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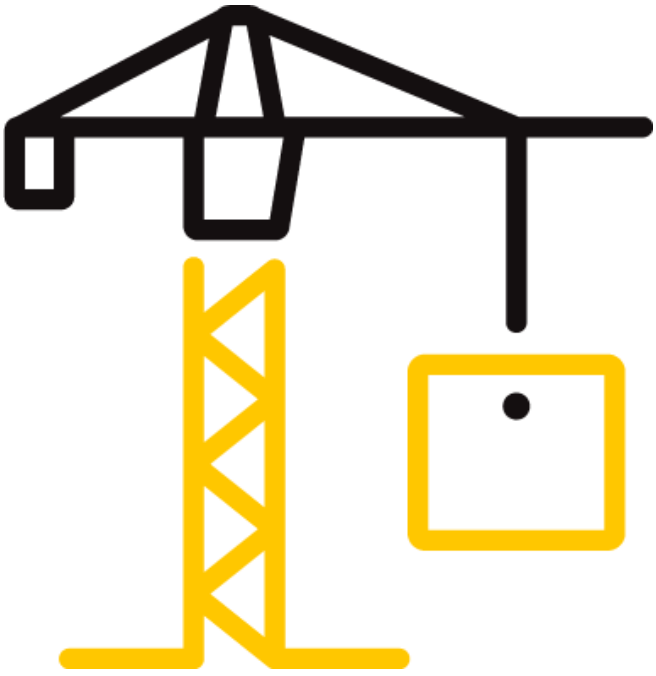
STOVE BUILDER INTERNATIONAL INC.
TEST REPORT

SCOPE OF WORK
EPA EMISSIONS TESTING/3.3 SERIES (OSBURN 3300, AUSTRAL III, MYRIAD III, LEGEND III (LÉGENDE III), ESCAPE 1900, BLACK STAG II, SOLUTION 3.3, GATEWAY 3300)/ WOOD FUEL ROOM HEATER

REPORT NUMBER
103994967MTL-001
TEST DATE(S)
06/03/19 - 06/06/19

ISSUE DATE	**[REVISED DATE]**
09/17/19	FIRST ISSUE



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22

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Report No.: 103994967MTL-001
Date: 09/17/19

REPORT ISSUED TO

STOVE BUILDER INTERNATIONAL, INC.
250 de Copenhague
ST-Augustin-de-Desmaures, Qc, G3A 2H3

SECTION 1

SCOPE

Intertek Testing Services NA (Intertek) has conducted testing for Stove Builder International Inc., on model Osburn 3300 Wood Burning Room Heater to evaluate all applicable performance requirements included in "Determination of particulate matter emissions from wood heaters." Osburn 3300 is a representative model of the 3.3 Series. This series includes the following models: Austral III, Myriad III, Legend III (Légende III for french market), Escape 1900, Black Stag II, Solution 3.3 and Gateway 3300. See PEV # 10399496MTL-002 for more details.

The test was conducted to determine if the unit is in accordance with U.S EPA requirements under EPA 40 CFR Part 60 "Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces". This evaluation was conducted on June 3rd to June 6th 2019. The following test methods were applicable:

ASTM E2515-11- Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel

ASTM E3053-17 - Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel. It is based on the ALT-125 send by EPA on February 28th, 2018.

CSA B415.1-10 - Performance Testing of Solid-Fuel-Burning Heating Appliances

Testing was performed by the undersigned at client's facility.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

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SECTION 2
SUMMARY OF TEST RESULTS

The appliance tests resulted in the following performance:

Particulate Emissions: 0.95 g/hr
Carbon Monoxide Emissions: 1.02 g/min
Heating Efficiency: 71% (Higher Heating Value Basis)

For INTERTEK B&C:

COMPLETED BY:	Claude Pelland, P.E.	**REVIEWED BY:**	Brian Ziegler
TITLE:	Manager B&C, Intertek, Quebec	**TITLE:**	Technical Team Leader - Hearth
SIGNATURE:		**SIGNATURE:**	
DATE:	09/17/19	**DATE:**	12/19/19

aaa:bbb

SECTION 3
TEST METHOD(S)

The specimen was evaluated in accordance with the following:
ASTM E2515-11- Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel

ASTM E3053-17 - Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel. It is based on the ALT-125 send by EPA on February 28th, 2018.

CSA B415.1-10 - Performance Testing of Solid-Fuel-Burning Heating Appliances

SECTION 4
MATERIAL SOURCE

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 the manufacturer's instructions without difficulty.

Following assembly, the unit was placed on the test stand. Prior to beginning the emissions tests, the manufacturer operated the unit for a minimum of 50 hours at medium burn rates to break-in the stove. The unit was found to be operating satisfactory during this break-in. The 50 plus hours

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of pre-burning were conducted from May 21st to May 28th, 2019. The fuel used for the break-in process was beech cordwood.

Following the pre-burn break-in process the unit was allowed to cool and ash and residue were removed from the firebox. The unit's chimney system and laboratory dilution tunnels were cleaned using standard wire brush chimney cleaning equipment. On May 29th, 2019, the unit was set-up for testing.

SECTION 5
EQUIPMENT

Equipment	INV Number	Calibration Due	MU
Handheld Thermocouple Thermometer	SBI-132	February 22, 2020	±0.5°F
Floor scale	SBI-014	March 31, 2020	± 0.020 kg
DGM system 1	SBI-046	November 22, 2019	±2% F.S.
DGM System 2	SBI-047	November 21, 2019	±2% F.S.
Reference DGM	SBI-103	October 26, 2019	±2% F.S.
5 kg weight	SBI-190	October 02, 2023	±0.2 g
Temperature acquisition	SBI-197	October 26, 2019	±0.5°F
Pitot tube type S	SBI-104	June 26, 2019	±0.58
Analytical scale	SBI-206	March 31, 2020	±0.13 mg
Table scale	SBI-222	March 31, 2020	±0.88 g
100 mg weight	SBI-237	October 09, 2023	±0.0025 mg
10 g weight	SBI-238	October 09, 2023	±0.012 mg
Anemometer	SBI-097	June 26, 2019	±15 ft/min
Magnesense (tunnel)	SBI-253	June 27, 2019	±0.00015" H2O
Magnesense (draft)	SBI-254	October 10, 2019	±0.00015" H2O
DGM system 3	SBI-276	November 25, 2019	±2% F.S.
Pressure transmitter	SBI-293	June 26, 2019	±9.4e-003 psi
Pressure transmitter	SBI-298	October 15, 2019	±9.5e-003 psi
Vacuum transmitter	SBI-302	June 27, 2019	±5.8e-003 in.HG
Vacuum transmitter	SBI-305	October 12, 2019	±6.1e-003 in.HG

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Relative humidity temperature meter	SBI-212	June 19, 2019	±3%
200 g weight	SBI-312	October 09, 2023	±0.06 mg

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Guillaume Thibodeau-Fortin	Stove Builder International inc.
Claude Paré	Stove Builder International inc.
Claude Pelland, P.E.	Intertek B&C

SECTION 7
TEST PROCEDURE

From June 3rd to June 6th, 2019, the unit was tested for EPA emissions. For Wood stoves, the test was conducted in accordance with ASTM E3053-17 and ASTM E2515-11. The fuel used for the test run was beech cordwood.

The applicable EPA regulatory limits are:

Step 1 – 2015 – 4.5 grams per hour.

Step 2 – 2020 – 2.0 grams per hour with crib, 2.5 grams per hour with cordwood.

MANUFACTURER LOADING PROCEDURE

Kindling (13.5 lbs) - Split the start-up fuel log into 8 pieces. Crisscross the 8 pieces on the brick, leaving some space between each wood pieces (3 in the bottom, 3 in the middle, 2 on the top). Crisscross the kindling on the top of the start-up fuel. The kindling is made of between 10-12 finly split piece of wood that are 10% of moisture content. Place crumbled newspaper on top of the kindling (5 full sheets). Light up the paper and let the door ajar at 90° until the flue temperature reaches 500°F, then close the door. The fan is always OFF.

Low&Medium Pre-load (high fire) (27.9 lbs) - When there is coal bed of 3.5 lbs left, break ashes and level coal bed, then add pre-load. Place the two smallest pieces in the back, East-West orientation, one over the other. Then put the biggest piece in middle and front (6 pieces in total). Leave tree inches or air space between the rear bricks and one inch between all the pieces column. Let the door ajar until flue temperature is around 575°F. Close the door and let burn until the

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weight is down to target. When coal bed weight is around 10.5 lbs, stir logs. At 6.7 lbs, slightly level the coal bed. Let the door ajar by one inch for one minute. There should be approximately 6.5 lbs of coal bed.

Low fire load (33.5 lbs) - Place the two smallest pieces in the back, East-West orientation, one over the other. Then put the biggest piece in middle and front (6 pieces in total). Leave tree inches or air space between the rear bricks and one inch between all the pieces column. Let the door ajar until flue temperature is around 575°F. Close the door and let burn until the weight is down to initial coal bed weight. When the oxygen falls below 7%, close the primary air control to 50%. Close the primary air control completely at 16 min from beginning. Start the fan at minimum speed at 30 minutes.

Medium fire load (33.5 lbs) - Same as for low fire load, but close the primary air control on a rod of ¼" of outside diameter at 16 min. Remove the rod. Start the fan at minimum speed at 30 minutes.

High fire load (27.9 lbs) – Same as Low&Medium Pre-load. Stop the test when 90% of the high fire load has been consumed.

TEST SET-UP DESCRIPTON

A 6" flue is connected to a standard 6" diameter vertical single wall pipe and insulated chimney system was installed to 15' above floor level. The single wall pipe extended to 8 feet above the floor and insulated chimney extended the remaining height.

AIR SUPPLY SYSTEM

Combustion air enters at the bottom of the heater, which is directed to the firebox. All gases exit through the 6" flue located on top of the heater.

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 an average moisture content between 18% and 28% on a dry basis. Cordwood fuel was loaded from side to side into the firebox per manufacturer's instructions.

SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel at point 20 feet from the tunnel entrance. The tunnel has two elbows and two mixing baffles in the system ahead of the sampling section. (See Figure 3.) The sampling section is a continuous 13-foot section of 8-inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a type

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"S" Pitot tube located 100 inches from the beginning of the sampling section. The dry bulb thermocouple is located on the pitot tube. Tunnel samplers are located 48 inches downstream of the Pitot tube and 36 inches upstream from the end of this section. (See Figure 1.)

Stack gas samples are collected from the steel chimney section 8 feet ± 6 inches above the scale platform.

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FIGURE 1 – DILUTION TUNNEL

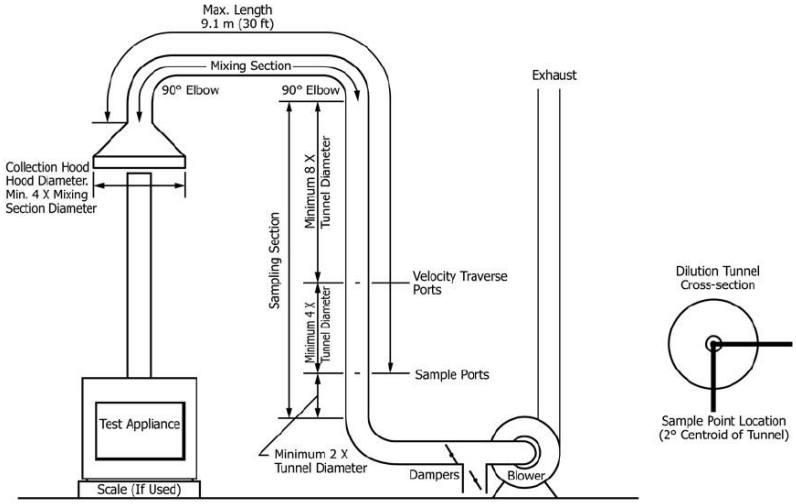

FIGURE 2 – STACK GAS SAMPLE TRAIN

SAMPLING METHODS

PARTICULATE SAMPLING

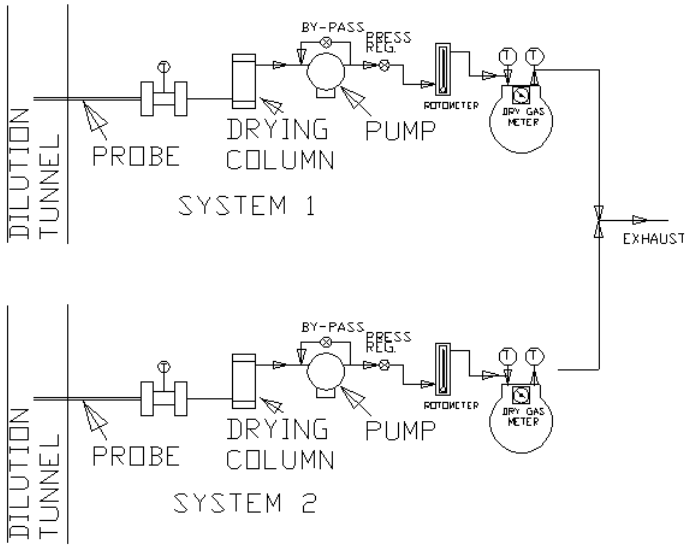

Figure 2

Particulates were sampled in strict accordance with ASTM E2515-2011. This method uses two identical sampling systems with Gelman A/E 61631 binder free, 47-mm diameter filters. The dryers used in the sample systems are filled with “Drierite” before each test run. In order to measure first-hour emissions rates, a third filter set is prepared at one hour into the test run, the

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filter sets are changed in one of the two sample trains. The two filter sets used for this train are analyzed individually to determine the first hour and total emissions rate.

