightly covered metal container, they should be taken outside immediately. The closed container of ashes should be placed on a non-combustible floor or on the ground well away from all combustible materials pending final disposal. Ashes normally contain some live charcoal that can stay hot for several days. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled. Other waste should not be placed in this container.

NEVER STORE ASHES INDOORS OR IN A NON-METALIC CONTAINER OR ON A WOODEN DECK.

4.3.3 Raking Charcoal

Rekindle the fire when you notice that the room temperature has fallen. You will find most of the remaining charcoal at the back of the firebox, furthest from the door. Rake these coals towards the door before loading. There are two reasons for this raking of the coals. First, it concentrates them near where most of the combustion air enters the firebox and where they can ignite the new load quickly, and second, the charcoal will not be smothered by the new load of wood. If you were to simply spread the charcoal out, the new load will smoulder for a long time before igniting.

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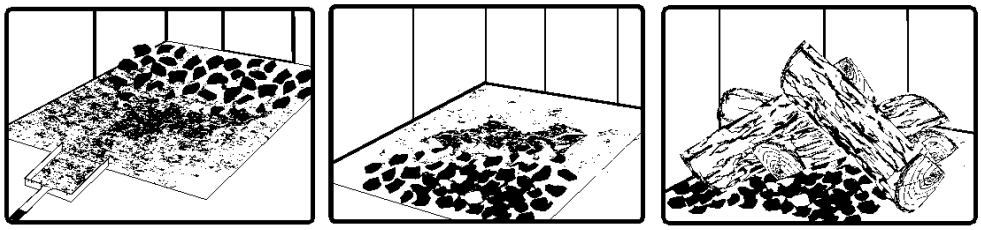

Remove ash first, and then rake charcoal towards the front of the firebox before loading so that it will ignite the new load.

4.3.4 Firing Each New Load Hot

Place the new load of wood on and behind the charcoal, and not too close to the glass. Close the door and open the air control fully. Leave the air control fully open until the firebox is full of flames, the wood has charred to black and its edges are glowing red. Firing each load of wood hot accomplishes a few things:

- drives the surface moisture from the wood,
- creates a layer of char on the wood, which slows down its release of smoke,
- heats the firebox components so they reflect heat back to the fire, and
- heats the chimney so it can produce strong, steady draft for the rest of the cycle.

DO NOT LEAVE THE FIREPLACE UNATTENDED WHILE A NEW LOAD IS BEING FIRED HOT.

DO NOT OVERFIRE.

When you burn a new load of wood hot to heat up the wood, the fireplace and the chimney, the result will be a surge of heat from the fireplace. This heat surge is welcome when the room temperature is a little lower than desirable, but not welcome if the space is already warm. Therefore, allow each load of wood to burn down so that the space begins to cool off a little before loading. Letting the space cool before loading is one of the secrets to clean burning and effective zone heating.

4.3.5 Turning Down the Air Supply

Once the firewood, firebox and chimney are hot, you can begin to reduce the air supply for a steady burn.

As you reduce the air supply to the fire, two important things happen. First, the firing rate slows down to spread the heat energy in the fuel over a longer period of time. Second, the flow rate of exhaust through the fireplace and flue pipe slows down, which gives more time for the transfer of heat from the exhaust. You will notice that as you reduce the air setting, the flames slow down. This is your indication that the fireplace is burning at its peak efficiency.

This fireplace comes with an automatic air supply control that will prevent the air supply to be closed too early. You can gradually slow the burn rate by closing the air supply even before the automatic system is engaged. The system is electronic and will close a second air intake when the temperature of the fireplace is warm enough.

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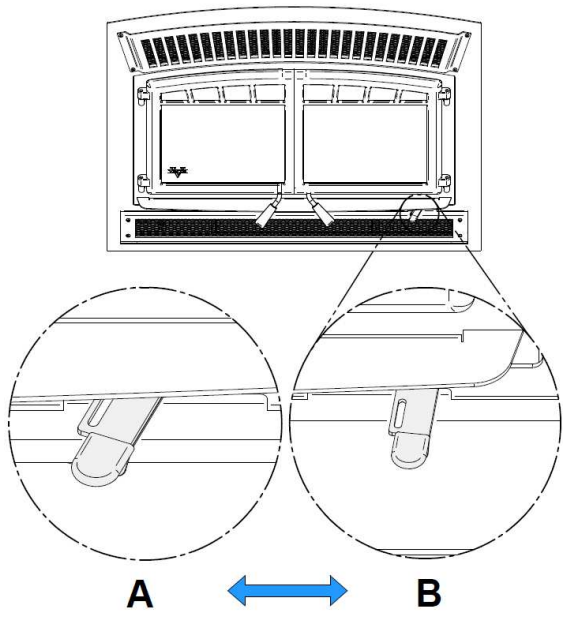


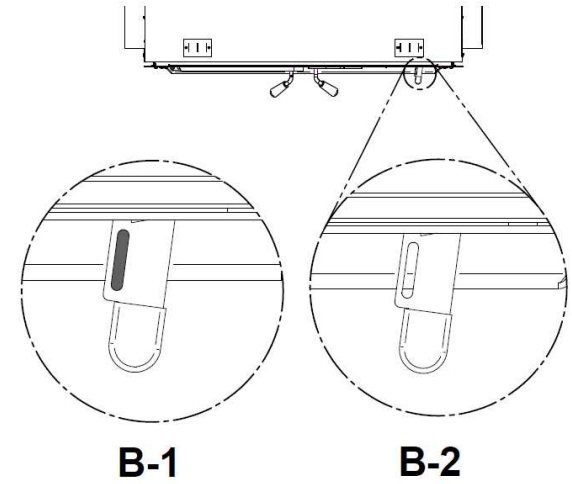
Position A: In this position, the air supply is fully open. You should be using this position for :

- Ignition
- After reloading for a main load for 15 to 30 minutes
- For a high fire

Position B: In this position the automatic system can be between 2 states :

- Medium-high: If the fireplace is not hot enough, the air supply will be waiting to warm before going to a medium or a low setting.
- Medium or low: If the fireplace is warm enough, the air supply will decrease and the burn rate will be slower.

DON'T TRY TO USE THE AIR CONTROL BETWEEN **A** AND **B**.



Position B1: This I the result of being on the B position (right side) and having the auxiliary lever **PULLED**. THIS IS THE LOWEST COMBUSTION SETTING.

Position B2: This I the result of being on the B position (right side) and having the auxiliary lever **PUSHED**. THIS IS THE MEDIUM COMBUSTION SETTING.

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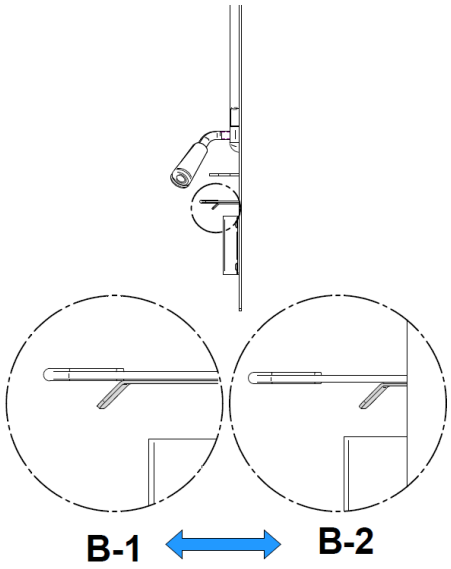	You can vary the burn rate anywhere between B1 and B2.

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4.3.6 Building Different Fires for Different Needs

Using the air control is not the only way to match the fireplace's heat output to the heat demand. Your house will need far less heat in October than in January to be kept at a comfortable temperature. If you fill the firebox full in fall weather, you will either overheat the space or turn the fireplace down so much that the fire will be smoky and inefficient.

4.3.6.1 Maximum Burn Cycle Times

The burn cycle time is the period between loading wood on a coal bed and the consumption of that wood back to a coal bed of the same size. The flaming phase of the fire lasts for roughly the first half of the burn cycle and the second half is the coal bed phase during which there is little or no flame. The length of burn you can expect from your fireplace, including both the flaming and coal bed phases, will be affected by a number of things, such as:

- firebox size,
- the amount of wood loaded,
- the species of wood you burn,
- the wood moisture content,
- the size of the space to be heated,
- the climate zone you live in, and
- the time of year.

The table below provides a very general indication of the maximum burn cycle times you are likely to experience, based on firebox volume.

FIREBOX VOLUME	MAXIMUM BURN TIME
<1.5 cubic feet	3 to 5 hours
1.5 c.f. to 2.0 c.f	5 to 6 hours
2.0 c.f. to 2.5 c.f.	6 to 8 hours
2.5 c.f. to 3.0 c.f.	8 to 9 hours
>3.0 c.f.	9 to 10 hours

Long burn times are not necessarily an indication of efficient fireplace operation. When you are home during the day and able to tend the fire, it is preferable to build a smaller fire that might provide three or four hours of heating than to fully load the firebox for a much longer burn. Shorter burn cycles make it easier to match the heat output of the fireplace to the heat demand of the space.

4.3.6.2 How to place the logs

In fireboxes that are roughly square, wood can be loaded so that looking through the glass door you see the ends of the logs (north-south) or the sides of the logs (east-west). This fireplace is designed to burn efficiently in the **north-south** orientation.

5 MAINTAINING YOUR WOOD HEATING SYSTEM

5.1 Fireplace Maintenance

Your new fireplace will give many years of reliable service if you use and maintain it correctly. Some of the internal components of the firebox, such as firebricks, baffles and air tubes, will wear over time under intense heat. You should always replace defective parts with original parts. Firing each load hot to begin a cycle as described above will not cause premature deterioration of the fireplace. However, letting the fireplace run with the air control fully open for the entire burn cycles can cause damage over time. The

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hotter you run the fireplace throughout burn cycles, the more quickly its components will deteriorate. For that reason, **never leave the fireplace unattended while a new load is being fired hot**.

5.1.1 Plated Finish Maintenance

If your appliance has a plated finish, use a metal polish and a soft cloth to clean it. Do not use abrasives such as steel wool, steel pads or an abrasive cleaner for they may scratch the finish.

5.1.2 Glass Door Cleaning

Under normal conditions, your door glass should stay relatively clear. If your firewood is dry enough and you follow the operating instructions in this manual, a whitish, dusty deposit will form on the inside of the glass after a week or so of use. This is normal and can be easily removed when the fireplace is cool by wiping with a damp cloth or paper towel and then drying. **Never try to clean the glass when the fireplace is hot.**

In spring and fall when the fireplace is run at lower temperatures, you may see some light brown stains forming, especially at the lower corners of the glass. This indicates that the fire has been smoky and some of the smoke has condensed on the glass. When the weather is mild, you may find that letting the fire go out is better than trying to maintain a continuous fire. Use the technique described above for building a fire to take the chill off the house.

If you do get brown stains on the glass you can remove them with special cleaners for wood heater glass doors. **Do not use abrasives to clean your fireplace's door glass.**

The deposits that form on the glass are the best indication of the quality of your fuel and how well you are doing in operating the fireplace. Your goal should be clear glass with no brown stains. If you continue to see brown stains on the glass, something about your fuel and operating procedure needs to be changed. Stains on the glass indicate incomplete combustion of the wood, which also means more smoke emissions and faster formation of creosote in the chimney.

If you see brown streaks coming from the edge of the glass, it is time to replace the gasket around the glass. Visit your fireplace retailer to get the self-adhesive glass gasket and follow the instructions below for installation.

Do not abuse the glass door by striking or slamming shut. Do not use the fireplace if the glass is broken.

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5.1.3 Cleaning and Painting the Fireplace

Do not attempt to clean or paint the fireplace when the unit is hot. Painted surfaces can be wiped down with a damp cloth. Plated surfaces may be scratched by abrasive cleaners. To maintain the finish at its original brilliance, use only a damp soft cloth to clean plated surfaces.

If the paint becomes scratched or damaged, you can give your wood fireplace a brand new look by repainting it with heat-resistant paint. Before painting, roughen the surface with fine sand paper, wipe it down to remove dust, and apply two thin coats of paint. For best results, use the same paint that was originally used on the fireplace, which is available in spray cans. See your dealer for details.

5.2 Chimney and Chimney Liner Maintenance

5.2.1 Why Chimney Cleaning is Necessary

Wood smoke can condense inside the chimney liner and chimney, forming a combustible deposit called creosote. If creosote is allowed to build up in the venting system it can ignite when a hot fire is burned in the fireplace and a very hot fire can progress to the top of the chimney. Severe chimney fires can damage even the best chimneys. Smouldering, smoky fires can quickly cause a thick layer of creosote to form. When you avoid smouldering so the exhaust from the chimney is mostly clear, creosote builds up more slowly. Your new fireplace has the right characteristics to help you to burn clean fires with little or no smoke, resulting in less creosote in the chimney.

5.2.2 How Often Should You Clean the Chimney?

It is not possible to predict how much or how quickly creosote will form in your chimney. It is important, therefore, to check the build-up in your chimney monthly when getting used to the new fireplace until you determine the rate of creosote formation. Even if creosote forms slowly in your system, the chimney should be cleaned and inspected at least once each year. Do not allow more than 1/8″ (3 mm) creosote buildup in the chimney.

It is recommended to clean thoroughly the chimney system at the end of every heating season. During summer, the air is damper and with minimal air circulation within the stove or furnace, it can mix with creosote and/or sooth deposits in the chimney system to form an acid that could accelerate the corrosion process and induce premature decay of the steel. Corrosion damages are not covered under warranty. Have your chimney system cleaned by a professional chimney sweep. Use a plastic or steel brush.

Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

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5.2.3 Cleaning the Chimney

Chimney cleaning can be a difficult and dangerous job. If you don't have experience cleaning chimneys, you might want to hire a professional chimney sweep to clean and inspect the system for the first time. After having seen the cleaning process, you can decide if it is a job you would like to take on.

The most common equipment used are fibreglass rods with threaded fittings and stiff plastic brushes. The brush is forced up and down inside the chimney flue to scrub off the creosote.

The chimney should be checked regularly for creosote build-up. Inspection and cleaning of the chimney can be facilitated by removing the baffle.

Do not expect chemical cleaners to keep your chimney clean.

The rain cap can be removed for inspection and/or cleaning of the chimney.

The chimney should be swept following these steps:

1) Remove the fire baffle and air tubes.
2) Remove the rain cap.
3) Sweep the chimney.
4) Clean the inside of the firebox.
5) Re-install the baffle, the air tubes and the rain cap.

CAUTION: OPERATION OF YOUR HE350 WITHOUT THE BAFFLE MAY CAUSE UNSAFE AND HAZARDOUS TEMPERATURE CONDITIONS AND WILL VOID THE WARRANTY.

5.2.4 Fire Baffle Removal Prior to Cleaning the Chimney

Before starting to clean your chimney, we recommend that you remove the fire baffle to avoid creosote dust collection on top of the baffle. Follow the steps below to remove the fire baffle:

1. Remove the front air tube by pulling out the cutter pin on the side of the tube. They are located at the top, underneath the baffle.
2. Lift the baffle assembly and slide it out of the fireplace. You now have access to the chimney.