At the conclusion of each test program the dry gas meters are checked against our 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 6 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 .1%, giving an accuracy higher than the ±2% required by the standard.

STACK SAMPLE ROTAMETER

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

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 (values are recorded). At the conclusion of a test, the instruments are checked again with zero, span and calibration gases (values are recorded only). 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 three-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.

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TEST METHOD PROCEDURES

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 10 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 the vacuum was typically less than 2 inches of mercury. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

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.

PM SAMPLING PROPORTIONALITY

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

DEVIATIONS FROM STANDARD METHOD:

The following deviations were requested by EPA:

Changes to ASTM E3053-17 are:

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

Changes to ASTM E2515-11 must be as followed:

1. The filter temperature must be maintained between 80 and 90 Degrees F during testing.
2. Filters must be weighed in pairs to reduce weighing error propagation.
3. Sample filters must be Pall TX-40 or equivalent Teflon coated glass fiber, and of 47 mm,90mm, 100mm of 110mm in diameter.
4. Only one point is allowed outside the +/- 10% proportionality range per test run.

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SECTION 8
TEST CALCULATIONS

Weight of test fuel load, dry basis ASTM E3053

$$M_{Fldb} = \Sigma((M_{FLnwb})(100)/(100+MC_{FLn}))$$

where:

M_{FLdb} = weight of test fuel load, dry basis, lb (kg);
M_{FLnwb} = weight of each test fuel piece, *n*, in test fuel load per 8.4.1, wet basis, lb (kg);
MC_{FLn} = average fuel moisture of test fuel piece, *n*, in test fuel load, % dry basis; and
n = individual test fuel pieces that comprise the test fuel load, as applicable.

Weighted Average Determination ASTM E3053

$$Vi_{WA} = 0.4(Vi_{LAve)} + 0.4(Vi_{MAve}) + 0.2(Vi_{HAve})$$

where:

Vi_{WA} = Weighted average for variable *i*;
Vi = Test result variable (Particulate Matter: g/h, g/kg, lb/MMBtu; % Overall Efficiency: HHV, LHV; Carbon Monoxide: g/h, etc.)
Vi_{LAve} = Arithmetic average for variable *Vi* for all test runs (except per 8.6.13 or 8.9) that are included in the low fire burn rate category
Vi_{MAve} = Arithmetic average for variable *Vi* for all test runs (except per 8.6.13 or 8.9) that are included in the medium fire burn rate category;
Vi_{HAve} = Arithmetic average for variable *Vi* for all test runs (except per 8.9) that are included in the high fire burn rate category.

NOMENCLATURE FOR ASTM E2515:

A = Cross-sectional area of tunnel m2 (ft2).
B_{ws} = Water vapor in the gas stream, proportion by volume (assumed to be 0.02 (2.0 %)).
C_p = Pitot tube coefficient, dimensionless (assigned a value of 0.99).
c_r = Concentration of particulate matter room air, dry basis, corrected to standard conditions, g/dscm (gr/ dscf) (mg/dscf).
c_s = Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscm (gr/dscf) (mg/dscf).
E_T = Total particulate emissions, g.
F_p = Adjustment factor for center of tunnel pitot tube placement.
$F_p = V_{stravv}/V_{scent}$

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K_P = Pitot Tube Constant, 34.97 $\frac{m}{\sec}\left[\frac{\left(\frac{g}{g}\blacksquare mole\right)(mm\ Hg)}{(K)(mm\ water)}\right]^{\frac{1}{2}}$

or

= Pitot Tube Constant, 85.49 $\frac{ft}{\sec}\left[\frac{\left(\frac{lb}{lb}-mole\right)(in\ Hg)}{(R)(in\ water)}\right]^{\frac{1}{2}}$

L_a = Maximum acceptable leakage rate for either a pretest or post-test leak- check, equal to 0.0003 m3/min (0.010 cfm) or 4 % of the average sampling rate, whichever is less.

L_p = Leakage rate observed during the post-test leak-check, m3/min (cfm).

m_p = mass of particulate from probe, mg.

m_f = mass of particulate from filters, mg.

m_g = mass of particulate from filter gaskets, mg.

m_r = mass of particulate from the filter, filter gasket, and probe assembly from the room air blank filter holder assembly, mg.

m_n = Total amount of particulate matter collected, mg.

M_s = the dilution tunnel dry gas molecular weight (may be assumed to be 29 g/g mole (lb/lb mole).

P_{bar} = Barometric pressure at the sampling site, mm Hg (in. Hg).

P_g = Static Pressure in the tunnel (in. water).

P_R = Percent of proportional sampling rate.

P_s = Absolute average gas static pressure in dilution tunnel, mm Hg (in. Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

Q_{std} = Average gas flow rate in dilution tunnel.

$Q_{std} = 60\ (1 - B_{ws})\ V_s\ A\ [T_{std}\ P_s/T_s\ P_{std}]$

dscm/min (dscf/min).

T_m = Absolute average dry gas meter temperature, K (R).

T_{mi} = Absolute average dry gas meter temperature during each 10-min interval, *i*, of the test run.

$T_{mi} = (T_{mi(b)} + T_{mi(e)})/2$

where:

$T_{mi(b)}$ = Absolute dry gas meter temperature at the beginning of each 10-min test interval, i, of the test run, K (R), and

$T_{mi(e)}$ = Absolute dry gas meter temperature at the end of each 10-min test interval, i, of the test run, K (R).

Ts = Absolute average gas temperature in the dilution tunnel, K (R).

Tsi = Absolute average gas temperature in the dilution tunnel during each 10-min interval, i, of the test run, K (R).

$T_{si} = (T_{si(b)} + T_{m=si(e)})/2$

where:

$T_{si(b)}$ = Absolute gas temperature in the dilution tunnel at the beginning of each 10-min test interval, i, of the test run, K (R), and

$T_{si(e)}$ = Absolute gas temperature in the dilution tunnel at the end of each 10-min test interval, i, of the test run, K (R).

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V_m = Volume of gas sample as measured by dry gas meter, dcm (dcf).

V_{mc} = Volume of gas sampled corrected for the post test leak rate, dcm (dcf).

V_{mi} = Volume of gas sample as measured by dry gas meter during each 10-min interval, i, of the test run, dcm.

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions.

$$V_{m(std)} = K_1 V_m Y [(P_{bar} + (\Delta H/13.6))/T_m]$$

where:

K_1 = 0.3855 K/mm Hg for SI units and = 17.64 R/in. Hg for inch-pound units.

$$V_{m(std)} = K_1 V_{mc} Y [(P_{bar} + (\Delta H/13.6))/T_m]$$

where:

V_{mc} = Vm– (Lp– La)u

V_{mr} = Volume of room air sample as measured by dry gas meter, dcm (dcf), and

$V_{mr(std)}$ = Volume of room air sample measured by the dry gas meter, corrected to standard conditions.

$$V_{m(std)} = K_1 V_{mr} Y [(P_{bar} + (\Delta H/13.6))/T_m]$$

Where:

K_1 = 0.3855 K/mm Hg for SI units and = 17.64 R/in. Hg for inch-pound units, and

V_s = Average gas velocity in the dilution tunnel.

$$V_s = F_p K_p C_p (\sqrt{\Delta P_{avg}})(\sqrt{(T_s/P_s M_s)})$$

V_{si} = Average gas velocity in dilution tunnel during each 10-min interval, i, of the test run.

$$V_{si} = F_p K_p C_p (\sqrt{\Delta P_i})(\sqrt{(T_{si}/P_s M_s)})$$

V_{scent} = Average gas velocity at the center of the dilution tunnel calculated after the Pitot tube traverse.

V_{strav} = Average gas velocity calculated after the multipoint Pitot traverse.

Y = Dry gas meter calibration factor.

ΔH = Average pressure at the outlet of the dry gas meter or the average differential pressure across the orifice meter, if used, mm water (in. water).

ΔP_{avg} = Average velocity pressure in the dilution tunnel, mm water (in. water).

ΔP_i = Velocity pressure in the dilution tunnel as measured with the Pitot tube during each 10-min interval, i, of the test run.

$$\Delta P_i = (\Delta P_{i(b)} + \Delta P_{i(e)})/2$$

where:

$\Delta P_{i(b)}$ = Velocity pressure in the dilution tunnel as measured with the Pitot tube at the beginning of each 10-min interval, i, of the test run, mm water (in. water), and

$\Delta P_{i(e)}$ = Velocity pressure in the dilution tunnel as measured with the Pitot tube at the end of each 10-min interval, i, of the test run, mm water (in. water).

θ = Total sampling time, min.

10 = ten min, length of first sampling period.

13.6 = Specific gravity of mercury.

100 = Conversion to percent.

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TOTAL PARTICULATE WEIGHT – ASTM E2515

$$M_n = m_p + m_f + m_g$$

PARTICULATE CONCENTRATION – ASTM E2515

$$C_s = K_2(m_n/V_{m(std)})\ g/dscm\ (g/dscf)$$

where:

K_2 = 0.001 g/mg

TOTAL PARTICULATE EMISSIONS (g) – ASTM E2515

$$E_T = (C_s - C_r)Q_{std}\theta$$

PROPORTIONAL RATE VARIATION (%) – ASTM E2515

$$PR = [\theta(V_{mi}\ V_s\ T_m\ T_{si})/(10(V_m\ V_{si}\ T_s\ T_{mi})] \times 100$$

MEASUREMENT OF UNCERTAINTY – ASTM E2515

$$MU_{weighing} = \sqrt{0.1^2} \bullet X$$

GENERAL FORMULA – ASTM E2515

$$uY = \sqrt{((\delta Y/\delta x_1) \times u_1)^2 + \ldots + ((\delta Y/\delta x_n) \times u_n)^2}$$

Where:

$\delta Y/\delta x_i$ = Partial derivative of the combining formula with respect to individual measurement xi,
u_i = is the uncertainty associated with that measurement.

TOTAL PARTICULATE EMISSIONS – ASTM E2515

$$E_T = (c_s - c_r)\ Q_{std}\ \theta$$

where:

c_s = sample filter catch/(sample flow rate x test duration), g/dscf,
c_r = room background filter catch/(sample flow x sampling time), g/dscf,
Q_{std} = average dilution tunnel flow rate, dscf/min, and
θ = sampling time, minutes.

MU OF c_s

$c_s = F_c/(Q_{sample} \times \theta) = 0.025/(0.25 \times 180) = 0.0005555$
$\delta c_s/\delta F_c = 1/Q_{sample} \bullet \Theta = 1/0.25 \bullet 180 = 0.0222$
$\delta c_s/\delta Q_{sample} = -F_c/Q^2_{sample} \bullet \Theta = -0.025/0.25^2 \bullet 180 = -0.00222$
$\delta c_s/\delta\Theta = -F_c/Q_{sample} \bullet \Theta^2 = -0.025/0.25 \bullet 180^2 = -0.000003$
$MUc_s = \sqrt{(0.00027 \bullet 0.0222)^2 + (0.0025 \bullet - 0.00222)^2}$
$\sqrt{} + (0.1 \bullet - 0.000003)^2 = 0.0000091g$
Thus, c_s would be 0.555 mg/dscf ± 0.0081 mg/dscf at 95% confidence level.

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MU OF c_r

$c_r = BG_c/(QBG \times \theta) = 0.002/(0.15 \times 180) = 0.000074$
$\delta c_r/\delta BG_c = 1/Q_{BG} \bullet \Theta = 1/0.15 \bullet 180 = 0.03704$
$\delta c_r/\delta Q_{BG} = -BG_c/Q^2_{BG} \bullet \Theta = -0.002/0.15^2 \bullet 180 = -0.0004938$
$\delta c_r/\delta \Theta = -BG_c/Q_{BG} \bullet \Theta^2 = -0.002/0.15 \bullet 180^2 = -0.0000004$
$MUc_r = \sqrt{(0.00027 \bullet 0.03704)^2 + (0.0015 \bullet - 0.0004938)^2}$
$\sqrt{} + (0.1 \bullet - 0.0000004)^2 = 0.00001g$
Thus, c_r would be 0.074 mg/dscf ± 0.01 mg/dscf at 95% confidence level.

E_T AND MU_{ET}

$E_T = (c_s - c_r)\, Q_{sd}\, \theta = (0.000555 - 0.000074) \times 150 \times 180 = 13.00g$
$\delta E_T/\delta c_s = Q_{std} \bullet \Theta = 150 \bullet 180 = 27{,}000$
$\delta E_T/\delta c_r = Q_{std} \bullet \Theta = 150 \bullet 180 = 27{,}000$
$\delta E_T/\delta Q_{std} = c_s \bullet \Theta - c_r \bullet \Theta = 0.000555 \bullet 180 - 0.000074 \bullet 180 = 0.08667$
$\delta E_T/\delta \Theta = c_s \bullet Q_{std} - c_r \bullet Q_{std} = 0.000555 \bullet 180 - 0.000074 \bullet 180 = 0.07222$
$MU_{ET} = \sqrt{(27{,}000 \bullet 0.0000081)^2 + (27{,}000 \bullet 0.00001)^2\ (0.08667 \bullet 3)^2}$
$\sqrt{} + (0.07222 \bullet 0.1)^2 = 0.436$
Thus the result in this example would be:
ET = 13.00g ± 0.44 g at a 95% confidence level.

EFFICIENCY – CSA B415.1

The change in enthalpy of the circulating air shall be calculated using the moisture content and temperature rise of the circulating air, as follows:

$$\Delta h = \Delta t\ (1.006 + 1.84x)$$

Where:
Δh = change in enthalpy, kJ/kg
Δt = temperature rise, °C
1.006 = specific heat of air, kJ/kg °C
1.84 = specific heat of water vapor, kJ/kg °C
x = humidity ratio, kg/kg

The equivalent duct diameter shall be calculated as follows:

$$ED = 2HW/H+W$$

Where:
ED = equivalent duct diameter
H = duct height, m

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W = duct width, m

The air flow velocity shall be calculated as follows:

$$V = F_p \times C_p \times 34.97 \times \sqrt{T/28.56(P_{baro} + P_s)}$$

where
V = velocity, m/s
F_P = Pitot tube calibration factor determined from vane anemometer measurements
C_P = Pitot factor
= 0.99 for a standard Pitot tube or as determined by calibration for a Type S Pitot tube
34.97 = Pitot tube constant
Note: The Pitot tube constant is determined on the basis of the following units: $m/s[g/g\ mole\ (mm\ Hg)/(K)(mm\ H_2O)]^{0.5}$
ΔP = velocity pressure, mm H2O
T = temperature, K
28.56 = molecular weight of air
P_{Baro} = barometric pressure, mm Hg
P_s = duct static pressure, mm Hg

The mass flow rate shall be calculated as follows:

$$m = 3600VAp$$

where:
m = mass flow rate, kg/h
V = air flow velocity, m/s
3600 = number of seconds per hour
A = duct cross-sectional area, m2
p = density of air at standard temperature and pressure (use 1.204 kg/m3)

The rate of heat release into the circulating air shall be calculated using the air flow and change in enthalpy, as follows:

$$\Delta e = \Delta h \times m$$

Where:
Δe = rate of heat release into the circulating air, kJ/h
Δh = change in enthalpy of the circulating air, kJ/kg
m = mass air flow rate, kg/h

The heat output over any time interval shall be calculated as the sum of the heat released over each measurement time interval, as follows:

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$$E_t = \sum(\Delta e \times i) \text{ for } i = t_1 \text{ to } t_2$$

Where:
Et = delivered heat output over any time interval $t_2 – t_1$, kJ
i = time interval for each measurement, h

The average heat output rate over any time interval shall be calculated as follows:

$$e_t = E_t / t$$

where
e_t = average heat output, kJ/h
t = time interval over which the average output is desired, h

The total heat output during the burn shall be calculated as the sum of all the heat outputs over each time interval, as follows:

$$E_d = \sum(E_t) \text{ for } t = t_0 \text{ to } t_{final}$$

Where:
E_d = heat output over a burn, kJ/h (Btu/h)
E_t = heat output during each time interval, kJ/h (Btu/h)

The efficiency shall be calculated as the total heat output divided by the total energy input, expressed as a percentage as follows:

$$\text{Efficiency, \%} = 100 \times E_d / I$$

Where:
E_d = total heat output of the appliance over the test period, kJ/kg
I = input energy (fuel calorific value as-fired times weight of fuel charge), kJ/kg (Btu/lb)

SECTION 9
TEST SPECIMEN DESCRIPTION

The model from the 3.3 Series (Osburn 3300) Wood Fuel Room Heater is constructed of sheet steel. The outer dimensions are 33 5/8-inches deep, 34-inches high, and 24 1/4-inches wide. The unit has a door located on the front with a viewing glass.

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SECTION 10
TEST RESULTS

DESCRIPTION OF TEST RUNS:

RUN #1 (June 3rd 2019) Air control set fully opened, burn time was 200 minutes with a category High burn rate of 4.3 kg/hr. The door was open for 4 minutes after kindling, then closed. Loading occurred at 1 hour 5 minutes. Door was open for 3 minutes. The air control was fully opened. Start the fan at full speed.

RUN #2 (June 4th 2019) Air control set at the lowest burn rate, burn time was 630 minutes with a category "Low burn rate" of 1.2 kg/hr. Let the door ajar for 2 minutes, and then closed. The air control was opened for 15 minutes after loading time, and then set at the lowest burn rate. The fan was turned on at low speed at 30 minutes.

RUN #3 (June 5th 2019) - Invalid test run. Air control set at the targeted burn rate for medium burn rate. Let the door ajar for 3 minutes, and then closed. The air control was opened for 12 minutes and then set at the targeted burn rate (1/4" open). The fan was turned on at medium speed at 30 minutes. Flame disappeared after 2h19 of run time. Sampling system pump bypass were adjusted until maximum. Filters plugged at 3h25 run time. Proportionality was violated as per "Only one point is allowed outside the +/- 10% proportionality range per test run.". Sampling system 1 was at 90.01% at 210 minutes, 80.01% at 220 minute and 74.88% at 230 minutes. Pump stopped at 230 minutes.

RUN #4 (June 6th 2019) Air control set at the targeted burn rate, burn time was 510 minutes with a category "Medium burn rate" of 1.5 kg/hr. Let the door ajar for 4 minutes, and then closed. The air control was opened for 9 minutes and then set at the targeted burn rate (1/4" open). The fan was turned on at medium speed at 30 minutes.

TABLE 1 – EMISSIONS

RUN#	TEST DATE	BURN RATES (kg/hr)(Dry)	PARTICULATE EMISSION RATE (g/hr)	1st HOUR EMISSIONS (g)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (%HHV)
1	June 3rd 2019	4.3	2.86	**3.54**	**1.3**	70%
2	June 4th 2019	1.2	0.39	**1.83**	**1.1**	70%
3	June 5th 2019	3.3	11.44	**2.65**	**-**	-
4	June 6th 2019	1.5	0.55	**2.20**	**0.8**	73%

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TABLE 2 – TEST FACILITY CONDITIONS

RUN #	ROOM TEMP BEFORE (°F)	ROOM TEMP AFTER (°F)	BARO PRES BEFORE (in/Hg)	BARO PRES AFTER (in/Hg)	R. H. BEFORE (%)	R. H. AFTER (%)	AIR VEL BEFORE (ft/min)	AIR VEL AFTER (ft/min)
1	72	88	29.6	29.7	42	22	0	0
2	84	81	29.9	29.9	19	24	0	0
3	89	88	29.8	29.8	22	20	0	0
4	84	89	29.8	29.8	28	21	0	0

TABLE 3 – DILUTION TUNNEL FLOW RATE MEASUREMENTS AND SAMPLING DATA

RUN #	BURN TIME (min)	VELOCITY (ft/sec)	VOLUMETRIC FLOW RATE (dscf/min)	AVG TEMP (°R)	SAMPLE VOLUME (dscf)		PARTICULATE CATCH (mg)	
					1	2	1	2
1	200	17.02	314.92	580	31.166	31.049	4.6	4.8
2	630	17.37	339.34	554	102.302	100.717	2.1	1.8
3	230	17.18	325.39	570	35.626	36.052	20.9	21.1
4	510	17.34	331.19	565	85.229	83.884	2.3	2.4

TABLE 4 - DILUTION TUNNEL DUAL TRAIN PRECISION

RUN #	SAMPLE RATIOS		TOTAL EMISSIONS (g)		DEVIATION (%)	DEVIATION (g/kg)
	TRAIN 1	TRAIN 2	TRAIN 1	TRAIN 2		
1	2021	2029	9.296	9.737	2.32%	0.58%
2	2090	2123	4.388	3.821	6.92%	1.73%
3	2101	2076	43.906	43.802	0.12%	0.03%
4	1982	2014	4.558	4.833	2.92%	0.73%

TABLE 5 - GENERAL SUMMARY OF RESULTS

RUN #	BURN RATE (kg/hr)(dry) (OVERALL)	Change in Surface Temp (^{O}F)	INITIAL DRAFT (in/H_2O)	RUN TIME (min)	AVERAGE DRAFT (in/H_2O)
1	4.3	376	0.003	200	0.079
2	1.2	174	0.069	630	0.053
4	1.5	204	0.075	510	0.061

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TABLE 6 - CSA B415.1 RESULTS

BURN RATE (kg/hr)(dry)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (% HHV)	Heating Efficiency (% LHV)	HEAT OUTPUT (Btu/hr)
Low – 1.2	1.1	70%	75%	15,841
Medium – 1.5	0.8	73%	78%	20,376
High – 4.3	1.3	70%	76%	57,041

TABLE 7 – WEIGHTED AVERAGE CALCULATION

Test No.	Burn Rate	(E) Average Emission Rate g/hr	(CO) Average Emission Rate g/hr	Heat Output (Btu/hr)	HHV	LHV	(K) Weighting Factor	(KxE) g/hr	(K x CO) g/hr	(K x CO) g/min	(K x HHV)	(K x LHV)
2	1.2	0.39	64	15841	70	75	40%	0.16	25.6	0.43	28.0	30.2
4	1.5	0.55	50	20376	73	78	40%	0.22	19.8	0.33	29.0	31.2
1	4.3	2.86	80	57041	70	76	20%	0.57	15.9	0.27	14.1	15.2
TOTALS:							**100%**	**0.95**	**61.3**	**1.02**	**71.1**	**76.6**

SECTION 11
CONCLUSION

This test demonstrates that this unit is an affected facility under the definition given in the regulation. The emission rate of 0.95 g/hr meets the EPA requirements for the Step 2 limits.

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SECTION 12
PHOTOGRAPHS

Photo No. 1
Isometric view of unit

Photo No. 2
Typical load

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SECTION 13
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/17/19	N/A	Original Report Issue

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STOVE BUILDER INTERNATIONAL PRODUCT EVALUATION

PRODUCT EVALUATED
FW3200, OSBURN 3300

EVALUATION PROPERTY
U.S. ENVIRONMENTAL PROTECTION AGENCY 40 CFR PART 60

REPORT NUMBER
103994967-MTL003

ORIGINAL ISSUE DATE
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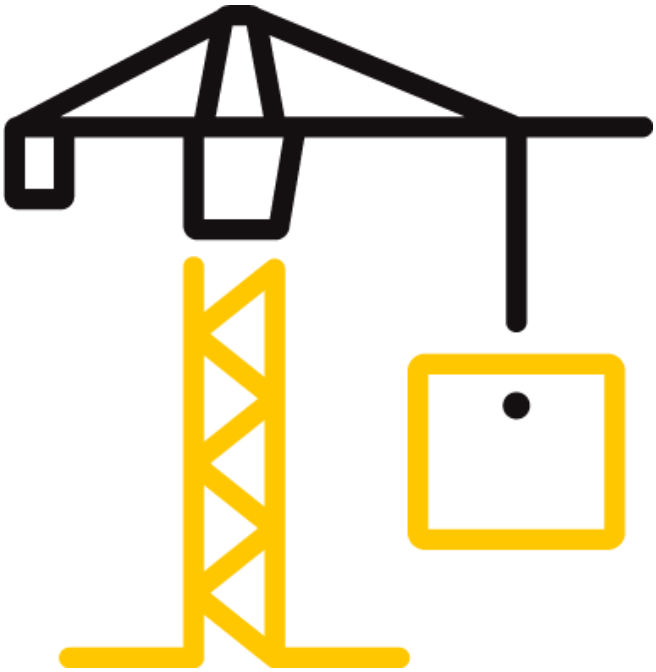

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PRODUCT EVALUATION FOR STOVE BUILDER INTERNATIONAL
Report No.: 103994967-MTL003
Date: 04/29/20

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PRODUCT EVALUATION FOR STOVE BUILDER INTERNATIONAL
Report No.: 103994967-MTL003
Date: 04/29/20

1 Introduction

Intertek Testing Services NA Ltd./Inc. (Intertek) is conducting a product evaluation for Stove Builder International, on FW3200 to evaluate if the differences with the tested Osburn 3300 will increase particulate matter emission rate limit. The evaluation is being conducted to determine if items listed in *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)* will show equivalency with the tested Osburn 3300.