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5.2.5 Chimney Fire

Regular chimney maintenance and inspection can prevent chimney fires. If you have a chimney fire, follow these steps:

1. Close the fireplace door and the air intake controls;
2. Alert your family of the possible danger;
3. If you require assistance, alert your fire department;
4. If possible, use a dry chemical fire extinguisher, baking soda or sand to control the fire. Do not use water as it may cause a dangerous steam explosion;
5. Check outside to ensure that sparks and hot embers coming out of the chimney are not igniting the roof;
6. Do not use the fireplace again until your chimney and fireplace have been inspected by a qualified chimney sweep or a Fire Department Inspector;

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PART B – INSTALLATION

Install the fireplace only as described in these instructions and using only components from the chimney manufacturers listed in table 2.

Parts Required

- HE350 Fireplace
- Insulated chimney made by the manufacturers listed in table 2, with the corresponding specifications :
  - Chimney lengths
  - Elbows (where necessary)
  - Associated components as per these installation instructions.

Additional Equipment (optional)

- Forced Air Distribution Kit

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6 THE VENTING SYSTEM

6.1 General

The venting system, acts as the engine that drives your wood heating system. Even the best fireplace will not function safely and efficiently as intended if it is not connected to a suitable chimney.

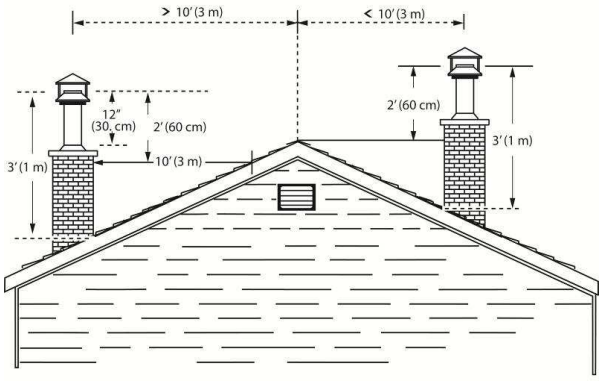
The heat in the flue gases that pass from the fireplace into the chimney is not waste heat. This heat is what the chimney uses to make the draft that draws in combustion air, keeps smoke inside the fireplace and safely vents exhaust to outside. You can think of heat in the flue gas as the fuel the chimney uses to make draft.

6.2 Suitable Chimneys

Your wood fireplace will provide optimum efficiency and performance when connected to a 8-inch diameter chimney.

6.3 Minimum Chimney Height

The top of the chimney should be tall enough to be above the air turbulence caused when wind blows against the house and its roof. The chimney must extend at least 1 m (3 ft.) above the highest point of contact with the roof, and at least 60 cm (2 ft.) higher than any roof line or obstacle within a horizontal distance of 3 m (10 ft.).



6.4 The Relationship Between the Chimney and the House

Because the venting system is the engine that drives the wood heating system, it must have the right characteristics. The signs of bad system design are cold backdrafting when there is no fire in the fireplace, slow kindling of new fires, and smoke roll-out when the door is opened for loading.

6.4.1 Why the chimney should penetrate the highest heated space

When it is cold outside, the warm air in the house is buoyant so it tends to rise. This tendency of warm air to rise creates a slight pressure difference in the house. Called 'stack effect', it produces a slightly negative pressure low in the house (relative to outside) and a slightly positive pressure zone high in the house. If there is no fire burning in a heater connected to a chimney that is shorter than the warm space inside the house, the slight negative pressure low in the house will compete against the desired upward flow in the chimney.

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There are two reasons why the chimney in the house at right will cold backdraft when it is cold outside and there is no fire burning in the fireplace. First, the chimney runs up the outside of the house, so the air in it is colder and denser than the warm air in the house. And second, the chimney is shorter than the heated space of the house, meaning the negative pressure low in the house will pull outside air down the chimney, through the fireplace and into the room. Even the finest fireplace will not work well when connected to this chimney.

6.5 Chimney Installation Notes

1. If possible, install an interior chimney as it will provide better performance. In areas with continuous temperatures below –18° C (0° F), the use of an exterior chimney increases the likelihood of operating problems such as low draft, high rate of creosoting, and poor start-up characteristics. Exterior chimneys are also prone to down-drafting and flow reversal. Installations, which are located on lower floors in the house, such as in a basement, in combination with outside chimney, are especially prone to flow reversal.
2. The HE350 is listed only with chimney systems described in table 1.
3. A chimney venting a fireplace shall not vent any other appliance.
4. The minimum chimney system height for a straight installation is 15 ft. (4,6 m).
5. All chimney installations must include at least one support. Reducing the amount of chimney weight on the fireplace will help avoid the noise created when the fireplace expands. This can be achieved by having the chimney supported by the supports. The maximum chimney length that should be supported by the fireplace is 9 ft. (2.75 m) for 2" Solid Pack Chimney and 12 ft. (3.7 m) for 1" Solid Pack Chimney.
6. The chimney must extend at least 3 ft. (92 cm) above its point of contact with the roof and at least 2 ft. (61 cm) higher than any wall, roof or building within 10 ft. (3.1 m) of it. See the figures on point 11 bellow to determine the configuration that applies to your roof (flat or sloped roof and the distance between the chimney and the highest point of the roof and/or the nearest chimney).
7. Deviations should be avoided whenever possible, especially the most pronounced. Each deviation adds some restriction to the chimney system and may lead to draft problems.
8. If the chimney extends higher than 5 ft. (1.5 m) above its point of contact with the roof, it must be secured using a roof brace.
9. A rain cap must be installed on top of the chimney. Failure to install a rain cap may cause corrosion problems.
10. Cut and frame square holes in all floors, ceilings, and roof that the chimney will go through to provide a 2" (50 mm) minimum clearance between the chimney and any combustible materials. Do not fill this 2″ space with insulation or any other combustible material.
11. Portions of the chimney which may extend through accessible spaces must be enclosed to avoid contact with combustible materials or damage the chimney.

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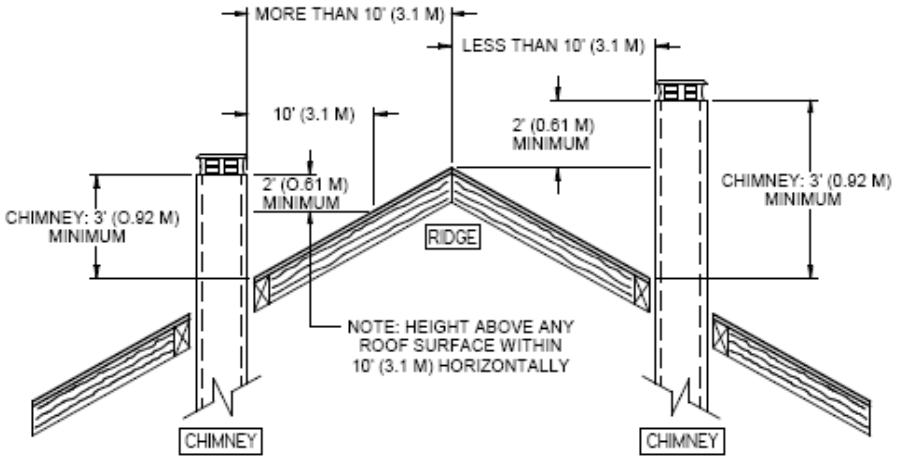

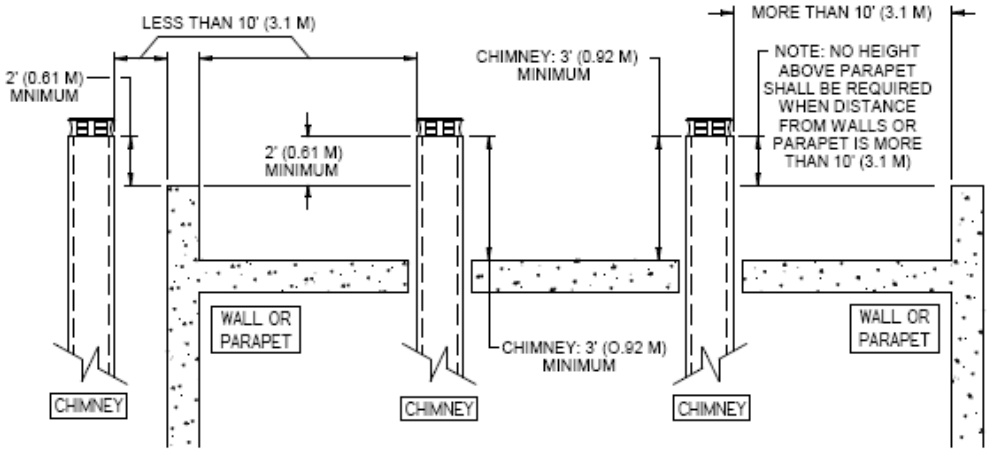

12. For installations where more than one chimney is located in the same non-chase or within the same area, we suggest that their terminations be separated by at least 16" (410 mm) horizontally, and 18" (460 mm) vertically. This separation is to prevent smoke migrating from one chimney to another.

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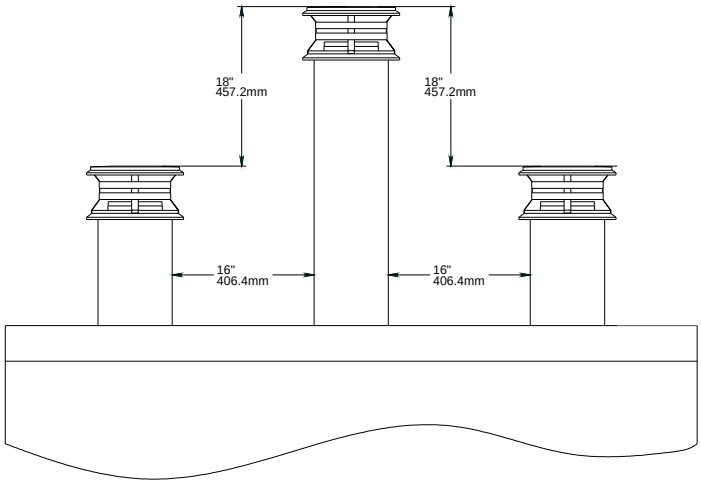

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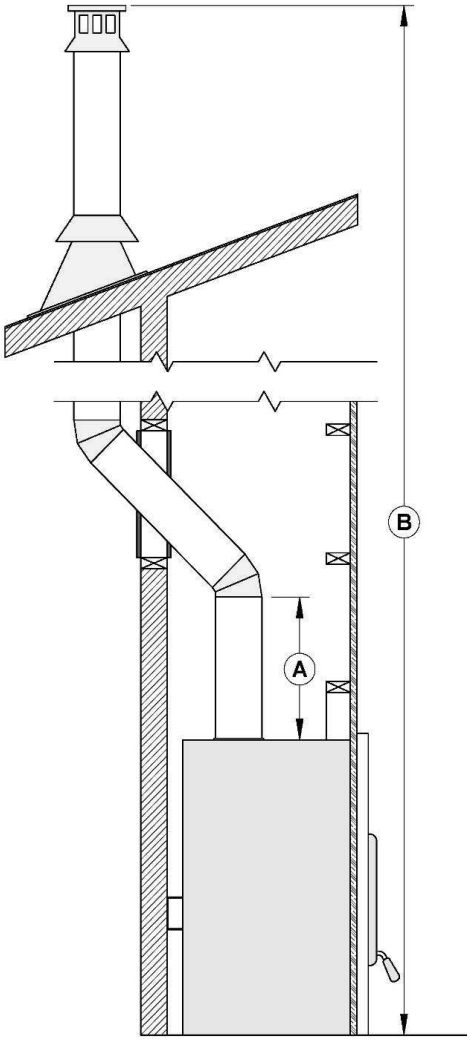
6.6 Chimney Installation Instructions

Always refer to the chimney manufacturer's Installation manual to ensure a safe installation. Some non-illustrated parts may be required.

6.6.1 Examples of Typical Chimney Installation



A	To insure a good draft, it is recommended to have a length of 18 inches from the top of the unit to the first offset. However, starting using a 30° or 45° elbow is also approved.
B	Mandatory measure of 15 ft. from the bottom of the fireplace to the top of the outside chimney.

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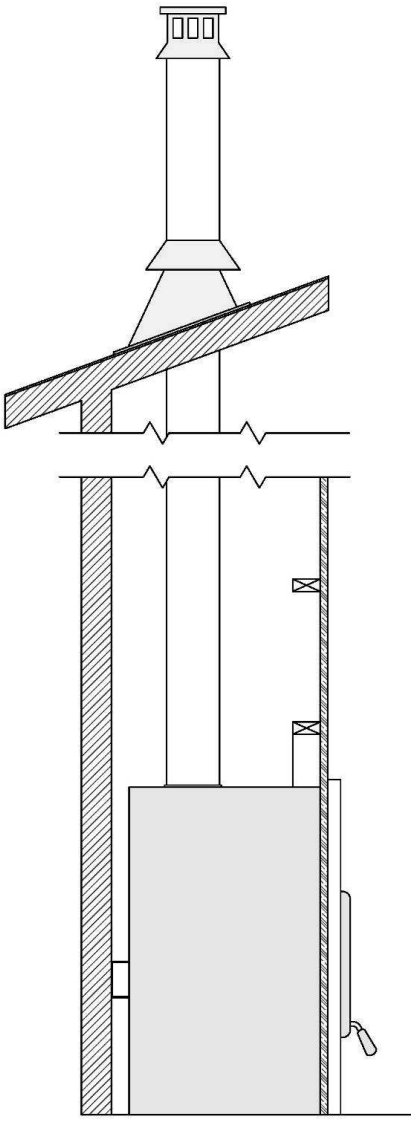
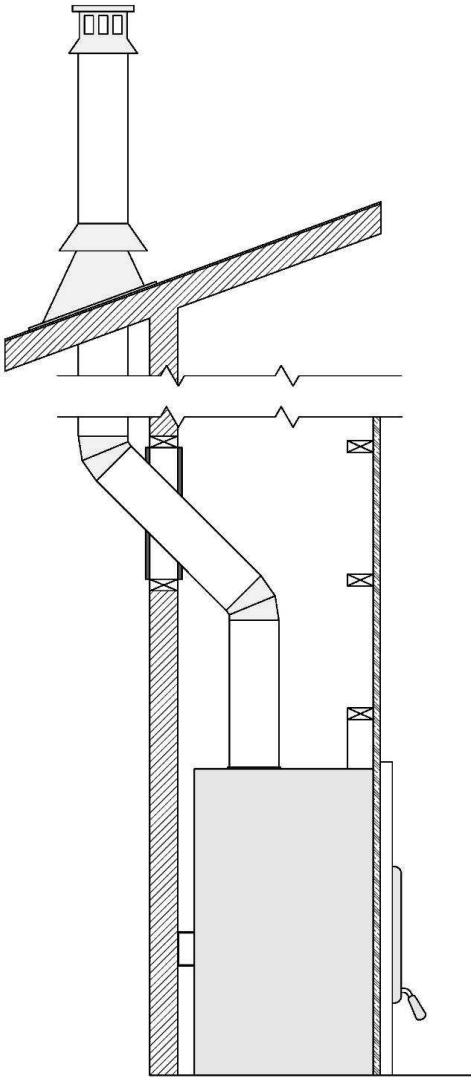


Direct installation



Exterior offset installation

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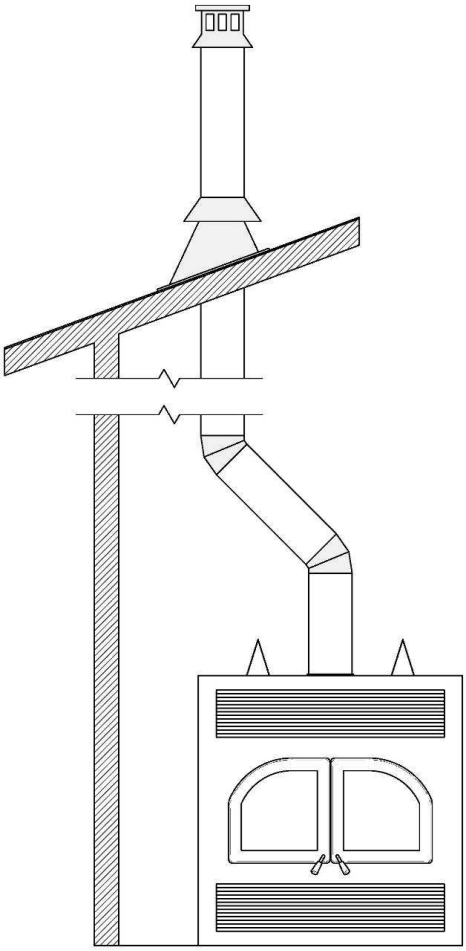
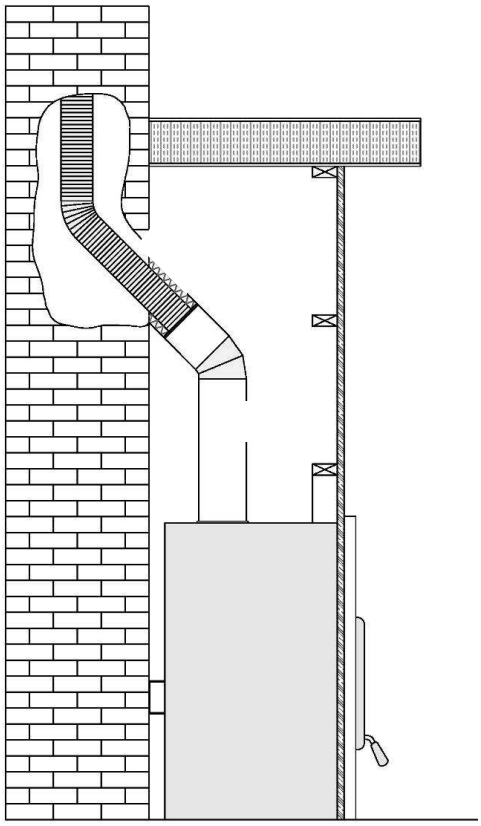


Interior offset installation



Connection to a masonry chimney

1. Cut and frame the holes in the ceiling, floor and roof where the chimney will pass. Use a plumb bob to line up the center of the holes. Make sure that the size of the floor and ceiling holes are in accordance with the chimney manufacturer's instructions.
2. From below, install a firestop (B) supplied by the chimney manufacturer in each ceiling/floor separation through which the chimney will pass. At the attic level, install a radiation shield from above (C).
3. Follow the chimney's manufacturers' instructions and place the first chimney length on the fireplace. For all chimneys, you must use an anchor plate (A) supplied by the chimney manufacturer before installing the first chimney length. Continue installing chimney lengths making sure to lock each length in place.
4. Every time the chimney passes through a ceiling or a wall, install the appropriate firestop. When you reach the desired height, install the roof support (not illustrated). (Refer to instructions included with the support).

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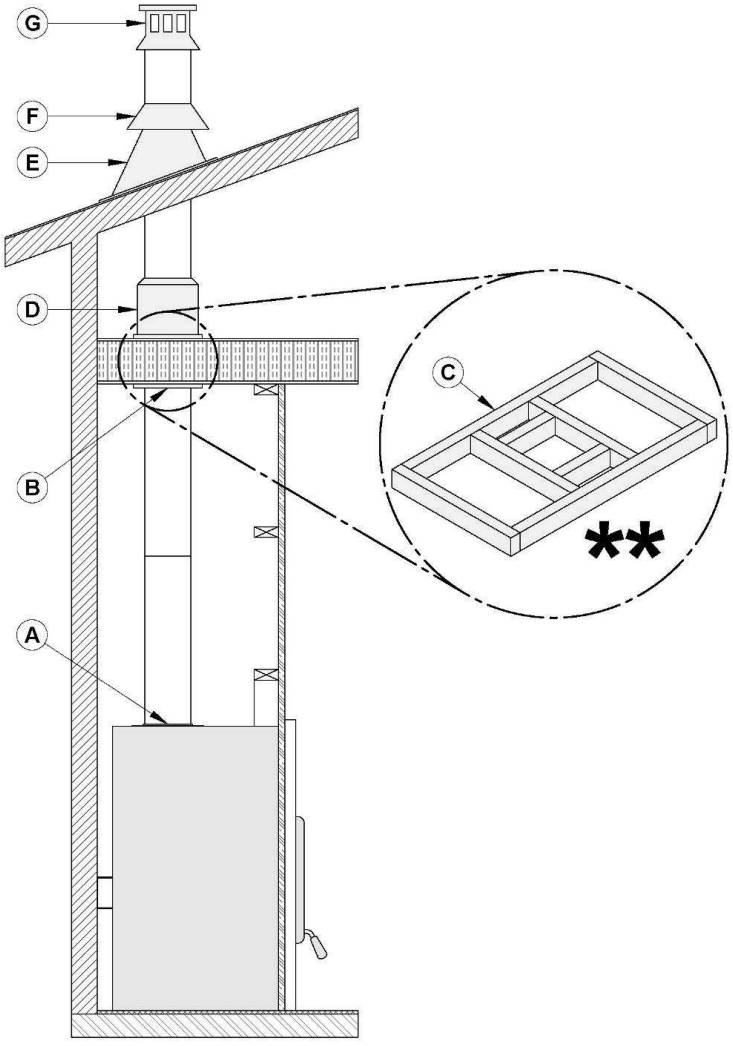
5. Then, put the roof flashing (D) in place and seal the joint between the roof and the flashing with roofing pitch. For sloping roofs, place the flashing under the upper shingles and on top of the lower shingles. Nail the flashing to the roof, using roofing nails.
6. Place the storm collar (E) over the flashing, and tighten it with the bolt supplied. Finally, seal the joint between the storm collar and the chimney, using silicone caulking.
7. Install the chimney cap (G).
8. When a ventilated roof flashing is installed, precautions are to be taken not to caulk or seal the ventilating openings.



** **THE STRUCTURAL INTEGRITY OF THE FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED**

NOTE: THE FLOOR AND WALLS BELOW THE ATTIC MUST BE INSULATED USING THE SAME INSULATION.

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6.6.2 Offset Chimney Installation

TABLE 1 - THE MINIMUM SYSTEM HEIGHT WHEN USING ELBOWS IS:

Fireplace model	HE350
Chimney model	All models
Vertical installation	15 ft. (4.6 m)
Two (2) elbows	15 ft. (4.6 m)
Four (4) elbows	17 ft. (5.2 m)

After reaching the location requiring the elbow, proceed as follows:

1. Install the first elbow; turn it in the required direction. Secure it to the chimney according to the chimney manufacturer's instructions. In many cases, it is recommended to secure connections with three (3) ½" (12 mm) metal screws.
2. Install the necessary chimney lengths to achieve the required offset. Lock the chimney lengths together according to the chimney manufacturer's instructions. In many cases, it is recommended to use three (3) ½" (12 mm) screws. If the offset length is made of two (2) chimney lengths or more, many chimney manufacturers may require that you use an offset or roof support halfway up the offset. If penetrating a wall, install a wall radiation shield supplied by the chimney manufacturer.
3. Use another elbow to turn the chimney vertically. Secure the elbow.
4. Use a plumb bob to line up the centre of the hole. Cut a hole for the chimney in the ceiling/floor. Frame this hole as described previously.
5. From below, install a firestop supplied by the chimney manufacturer (see preceding figure).
6. A support must be used on the first 15' section (4.6 m).
7. Continue with the regular installation.

TABLE 2 - LISTED CHIMNEYS FOR YOUR HE350

CHIMNEY MANUFACTURER	BRAND	TYPE	INNER DIAMETER
Olympia Chimney	Ventis	1" Solid Pack	8" (20 cm)

WARNING: IN EVERY CASE, THE CHIMNEY MUST START WITH A 8'' DIAMETER ANCHOR PLATE SECURED TO THE FIREPLACE.

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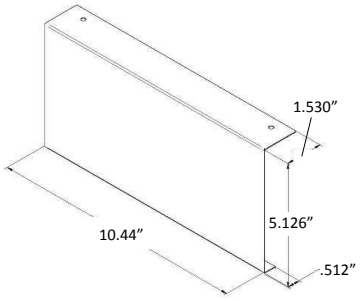
TABLE 3 – LIST OF MANDATORY COMPONENTS

CHIMNEY MANUFACTURER	MANDATORY COMPONENTS	TYPE/BRAND
Olympia Chimney	• Ventilated roof flashing. • Rafter protector at the roof level is chimney is enclosed at the attic level.	1" Solid Pack

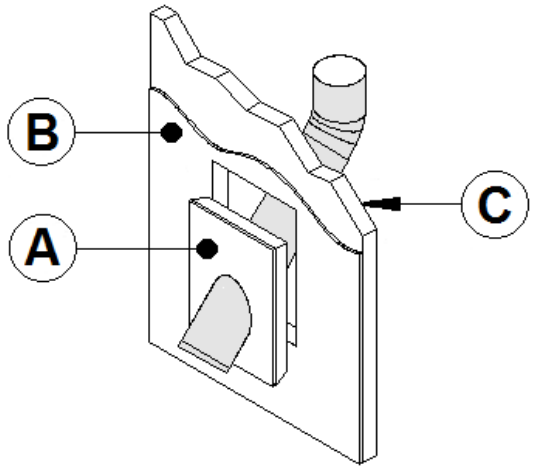
*You can get a kit of four (4) rafter protector (AC03510) from your dealer. Each rafter is made of 22GA galvanized steel (10.44”W x 5.126”H).



6.7 Angled Wall Radiation Shield

When passing through a combustible wall with the chimney at a 30° or 45° angle (30° or 45° in Canada and 30° only in the USA), an angled firestop or wall radiation shield provided by the chimney manufacturer must be installed. Only one is required. Follow the chimney manufacturer’s installation instructions.

In cold climate locations, it is recommended that you use the insulated wall radiation shield since it will maintain the home’s thermal barrier.



A	INSULATED WALL RADIATION SHIELD
B	GYPROCK
C	INSULATED WALL

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6.8 Chimney Support Installation

6.8.1 Universal Roof Support

This support has three possible uses:

1. It must be used on a roof to support the chimney.
2. It may be used on a floor, ceiling or roof above an offset to support the chimney above the offset.
3. It may be used on a floor, ceiling or roof as a supplementary support.

For roof support installation, refer to the instructions provided with the support by the chimney manufacturer. Many manufacturers will provide the maximum height of chimney that can be supported by the support. Make sure you respect those parameters.

6.8.2 Universal Offset Support

This support is used to support the chimney above an offset. When the chimney offset is used to pass through a wall, this support may be used on the wall to support the chimney. For offset support installation, refer to the instructions provided with the support by the chimney manufacturer. Many manufacturers will provide the maximum height of chimney that can be supported by the support. Make sure you respect those parameters.

6.9 Supply of Combustion Air

In Canada, wood fireplaces are not required to have a supply of combustion air from outdoors because research has shown that these supplies do not give protection against house depressurization and may fail to supply combustion air during windy weather. However, to protect against the risk of smoke spillage due to house depressurization, **a carbon monoxide (CO) detector/alarm is required** in the room in which the fireplace is installed. The CO detector will provide warning if for any reason the wood fireplace fails to function correctly.

6.9.1 Air Supply in Conventional Houses

The safest and most reliable supply of combustion air for your wood fireplace is from the room in which it is installed. Room air is already preheated so it will not chill the fire, and its availability is not affected by wind pressures on the house. Contrary to commonly expressed concerns, almost all tightly-sealed new houses have enough natural leakage to provide the small amount of air needed by the fireplace. The only case in which the wood fireplace may not have adequate access to combustion air is if the operation of a powerful exhaust device (such as a kitchen range exhaust) causes the pressure in the house to become negative relative to outdoors.

If you do install an air supply through the wall of the house, be aware that its pressure can be affected during windy weather. If you notice changes in wood fireplace performance in windy weather, and in particular if smoke puffs from the fireplace, you should disconnect the outdoor air duct from the fireplace and remove the duct. In some windy conditions, negative pressure at the duct weatherhood outside the house wall may draw hot exhaust gases from the fireplace backwards through the duct to outdoors. Check the outdoor air duct for soot deposits when the full system is cleaned and inspected at least once each year.

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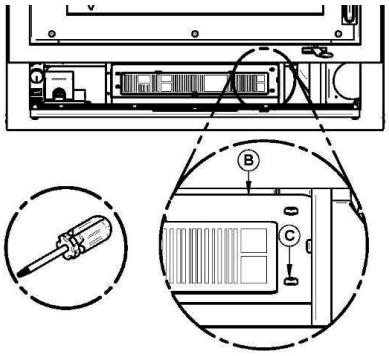
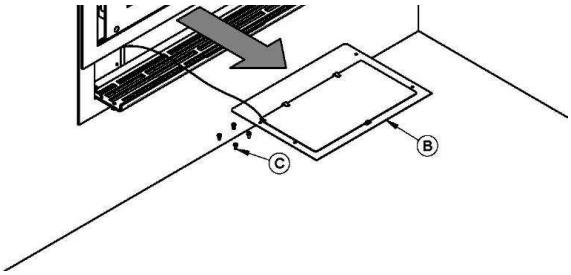
APPENDIX 1: BLOWER MAINTENANCE OR REPLACEMENT

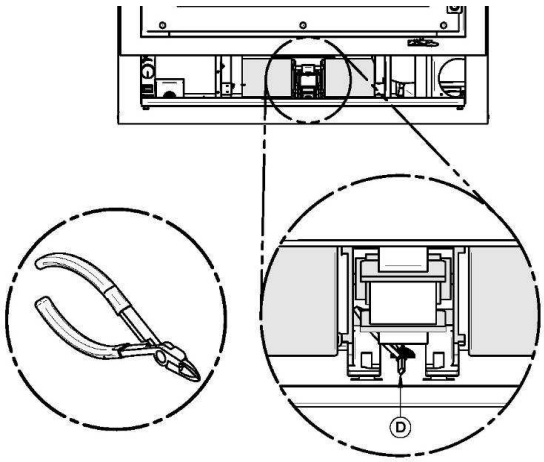
1. Open the bottom louver (A).



2. With a short square head screwdriver, remove the 4 screws (C) holding in place the heat shield (B).



3. Remove and keep the heat shield (B) and the 4 screws (C).



4. Cut the Tie wrap (D)

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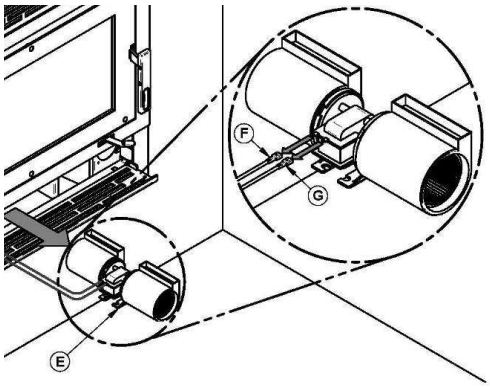

5. Unplug the blower's electric wires (F) and (G).
6. Lift the blower (E) located under the firebox towards the back.
7. Turn 90° to pull out.