2 Product and Assembly Description

2.1. Product Description:

The model tested Osburn 3300 Wood Fuel Room Heater is constructed of sheet steel. The outer dimensions are 30 1/2-inches deep, 31 1/2-inches high, and 21 7/8-inches wide. The unit has a door located on the front with a viewing glass.

Construction drawings are in appendix and named EM00001.

This PEV refers to a product described in Intertek Test Report 103994967-MTL001. Consult that document for additional information and specific test conditions.

2.2. Product Traceability:

The test specimen identification is as provided by the client and Intertek accepts no responsibility for any inaccuracies therein.

2.3. Product Certification:

Stove Builder International is an Intertek testing client and an Intertek Listing and Follow-up Service client. Stove model FW3200 is in the process of listing within Intertek. Currently, Intertek does not have any Listings for this model contained in Intertek's Directory of Listed Building Products.

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3 Reference Documents

As part of this evaluation, Intertek has directly or indirectly used the following referenced documents:

- *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)*
- SBI drawings number: CB00023-V01 and EM00001
- Intertek Testing Report No.: 103994967MTL-001

4 Evaluation Method

The model listed in subject is a free-standing stove model based on the construction of the Osburn 3300. The combustion room of the mentioned units are identical so is their combustion air intake.

The variations are esthetical only and they are as follows:

- The loading door differs by shape;
- The façade differs by shape;
- The pedestal or leg differs by shape and materials;
- The decorative side panels differ by shape.

This investigation was authorized by SBI in April 2020. Drawings numbers CB00023-V01 and EM00001 were received on April 29th 2020 at the Intertek Lachine facility. Drawings can be found in Spec-Direct #51547.

The Models mentioned in Subject shares similar features and are designed after an EPA certified wood burning stove Model Osburn 3300.

Design drawings were evaluated to determine similarities between the above-mentioned models. Drawings show internal fire box size to be the same at 18 1/4" deep, 13 5/8" high (from brick to higher tube) and 18 3/4" wide. All appliances share a 6" flue collar and have the same primary air intake controls. Differences noted during this evaluation were on the door shape, pedestal, legs, decorative side panels as well as the typical look of the façade of all unit' inspired by their typical branding look.

5 Conclusion

Intertek has conducted this product evaluation for Stove Builder International, FW3200, to evaluate if the differences with the tested Osburn 3300 will increase particulate matter emission rate limit. The evaluation was conducted to determine if items listed in *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)* will show equivalency with the previously tested Osburn 3300.

Based on the information contained and referenced herein, it is Intertek's professional judgment based on sound engineering principles that the following is true:

- Changes made are only aesthetical and do not increase particulate matter emission rate limit.

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Date: 04/29/20

INTERTEK TESTING SERVICES NA LTD.

Reported by: _____

Claude Pelland P.Eng.
Manager B&C Intertek, Quebec
Intertek Lachine

Reviewed by: Brian Ziegler_____

Project Team Leader
Building Products Division

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6 APPENDIX

Drawing # CB00023-V01,
Drawing # EM00001

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Date: 04/29/20

7 LAST PAGE & REVISION SUMMARY

DATE	SUMMARY	REPORTER	REVIEWER
04/29/20	Original	Claude Pelland	Brian Ziegler

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STOVE BUILDER INTERNATIONAL PRODUCT EVALUATION

PRODUCT EVALUATED
BLACK STAG II

EVALUATION PROPERTY
U.S. ENVIRONMENTAL PROTECTION AGENCY 40 CFR PART 60

REPORT NUMBER
103994967MTL-004

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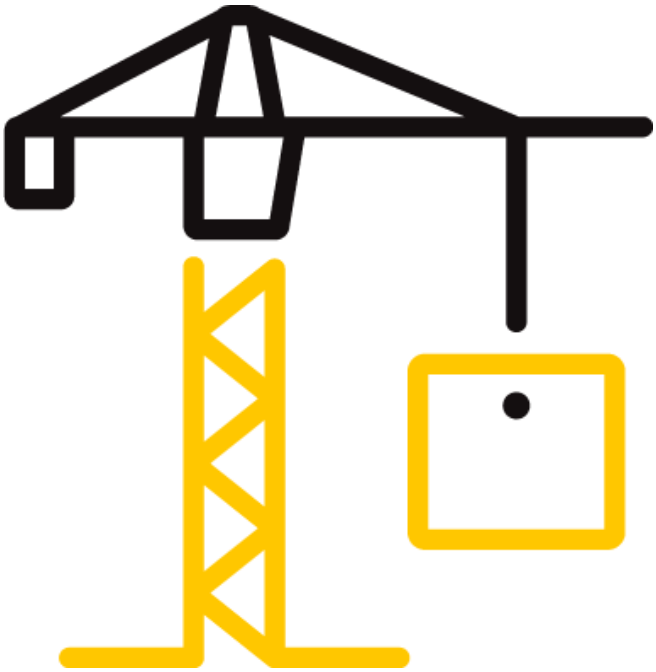

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PRODUCT EVALUATION FOR STOVE BUILDER INTERNATIONAL
Report No.: 103994967MTL-004
Date: 09/20/21

PRODUCT EVALUATION RENDERED TO:	
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PRODUCT EVALUATION FOR STOVE BUILDER INTERNATIONAL
Report No.: 103994967MTL-004
Date: 09/20/21

1 Introduction

Intertek Testing Services NA Ltd./Inc. (Intertek) is conducting a product evaluation for Stove Builder International, on Black Stag II to evaluate if the differences in the door change will increase particulate matter emission rate limit. The evaluation is being conducted to determine if items listed in *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)* will show equivalency with the previously EPA certified door.

2 Product and Assembly Description

2.1. Product Description:

The model Black Stag II Wood Fuel Room Heater is constructed of sheet steel. The outer dimensions are 31 5/16-inches deep, 32 5/8-inches high, and 23 3/4-inches wide. The unit has a door located on the front without a viewing glass.

Construction drawings are in appendix and named DB03411-V01.

This PEV refers to a product described in Intertek Test Report 103994967MTL-001. Consult that document for additional information and specific test conditions.

2.2. Product Traceability:

The test specimen identification is as provided by the client and Intertek accepts no responsibility for any inaccuracies therein.

2.3. Product Certification:

Stove Builder International is an Intertek testing client and an Intertek Listing and Follow-up Service client. Stove model Black Stag II is listed within Intertek. Intertek does have a Listings for this model contained in Intertek's Directory of Listed Building Products.

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3 Reference Documents

As part of this evaluation, Intertek has directly or indirectly used the following referenced documents:

- *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)*
- SBI drawings number: DB03411-V01 and DB03411-V02
- Intertek Testing Report No.: 103994967MTL-001

4 Evaluation Method

The model Black Stag II is a free-standing stove with a solid door (see Figure 1). The proposed design change is to change the solid cast-iron door with a combination of a hollow cast-iron door with a steel plate instead of the commonly used ceramic glass (see Figure 2). The combustion room of the mentioned units are identical so is their combustion air intake.

This investigation was authorized by SBI in August 2021. Drawings numbers DB03411-V01 and DB03411-V02 were received on August 20th, 2021 at the Intertek Lachine facility.

The Model mentioned in Subject shares similar features and is designed after an EPA certified wood burning stove Model Osburn 3300.

Design drawings were evaluated to determine similarities between the two door models. Drawings show the same internal primary air distance with primary lip above the door opening and the door inner face. Also, the model with the steel plate shows the addition of a gasket to ensure the air tightness between the plate and the cast-iron door assembly. This is the same type of gasket used when the door has a viewing glass.

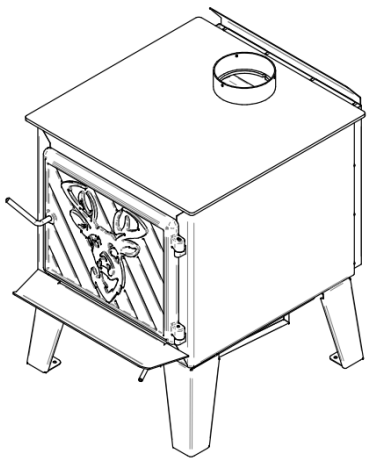

Figure 1 – Solid cast-iron door

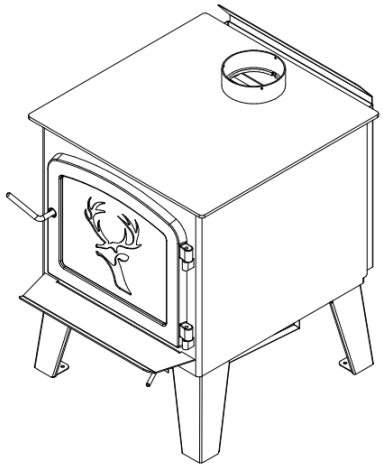

Figure 1 – New hollow cast-iron door with steel plate assembly

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Date: 09/20/21

5 Conclusion

Intertek has conducted this product evaluation for Stove Builder International, on the Black Stag II, to evaluate if the differences in the door change will increase particulate matter emission rate limit. The evaluation was conducted to determine if items listed in *U.S. Environmental Protection Agency 40 CFR Part 60 Standards of Performance for New Residential Wood Heaters; Final Rule, SECTION 60.533(k)* will show equivalency with the previously EPA certified door.

Based on the information contained and referenced herein, it is Intertek's professional judgment based on sound engineering principles that the following is true:

- Changes made are only aesthetical and do not increase particulate matter emission rate limit.

INTERTEK TESTING SERVICES NA LTD.

Reported by: _____
Hussein Mortada, CPI
Engineer
Intertek Lachine

Reviewed by: _____
Brian Ziegler
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7 LAST PAGE & REVISION SUMMARY

DATE	SUMMARY	REPORTER	REVIEWER
09/20/21	Original	Hussein Mortada	Brian Ziegler

Fabricant de poêles international inc.
Stove Builder International Inc.

Test load procedure for certification of 3.3 Series wood stove using ASTM E3053-17 according to EPA Alt-127

Low burn rate

Stove lighting: 13.5 lbs

Split the start-up fuel log into 8 pieces. Crisscross the 8 pieces on the brick, leaving some space between each wood pieces (3 in the bottom, 3 in the middle, 2 on the top). Crisscross the kindling on the top of the start-up fuel. The kindling is made of between 10-12 finly split piece of wood that are 10% of moisture content. Place crumbled newspaper on top of the kindling (5 full sheets). Light up the paper and let the door ajar at 90° until the flue temperature reaches 500°F, then close the door. The fan is always OFF.

Pre-load (high burn): 27.9 lbs

When there is coal bed of 3.5 lbs left, break ashes and level coal bed, then add pre-load. Place the two smallest pieces in the back, East-West orientation, one over the other. Then put the biggest piece in middle and front (6 pieces in total). Leave tree inches or air space between the rear bricks and one inch between all the pieces column. Let the door ajar until flue temperature is around 575°F. Close the door and let burn until the weight is down to target.

When coal bed weight is around 10.5 lbs, stir logs. At 6.7 lbs, slightly level the coal bed. Let the door ajar by one inch for one minute. There should be approximately 6.5 lbs of coal bed.

Loading: 33.5 lbs

Place the two smallest pieces in the back, East-West orientation, one over the other. Then put the biggest piece in middle and front (6 pieces in total). Leave tree inches or air space between the rear bricks and one inch between all the pieces column. Let the door ajar until flue temperature is around 575°F. Close the door and let burn until the weight is down to initial coal bed weight. When the oxygen falls below 7%, close the primary air control to 50%. Close the primary air control completely at 16 min from beginning. Start the fan at minimum speed at 30 minutes.