Repeat the steps in reverse order to reinstall the fan.

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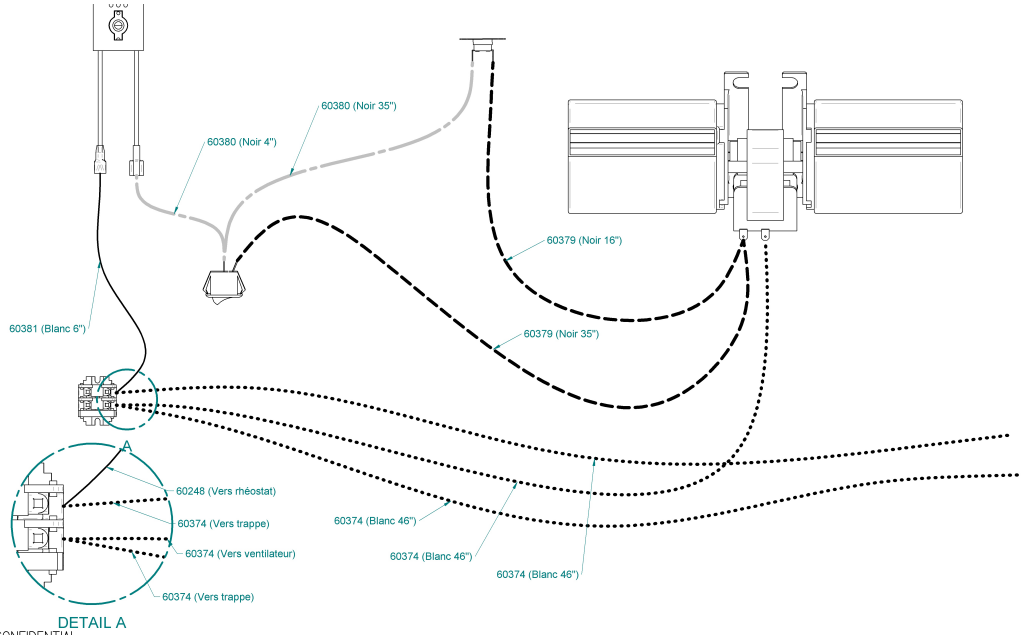
Blower connection

Have the wiring installed by a qualified electrician. Connect the wires from the power outlet to the terminal block, making sure that the white wire matches the white wire on the terminal. Connect the black wire with the black wire of the terminal block. The ground (green or skinned wire) must be attached to the fireplace metal frame.



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VENTIS LIMITED LIFETIME WARRANTY

The warranty of the manufacturer extends only to the original consumer purchaser and is not transferable. This warranty covers brand new products only, which have not been altered, modified nor repaired since shipment from factory. Products covered under this warranty must have been manufactured after the revision date indicated below. Proof of purchase (dated bill of sale), model name and serial number must be supplied when making any warranty claim to your VENTIS dealer.

This warranty applies to normal residential use only. Damages caused by misuse, abuse, improper installation, lack of maintenance, over firing, negligence or accident during transportation, power failures, downdrafts, or venting problems are not covered by this warranty.

This warranty does not cover any scratch, corrosion, distortion, or discoloration. Any defect or damage caused by the use of unauthorized parts or others than original parts void this warranty. An authorized qualified technician must perform the installation in accordance with the instructions supplied with this product and all local and national building codes. Any service call related to an improper installation is not covered by this warranty.

The manufacturer may require that defective products be returned or that digital pictures be provided to support the claim. Returned products are to be shipped prepaid to the manufacturer for investigation. If a product is found to be defective, the manufacturer will repair or replace such defect. Transportation fees to ship the product back to the purchaser will be paid by the manufacturer. Repair work covered by the warranty, executed at the purchaser's domicile by an authorized qualified technician requires the prior approval of the manufacturer. Labour cost and repair work to the account of the manufacturer are based on predetermined rate schedule and must not exceed the wholesale price of the replacement part. All parts and labour costs covered by this warranty are limited according to the table below.

The manufacturer at its discretion may decide to repair or replace any part or unit after inspection and investigation of the defect. The manufacturer may, at its discretion, fully discharge all obligations with respect to this warranty by refunding the wholesale price of any warranted but defective parts. The manufacturer shall in no event be responsible for any special, indirect, consequential damages of any nature, which are in excess of the original purchase price of the product. A one-time replacement limit applies to all parts benefiting from a lifetime coverage. This warranty applies to products purchased after October 1st, 2011.

DESCRIPTION	WARRANTY APPLICATION	
	PARTS	LABOUR
Combustion chamber (welds only), castings, convector air-mate, ceramic glass (thermal breakage only*), and secondary air tubes*.	Lifetime	4 years
Plating* (defective manufacture) – subject to limitations above.	Lifetime	n/a
Stainless steel firebox components, surrounds and heat shields, ash drawer, steel legs, pedestal, trims (aluminum extrusions), C-Cast baffle*, and vermiculite baffle*.	5 years	3 years
Carbon steel firebox components, glass retainers, and handle assembly.	3 years	2 years
Blowers, heat sensors, switches, rheostat, wiring, and other controls.	2 years	1 year
Paint (peeling), gaskets, insulation, firebrick, and ceramic fibre blankets.	1 year	n/a

**Pictures required*

Shall your unit or a components be defective, contact immediately your **VENTIS** dealer. Prior to your call make sure you have the following information necessary to your warranty claim treatment:

- Your name, address and telephone number;
- Bill of sale and dealer's name;
- Serial number and model name as indicated on the nameplate fixed to the back of your unit;
- Nature of the defect and any relevant information.

Before shipping your unit or defective component to our plant, you must obtain from your VENTIS dealer an Authorization Number. Any merchandise shipped to our plant without authorization will be refused automatically and returned to sender.

600- App-E Dry Gas Meter CAlibration Data

Appendix E

Dry Gas meter Calibration Data

600- App-E Dry Gas Meter CAlibration Data (page 2 of 4)

Intertek

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Dry Gas Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

Date	2016-03-30	Acceptable Deviation (5%)	Deviation
y Factor	1.003	0.05015	0.012
Acceptance			

Average Gas Meter y Factor
1.015

Calibration Date:	06-14-16
Calibrated by:	Vincent Pelletier
Calibration Frequency:	Post Test
Next Calibration Due:	08-04-16
Instrument Range:	1.000 cfm
Standard Temp.:	73 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.8 "Hg
Signature/Date:	Vincent Pelletier 2016-06-14

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.025
Acceptance	Acceptable

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

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	728.265	732.238	736.434
Final Reference Meter	732.238	736.434	739.292
Initial DGM	1249.067	1253	1257.17
Final DGM	1253	1257.17	1259.905
Temp. Ref. Meter (°F), Tr	78.7	79.2	79.3
Temperature DGM (°F), Td	79.5	79.6	80.1
Time (Minutes)	43.0	75.0	30.0
Net Volume Ref. Meter, Vr	3.973	4.196	2.858
Net Volume DGM, Vd	3.933	4.17	2.735
Gas Meter y Factor =	**1.005**	**1.000**	**1.039**
Gas Meter y Factor Deviation (from avg.)	0.010	0.015	0.025
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.091465116

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-046_06-2016 - PT

600- App-E Dry Gas Meter CAlibration Data (page 3 of 4)

Intertek Page 1 of 1

Dry Gas Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

Date	2016-03-30	Acceptable Deviation (5%)	Deviation
y Factor	1.006	0.0503	0.007
Acceptance			

Average Gas Meter y Factor
0.999

Calibration Date:	06-14-16
Calibrated by:	Vincent Pelletier
Calibration Frequency:	Post Test
Next Calibration Due:	08-04-16
Instrument Range:	1.000 cfm
Standard Temp.:	73 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.8 "Hg
Signature/Date:	Vincent Pelletier 2016-06-14

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. 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 ("H2O)	0.00	0.00	0.00
Initial Reference Meter	719.913	722.591	725.504
Final Reference Meter	722.591	725.504	728.265
Initial DGM	1082.729	1085.396	1088.294
Final DGM	1085.396	1088.294	1091.036
Temp. Ref. Meter (°F), Tr	76.7	77.7	78.2
Temperature DGM (°F), Td	76.3	78.0	78.5
Time (Minutes)	30.0	34.0	30.0
Net Volume Ref. Meter, Vr	2.678	2.913	2.761
Net Volume DGM, Vd	2.667	2.898	2.742
Gas Meter y Factor =	**0.996**	**0.999**	**1.001**
Gas Meter y Factor Deviation (from avg.)	0.002	0.000	0.002
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.0889

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-047_06-2016 - PT

600- App-E Dry Gas Meter CAlibration Data (page 4 of 4)

Intertek

Dry Gas Metering System Calibration
Y factor for Method 5G sampling

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

Previous Calibration Comparision

Date	2016-06-02	Acceptable Deviation (5%)	Deviation
y Factor	0.983	0.04915	0.004
Acceptance	Acceptable		

Average Gas Meter y Factor
0.987

Calibration Date:	06-14-16
Calibrated by:	Vincent Pelletier
Calibration Frequency:	6-month
Next Calibration Due:	12-13-16
Instrument Range:	1.000 cfm
Standard Temp.:	68.1 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.8 "Hg
Signature/Date:	Vincent Pelletier 2016-06-14

Current Calibration

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

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

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	739.292	744.509	751.327
Final Reference Meter	744.509	751.327	757.625
Initial DGM	565.410	570.710	577.527
Final DGM	570.710	577.527	583.821
Temp. Ref. Meter (°F), Tr	81.2	81.3	80.8
Temperature DGM (°F), Td	80.7	80.4	79.7
Time (Minutes)	31.0	40.0	37.0
Net Volume Ref. Meter, Vr	5.217	6.818	6.298
Net Volume DGM, Vd	5.3	6.817	6.294
Gas Meter y Factor =	**0.977**	**0.992**	**0.992**
Gas Meter y Factor Deviation (from avg.)	0.010	0.005	0.005
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.170967742

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

SBI-276_06-2016 - PT

700- App-F Unit Pre-Burn Documentation

Appendix F

Unit Pre-Burn documentation

May 26th, 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	374.80	78.59	108.19	362.69	419.93	490.36	449.78	413.41	7.13
10	652.57	78.71	149.20	641.25	409.48	484.63	448.22	405.47	53.58
20	722.49	80.58	154.64	753.26	439.60	471.97	435.77	443.36	48.47
30	741.92	83.01	158.66	820.59	465.06	469.61	419.39	465.05	44.03
40	749.28	85.93	163.11	859.36	485.21	470.89	403.27	473.06	39.85
50	758.02	86.68	166.29	881.74	502.78	473.88	390.45	481.46	35.72
60	754.23	86.79	165.39	883.82	518.50	479.88	382.63	495.88	31.89
70	742.28	88.26	163.53	903.03	527.35	487.69	377.16	509.66	28.41
80	737.61	88.08	162.42	912.96	534.94	496.22	375.90	525.85	25.25
90	708.95	89.48	157.61	866.59	540.13	505.67	375.30	541.46	22.54
100	679.86	89.21	153.48	820.84	539.12	516.35	376.69	552.14	20.39
110	642.17	88.62	147.92	761.13	537.54	529.48	379.92	557.32	18.60
120	599.99	89.33	142.31	708.45	533.75	545.20	383.33	557.90	17.23
130	561.27	88.17	136.83	652.99	525.16	558.00	387.89	551.54	16.26
140	524.34	87.20	132.48	584.64	513.40	566.25	394.18	543.19	15.58
150	490.16	86.99	128.04	528.87	500.85	567.26	400.90	532.38	15.04
160	467.16	86.71	125.20	492.11	486.83	562.90	405.89	520.87	14.56
170	451.34	86.54	122.89	468.56	467.56	556.71	409.10	509.98	14.15
180	439.57	85.94	121.15	455.19	451.47	550.12	411.52	499.88	13.68
190	427.70	85.22	119.62	441.03	437.81	542.37	412.70	490.83	13.28
200	419.54	85.15	118.17	430.07	426.24	534.40	413.48	481.36	12.90
210	412.13	85.10	117.30	419.55	416.80	527.60	413.62	473.07	12.55
220	401.86	84.72	115.98	404.76	409.98	521.29	413.41	465.84	12.18
230	393.65	84.64	114.91	394.82	404.44	514.33	411.14	460.01	11.85
240	389.97	84.62	114.17	390.24	398.72	507.61	408.91	453.63	11.48
250	382.66	84.23	113.34	382.82	394.54	501.20	406.69	447.41	11.15
260	378.22	84.03	112.41	375.81	391.46	494.36	404.69	442.45	10.83
270	372.57	83.52	111.77	368.82	388.43	486.24	402.50	437.19	10.50
280	367.14	83.55	111.11	365.47	384.67	477.36	399.81	432.04	10.18

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
290	363.35	83.65	110.65	362.82	381.12	470.43	397.25	421.73	9.85
300	357.11	83.40	109.95	356.02	378.19	464.21	394.02	408.97	9.58
310	352.31	83.60	109.36	348.39	373.37	457.46	390.05	398.36	9.30
320	345.43	83.42	108.45	339.37	369.50	450.68	385.00	388.08	9.04
330	339.76	83.53	107.72	331.40	365.19	444.06	379.89	379.35	8.80
340	332.27	83.39	106.88	321.23	360.06	437.45	374.73	370.22	8.56
350	324.73	82.66	106.03	310.65	353.44	430.21	367.44	362.24	8.35
360	319.69	82.67	105.24	302.91	345.12	422.98	360.88	353.12	8.14
370	313.80	82.68	104.62	295.55	336.65	416.46	353.48	346.54	7.95
380	305.72	82.53	103.62	287.69	328.68	410.34	347.55	338.43	7.76
390	298.74	82.33	102.82	279.19	320.32	404.09	341.96	330.78	7.59
400	292.16	82.43	102.13	271.25	313.19	397.73	336.81	322.93	7.42
410	285.81	82.29	101.29	264.79	306.29	391.17	332.32	314.90	7.26
420	280.43	81.98	100.65	259.34	299.48	384.82	327.75	307.85	7.11
430	275.37	81.85	99.95	253.74	292.89	378.68	323.04	300.57	6.95
440	271.40	81.60	99.25	248.24	286.46	372.59	319.05	293.73	6.80
450	266.12	81.47	98.74	243.06	280.94	366.95	315.25	286.63	6.67
460	260.83	81.41	98.14	237.82	275.59	361.52	311.75	280.09	6.53
470	255.42	81.22	97.47	232.17	270.20	355.77	308.87	274.52	6.41
480	250.68	81.12	96.81	226.85	264.89	349.78	305.63	268.75	6.30
490	245.64	80.98	96.38	222.00	259.96	343.77	302.64	262.96	6.18
500	240.45	80.78	95.62	216.58	255.45	337.75	299.54	257.06	6.08
510	235.92	80.63	94.98	211.08	250.79	331.69	296.45	250.78	5.98
520	229.66	80.66	94.35	205.68	245.93	325.61	293.67	244.82	5.88
530	223.24	80.39	93.63	199.66	240.86	319.03	290.30	239.54	5.80
540	218.66	80.29	92.98	194.78	235.62	312.21	286.68	232.77	5.71
550	213.83	80.11	92.31	190.22	230.53	305.65	284.46	226.82	5.64
560	208.18	79.97	91.76	185.26	225.73	299.30	281.97	220.87	5.55
570	201.37	79.81	91.08	179.54	221.07	292.83	278.43	215.23	5.50
580	194.48	79.52	90.39	173.78	216.27	285.68	276.09	209.74	5.42
590	188.80	79.45	89.78	168.48	210.99	278.03	273.39	204.07	5.37

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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
600	183.47	79.31	89.21	163.83	205.59	270.25	270.28	197.90	5.31
610	179.05	79.26	88.62	159.86	200.72	262.89	267.58	192.58	5.27
620	174.30	79.20	88.11	156.15	195.78	255.89	264.61	187.22	5.22
630	170.65	79.04	87.63	152.72	191.11	249.29	262.12	182.20	5.18
640	166.56	78.95	87.17	149.74	186.65	243.10	259.26	177.95	5.14
650	163.10	78.79	86.76	146.49	182.70	237.23	256.48	173.85	5.09
660	159.18	78.86	86.36	143.51	179.14	231.74	254.05	169.84	5.07
670	156.04	78.92	85.97	140.90	175.56	226.39	251.79	165.97	5.04
680	152.57	78.84	85.61	138.08	172.26	221.18	249.33	162.32	5.03
690	149.00	78.82	85.27	135.38	168.95	216.04	246.39	158.95	5.01
700	145.86	78.66	84.90	132.82	165.74	210.96	244.28	155.89	4.99
710	142.79	78.50	84.63	130.42	162.55	206.01	241.79	152.86	4.97
720	139.89	78.53	84.30	128.07	159.31	201.17	239.17	149.96	4.95
730	137.09	78.45	83.97	125.87	156.23	196.41	236.90	146.95	4.94
740	134.40	78.47	83.72	123.76	153.22	191.91	234.40	144.22	4.92
750	132.06	78.38	83.47	121.86	150.47	187.58	231.83	141.66	4.91
760	129.69	78.20	83.20	120.02	147.88	183.45	228.76	139.16	4.90
770	127.68	78.27	83.00	118.36	145.27	179.47	226.37	136.78	4.89
780	125.55	78.24	82.75	116.79	143.01	175.75	223.81	134.48	4.88
790	123.74	78.22	82.58	115.38	140.62	172.24	221.35	132.26	4.86
800	122.14	78.07	82.34	114.05	138.44	168.91	219.06	130.28	4.86
810	120.57	77.95	82.15	112.78	136.54	165.82	216.77	128.44	4.84
820	118.96	77.92	81.97	111.61	134.66	162.92	214.48	126.74	4.84
830	117.36	77.89	81.76	110.44	132.95	160.18	212.46	125.00	4.82
840	116.06	77.86	81.57	109.33	131.22	157.58	210.48	123.39	4.81
850	114.93	77.74	81.45	108.32	129.75	155.13	208.46	121.96	4.80
860	113.62	77.60	81.20	107.36	128.15	152.80	206.42	120.49	4.80
870	112.52	77.62	81.10	106.44	126.82	150.62	204.38	119.12	4.77
880	111.02	77.47	80.66	105.63	125.55	148.58	202.42	117.91	4.77
890	109.86	77.41	80.37	104.95	124.35	146.79	200.19	116.59	4.75
900	108.78	77.38	80.10	104.20	123.07	145.06	198.10	115.50	4.75

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
910	107.97	77.32	79.93	103.48	122.05	143.35	195.67	114.46	4.74
920	107.10	77.19	79.78	102.83	121.00	141.74	193.36	113.43	4.72
930	106.26	77.25	79.74	102.19	119.95	140.21	191.30	112.44	4.72
940	105.46	77.12	79.66	101.59	119.13	138.77	189.17	111.51	4.71
950	104.74	77.14	79.54	101.06	118.39	137.45	187.11	110.66	4.70
960	104.20	77.10	79.45	100.54	117.65	136.24	185.06	109.85	4.69
970	103.60	76.98	79.35	100.06	116.90	135.20	183.13	109.14	4.68
980	103.01	76.94	79.29	99.71	116.25	134.31	181.45	108.48	4.67

May 30th, 2016

Elapsed Time (min)	Flue temp °F	Room temp °F	Tunnel dry bulb °F	top °F	back °F	right °F	left °F	bottom °F	scale lbs
0	264.85	76.85	92.48	294.09	320.45	401.60	370.63	335.70	7.63
10	515.17	75.82	121.35	522.31	309.56	393.50	357.99	322.24	56.75
20	658.28	79.23	139.92	766.38	322.11	381.22	345.47	346.86	52.89
30	722.15	85.93	150.31	833.33	357.18	391.10	332.16	385.36	48.64
40	740.33	85.52	154.84	842.20	396.51	407.12	320.83	412.27	44.58
50	744.70	87.54	156.55	865.19	427.18	422.17	313.26	428.38	40.83
60	624.21	88.76	133.25	806.77	442.03	433.10	311.72	430.42	38.23
70	594.09	89.74	134.08	807.28	434.81	431.76	311.33	416.87	36.13
80	586.75	86.71	132.87	812.49	426.48	426.49	308.97	407.80	34.04
90	577.98	86.42	131.68	807.70	420.53	424.80	307.01	403.21	32.02
100	572.89	85.38	131.09	809.36	419.30	426.18	304.05	402.84	30.03
110	576.79	87.16	130.98	820.52	419.36	429.73	302.74	405.34	28.06
120	567.86	87.20	130.09	814.43	421.75	435.01	299.46	408.44	26.16
130	540.94	87.02	127.67	740.89	420.28	440.77	296.55	410.79	24.51
140	514.10	87.00	124.88	674.32	415.58	448.27	292.42	410.50	23.10
150	496.88	87.20	122.99	646.44	413.13	455.01	289.85	408.26	21.77
160	487.19	87.03	121.65	623.33	412.73	459.33	289.90	408.00	20.53

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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
170	467.30	86.99	119.76	583.97	411.90	462.55	288.98	407.70	19.47
180	459.83	86.67	118.34	574.10	410.84	464.78	288.02	404.53	18.58
190	456.99	86.57	117.46	553.62	404.34	462.31	288.29	404.08	17.81
200	443.69	86.32	116.43	535.40	395.48	459.45	290.26	405.23	17.13
210	429.63	86.36	114.79	510.09	386.93	457.51	293.75	404.66	16.57
220	395.33	86.05	112.15	470.77	378.59	455.05	297.85	401.54	16.18
230	376.45	85.59	110.24	439.84	371.15	448.57	299.98	396.39	15.85
240	358.86	85.51	108.63	417.28	363.68	441.31	302.59	391.33	15.56
250	343.52	85.28	107.13	396.93	355.81	435.00	306.04	386.30	15.28
260	334.13	84.99	106.11	384.28	347.51	430.17	310.11	381.10	15.02
270	326.38	84.83	105.13	373.65	339.92	426.40	313.82	376.65	14.75
280	320.51	84.76	104.46	364.78	333.10	423.59	317.10	372.88	14.50
290	315.52	84.57	103.80	357.48	328.01	421.57	320.70	368.66	14.23
300	310.10	84.31	103.31	352.04	322.45	419.69	322.44	366.04	13.98
310	305.76	84.26	102.80	346.98	318.42	417.76	324.22	363.31	13.72
320	303.35	84.18	102.36	343.47	314.85	415.69	325.25	360.90	13.48
330	301.71	84.14	102.04	340.93	311.07	413.55	326.55	358.11	13.24
340	298.04	83.72	101.75	337.93	308.31	411.60	327.06	356.47	13.01
350	295.75	83.80	101.40	334.77	305.25	409.98	327.73	354.42	12.78
360	295.69	83.63	101.13	333.33	303.02	408.65	328.61	352.33	12.54
370	295.75	83.67	100.98	331.95	301.37	407.73	328.56	350.61	12.30
380	294.20	83.62	100.81	328.66	300.44	407.82	328.23	350.19	12.07
390	292.75	83.68	100.71	327.39	299.24	408.16	327.36	348.35	11.84
400	292.09	83.59	100.52	325.99	297.80	408.00	327.54	346.35	11.62
410	289.10	83.37	100.26	321.73	296.97	407.12	325.74	343.81	11.42
420	284.15	83.26	99.84	312.92	295.18	406.03	323.94	341.14	11.22
430	279.36	83.36	99.42	305.52	293.48	403.81	320.25	337.99	11.04
440	276.01	83.24	98.98	299.66	290.74	400.39	316.45	333.95	10.86
450	272.89	83.04	98.60	295.05	288.32	396.37	313.31	329.91	10.68
460	268.82	82.85	98.18	290.00	285.65	392.26	310.75	326.45	10.51
470	263.20	82.81	97.70	282.26	282.73	387.74	307.79	322.24	10.35

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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
480	258.74	82.73	97.22	276.86	279.52	383.45	305.99	317.33	10.20
490	256.51	82.61	96.86	273.09	276.83	379.40	303.18	312.01	10.04
500	254.08	82.50	96.54	269.89	274.45	374.73	301.07	307.53	9.89
510	251.43	82.38	96.33	266.42	272.32	369.87	298.20	303.31	9.75
520	248.02	82.46	95.97	262.12	270.14	364.94	296.09	299.86	9.61
530	245.77	82.25	95.63	258.98	267.64	359.78	293.23	295.51	9.47
540	242.99	82.07	95.35	255.50	264.88	354.97	290.30	291.85	9.34
550	240.11	82.10	94.97	251.11	262.03	350.32	287.63	288.18	9.20
560	236.74	81.96	94.65	247.23	258.81	345.65	284.08	285.12	9.08
570	234.28	81.88	94.30	243.29	256.10	341.06	281.45	282.41	8.96
580	230.92	81.81	93.90	239.37	252.68	336.37	278.72	279.20	8.82
590	228.60	81.71	93.51	235.67	249.28	331.79	276.08	276.45	8.70
600	225.86	81.66	93.38	232.18	246.20	327.55	273.53	273.70	8.60
610	222.98	81.32	93.00	228.22	242.63	323.36	271.08	270.06	8.50
620	219.69	81.40	92.64	224.55	239.48	319.21	269.24	266.03	8.39
630	215.60	81.31	92.28	219.63	236.26	314.91	266.88	262.00	8.30
640	211.83	81.13	91.85	214.49	232.68	310.43	264.84	257.40	8.20
650	208.56	80.99	91.53	210.37	229.16	305.73	261.66	252.82	8.11
660	205.44	80.91	91.16	206.96	225.77	301.12	258.21	248.37	8.01
670	203.16	80.69	90.86	204.04	222.62	296.81	254.58	244.44	7.94
680	201.08	80.65	90.61	201.81	219.61	293.09	250.42	240.94	7.84
690	197.97	80.54	90.24	198.65	217.03	289.79	247.73	237.72	7.76
700	195.51	80.54	89.95	195.22	214.16	286.50	245.17	234.00	7.69

May 31st, 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	374.80	78.59	108.19	362.69	419.93	490.36	449.78	413.41	7.13
10	652.57	78.71	149.20	641.25	409.48	484.63	448.22	405.47	53.58
20	722.49	80.58	154.64	753.26	439.60	471.97	435.77	443.36	48.47
30	741.92	83.01	158.66	820.59	465.06	469.61	419.39	465.05	44.03
40	749.28	85.93	163.11	859.36	485.21	470.89	403.27	473.06	39.85
50	758.02	86.68	166.29	881.74	502.78	473.88	390.45	481.46	35.72
60	754.23	86.79	165.39	883.82	518.50	479.88	382.63	495.88	31.89
70	742.28	88.26	163.53	903.03	527.35	487.69	377.16	509.66	28.41
80	737.61	88.08	162.42	912.96	534.94	496.22	375.90	525.85	25.25
90	708.95	89.48	157.61	866.59	540.13	505.67	375.30	541.46	22.54
100	679.86	89.21	153.48	820.84	539.12	516.35	376.69	552.14	20.39
110	642.17	88.62	147.92	761.13	537.54	529.48	379.92	557.32	18.60
120	599.99	89.33	142.31	708.45	533.75	545.20	383.33	557.90	17.23
130	561.27	88.17	136.83	652.99	525.16	558.00	387.89	551.54	16.26
140	524.34	87.20	132.48	584.64	513.40	566.25	394.18	543.19	15.58
150	490.16	86.99	128.04	528.87	500.85	567.26	400.90	532.38	15.04
160	467.16	86.71	125.20	492.11	486.83	562.90	405.89	520.87	14.56
170	451.34	86.54	122.89	468.56	467.56	556.71	409.10	509.98	14.15
180	439.57	85.94	121.15	455.19	451.47	550.12	411.52	499.88	13.68
190	427.70	85.22	119.62	441.03	437.81	542.37	412.70	490.83	13.28
200	419.54	85.15	118.17	430.07	426.24	534.40	413.48	481.36	12.90
210	412.13	85.10	117.30	419.55	416.80	527.60	413.62	473.07	12.55
220	401.86	84.72	115.98	404.76	409.98	521.29	413.41	465.84	12.18
230	393.65	84.64	114.91	394.82	404.44	514.33	411.14	460.01	11.85
240	389.97	84.62	114.17	390.24	398.72	507.61	408.91	453.63	11.48
250	382.66	84.23	113.34	382.82	394.54	501.20	406.69	447.41	11.15
260	378.22	84.03	112.41	375.81	391.46	494.36	404.69	442.45	10.83
270	372.57	83.52	111.77	368.82	388.43	486.24	402.50	437.19	10.50
280	367.14	83.55	111.11	365.47	384.67	477.36	399.81	432.04	10.18

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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
290	363.35	83.65	110.65	362.82	381.12	470.43	397.25	421.73	9.85
300	357.11	83.40	109.95	356.02	378.19	464.21	394.02	408.97	9.58
310	292.24	84.23	100.99	325.64	348.19	404.28	313.15	323.77	12.35
320	288.63	84.16	100.60	322.20	344.81	401.64	311.52	321.88	12.14
330	285.02	83.85	100.15	317.92	341.38	398.94	310.11	320.35	11.92
340	283.35	83.86	99.84	311.06	338.20	396.00	308.25	317.79	11.72
350	281.51	83.90	99.52	306.62	335.94	393.55	305.90	314.57	11.52
360	280.50	83.47	99.25	303.24	333.02	391.93	303.94	310.88	11.32
370	278.95	83.45	99.05	300.40	330.48	390.57	301.60	307.38	11.12
380	276.53	83.31	98.64	299.21	327.96	389.32	300.39	304.04	10.92
390	275.77	83.15	98.40	297.35	325.50	387.95	299.02	301.48	10.74
400	273.53	83.00	98.20	294.38	323.67	386.47	297.37	298.18	10.55
410	272.65	82.84	98.07	292.68	322.21	385.25	295.75	294.56	10.34
420	271.73	82.76	97.86	290.19	321.75	384.26	294.05	291.19	10.17
430	270.22	82.82	97.52	287.73	321.35	383.35	292.61	288.16	9.98
440	269.14	82.87	97.45	285.10	319.85	382.25	289.47	285.30	9.81
450	267.15	82.75	97.01	282.66	319.08	380.55	287.54	282.63	9.66
460	265.80	82.51	96.92	280.05	317.21	378.65	284.83	280.13	9.49
470	261.81	82.55	96.60	277.44	314.56	376.55	282.09	277.50	9.33
480	257.25	82.22	96.17	271.27	310.64	373.69	279.60	274.79	9.19
490	253.16	82.36	95.74	265.44	305.16	369.56	276.92	271.93	9.05
500	250.05	82.25	95.40	260.33	299.91	364.84	273.68	268.59	8.91
510	246.16	82.13	94.94	255.59	295.35	360.10	270.88	266.11	8.76
520	242.08	81.95	94.58	250.41	290.45	355.38	268.20	263.11	8.64
530	239.20	81.80	94.24	246.30	285.24	350.72	265.98	259.91	8.50
540	236.71	81.80	93.88	242.67	280.98	346.38	263.44	256.84	8.39
550	233.55	81.69	93.53	238.93	276.05	342.34	260.96	253.71	8.27
560	230.51	81.53	93.12	235.17	271.60	338.26	258.99	250.65	8.15
570	228.01	81.06	92.82	232.22	267.86	334.16	257.41	247.95	8.03
580	226.63	81.36	92.56	230.08	264.15	330.41	256.02	245.70	7.91
590	224.78	80.93	92.32	227.50	260.64	326.94	254.03	244.18	7.79