Medium burn rate

Stove lighting: 13.5 lbs

Use the same method than for low burn rate.

Pre-load (high burn): 27.9 lbs

Use the same method than for low burn rate.

Loading: 33.5 lb

Same as for low burn, but close the primary air control on a rod of ¼" of outside diameter at 16 min. Remove the rod. Start the fan at minimum speed at 30 minutes.

Guillaume Thibodeau-Fortin
2018-05-22

High burn rate

Note: For this test run, according to ASTM E3053-17, the sampling starts as soon as the kindling is ignited (cold start).

Stove lighting: 13.5 lbs

Same as low burn.

High burn: 27.9 lbs

Same as low burn. Stop the test when 90% of the high fire load has been consumed.

Guillaume Thibodeau-Fortin
2018-05-22

Intertek ETL SEMKO

Date: 06,03,2019 Page 1 of 1

Manufacturer: SBI Model: 3,3 Series.

Project #: _____ Run: 1 Tech: _____ Reviewer: EM

COMMENTS

11:22 Set on file. (door open)
11:26 close door (stack=500°F)
12:23 Sys 3 stopped
12:27 door open stir sticks - Load 3.45 lbs remaining.
12:30 close door T:575°F
Ref test weight = 2.8 + 3.45 lbs = 6.25 lbs
12:57 FAN on Max.
14:42 END of TEST

TEST LOAD CONFIGURATION

Intertek ETL SEMKO

Date: 2019-06-04 Page 1 of 1

Manufacturer: SBI Model: Series 3,3

Project #: _____ Run: 2 Tech: _____ Reviewer: _____

COMMENTS

7:09 Ignition of kindling.
7:13 close door.
8:09 Loading of the Pre Load
8:12 Door closed
9:33 10.25 lbs stick ashes
10:14 stir
10:16 load inserted (1 min 20)
10:18 Door closed
10:22 10% O2 close trap by 1/2
10:23 Trap closed to 1/4"
10:31 Trap closed. (16 min 20)
11:15 FAN set to low.
20:37 stir 30sec (Δ = 0.99% 6.5 lbs
20:45 END of Test.

TEST LOAD CONFIGURATION

Intertek ETL SEMKO

Date: 2019-06-05 Page 1 of 1

Manufacturer: SBI Model: 3.3 Series

Project #: Run: 3 Tech: Reviewer:

COMMENTS

8:34	Ignition of kindling.
9:23	Preload Loaded
9:26	Door closed
11:02	STIR Preload (10.3 lbs)
11:54	stir
11:57	Loading starts
12:00	Door Closed (flue = 383°F)
12:02	door rope by 2/3 of opening. (closed 1/3)
12:05	close to 1/3 (closed 1/3
12:09	closed at 1/4" opening
12:27	FAN-ON @ MAX.
1:57	3rd Probe removed
3:47	Proportionality violated Test halted.

TEST LOAD CONFIGURATION

Intertek ETL SEMKO

Date: 6/6/2019 Page 1 of 1

Manufacturer: SBI Model: 3.3 Series

Project #: _____ Run: 4 Tech: _____ Reviewer: [signature]

COMMENTS

7:34	Kindling Start-up
7:43	Door closed
8:35	Load Preload (365°F AVG)
8:38	DOOR closed
9:57	STIR
10:13	STIR (UNTIL 10:44)
10:29	Load Loading. (Picture) Loading Time 1 min 20
10:33	Door closed
10:35	Closed Trap to 1/2" of its opening
10:38	closed to 1/4" opening
11:00	FAN ON MAX.
19:00	End of Test

TEST LOAD CONFIGURATION

Time	Flue	Room	Tunnel	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	Filter 2	DGM 3	Filter 3	Meter #1	Meter #2	Draft	Tunnel	CO	CO2	O2	scale	0	Meter	Meter	Draft	Calculated
10.0	Temp 1	Temp 2	Dry Bulb 3	In 13	Out 14	15	In 16	Out 17	18	In 19	20	21	22	23	24	% 25	% 25	% 27	Lbs 28	Corrected Scale	#1 Cu Ft	#2 Cu Ft		Tunnel
0.0	71.8866	71.62351	72.52044	71.64641	71.62768	77.92425	71.50112	71.55607	79.79656			194.248	82.888	0.002626	0.09632				35.88931	35.89	6.86	2.93	-0.249343	-0.22592
10.0	497.2539	72.98869	104.9736	72.50397	71.83308	83.27727	72.23098	71.73026	84.58989			195.835	84.465	0.078794	0.089105				33.89245	33.89	6.91	2.98	-0.230301	-0.22772
20.0	539.2747	73.74015	112.2044	72.60328	71.90786	82.94811	72.21502	71.73969	84.16706			197.412	86.033	0.081142	0.08829				31.81632	31.82	6.97	3.04	-0.229714	-0.22793
30.0	543.2037	74.75075	115.9912	72.65852	71.96312	83.47483	72.24198	71.78372	84.51397			199.000	87.620	0.084101	0.090765				29.80697	29.81	7.02	3.09	-0.228975	-0.22731
40.0	507.6468	75.44592	113.8527	72.74164	72.03753	83.58025	72.38671	71.8086	84.67598			200.588	89.190	0.0778	0.090942				28.08093	28.08	7.08	3.15	-0.23055	-0.22726
50.0	482.202	75.45686	111.2726	72.79004	72.06888	83.26052	72.43594	71.83163	84.18107			202.180	90.760	0.077495	0.091826				26.77106	26.77	7.14	3.20	-0.230626	-0.22704
60.0	436.2249	75.54738	107.1527	72.76876	72.07674	82.5204	72.36598	71.85239	83.32171			203.775	92.350	0.070556	0.093678				25.83579	25.84	7.19	3.26	-0.232361	-0.22658
70.0	503.1183	75.65676	129.128	72.92614	72.17049	89.0136	72.7048	71.98195	88.11355			205.350	93.920	0.073693	0.086827				23.71933	23.72	7.25	3.32	-0.231577	-0.22829
80.0	534.3408	74.49165	121.3499	72.83188	72.16859	81.46431	72.44076	71.96798	85.8851			206.925	95.495	0.085177	0.088174				21.74855	21.75	7.30	3.37	-0.228706	-0.22796
90.0	651.0638	74.50373	135.8782	72.93009	72.20524	85.564	72.54731	72.02961	87.9796			208.515	97.065	0.093911	0.089182				18.81515	18.82	7.36	3.43	-0.226522	-0.2277
100.0	671.8344	77.62593	138.9206	73.02811	72.28415	85.78661	72.62579	72.12018	87.63224			210.090	98.625	0.093438	0.086041				15.91969	15.92	7.42	3.48	-0.22664	-0.22849
110.0	668.6953	78.19744	139.6133	73.09641	72.33708	88.62626	72.69077	72.17852	88.15907			211.652	100.195	0.093893	0.085964				13.15234	13.15	7.47	3.54	-0.226527	-0.22851
120.0	663.0755	79.83339	139.4381	73.22431	72.38804	86.41165	72.79083	72.19703	86.19598			213.230	101.750	0.093376	0.086381				10.49891	10.50	7.53	3.59	-0.226656	-0.2284
130.0	651.5489	79.84312	137.7971	73.31934	72.52681	85.21955	72.82347	72.25923	85.04839			214.795	103.307	0.09118	0.085637				8.068722	8.07	7.58	3.65	-0.227205	-0.22859
140.0	617.8644	80.25448	133.7997	73.33406	72.56649	84.61894	72.83486	72.31515	84.38114			216.330	104.830	0.088725	0.085314				5.909948	5.91	7.64	3.70	-0.227819	-0.22867
150.0	601.3801	80.67893	131.0976	73.54334	72.67475	84.01805	72.99719	72.38014	83.69081			217.880	106.365	0.087626	0.086947				4.07706	4.08	7.69	3.75	-0.228094	-0.22826
160.0	543.308	80.55771	123.9959	73.56392	72.74818	83.26772	73.01236	72.43527	82.9031			219.465	107.940	0.082534	0.087925				2.749542	2.75	7.75	3.81	-0.229366	-0.22802
170.0	514.1295	80.47044	120.1344	73.62315	72.81367	82.51458	73.09699	72.4729	82.12828			221.062	109.500	0.078894	0.088907				1.721467	1.72	7.80	3.87	-0.230276	-0.22777
180.0	469.9919	78.89955	114.8316	73.67434	72.85906	81.73366	73.17148	72.55074	81.43172			222.655	111.075	0.074444	0.089604				1.057483	1.06	7.86	3.92	-0.231389	-0.2276
190.0	446.4641	78.43988	111.6772	73.7533	72.94222	85.35697	73.30829	72.67469	85.48346			224.250	112.655	0.072051	0.089364				0.469149	0.47	7.92	3.98	-0.231987	-0.22766
200.0	427.0417	78.12073	108.9547	73.98359	73.07359	86.38714	73.51491	72.85975	87.08275			225.852	114.230	0.069862	0.091025				0	0.00	7.97	4.03	-0.232534	-0.22724

Intertek Testing Services

Manufacturer:	**SBI**
Model:	**3.3 Series**
Date:	**6-3-19**
Run:	**1**
Project #:	**G103994967**
Test Duration: (minutes)	**200**

RESULTS

Average emission rate:(gr/hr) 2.855

Burn Rate (Dry kg/hr): 3.984
(fuel burned only, cold start)

PRESSURE FACTOR: 0.99098

TEMPERATURE FACTORS

DGM #1: 0.99116
DGM #2: 0.99174

BAROMETRIC PRESSURE

Average:	29.65
Start:	29.6
End:	29.7

DRY GAS METER VALUES

VOLUMES SAMPLED

DGM #1	Final:	225.852	
	Initial:	194.248	
DGM #1:	31.16607		
DGM #2:	31.04909		
DGM #2	Final:	114.230	
TOTAL TUNNEL VOLUME (scf):	62984	1782.44	Initial: 82.888

SAMPLE RATIOS

Sample Train 1:	2020.911
Sample Train 2:	2028.525

TEMPERATURES (DEG. RANKIN)

DGM #1:	532.710
DGM #2:	532.397

TOTAL EMISSIONS

CALIBRATION FACTORS

Sample Train 1 (g):	**9.296**	5.21542	DGM #1: 1.0040
Sample Train 2 (g):	**9.737**	5.46268	DGM #2: 1.0080

EMISSION RATES

TUNNEL FLOW RATE: 314.919

Sample Train 1 (g/hr):	**2.79**
Sample Train 2 (g/hr):	**2.92**

PARTICULATE CATCH (mg)

Total Sample Train 1:	4.6
Total Sample Train 2:	4.8
Filter and seal Sample Train 1:	3.8
Filter and seal Sample Train 2:	3.7
Probe Sample Train 1:	0.8
Probe Sample Train 2:	1.1

MAX Allowed	7.50%
DEVIATION:	2.32%

	Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
	Before	After	Before	After	Before	After	Before	After
	72	78	29.60	29.70	42.4	22.0	0	0

Average Dilution Tunnel Measurements						Sample Data	
Burn	Velocity	Flow Rate	Temp	Total Sample		Particulate Catch	
Time	(Ft/sec)	(dscf/min)	(R)	1	2	1	2
200	17.02	314.92	580.22	31.17	31.05	4.60	4.80

	Dilution Tunnel Dual Train Precision				
	Sample Ratios		Total Emissions (g)		
	Train 1	Train 2	Train 1	Train 2	Deviation (%)
	2020.91	2028.52	9.30	9.74	2.32%

Burn				Initial		Run	Average
Rate		Surface		Draft		Time	Draft
4.800		0.000		0.003		200.000	0.079

Run	Date	Burn Rate	Emission
1	2019-06-03	3.984	2.855

E&E Boiler Tunnel Traverse Worksheet

Static Pressure: **0.15**

Barometer: 29.6

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.096	70.700	0.3098
B CENTER	0.094	70.600	0.3066
A1	0.094	70.700	0.3066
A2	0.097	70.600	0.3114
A3	0.082	70.600	0.2864
A4	0.087	70.400	0.2950
B1	0.084	70.600	0.2898
B2	0.089	70.700	0.2983
B3	0.083	70.700	0.2881
B4	0.071	70.500	0.2665
AVERAGE		70.61	0.2959