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
600	222.14	81.10	91.98	224.09	256.74	323.43	252.64	242.66	7.69
610	220.11	80.71	91.84	221.82	252.59	320.20	251.08	240.92	7.58
620	217.42	80.60	91.48	218.83	248.40	316.99	249.68	238.96	7.46
630	214.97	80.79	91.22	215.94	244.90	313.73	248.76	236.91	7.36
640	212.69	80.63	90.90	212.91	241.40	310.34	247.37	234.59	7.26
650	210.88	80.33	90.69	210.17	238.00	306.86	245.90	232.61	7.17
660	209.48	80.31	90.46	208.33	234.78	303.59	244.97	230.50	7.06
670	207.85	80.27	90.26	207.68	232.24	300.40	243.29	228.54	6.97
680	204.37	80.18	89.87	204.02	229.45	296.70	241.82	225.89	6.88

June 2nd, 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	257.07	79.25	90.99	260.76	291.62	366.80	344.69	301.64	5.71
10	718.72	80.07	106.94	747.45	290.29	367.86	333.09	299.74	52.51
20	753.83	81.72	109.59	874.94	326.56	378.71	324.39	349.74	47.36
30	728.65	82.74	108.61	857.37	358.06	391.78	320.93	378.49	43.49
40	753.46	83.64	108.90	879.90	382.62	400.08	318.02	401.87	39.39
50	757.36	83.50	109.29	882.87	410.37	410.91	314.26	425.13	35.33
60	754.74	84.34	109.54	872.87	435.87	422.95	313.67	447.11	31.49
70	758.33	84.98	110.30	891.53	459.77	437.36	316.37	468.64	27.82
80	644.64	85.05	102.94	833.26	479.63	453.89	324.12	487.82	24.74
90	571.04	83.65	99.92	800.59	470.43	454.40	337.54	476.77	23.09
100	539.78	83.59	97.13	780.40	450.53	448.37	345.51	455.24	21.65
110	519.57	83.29	96.77	749.10	435.13	447.51	348.13	440.23	20.23
120	489.25	83.73	95.16	647.45	425.20	451.44	347.80	428.36	18.97
130	484.27	83.69	94.19	633.41	408.83	453.26	347.06	424.93	17.79
140	464.08	83.10	94.02	609.45	396.41	455.76	344.90	424.18	16.70
150	441.94	82.82	93.81	562.74	388.14	459.17	345.29	416.97	15.82

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
160	427.06	82.69	92.52	535.07	382.29	459.75	344.66	411.28	15.05
170	376.08	82.60	91.57	469.56	375.25	461.42	344.00	399.75	14.58
180	350.11	82.08	90.21	437.13	368.17	459.61	344.67	385.89	14.24
190	330.16	81.98	89.80	406.12	361.37	452.40	346.31	374.31	13.96
200	317.73	81.65	88.50	387.58	354.22	444.72	346.89	364.79	13.73
210	306.96	81.57	88.22	373.30	347.67	438.09	347.69	356.44	13.48
220	299.26	81.20	88.13	361.95	341.79	433.08	348.64	350.24	13.24
230	292.31	80.64	87.45	351.96	335.90	429.32	349.51	344.18	13.02
240	287.34	80.76	87.15	344.53	331.02	426.53	350.11	339.39	12.78
250	285.15	80.89	86.91	340.31	326.52	425.28	351.08	334.60	12.55
260	279.89	80.96	86.76	332.76	323.30	423.63	350.63	331.42	12.33
270	274.86	80.64	86.79	325.80	319.36	420.17	347.25	328.59	12.11
280	272.25	80.67	86.28	320.88	315.70	416.66	341.90	324.50	11.91
290	268.20	80.74	85.82	316.03	311.75	413.04	336.53	320.47	11.70
300	265.18	80.53	85.48	311.80	307.84	409.53	332.15	317.16	11.51
310	262.75	80.67	85.89	307.16	304.68	406.05	328.27	312.68	11.32
320	259.39	80.39	85.49	303.23	301.45	402.62	324.95	309.14	11.13
330	257.83	80.27	85.61	299.88	298.56	399.46	321.94	305.30	10.95
340	256.46	80.34	85.31	297.27	294.61	396.46	319.78	302.67	10.77
350	255.06	80.11	85.50	294.66	291.68	393.56	316.67	299.94	10.58
360	252.81	80.23	84.94	291.70	287.65	390.78	315.17	298.30	10.42
370	250.90	80.15	85.23	286.79	284.54	388.15	314.25	296.07	10.25
380	248.25	80.13	84.78	282.63	281.54	385.94	311.32	293.80	10.09
390	246.90	79.80	84.64	279.38	278.87	383.57	307.08	291.22	9.92
400	245.51	79.97	84.72	277.14	276.86	380.96	304.20	288.42	9.75
410	244.50	80.00	84.52	274.71	274.96	378.38	301.93	286.40	9.59
420	242.18	80.12	84.33	272.36	273.83	375.82	300.17	284.21	9.44
430	240.72	79.89	84.32	269.85	271.95	373.65	297.80	282.31	9.27
440	239.67	79.67	84.10	267.44	269.58	371.77	295.43	280.55	9.13
450	238.76	79.67	84.09	265.53	267.53	369.86	292.79	278.83	8.96
460	237.79	79.63	83.62	263.64	265.57	368.08	289.86	277.14	8.82

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
470	236.74	79.73	83.91	262.22	263.85	366.42	285.68	275.41	8.67
480	235.36	79.60	83.65	260.14	261.76	364.57	281.33	273.80	8.53
490	233.31	79.56	83.49	257.40	259.61	362.26	277.50	271.94	8.39
500	231.86	79.51	83.65	254.49	257.57	358.99	274.66	270.41	8.25
510	230.21	79.51	82.86	251.69	255.36	355.54	271.71	269.26	8.12
520	227.36	79.32	83.60	246.48	253.46	352.07	268.61	267.31	7.99
530	224.57	78.93	82.98	241.92	249.95	348.12	264.92	265.41	7.88
540	222.46	79.29	82.83	238.23	245.81	343.65	261.09	263.63	7.77
550	217.97	79.21	82.97	233.49	242.63	338.22	257.96	261.43	7.66
560	212.45	79.22	82.45	226.45	238.90	331.18	255.10	258.25	7.59
570	207.12	79.16	82.72	219.64	234.81	322.87	251.88	254.75	7.50
580	202.58	78.81	82.21	213.70	230.04	314.49	249.42	250.48	7.42
590	198.78	78.79	82.30	208.61	225.33	306.52	246.97	246.02	7.35
600	195.27	78.71	82.27	204.66	220.66	299.31	245.22	241.66	7.27
610	191.98	78.78	81.97	200.74	216.31	292.76	242.99	237.35	7.20
620	189.05	78.62	81.36	197.49	212.09	286.72	240.41	233.43	7.12
630	186.63	78.65	81.35	194.40	208.09	281.30	237.77	229.68	7.05
640	184.28	78.67	81.94	191.92	204.06	276.41	235.72	226.29	6.98
650	182.28	78.49	81.43	189.35	200.62	272.08	233.81	222.51	6.90
660	180.47	78.44	81.46	187.25	196.77	268.11	231.91	219.21	6.83
670	178.66	78.42	81.41	184.84	193.72	264.43	230.11	216.29	6.77
680	176.57	78.47	80.81	182.39	190.49	260.96	228.18	213.26	6.72
690	174.29	78.41	81.14	179.58	187.67	257.68	226.46	210.06	6.64
700	171.91	78.29	81.14	176.15	184.76	254.57	224.71	206.71	6.59
710	168.65	78.14	80.94	172.58	181.95	251.26	223.36	203.16	6.54
720	166.32	78.14	80.93	169.73	179.21	248.05	221.99	198.62	6.49
730	163.95	78.19	80.42	166.94	176.57	244.83	221.05	194.14	6.44
740	161.55	78.05	80.75	164.33	173.89	241.28	219.98	190.41	6.39
750	159.13	77.84	80.68	161.73	171.44	237.61	218.46	186.59	6.35
760	156.78	77.77	80.44	159.17	168.86	233.98	217.40	182.79	6.31
770	154.41	77.64	79.75	156.92	166.58	230.47	216.23	179.65	6.27

700- App-F Unit Pre-Burn Documentation (page 13 of 13)

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
780	152.79	77.61	80.02	155.25	164.28	227.06	214.91	176.49	6.23
790	150.70	77.70	81.86	153.65	162.33	223.82	213.62	174.05	6.19
800	150.30	77.81	81.58	153.75	160.43	221.11	212.28	171.44	6.14
810	148.65	77.70	81.56	152.44	159.08	218.81	211.36	169.31	6.09
820	146.04	77.71	81.14	149.32	157.77	216.32	210.28	167.02	6.06
830	143.01	77.67	80.98	146.17	155.90	213.14	209.00	164.50	6.03
840	140.36	77.72	80.97	143.16	153.53	209.50	207.96	161.93	6.01
850	137.54	77.74	80.78	140.66	151.41	205.68	207.06	159.01	5.98
860	135.55	77.62	80.50	138.34	149.12	201.97	206.23	156.25	5.96
870	133.16	77.51	80.39	135.98	146.89	198.37	205.39	153.78	5.93
880	130.85	77.53	80.15	133.64	144.80	194.78	204.70	151.41	5.92
890	128.67	77.40	80.06	131.40	142.70	191.26	203.77	149.04	5.91
900	126.52	77.38	79.91	129.18	140.70	187.82	203.00	146.58	5.89
910	124.49	77.34	79.72	127.18	138.76	184.48	202.30	144.33	5.87
920	122.53	77.32	79.68	125.24	136.88	181.26	201.55	142.34	5.86
930	120.81	77.31	79.56	123.43	135.15	178.20	200.82	140.18	5.84
940	119.22	77.38	79.45	121.71	133.47	175.28	200.03	138.07	5.83
950	117.44	77.39	79.28	120.10	131.86	172.50	199.41	136.24	5.82
960	115.97	77.46	79.15	118.58	130.36	169.85	198.89	134.50	5.81
970	114.49	77.46	79.13	117.21	128.90	167.36	198.09	132.85	5.80
980	113.21	77.52	79.26	115.89	127.55	165.00	197.33	131.29	5.79
990	112.05	77.68	79.27	114.88	126.32	162.80	196.23	129.58	5.78

800- App-G Stack Loss Efficiency data and Results

Appendix G

Stack Loss Efficiency Data/Results

800- App-G Stack Loss Efficiency data and Results (page 6 of 16)

Intertek Testing Services NA, Inc.

Manufacturer: SBI
Model: FP-15 Series
Date: 06-10-16
Run: 3
Control #: QC20160608
Test Duration: 680
Output Category: 2

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	65.1%	69.7%
Combustion Efficiency	94.9%	94.9%
Heat Transfer Efficiency	69%	73.5%

Output Rate (kJ/h)	20 095	19 062	(Btu/h)
Burn Rate (kg/h)	1.64	3.62	(lb/h)
Input (kJ/h)	30 886	29 299	(Btu/h)

Test Load Weight (dry kg)	18.62	41.04	dry lb
MC wet (%)	20.13		
MC dry (%)	25.20		
Particulate (g)	12.265		
CO (g)	1 343		
Test Duration (h)	11.33		

Emissions	Particulate	CO
g/MJ Output	0.05	5.90
g/kg Dry Fuel	0.66	72.14
g/h	1.08	118.52
lb/MM Btu Output	0.13	13.71

Air/Fuel Ratio (A/F)	18.04

VERSION: 2.4 2010-04-15

800- App-G Stack Loss Efficiency data and Results (page 11 of 16)

Intertek Testing Services NA Inc.

Manufacturer: SBI
Model: FP-15 Series
Date: 06-08-16
Run: 1
Control #: QC20160608
Test Duration: 250
Output Category: High

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	62.4%	66.8%
Combustion Efficiency	95.9%	95.9%
Heat Transfer Efficiency	65%	69.7%

Output Rate (kJ/h)	45 352	43 021	(Btu/h)
Burn Rate (kg/h)	3.87	8.52	(lb/h)
Input (kJ/h)	72 695	68 959	(Btu/h)

Test Load Weight (dry kg)	16.11	35.51	dry lb
MC wet (%)	17.84		
MC dry (%)	21.71		
Particulate (g)	15.415		
CO (g)	911		
Test Duration (h)	4.17		

Emissions	Particulate	CO
g/MJ Output	0.08	4.82
g/kg Dry Fuel	0.96	56.56
g/h	3.70	218.69
lb/MM Btu Output	0.19	11.21

Air/Fuel Ratio (A/F)	12.81

VERSION: 2.4 2010-04-15

800- App-G Stack Loss Efficiency data and Results (page 16 of 16)

Intertek Testing Services NA, Inc

Manufacturer: SBI
Model: FP-15 Series
Date: 06-09-16
Run: 2
Control #: QC20160608
Test Duration: 770
Output Category: 1

Technicians: Claude Pelland

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	63.5%	68.0%
Combustion Efficiency	91.7%	91.7%
Heat Transfer Efficiency	69%	74.1%

Output Rate (kJ/h)	17 510	16 610	(Btu/h)
Burn Rate (kg/h)	1.47	3.23	(lb/h)
Input (kJ/h)	27 587	26 170	(Btu/h)

Test Load Weight (dry kg)	18.83	41.51	dry lb
MC wet (%)	19.92		
MC dry (%)	24.88		
Particulate (g)	19.145		
CO (g)	2 125		
Test Duration (h)	12.83		

Emissions	Particulate	CO
g/MJ Output	0.09	9.46
g/kg Dry Fuel	1.02	112.86
g/h	1.49	165.61
lb/MM Btu Output	0.20	21.98

Air/Fuel Ratio (A/F)	18.24

VERSION: 2.4 2010-04-15

A10- App-I EPA Correspondence

Appendix I

EPA Correspondence

A10- App-I EPA Correspondence (page 2 of 8)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JAN 21 2016

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Vincent Pelletier, Jr. Eng.
Stove Builder International
Chemical Engineer
250 rue de Copenhague
Saint-Augustin-de-Desmaures
Quebec Canada, G3A 2H3

Dear Mr. Pelletier,

I am writing in response to your January 20, 2016 letter regarding the HE 350 wood stove and equivalent model FP-15 and Horizon. You are requesting an alternative test method using cordwood as referenced in Section 60.534 (a) (ii) of 40 CFR Part 60 Subpart AAA, Standards of Performance for New Residential Wood Heaters. You request to use the procedures and specifications found in the ASTM draft cordwood test method, ASTM work Item WK47329, titled "Standard Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel."

With the caveats listed below, we approve your alternative method request for testing the HE 350 wood stove and equivalent model FP-15 and Horizon wood stoves. As required in Subpart AAA Standards of Performance for New Residential Wood Heaters Section 60.534 (d), the manufacturer or approved test lab must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel sampling trains. These results must be reported separately and also included in the total particulate matter emissions per run and Section 60.534 (e) the manufacturer must have the approved test laboratory measure the efficiency, heat output and carbon monoxide emissions of the tested wood heater using Canadian Standards Administration (CSA) Method B415.1-10. For particulate matter emission concentrations ASTM 2515-11 should be used, four inch filters are also acceptable to use.

The following changes to ASTM work Item WK47329, titled "Standard Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel" must be followed:

1. The wood heater must be aged for 50 hours as stated in Appendix A-8 to Part 60 Test Methods 26 through 30B, procedures section 2.1.4 and not the 48 hours a stated in WK47329 section 9.1.4.

2. The end of test criteria is defined when the weight scale indicates the remaining weight of the test fuel as 0.0 lbs (0.00 kg) or less for 30 seconds. This criteria should be used for the high fire, low and medium burn rates.

3. Section 9.5.1 Start-up Condition. The average heater surface temperature per 9.2.2 and flue-gas temperature per 9.2.4 at the start of the test run must be less than a 10°F above ambient for the high fire test category.

4. Section 9.6.14 Invalid Test Run. The test run shall be considered invalid if less than the full test fuel weight has been consumed and there is no measurable weight loss (<0.1 lb (0.05 kg) or 1.0% of the test fuel weight, whichever is greater) for at least 30 minutes.

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5. Coal bed conditions prior to loading test fuel. The coal bed should a level plane without valleys or ridges for all test runs in the high fire, low and medium burn rate categories.

6. The pre burn cycle burn rate category, leading into a test run, should be the same as the attempted burn rate category of the actual test. Example: If a low burn category is the desired test, the preburn should be at a low burn setting and likewise for the medium low, medium high and high burn rate categories.

The following changes to ASTM E2515-11 "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel" must be followed:

1. The filter temperature must be maintained between 80 and 90 degree F during testing.

2. A glass cyclone must be used between the sampling probe and filter holders when the total particulate catch is expected to exceed 100 mg or when water droplets are present in the stack gas. This cyclone and its contents must be included in the pre-test weighing and post-test desiccation and weighing.

3. Filters must be weighed in pairs to reduce weighing error propagation. See ASTM E2515-11 Section 10.2.1 Analytical Procedure.

4. Sample filters must be Pall TX-40 or equivalent Teflon coated glass fiber, and of 47 mm, 90 mm, 100 mm or 110 mm.

5. Only one point is allowed outside the +/- 10% proportionality range per test run.

Please include this approval in your certification test report. If you have additional questions regarding these decisions, please contact Michael Toney of my staff at (919) 541-5247.

Sincerely,

Steffan Johnson, Group Leader
Measurement Technology Group

cc: Michael Toney, EPA/AQAD (143-02)
Rafael Sanchez, EPA/OECA (2227A)
Adam Baumgart-Getz, EPA/OID (C311M)
David Cole, EPA/OID (C311M)
Amanda Aldridge, EPA/OID (C311M)

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

Fabricant de poêles international inc.
Stove Builder International Inc.

April 21st, 2016

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

Subject: 30 days notice for certification of model line name **HE350**

Dear Mr. Sanchez

The model line **HE350** and equivalent model FP-15 and Horizon 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 May 30th, 2016. This certification program is planned to end on June 3rd, 2016.

On January 20th, 2016 SBI requested to use an alternative test method using cordwood as referenced in Section 60.534 (a) (ii) of 40 CFR Part 60 Subpart AAA, Standards of Performance for New Residential Wood Heaters for certification of this model line. In a letter dated January 21st, 2016 you approved the use of ASTM work item WK47329, titled "Standard Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel" with caveats. (See letter attached)

We would therefore like to inform you that we'll be using ASTM work item WK47329 in conjunction with ASTM 2515-11 and CSA B415.1-10 for certification of this model line.

I would like to inform you that we'll be adding two additional model names to this certification which are the Monaco XL and Kozy Heat. Just like the FP-15 and the Horizon, these models will only be aesthetically different compared to the HE350.

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

250, rue De Copenhague, Saint-Augustin-de-Desmaures, Qc G3A 2H3 • Tél. : 418 878-3040 • Fax : 418 878-3001
www.sbi.international.com

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

And contact information at Intertek will be the following:

Claude Pelland, Eng
claude.pelland@intertek.com

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

Vincent Pelletier, Jr. Eng.
vpelletier@sbi-international.com

Should you need additional documents, please let us know.

Sincerely,

Vincent Pelletier, Jr. Eng.
Chemical Engineer
Stove Builder International Inc.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JAN 21 2016

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Vincent Pelletier, Jr. Eng.
Stove Builder International
Chemical Engineer
250 rue de Copenhague
Saint-Augustin-de-Desmaures
Quebec Canada, G3A 2H3

Dear Mr. Pelletier,

I am writing in response to your January 20, 2016 letter regarding the HE 350 wood stove and equivalent model FP-15 and Horizon. You are requesting an alternative test method using cordwood as referenced in Section 60.534 (a) (ii) of 40 CFR Part 60 Subpart AAA, Standards of Performance for New Residential Wood Heaters. You request to use the procedures and specifications found in the ASTM draft cordwood test method, ASTM work Item WK47329, titled "Standard Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel."

With the caveats listed below, we approve your alternative method request for testing the HE 350 wood stove and equivalent model FP-15 and Horizon wood stoves. As required in Subpart AAA Standards of Performance for New Residential Wood Heaters Section 60.534 (d), the manufacturer or approved test lab must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel sampling trains. These results must be reported separately and also included in the total particulate matter emissions per run and Section 60.534 (e) the manufacturer must have the approved test laboratory measure the efficiency, heat output and carbon monoxide emissions of the tested wood heater using Canadian Standards Administration (CSA) Method B415.1-10. For particulate matter emission concentrations ASTM 2515-11 should be used, four inch filters are also acceptable to use.

The following changes to ASTM work Item WK47329, titled "Standard Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel" must be followed:

1. The wood heater must be aged for 50 hours as stated in Appendix A-8 to Part 60 Test Methods 26 through 30B, procedures section 2.1.4 and not the 48 hours a stated in WK47329 section 9.1.4.

2. The end of test criteria is defined when the weight scale indicates the remaining weight of the test fuel as 0.0 lbs (0.00 kg) or less for 30 seconds. This criteria should be used for the high fire, low and medium burn rates.

3. Section 9.5.1 Start-up Condition. The average heater surface temperature per 9.2.2 and flue-gas temperature per 9.2.4 at the start of the test run must be less than a 10°F above ambient for the high fire test category.

4. Section 9.6.14 Invalid Test Run. The test run shall be considered invalid if less than the full test fuel weight has been consumed and there is no measurable weight loss (<0.1 lb (0.05 kg) or 1.0% of the test fuel weight, whichever is greater) for at least 30 minutes.

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5. Coal bed conditions prior to loading test fuel. The coal bed should a level plane without valleys or ridges for all test runs in the high fire, low and medium burn rate categories.

6. The pre burn cycle burn rate category, leading into a test run, should be the same as the attempted burn rate category of the actual test. Example: If a low burn category is the desired test, the preburn should be at a low burn setting and likewise for the medium low, medium high and high burn rate categories.

The following changes to ASTM E2515-11 "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel" must be followed:

1. The filter temperature must be maintained between 80 and 90 degree F during testing.

2. A glass cyclone must be used between the sampling probe and filter holders when the total particulate catch is expected to exceed 100 mg or when water droplets are present in the stack gas. This cyclone and its contents must be included in the pre-test weighing and post-test desiccation and weighing.

3. Filters must be weighed in pairs to reduce weighing error propagation. See ASTM E2515-11 Section 10.2.1 Analytical Procedure.

4. Sample filters must be Pall TX-40 or equivalent Teflon coated glass fiber, and of 47 mm, 90 mm, 100 mm or 110 mm.

5. Only one point is allowed outside the +/- 10% proportionality range per test run.

Please include this approval in your certification test report. If you have additional questions regarding these decisions, please contact Michael Toney of my staff at (919) 541-5247.

Sincerely,

Steffan Johnson, Group Leader
Measurement Technology Group

cc: Michael Toney, EPA/AQAD (143-02)
Rafael Sanchez, EPA/OECA (2227A)
Adam Baumgart-Getz, EPA/OID (C311M)
David Cole, EPA/OID (C311M)
Amanda Aldridge, EPA/OID (C311M)

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

Fabricant de poêles international inc.
Stove Builder International Inc.

May 24th, 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: Start of program certification of model line name **HE350** delayed

Dear Mr. Sanchez

In a letter dated April 21st, SBI informed EPA that we wanted to start a test program on May 30th, 2016 on the model line **HE350**.

We would like to inform EPA that this program has to be delayed due to an outstanding event. My wife very recently gave birth earlier than expected and I will be not be at work for the next two weeks and will have limited access to my e-mails.

We have another test program for which we have notified EPA with a 30-days' notice that will start on June 6th and we would like the test program of the model line **HE350** to follow this certification.

The accredited laboratory and contact person will remain the same and they have already been informed of that delay.

Should you need additional documents, please let me know.

Sincerely,

Vincent Pelletier

Vincent Pelletier, Jr. Eng.
Chemical Engineer
Stove Builder International Inc.

250, rue De Copenhague, Saint-Augustin-de-Desmaures, Qc G3A 2H3 • Tél. : 418 878-3040 • Fax : 418 878-3001
www.sbi.international.com

Quality Control Document

VENTIS	☐ Wood stove ☐ Wood furnace ■ Fireplace ☐ Pellet stove ☐ Pellet furnace FAMILY FP15 Fireplace HE350 # VB00005 JOB: _____ ___ / ___ / 20 ___	**Quality Control** Created : 18-juil-16 Modified: 18-juil-16 Rév.: 0	SBI Fabricant de poêles international Stove Builder International

INSPECTION POINTS	SERIAL NUMBER OF INSPECTED PRODUCTS									
VISUAL ASPECT OF THE STOVE MEET SBI REQUIREMENTS (PAINT, ASSEMBLY)										
BOTH PRIMARY AND SECONDAIRE AIR INTAKE TUBE ARE 3" INNER DIAMETER										
DOORS ARE AIRTIGHT										
COMBUSTION CHAMBER DIMENSIONS RESPECT THE DRAFT AND NO MAJOR REVISION WAS DONE SINCE JULY 18TH 2016										
FAN NUMBER 44122 CLASS H IS INSTALLED										
ROBAX CARDBOARD (#45411) IS ON THE HANDLE										
BRICKS ARE INSTALLED AND FREE OF CRACKS										
SECONDARY AIR TUBES HAVE HOLES OF : 0.141"; 0.125"; 0.109"; 0.101" FROM FRONT TO BACK. FRONT TUBES HAS HOLES ON 2 SIDES.										
A C-CAST BAFFLE IS INSTALLED										
PILOT ASSEMBLY IS INSTALLED AND ITS TUBE INNER DIAMETER IS 0.25"										
THE USER MANUAL IS INSIDE OF THE COMBUSTION CHAMBER.										
THE DESICCANT IS INSIDE THE COMBUSION CHAMBER										
THE 5" FRESH AIR ADAPTOR IS INCLUDED.										
6 SPACERS ARE PUT INSIDE OF COMBUSTION CHAMBER										
AIR CONTROL WORKS PROPERLY AND COVERS THE FULL RANGE										
THE RUBBER HANDLE IS INSTALLED										
THE SPRINGS ARE INSTALLED										
THE NAME PLATE IS INSTALLED										
THE FAN STICKER IS INSTALLED										
THE ELECTRIC PART ARE PROPERLY WIRED AND SNAP DISC WORK FINE.										
PAINT THICKNESS VARIES FROM 0.4 TO 0.7 MILS ON THE FACE PLATE										
THE SERIAL NUMBER IS THE SAME ON THE BAG, THE USERMANUAL AND THE NAME PLATE										
THE FIREPLACE IS SCREWED ON THE CRATE.										

INSPECTED BY: _____ **DATE:** ____ / ____ / 20____

COMMENTS: _____

_____

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COMPONENTS

ETL Mark Minimum Labeling Requirements (new Intertek Mark)

MINIMUM MARKING REQUIREMENTS FOR PRODUCTS BEARING THE ETL MARK

The ETL Listing Mark consists of the following four items:

1. The ETL Certification Mark with “US” and/or “C” as identifiers. The letter “C” adjacent and to the lower left side of the ETL Certification Mark indicates that the product complies with a Canadian standard. The letters “US” adjacent and to the lower right side of the ETL Certification Mark indicates that the product complies with a US standard. The required minimum size of the identifiers is 2 mm.
2. The word, "Listed" or "Classified" or "Recognized Component" (whichever is appropriate). The word, "Listed" is to be incorporated into the ETL Certification Mark. If upon reduction, the word “listed” is not legible as part of the trademark, it shall also appear separately.
3. The Control Number issued by Intertek Testing Services. This five to eleven digit number is unique to the manufacturing site for each applicant.
4. A standard description, which refers to the national standard used for certification shall be used. Example:

    - For US standards, the words, “Conforms to” shall appear with the standard number along with the word, “Standard” or “Std.” Example: “Conforms to ANSI/UL Std. XX.”
    - For Canadian standards, the words “Certified to CAN/CGA Standard CXX No. XX", shall be used, or abbreviated, "Cert. to CAN/CSA Std CXX No. XX".
    - If the manufacturer wishes, they may use the standard title, example “Telephone Equipment.”

Nothing selected
Nothing selected

Listing Report General Information

LISTING REPORT GENERAL INFORMATION

The Applicant have agreed to produce, test and label Intertek Listed products in accordance with the requirements of this Report. The Applicant has also agreed to notify Intertek and request authorization prior to using alternate parts, components or materials.

INSTRUCTIONS FOR USE

- One copy of this Report is submitted to the Applicant and used by the Intertek Field Representative for Follow-up Service Inspections; and
- One copy is retained in files at the Intertek Regional Certification Center.

The Applicant is to use this Report as a guide for the operation of the certification program, and will manufacture the Listed product(s) in accordance with the specifications information stated herein.

The Intertek Field Representative shall determine that the product is manufactured in accordance with this Report and that certification procedures are followed.

In the case where a discrepancy exists between the product and this Report, this Report will be considered correct, and therefore the Applicant has the responsibility for making the necessary corrections so that the product will meet the specifications stated herein.

COMPONENTS

Components used shall be those itemized in this Intertek Report covering the product, including any amendments and/or revisions.

CERTIFICATION MARK

The Intertek Certification Mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the Intertek Certification Mark is subject to the control of Intertek.

MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

FOLLOW-UP SERVICE

Periodic unannounced Follow-up Service Inspections of the manufacturing facility shall be conducted by Intertek. A Follow-up Service Inspection Report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the Intertek Certification Mark with the requirements of this Report and the Intertek Certification Agreement.
3. In-plant quality control procedures and personnel.
4. Manufacturing processes and changes.
5. Performance of specified manufacturing and production tests.

In the event that the Intertek Field Representative identifies variance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the Intertek Certification Mark from non-conforming product.
3. Contact the Intertek office that issued this Report for additional instructions.

GENERAL REQUIREMENTS AND DEFINITIONS

Accepted - Accepted by Intertek. All inquiries regarding change to Listed products must be presented to Intertek in writing for consideration and acceptance.