PITOT CONSTANT= 0.9599

November 20 Adjunct to ASTM E 3053-17 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	2.67	ft^3				
Total Nom. Load Wt. Target	26.70	lb				
Total Load Wt. Allowable Range	25.40	to	28.00	lb		
Core Target Wt. Allowable Range	12.00	to	17.40	lb		
Remainder Load Wt. Allowable Range	9.30	to	14.70	lb		
						Mid-Point
Core Load Pc. Wt. Allowable Range	4.00	to	6.70	lb		5.35
Remainder Load Pc. Wt. Allowable Range	2.70	to	14.70	lb		8.70
	Pc. #					
Core Load Piece Wt. Actual	1	5.17	lb	In Range		5
	2	4.98	lb	In Range		1
	3	4.95	lb	In Range		6
Core Load Total. Wt. Actual		15.09	lb	In Range		
	Pc. #					
Remainder Load Piece Wt.	1	5.36	lb	In Range		3
(1 to 3 Pcs.)	2	4.47	lb	In Range		4
	3	3.05	lb	In Range		**2**
Remainder Load Piece Weight Ratio - Small/Large		57%		In Range		≤ 67%
Remainder Load Tot. Wt. Act		12.88	lb	In Range		
Total Load Wt. Actual		27.97	lb	In Range		
Core % of Total Wt.		54%		In Range		45-65%
Remainder % of Total Wt.		46%		In Range		35-55%
Actual Load % of Nominal Target		105%		In Range		95-105%
Actual Fuel Load Density		10.5	lb/ft^3			
Kindling and Start-up Fuel						
Maximim Kindling Wt. (20% of Tot. Load Wt.)		5.59	lb			
Actual Kindling Wt.		5.57	lb	In Range		19.9%
Maximum Start-up Fuel Wt. (30% of Tot. Load Wt.)		8.39	lb			
Actual Start-up Fuel Wt.		8.34	lb	In Range		29.8%
Allowable Residual Start-up Fuel Wt. Range	2.8	to	5.6	lb		Mid-Point
Actual Residual Start-up Fuel Wt.		3.45	lb	In Range		4.2
Total Wt. All Fuel Added (wet basis)		41.88	lb			
High Fire Test Run End Point Range	Low		High			Mid-Point
Based on Fuel Load Wt. (w/tares)	2.5	to	3.1	lb		2.8
Actual Fuel Load Ending Wt.		2.6	lb	In Range		

Fuel Piece Moisture Reading (%-dry basis)

1	2	3	Ave.		Pc. Wt. Dry Basis			
16.3	22	20.9	19.7	In Range	4.32	lb	1.96	kg
17.9	23.2	24.1	21.7	In Range	4.09	lb	1.85	kg
18.4	19.2	22.7	20.1	In Range	4.12	lb	1.87	kg
16.9	21.4	15.9	18.1	In Range	4.54	lb	2.06	kg
18.8	19.9	19.3	19.3	In Range	3.75	lb	1.70	kg
16.3	24.9	18.2	19.8	In Range	2.55	lb	1.15	kg

Total Load Ave. MC (%-dry basis) 19.8 In Range
Total Load Ave. MC % (wet basis) 16.5
Total Test Load Weight (dry basis) → 23.36 lb 10.59 kg

Kindling Moisture (%-dry basis)

10	10	10	10.0	In Range	5.06	lb	2.30	kg

Start-up Fuel Moisture Readings (%-dry basis)

18.5	23.5	21.4	21.1	In Range	6.89	lb	3.12	kg

Total Wt. All Fuel Added (dry basis) → 35.31 lb 16.01 kg
Total Wt. All Fuel Burned (dry basis) → 29.3 lb 13.3 kg

Intertek Testing Services

Manufacturer:	**SBI**			RESULTS			
Model:	**3.3 Series**			**Average emission rate:(gr/hr)**			**#DIV/0!**
Date:	**6-3-19**			Burn Rate (Dry kg/hr):			13.278
Run:	**1**			(fuel burned only, cold start)			
Project #:	**G103994967**						
Test Duration: (minutes)	**60**						
PRESSURE FACTOR:		0.99098		BAROMETRIC PRESSURE			
						Average:	29.65
TEMPERATURE FACTORS						Start:	29.6
	DGM #1:	0.98755				End:	29.7
	DGM #2:	1.14783					
				DRY GAS METER VALUES			
VOLUMES SAMPLED					DGM #1	Final:	983.968
	DGM #1:	9.32054				Initial:	974.444
	DGM #2:	0.00000					
					DGM #2	Final:	0.000
TOTAL TUNNEL VOLUME (scf):		19420				Initial:	0.000
SAMPLE RATIOS				TEMPERATURES (DEG. RANKIN)			
	Sample Train 1:	2083.573				DGM #1:	534.657
	Sample Train 2:	#DIV/0!				DGM #2:	460.000
TOTAL EMISSIONS				CALIBRATION FACTORS			
	Sample Train 1 (g):	**3.542**				DGM #1:	1.0000
	Sample Train 2 (g):	**#DIV/0!**				DGM #2:	0.0000
EMISSION RATES				TUNNEL FLOW RATE:			323.667
	Sample Train 1 (g/hr):	**3.54**					
	Sample Train 2 (g/hr):	**#DIV/0!**		PARTICULATE CATCH (mg)			
						Total Sample Train 1:	1.7
						Total Sample Train 2:	0
						Filter and seal Sample Train 1:	1.3
	MAX Allowed	7.50%				Filter and seal Sample Train 2:	
						Probe Sample Train 1:	0.4
DEVIATION:		#DIV/0!				Probe Sample Train 2:	