Authorized - Authorized by Intertek. All inquiries regarding change to Listed products must be

presented to Intertek in writing for consideration and approval.

C.S.A. - Canadian Standards Association.

Certified - Equipment or material included in a list published by a nationally recognized certification agency that conducts periodic inspections of production of Listed equipment or materials and whose listing stated either that the equipment or material meets recognized standards or has been tested and found suitable for use in a specified manner.

Construction Details - For specific construction details, reference should be made to the following photographs and descriptions. All dimensions are approximate unless specified as exact or within a tolerance. In addition to the specific construction details described in this Report, the following general requirements may also apply as applicable.

Discrepancy - A difference between this Report and a product described in this Report. This will result in the filing of a Variance Report on which a management level decision for the corrective action will be based.

Installation, Operating and Safety Instructions - Instructions for installation and use of this product are provided by the Manufacturer as required by the standard.

Listed - Equipment or materials included in a list published by a nationally recognized certification agency that conducts periodic inspections of production of listed equipment of materials, and whose listing states either that the equipment or materials meets nationally recognized standards, or has been tested and found suitable for use in a specified manner.

Listed Component - Identifies any product covered under the Listing or Certification service of an NRTL (US) or a CO (Canada).

Markings - The Intertek Certification Mark shall be visible after installation. Other markings may be required as identified in this Report. If evaluated to a Canadian standard, the products may be required to have markings in both French and English. If so, it is the responsibility of the Applicant to determine any such requirement and provide bilingual markings, where applicable, in accordance with the Provincial Regulatory Authorities.

N.F.P.A. - National Fire Protection Association.

Production Test Requirements - When applicable, the Manufacturer shall have the necessary test facilities to carry out production tests on the Listed product.

Products - The product as described under "Authorization to Mark" is eligible to carry the Intertek Certification Mark.

Recognized Component - Identifies any component, part or sub-assembly, covered under the recognition service of an NRTL (US) or a CO (Canada), and intended for use in Intertek Listed, Intertek Classified, or Intertek Recognized products.

Records - Records of the use of the Intertek Certification Mark must be maintained by the Applicant and must be available for review during normal business hours.

Shipping - As practically as possible, each Listed product is to be shipped completely assembled and incorporate the necessary safety and installation instructions.

Standards - The Manufacturer shall have in his possession all the current standards/specifications for the Listed product.

U.L. - Underwriters Laboratories Inc.

ULC - Underwriters' Laboratories of Canada.

Unlisted Component – Because unlisted components are uncontrolled, and they do not fall under a third party follow up program, ITS may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process.

Use of Mark - The Components containing the Intertek Certification Mark (i.e. ink stamps, labels) must be kept in a secure area, preferably locked and must not leave the designated manufacturing plant(s) location(s) unless authorized by Intertek. Records on the use of the mark are to be maintained up-to-date. The Intertek Certification Mark and associated product identification must be clearly visible and legible when applied to the finished product. Products to be marked must have successfully passed the production tests and scrutiny of the quality control personnel, determining that the product complies with the specifications stated in this Report. Failure to comply with procedures constitutes ground for withdrawal of Intertek authorization to use the Intertek Certification Mark.

Ordering Labels - It is the responsibility of the Applicant to ensure that an adequate stock of labels is maintained. Label quantities in stock are indicated on all packing slips issued by Intertek.

Modification Procedure - Intertek may approve modifications of a product based on an additional evaluation or tests. Fees are charged for this service. If modifications are desired, such as substituting a different material, changing the cosmetic appearance, changing the rating, altering a component to simplify the manufacturing or improve the product, or any other change, the following procedure must be followed:

1. Write the Intertek office that issued this Report requesting an evaluation of the modification required. Include a clear description and detailed drawings if required showing exactly what is involved, and state your reason for wanting to make the modifications.
2. Wait until written authorization is received from Intertek complete with additional or revised pages to be inserted into your Report. Only after written authorization is received may the Applicant proceed with the modification.

INITIAL FACTORY AUDIT

Purpose - The purpose of this audit is to ensure the following:

1. The Plant Manager, Foreman and Quality Control Personnel are familiar with this Report.
2. The Plant Quality Control Program will assure that the product is manufactured to the requirements in this Report.
3. Key personnel are familiar with and recognize the need for Follow-up Service Inspections as well as proper handling of the Intertek Certification Mark and the use of log sheets, where

applicable.
4. The duties of the Controller of the Intertek Certification Mark are properly understood.

Equipment or Supplies Needed

1. Applicable Specifications.
2. Applicable Standards.
3. Supply of log sheets where applicable.
4. Intertek Certification Mark Controller instruction sheet with sample log sheet.
5. Supply of open stock/custom labels or stamp, etc.

Initial Factory Audit Procedures - The initial inspection (pre-arranged with date and time agreeable to both the Applicant and the Intertek Field Representative) will consist of an initial meeting with the Plant Manager, Plant Foreman, Quality Control Manager and other key personnel. The initial meeting will cover a complete review of the Report and production facilities.

INTERTEK FOLLOW-UP SERVICE INSPECTIONS

The Intertek Field Representative shall determine that the product is manufactured in accordance with this Report, and that label procedures are followed.

Label Control - Record serial numbers of labels if applicable, in the plant. Inspect label log sheets. The following information should be recorded in the label log sheets by the manufacturer:

1. Label numbers, date labeled or shipped, product labeled, and destination.
2. Labels removed from, returned, freight damage, or rejected products should be picked up.

Examination of Product - At each Follow-up Service Inspection the Intertek Field Representative shall determine that the product which is intended to bear the Intertek Certification Mark is manufactured in accordance with the specified standards as per the test program and stated herein. The Intertek Field Representative shall pay special attention to the following:

1. Materials used must be free from defects that could affect the performance of the product.
2. Suitable protective packaging.
3. Complete safety and installation instructions are supplied with each product. No modification to these instructions shall be made without Intertek authorization.

Examination of Applicant's Inspection Programs - At each Follow-up Service Inspection, the Intertek Field Representative shall determine that the Applicant’s methods of inspection conform to the specifications included in the quality control procedures. The Intertek Field Representative will pay attention to:

1. The Applicant’s quality control report is complete and conforms to the procedure accepted by Intertek and included in this Report.
2. The equipment used for inspection conforms to the specification in the quality control procedure.The work area is suitable for a good quality control program.
3. Regular manufacturing production line tests are carried out by the Applicant.

Discrepancies - The Intertek Field Representative shall complete his Follow-up Service Inspection sheet detailing the discrepancy and issue a Variance Report. A signature on the Intertek Field Representative's copy shall be obtained from the Applicant's representative, giving evidence that they were issued a copy. Copies shall be forwarded to the Intertek Regional Certification Office.

The Intertek Field Representative shall require that the Applicant remove the Intertek Certification Mark from all products which do not meet the conformance requirements of this Report, and advise the Applicant not to use the Intertek Certification Mark until further advised.

In the case of minor cosmetic changes the Intertek Field Representative will note the variance on his Follow-up Services Inspection Report and determine the action to be taken by the Applicant. Actions may be to have the Applicant apply to Intertek for an evaluation of the variance and if approved, the subsequent modification of this Report, or to have the Applicant agree to correct the variance on all affected units.

On subsequent routine Follow-up Service Inspections, the Intertek Field Representative will pay special attention to any variances listed in previous Follow-up Inspection Reports. If it is found that a variance has not been corrected as agreed to by the Applicant, the Intertek Field Representative will contact Intertek Regional Certification Center for appropriate instructions. In extreme cases, service could be immediately suspended.

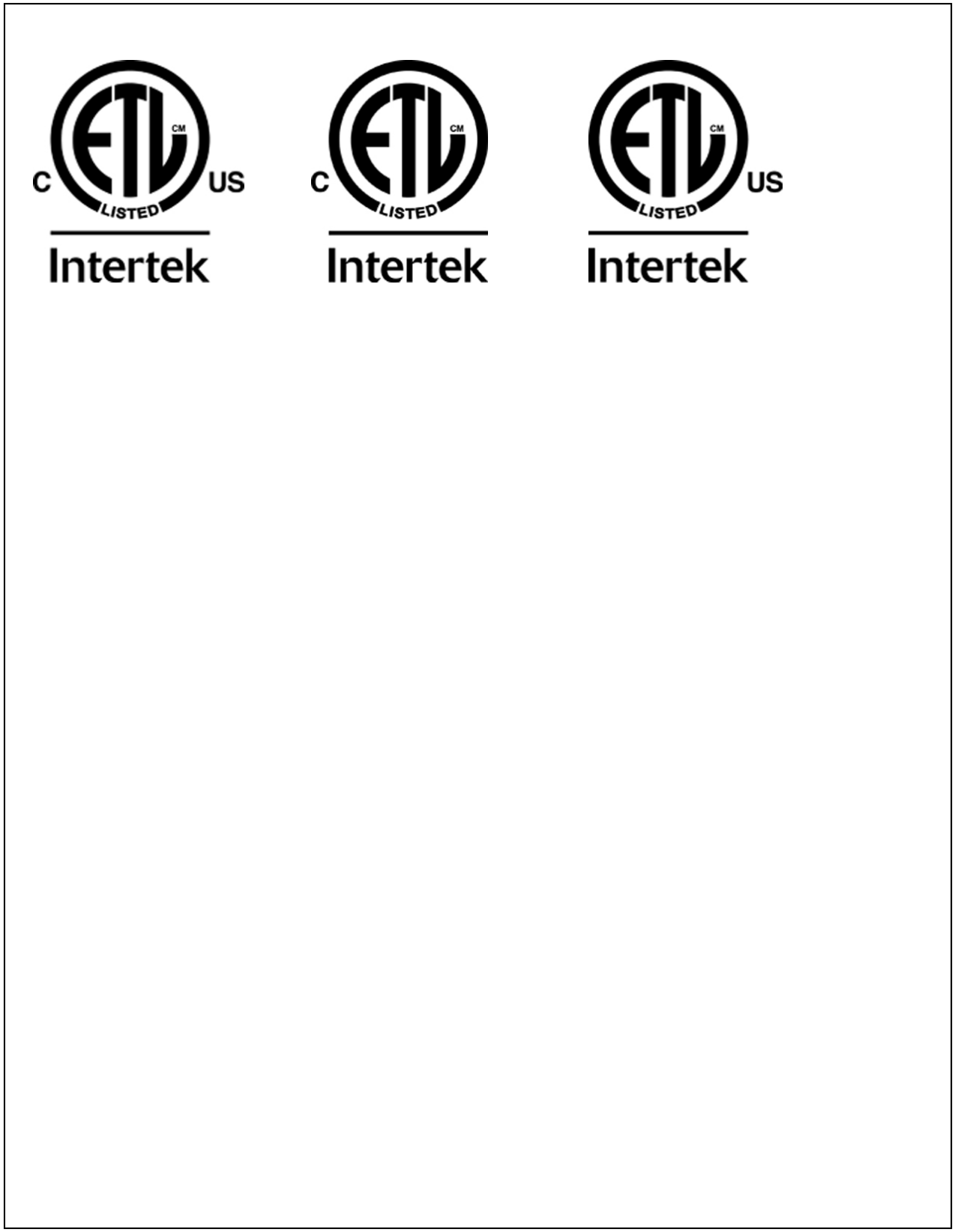
In the case of a difference existing between this Report and the product that could result in a safety hazard, the Intertek Field Representative will fill out a Variance Report. The determination of what constitutes a variance is left to the discretion of the Intertek Field Representative, but any modification or change that could affect the operating characteristics of a product must be reported. The action taken by Intertek will be:

1. Removal of all labels or the Intertek Certification Mark or halting the shipping of the affected product until the Applicant corrects the variance, or has an evaluation carried out by Intertek, the modification approved, and this Report updated.
2. For units already shipped, procedures must be taken per Intertek SOP 7.14.2.

ADDITIONAL REQUIREMENTS DRAWING INDEX

Intertek ETL Certification Marks

Intertek ETL Certification Marks



QUALITY CONTROL INFORMATION

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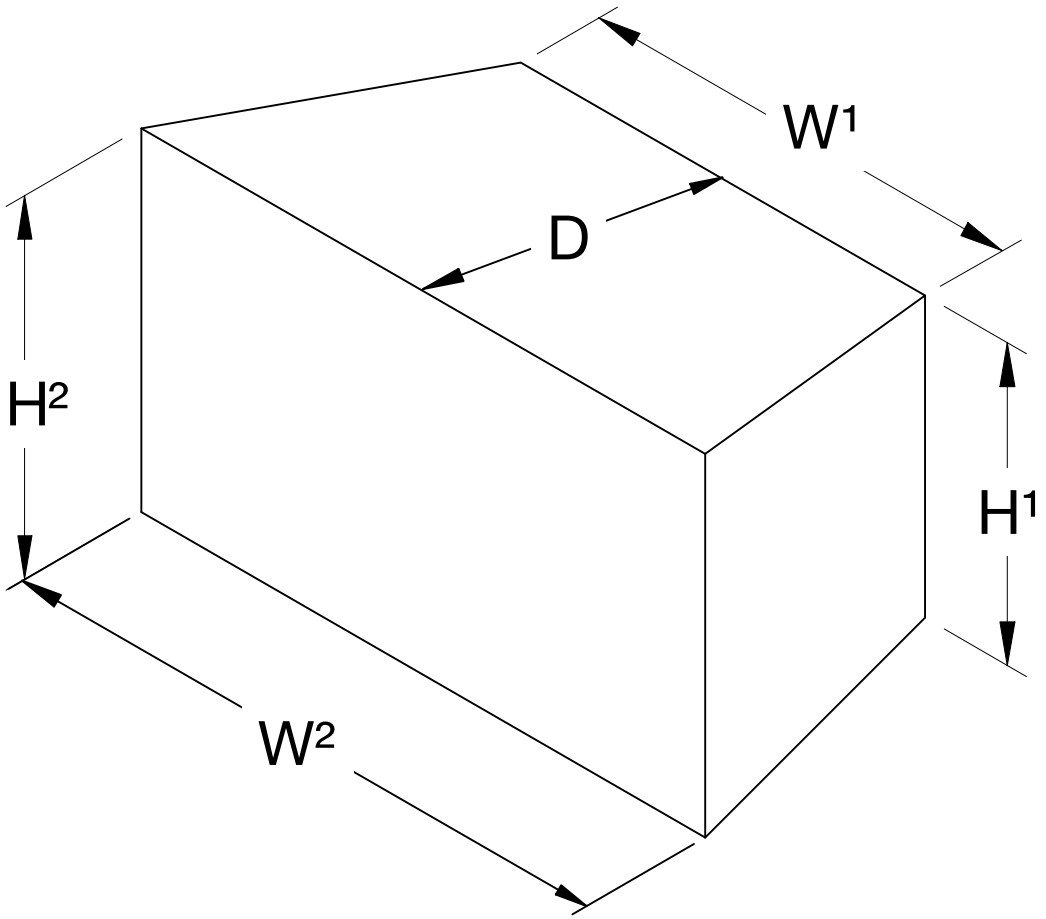
Firebox Volume For Fireplace

Serie: HE350

Model: HE350, FP-15 Waterloo ,FP-15A Waterloo, Horizon, Monaco XL and WFP100



W¹: 21.0 in D: 17.9 in H¹: 14.5 in

W²: 30.5 in H²: 17.7 in

Volume: 7405 in^3

Volume: 4.29 ft^3