Time	Flue	Room	Tunnel	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	Filter 2	DGM 3	Filter 3	Meter #1	Meter #2	Draft	Tunnel	CO	CO2	O2	scale	0	Meter	Meter		
																%	%	%	Lbs	Corrected	#1	#2	Draft	Calculated
10.0	Temp 1	Temp 2	Dry Bulb 3	In 13	Out 14	15	In 16	Out 17	18	In 19	20	21	22	23	24	25	25	27	28	Scale	Cu Ft	Cu Ft		Tunnel
0.0	440.4755	79.79685	127.9529	72.87772	72.89894	73.19971	72.81989	72.87481	72.92266			225.937	114.366	0.069347	0.088154				33.484	33.48	7.98	4.04	-0.232663	-0.22796
10.0	618.3109	79.19044	130.4687	73.45948	72.92537	86.02259	73.21199	72.88168	85.50268			227.512	115.944	0.089272	0.085733				30.56866	30.57	8.03	4.09	-0.227682	-0.22857
20.0	534.8582	80.18089	118.6307	73.43282	72.87333	84.91602	73.16537	72.80676	85.40137			229.075	117.500	0.082171	0.089369				28.2469	28.25	8.09	4.15	-0.229457	-0.22766
30.0	471.8844	79.26418	113.018	73.52054	72.8504	84.15587	73.21024	72.79756	84.51197			230.640	119.050	0.078912	0.092352				26.67192	26.67	8.14	4.20	-0.230272	-0.22691
40.0	457.7439	77.65007	111.2956	73.5947	72.89713	83.5189	73.22078	72.81392	83.98971			232.218	120.610	0.077794	0.093254				25.11244	25.11	8.20	4.26	-0.230551	-0.22669
50.0	468.663	77.57807	111.8462	73.56663	72.85782	83.2071	73.23763	72.74965	83.76777			233.798	122.165	0.0794	0.091899				23.46084	23.46	8.25	4.31	-0.23015	-0.22703
60.0	480.7914	78.21946	112.9276	73.6825	72.90217	83.3137	73.36017	72.77902	84.07828			235.381	123.720	0.080802	0.09136				21.77151	21.77	8.31	4.37	-0.229799	-0.22716
70.0	480.7602	78.68888	111.8291	73.72761	72.95437	83.55142	73.40654	72.84828	84.22697			236.962	125.290	0.081042	0.091669				20.06072	20.06	8.36	4.42	-0.22974	-0.22708
80.0	471.6054	78.31581	110.9933	73.75952	72.9996	83.59351	73.43596	72.8698	84.18261			238.540	126.845	0.07833	0.09236				18.4174	18.42	8.42	4.48	-0.230417	-0.22691
90.0	464.656	78.61802	109.953	73.94102	73.14581	83.30239	73.60251	72.99896	84.15094			240.112	128.412	0.07754	0.092327				16.85888	16.86	8.48	4.53	-0.230615	-0.22692
100.0	461.7525	78.86958	109.7772	73.91958	73.19259	83.31044	73.61892	73.04075	84.07461			241.692	129.992	0.077687	0.093202				15.36539	15.37	8.53	4.59	-0.230578	-0.2267
110.0	477.2702	78.55552	110.89	73.9686	73.22457	83.3497	73.64756	73.12182	84.08118			243.275	131.550	0.078137	0.093969				13.80454	13.80	8.59	4.64	-0.230466	-0.22651
120.0	488.638	79.28414	111.7957	74.05246	73.25356	83.67439	73.71564	73.15539	84.72334			244.877	133.140	0.077797	0.092917				12.11118	12.11	8.64	4.70	-0.230551	-0.22677
130.0	438.3383	78.82338	107.8436	74.12899	73.35715	83.23166	73.80382	73.20658	84.62081			246.470	134.735	0.074529	0.094807				10.91331	10.91	8.70	4.76	-0.231368	-0.2263
140.0	408.4459	78.62334	105.4509	74.16672	73.37951	82.44552	73.86692	73.26886	83.83317			248.075	136.325	0.069881	0.096257				9.985361	9.99	8.76	4.81	-0.23253	-0.22594
150.0	377.6701	78.64923	102.4802	74.33319	73.48906	81.96165	73.98934	73.38799	83.11998			249.664	137.917	0.067141	0.092982				9.298537	9.30	8.81	4.87	-0.233215	-0.22675
160.0	364.8066	78.28904	100.3861	74.38632	73.5863	86.74144	74.07533	73.48607	83.03837			251.275	139.515	0.065327	0.09357				8.667894	8.67	8.87	4.92	-0.233668	-0.22661
170.0	357.4591	77.94578	99.27368	74.47435	73.6885	86.01047	74.17501	73.5758	85.19747			252.877	141.105	0.064947	0.094962				8.064637	8.06	8.93	4.98	-0.233763	-0.22626
180.0	347.2212	78.91453	98.05404	74.61944	73.80746	84.62732	74.28188	73.64486	86.54968			254.485	142.695	0.063584	0.096584				7.521067	7.52	8.98	5.04	-0.234104	-0.22585
190.0	331.2568	77.57226	96.77155	74.54085	73.80535	83.96221	74.17625	73.6519	87.28196			256.100	144.295	0.060861	0.096957				7.123136	7.12	9.04	5.09	-0.234785	-0.22576
200.0	322.5066	77.89713	95.68552	74.58025	73.81067	81.63502	74.27678	73.66927	84.84388			257.715	145.890	0.060039	0.09757				6.736308	6.74	9.10	5.15	-0.23499	-0.22561
210.0	318.4059	77.99023	95.14535	74.58497	73.83161	84.60212	74.22121	73.69895	83.57214			259.327	147.495	0.057872	0.095149				6.36008	6.36	9.15	5.21	-0.235532	-0.22621
220.0	300.6349	77.37859	94.06601	74.53478	73.83962	85.11329	74.24544	73.74522	84.64937			260.941	149.097	0.054564	0.096669				6.032513	6.03	9.21	5.26	-0.236359	-0.22583
230.0	284.4633	77.96448	92.94342	74.937	74.08773	85.19502	74.77366	74.01621	85.13135			262.553	150.692	0.051572	0.09557				5.816285	5.82	9.27	5.32	-0.237107	-0.22611
240.0	273.3727	78.07435	91.91743	74.82177	74.11341	84.90468	74.58942	74.05727	85.5872			264.175	152.297	0.051287	0.097792				5.617975	5.62	9.33	5.38	-0.237178	-0.22555
250.0	265.8781	77.24561	91.26694	74.88255	74.13429	84.53262	74.63067	74.04489	85.60713			265.785	153.899	0.050192	0.097254				5.389217	5.39	9.38	5.43	-0.237452	-0.22569
260.0	261.0916	77.30054	90.53382	75.00154	74.18057	84.56045	74.7663	74.09616	85.339			267.445	155.532	0.049114	0.096378				5.202138	5.20	9.44	5.49	-0.237721	-0.22591
270.0	257.5693	77.61359	90.1315	75.0623	74.26671	84.47699	74.77054	74.12077	85.46267			269.115	157.165	0.048741	0.097303				4.999836	5.00	9.50	5.55	-0.237815	-0.22567
280.0	251.3067	77.18707	89.55187	75.11777	74.33551	84.56818	74.80814	74.17087	85.42815			270.780	158.790	0.045309	0.096653				4.836305	4.84	9.56	5.61	-0.238673	-0.22584
290.0	246.091	77.43656	89.03004	75.19549	74.41616	84.33782	74.84514	74.21786	85.29009			272.450	160.428	0.045838	0.097747				4.659674	4.66	9.62	5.66	-0.23854	-0.22556
300.0	241.5664	77.13655	88.64024	75.26127	74.45869	84.26101	74.95083	74.25041	85.00743			274.115	162.060	0.046115	0.096903				4.510356	4.51	9.68	5.72	-0.238471	-0.22577
310.0	238.1122	77.06961	88.08379	75.32599	74.50847	84.07684	74.96028	74.28606	84.88949			275.787	163.690	0.044457	0.098006				4.334889	4.33	9.74	5.78	-0.238886	-0.2255
320.0	236.3256	76.99177	87.83797	75.31457	74.5382	84.0903	74.98336	74.35155	84.63251			277.455	165.330	0.045029	0.098081				4.163335	4.16	9.79	5.84	-0.238743	-0.22548
330.0	235.167	77.02289	87.64514	75.34571	74.56894	84.01002	74.99622	74.36482	84.45053			279.128	166.957	0.044482	0.095468				3.994264	3.99	9.85	5.89	-0.238879	-0.22613
340.0	232.5958	76.51552	87.75212	75.3391	74.59808	83.96332	74.97673	74.37567	84.49358			280.794	168.589	0.044205	0.096638				3.837255	3.84	9.91	5.95	-0.238949	-0.22584
350.0	230.3973	76.9122	87.29599	75.37496	74.64061	84.00647	75.06081	74.41363	84.45152			282.462	170.225	0.044475	0.09773				3.689401	3.69	9.97	6.01	-0.238881	-0.22557
360.0	228.8021	76.99146	86.99901	75.39819	74.65428	83.85502	75.03915	74.42648	84.13466			284.130	171.860	0.042562	0.098882				3.539907	3.54	10.03	6.07	-0.23936	-0.22528
370.0	226.0946	77.05479	86.84105	75.45077	74.70064	84.20024	75.14909	74.49654	84.12123			285.799	173.491	0.043099	0.099458				3.382743	3.38	10.09	6.12	-0.239225	-0.22514
380.0	224.7216	76.96553	86.8778	75.4973	74.73971	84.09103	75.18316	74.53936	84.28213			287.468	175.122	0.043105	0.09814				3.241833	3.24	10.15	6.18	-0.239224	-0.22547
390.0	223.3142	76.81601	86.67742	75.41416	74.71764	84.09885	75.07175	74.50315	84.44463			289.134	176.762	0.041754	0.09862				3.089483	3.09	10.21	6.24	-0.239561	-0.22534
400.0	221.2557	76.94331	86.3889	75.441	74.70999	83.84634	75.0774	74.50921	84.26041			290.799	178.397	0.042032	0.096648				2.948639	2.95	10.27	6.30	-0.239492	-0.22584
410.0	220.1844	76.85234	86.17111	75.43763	74.73987	83.79831	75.09148	74.47799	84.09946			292.468	180.031	0.040669	0.098215				2.809934	2.81	10.32	6.36	-0.239833	-0.22545
420.0	218.3088	76.89857	86.17911	75.35924	74.68307	83.80548	74.97401	74.43906	84.28243			294.137	181.664	0.042295	0.099878				2.670311	2.67	10.38	6.41	-0.239426	-0.22503
430.0	217.1341	76.65311	85.834	75.34672	74.63604	83.79798	74.96066	74.41738	84.23191			295.805	183.300	0.040932	0.099987				2.52448	2.52	10.44	6.47	-0.239767	-0.225
440.0	215.6985	76.74153	85.72983	75.27688	74.58489	83.73176	74.90826	74.39449	84.46763			297.476	184.930	0.040391	0.097473				2.389245	2.39	10.50	6.53	-0.239902	-0.22563
450.0	214.1401	76.736	85.57098	75.27841	74.57228	83.72293	74.92309	74.35652	84.30248			299.140	186.553	0.040652	0.096954				2.257432	2.26	10.56	6.59	-0.239837	-0.22576
460.0	212.2639	76.48118	85.32519	75.22578	74.54956	83.78679	74.88375	74.35085	84.12187			300.805	188.172	0.039576	0.097846				2.128232	2.13	10.62	6.64	-0.240106	-0.22554
470.0	210.9623	76.69625	85.33218	75.21203	74.51794	83.67712	74.8459	74.33585	84.29887			302.474	189.810	0.039832	0.098687				1.989785	1.99	10.68	6.70	-0.240042	-0.22533
480.0	208.83	76.65985	85.07229	75.20304	74.47318	83.54859	74.85352	74.31355	84.19271			304.140	191.442	0.039572	0.096431				1.867392	1.87	10.74	6.76	-0.240107	-0.22589
490.0	206.286	76.3859	84.96244	75.17117	74.4808	83.49244	74.89563	74.30993	84.01911			305.781	193.101	0.038271	0.09587				1.767145	1.77	10.79	6.82	-0.240432	-0.22603
500.0	204.432	76.39301	84.72846	75.21651	74.48833	83.4027	74.85578	74.30042	83.84955			307.467	194.704	0.039564	0.099165				1.625374	1.63	10.85	6.87	-0.240109	-0.22521
510.0	202.7996	76.29459	84.54569	75.17247	74.45965	83.31084	74.8454	74.30168	83.93726			309.135	196.331	0.038204	0.100846				1.501055	1.50	10.91	6.93	-0.240449	-0.22479
520.0	201.5403	76.35027	84.4506	75.16669	74.44389	83.24053	74.83296	74.29547	83.82891			310.800	197.967	0.03875	0.098016				1.374503	1.37	10.97	6.99	-0.240313	-0.2255
530.0	200.0609	75.98011	84.3405	75.07808	74.37895	83.21189	74.7352	74.26005	83.78207			312.468	199.588	0.037931	0.09923				1.232265	1.23	11.03	7.05	-0.240517	-0.22519
540.0	199.6744	75.94265	84.26765	75.0722	74.35768	83.14974	74.75882	74.22381	83.55817			314.134	201.220	0.037395	0.096894				1.114088	1.11	11.09	7.10	-0.240651	-0.22578
550.0	198.6032	75.61228	83.94325	75.07584	74.3422	83.00769	74.78075	74.21665	83.47739			315.800	202.851	0.037113	0.098413				0.982176	0.98	11.15	7.16	-0.240722	-0.2254
560.0	197.8848	75.86697	83.84936	75.053	74.32226	83.04868	74.74877	74.18506	83.37437			317.468	204.476	0.037653	0.098516				0.843725	0.84	11.21	7.22	-0.240587	-0.22537
570.0	196.69	75.52321	83.68949	74.99381	74.27802	82.98145	74.68707	74.13873	83.15114			319.137	206.105	0.036573	0.097203				0.71076	0.71	11.27	7.28	-0.240857	-0.2257
580.0	195.736	75.85733	83.53153	74.99723	74.27021	82.90456	74.74536	74.13259	82.9621			320.800	207.736	0.036569	0.099372				0.592472	0.59	11.32	7.33	-0.240858	-0.22516
590.0	194.5982	75.67394	83.31907	75.00411	74.26213	82.89528	74.69863	74.10539	82.60842			322.470	209.364	0.036569	0.096901				0.469116	0.47	11.38	7.39	-0.240858	-0.22577
600.0	191.578	75.43827	83.08433	75.00859	74.26952	82.78136	74.66611	74.05166	82.59342			324.136	210.992	0.03711	0.098726				0.347189	0.35	11.44	7.45	-0.240722	-0.22532
610.0	188.9916	75.34697	82.89943	74.86074	74.18939	82.68046	74.56812	74.03015	82.49873			325.806	212.625	0.036015	0.101904				0.247889	0.25	11.50	7.51	-0.240996	-0.22452
620.0	188.1906	75.08738	82.65452	74.72413	74.10221	82.61519	74.40239	73.95793	82.41317			327.468	214.238	0.036293	0.095978				0.137148	0.14	11.56	7.56	-0.240927	-0.22601
630.0	199.5298	75.19166	83.22153	74.72077	74.03981	82.83538	74.38032	73.93129	82.25705			329.132	215.869	0.03852	0.100099				0	0.00	11.62	7.62	-0.24037	-0.22498

Intertek Testing Services

Manufacturer:	**SBI**
Model:	**3.3 Series**
Date:	**6-4-19**
Run:	**2**
Project #:	**G103994967**
Test Duration: (minutes)	**630**

PRESSURE FACTOR:	0.99933

TEMPERATURE FACTORS

DGM #1:	0.98805
DGM #2:	0.98504

VOLUMES SAMPLED

DGM #1:	102.30172
DGM #2:	100.71737
TOTAL TUNNEL VOLUME (scf):	213785

SAMPLE RATIOS

Sample Train 1:	2089.752
Sample Train 2:	2122.625

TOTAL EMISSIONS

Sample Train 1 (g):	**4.388**
Sample Train 2 (g):	**3.821**

EMISSION RATES

Sample Train 1 (g/hr):	**0.42**
Sample Train 2 (g/hr):	**0.36**
MAX Allowed	7.50%
DEVIATION:	6.92%

RESULTS

Average emission rate:(gr/hr)	**0.391**
Burn Rate (Dry kg/hr):	1.201

BAROMETRIC PRESSURE

Average:	29.9
Start:	29.9
End:	29.9

DRY GAS METER VALUES

DGM #1	Final:	329.132
	Initial:	225.937
DGM #2	Final:	215.869
	Initial:	114.366

TEMPERATURES (DEG. RANKIN)

DGM #1:	534.383
DGM #2:	536.017

CALIBRATION FACTORS

DGM #1:	1.0040
DGM #2:	1.0080

TUNNEL FLOW RATE:	339.342

PARTICULATE CATCH (mg)

Total Sample Train 1:	2.1
Total Sample Train 2:	1.8
Filter and seal Sample Train 1:	1.7
Filter and seal Sample Train 2:	1.4
Probe Sample Train 1:	0.4
Probe Sample Train 2:	0.4

	Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
	Before	After	Before	After	Before	After	Before	After
	80	0	29.90	29.90	19.3	23.7	0	0

Average Dilution Tunnel Measurements						Sample Data	
Burn	Velocity	Flow Rate	Temp	Total Sample		Particulate Catch	
Time	(Ft/sec)	(dscf/min)	(R)	1	2	1	2
630	17.37	339.34	554.15	102.30	100.72	2.10	1.80

	Dilution Tunnel Dual Train Precision				
	Sample Ratios		Total Emissions (g)		
	Train 1	Train 2	Train 1	Train 2	Deviation (%)
	2089.75	2122.63	4.39	3.82	6.92%

Burn				Initial		Run	Average
Rate		Surface		Draft		Time	Draft
1.201		0.000		0.069		630.000	0.053

Run	Date	Burn Rate	Emission
2	2019-06-04	1.201	0.391

E&E Boiler Tunnel Traverse Worksheet

Static Pressure: **0.148**

Barometer: 29.9

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.090	122.500	0.3000
B CENTER	0.088	116.900	0.2966
A1	0.079	121.800	0.2811
A2	0.089	122.100	0.2983
A3	0.074	120.300	0.2720
A4	0.084	93.700	0.2898
B1	0.085	118.300	0.2915
B2	0.094	119.000	0.3066
B3	0.083	119.200	0.2881
B4	0.069	95.200	0.2627
AVERAGE		114.9	0.2887

PITOT CONSTANT= 0.9677

November 20, 2015 Adjunct to ASTM E 3053 Wood Heater Cordwood Test Method
Cordwood Fuel Load Calculators - 12 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 Usable Firebox Volumes up to 3.0 ft^3 - Low and Medium Fire

Nominal Required Load Density (wet basis)	12	lb/ft^3				
Usable Firebox Volume	2.67	ft^3				
Total Nom. Load Wt. Target	32.04	lb				
Total Load Wt. Allowable Range	30.44	to	33.64	lb		
Core Target Wt. Allowable Range	14.418	to	20.83	lb		
Remainder Load Wt. Allowable Range	11.21	to	17.62	lb		
						Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	4.81	to	8.01	lb		6.41
Remainder Load Pc. Wt. Allowable Range	3.20	to	9.61	lb		6.41
	Pc. #					Ordre
Core Load Piece Wt. Actual	1	6.41	lb	In Range		1.000
	2	5.99	lb	In Range		2.000
	3	6.51	lb	In Range		3.000
Core Load Total. Wt. Actual		18.91	lb	In Range		
	Pc. #					
Remainder Load Piece Wt.	1	6.29	lb	In Range		4.000
(2 or 3 Pcs.)	2	4.66	lb	In Range		5.000
	3	3.62	lb	In Range		6.000
Remainder Load Piece Weight Ratio - Small/Large		58%		In Range		≤ 67%
Remainder Load Tot. Wt. Act		14.58	lb	In Range		
Total Load Wt. Actual		33.48	lb	In Range		
Core % of Total Wt.		56%		In Range		45-65%
Remainder % of Total Wt.		44%		In Range		35-55%
Actual Load % of Nominal Target		105%		In Range		95-105%
Actual Fuel Load Density		12.5	lb/ft^3			
Allowable Charcoal Bed Wt. Range (lb)	3.4	to	6.6			Mid-Point
Actual Charcoal Bed Wt.		3.6	lb	In Range		5.0
Actual Fuel Load Ending Wt.		0.0	lb	lb		≥ 90%
Total Wt. of Fuel Burned During Test Run lb.		33.5	lb			

Fuel Piece Moisture Reading (%-dry basis)									
1	2	3	Ave.		Pc. Wt. Dry Basis				
23.2	16.4	22.3	20.6	In Range	5.32	lb	2.41	kg	
19.3	23.6	14.3	19.1	In Range	5.03	lb	2.28	kg	
24.8	22.6	18	21.8	In Range	5.34	lb	2.42	kg	
22.9	23.8	18.3	21.7	In Range	5.17	lb	2.35	kg	
18.3	21.8	20.4	20.2	In Range	3.88	lb	1.76	kg	
20.4	18.9	19.1	19.5	In Range	3.03	lb	1.38	kg	
Total Load Ave. MC % (dry basis)			20.6	In Range					
Total Load Ave. MC % (wet basis)			17.1						
Total Test Load Weight (dry basis) →					27.77	lb	12.59	kg	
Total Fuel Weight Burned During Test Run (dry basis)					27.8	lb	12.59	kg	

5.0226
34.91

Intertek Testing Services

Manufacturer:	**SBI**			RESULTS			
Model:	**3.3 Series**			**Average emission rate:(gr/hr)**			**#DIV/0!**
Date:	**6-4-19**			Burn Rate (Dry kg/hr):			12.608
Run:	**2**						
Project #:	**G103994967**						
Test Duration: (minutes)	**60**						
	PRESSURE FACTOR:	0.99933		BAROMETRIC PRESSURE			
						Average:	29.9
TEMPERATURE FACTORS						Start:	29.9
	DGM #1:	0.98802				End:	29.9
	DGM #2:	1.14783					
				DRY GAS METER VALUES			
VOLUMES SAMPLED					DGM #1	Final:	993.653
	DGM #1:	9.50091				Initial:	984.030
	DGM #2:	0.00000					
					DGM #2	Final:	0.000
TOTAL TUNNEL VOLUME (scf):		19313				Initial:	0.000
SAMPLE RATIOS				TEMPERATURES (DEG. RANKIN)			
	Sample Train 1:	2032.734				DGM #1:	534.400
	Sample Train 2:	#DIV/0!				DGM #2:	460.000
TOTAL EMISSIONS				CALIBRATION FACTORS			
	Sample Train 1 (g):	**1.829**				DGM #1:	1.0000
	Sample Train 2 (g):	**#DIV/0!**				DGM #2:	0.0000
EMISSION RATES				TUNNEL FLOW RATE:			321.880
	Sample Train 1 (g/hr):	**1.83**					
	Sample Train 2 (g/hr):	**#DIV/0!**		PARTICULATE CATCH (mg)			
						Total Sample Train 1:	0.9
						Total Sample Train 2:	0
						Filter and seal Sample Train 1:	0.7
	MAX Allowed	7.50%				Filter and seal Sample Train 2:	
						Probe Sample Train 1:	0.2
	DEVIATION:	#DIV/0!				Probe Sample Train 2:	

Time	Flue	Room	Tunnel	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	Filter 2	DGM 3	Filter 3	Meter #1	Meter #2	Draft	Tunnel	CO	CO2	O2	scale	0	Meter	Meter		
10.0	Temp 1	Temp 2	Dry Bulb 3	In 13	Out 14	15	In 16	Out 17	18	In 19	20	21	22	23	24	% 25	% 25	% 27	Lbs 28	Corrected Scale	#1 Cu Ft	#2 Cu Ft	Draft	Calculated Tunnel
0.0	416.5592	76.59308	111.2939	73.94983	73.98767	79.17306	73.93486	74.03341	78.19742			329.184	215.995	0.067337	0.089457					0.00	11.62	7.62	-0.233166	-0.22764
10.0	596.4981	76.51863	126.1448	74.81234	74.15968	83.56924	74.52969	74.0757	85.46705			330.770	217.583	0.087919	0.088561					0.00	11.68	7.68	-0.22802	-0.22786
20.0	560.4246	77.92602	121.3827	74.87146	74.18224	83.92887	74.50859	74.03006	84.96611			332.335	219.140	0.086217	0.089848					0.00	11.73	7.74	-0.228446	-0.22754
30.0	553.1095	78.5373	120.5607	74.83209	74.13745	84.85045	74.47628	73.97695	84.86533			333.912	220.717	0.085173	0.090475					0.00	11.79	7.79	-0.228707	-0.22738
40.0	531.5894	77.4934	119.429	74.82184	74.13883	84.94816	74.39493	73.94756	85.02134			335.490	222.298	0.083539	0.089356					0.00	11.84	7.85	-0.229115	-0.22766
50.0	518.817	78.17407	117.524	74.92956	74.20584	84.77954	74.50434	73.90855	85.58031			337.070	223.870	0.08094	0.090508					0.00	11.90	7.90	-0.229765	-0.22737
60.0	503.1156	77.99833	115.8661	75.02369	74.25469	84.95464	74.61096	73.9599	85.59085			338.635	225.435	0.079156	0.091449					0.00	11.95	7.96	-0.230211	-0.22714
70.0	489.1565	78.14827	114.1454	75.09614	74.33382	84.62274	74.62482	73.98707	85.43392			340.210	227.002	0.078146	0.091236					0.00	12.01	8.01	-0.230464	-0.22719
80.0	486.1243	78.66821	113.9059	75.12035	74.35097	84.10172	74.6004	74.00879	85.12811			341.792	228.570	0.079049	0.092241					0.00	12.07	8.07	-0.230238	-0.22694
90.0	496.0069	78.80035	114.0602	75.18083	74.44266	84.34474	74.68417	74.09259	85.10767			343.390	230.137	0.078942	0.091576					0.00	12.12	8.12	-0.230264	-0.22711
100.0	495.2394	79.16737	113.7928	75.31253	74.48253	84.14245	74.76644	74.15368	84.9497			344.981	231.695	0.0786	0.091547					0.00	12.18	8.18	-0.23035	-0.22711
110.0	492.1643	81.46318	114.8963	75.32134	74.55994	84.38946	74.80393	74.21904	85.06679			346.570	233.260	0.077006	0.091862					0.00	12.23	8.23	-0.230748	-0.22703
120.0	459.2652	84.53294	112.369	75.45967	74.62725	84.49737	74.93441	74.29094	85.38136			348.210	234.870	0.074247	0.093893					0.00	12.29	8.29	-0.231438	-0.22653
130.0	443.784	85.66756	110.8193	75.50514	74.68936	84.13441	75.06675	74.35472	85.27034			349.840	236.450	0.072005	0.094042					0.00	12.35	8.35	-0.231999	-0.22649
140.0	428.8204	85.47506	108.9146	75.58959	74.78798	83.83833	75.13335	74.43382	85.02405			351.440	238.090	0.068688	0.093034					0.00	12.41	8.40	-0.232828	-0.22674
150.0	359.3185	81.0038	103.6679	75.68909	74.89957	82.93313	75.22248	74.54543	84.17732			353.060	239.695	0.063306	0.095874					0.00	12.46	8.46	-0.234173	-0.22603
160.0	331.5362	83.60587	104.9172	75.75375	74.95262	82.82413	75.31043	74.63632	83.55249			354.680	241.310	0.057697	0.095529					0.00	12.52	8.52	-0.235576	-0.22612
170.0	313.2393	87.94949	101.3347	75.96524	75.10103	86.1959	75.56019	74.82673	84.7926			356.335	242.934	0.057308	0.09686					0.00	12.58	8.58	-0.235673	-0.22579
180.0	300.31	81.26261	97.83665	76.16128	75.25934	87.16993	75.76707	74.98506	85.14195			357.999	244.575	0.054921	0.095104					0.00	12.64	8.63	-0.23627	-0.22622
190.0	286.2446	79.2959	95.66161	76.24888	75.3582	83.51028	75.87089	75.10763	83.43414			359.670	246.218	0.052429	0.098239					0.00	12.70	8.69	-0.236893	-0.22544
200.0	277.1718	78.73408	94.43616	76.36534	75.51626	81.82274	76.06214	75.25323	82.34821			361.310	247.859	0.051074	0.09714					0.00	12.75	8.75	-0.237232	-0.22572
210.0	269.7788	78.56748	93.56352	76.43486	75.65561	85.12033	76.10301	75.38138	82.81617			362.782	249.495	0.049747	0.097588					0.00	12.81	8.81	-0.237563	-0.2256
220.0	264.8317	78.18773	92.85943	76.52525	75.75019	85.79892	76.14275	75.4951	82.86363			364.101	251.053	0.048835	0.098968					0.00	12.85	8.86	-0.237791	-0.22526
230.0	465.8874	79.08448	110.3048	76.50895	75.80285	84.1727	76.12146	75.58432	82.86808			365.290	252.365	0.075892	0.094702					0.00	12.89	8.91	-0.231027	-0.22632

Intertek Testing Services

Manufacturer:	**SBI**
Model:	**3.3 Series**
Date:	**6-5-19**
Run:	**3**
Project #:	**G103994967**
Test Duration: (minutes)	**230**

PRESSURE FACTOR:	0.99599

TEMPERATURE FACTORS

DGM #1:	0.98672
DGM #2:	0.98734

VOLUMES SAMPLED

DGM #1:	35.62554
DGM #2:	36.05158
TOTAL TUNNEL VOLUME (scf):	74841

SAMPLE RATIOS

Sample Train 1:	2100.756
Sample Train 2:	2075.929

TOTAL EMISSIONS

Sample Train 1 (g):	**43.906**
Sample Train 2 (g):	**43.802**

EMISSION RATES

Sample Train 1 (g/hr):	**11.45**
Sample Train 2 (g/hr):	**11.43**
MAX Allowed	7.50%
DEVIATION:	0.12%

RESULTS

Average emission rate:(gr/hr)	**11.440**
Burn Rate (Dry kg/hr):	3.314

BAROMETRIC PRESSURE

Average:	29.8
Start:	29.8
End:	29.8

DRY GAS METER VALUES

DGM #1	Final:	365.290
	Initial:	329.184
DGM #2	Final:	252.365
	Initial:	215.995

TEMPERATURES (DEG. RANKIN)

DGM #1:	535.107
DGM #2:	534.771

CALIBRATION FACTORS

DGM #1:	1.0040
DGM #2:	1.0080

TUNNEL FLOW RATE:	325.394

PARTICULATE CATCH (mg)

Total Sample Train 1:	20.9
Total Sample Train 2:	21.1
Filter and seal Sample Train 1:	19.8
Filter and seal Sample Train 2:	19.9
Probe Sample Train 1:	1.1
Probe Sample Train 2:	1.2

	Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
	Before	After	Before	After	Before	After	Before	After
	77	79	29.80	29.80	22.0	19.8	0	0

Average Dilution Tunnel Measurements						Sample Data	
Burn	Velocity	Flow Rate	Temp	Total Sample		Particulate Catch	
Time	(Ft/sec)	(dscf/min)	(R)	1	2	1	2
230	17.18	325.39	569.57	35.63	36.05	20.90	21.10

	Dilution Tunnel Dual Train Precision				
	Sample Ratios		Total Emissions (g)		
	Train 1	Train 2	Train 1	Train 2	Deviation (%)
	2100.76	2075.93	43.91	43.80	0.12%

Burn				Initial		Run	Average
Rate		Surface		Draft		Time	Draft
3.314		0.000		0.067		230.000	0.070

Run	Date	Burn Rate	Emission
3	2019-06-05	3.314	11.440

E&E Boiler Tunnel Traverse Worksheet

Static Pressure: **0.145**

Barometer: 29.8

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.090	121.300	0.3000
B CENTER	0.090	115.800	0.3000
A1	0.080	120.700	0.2828
A2	0.091	120.800	0.3017
A3	0.079	119.100	0.2811
A4	0.076	95.400	0.2757
B1	0.078	117.100	0.2793
B2	0.092	118.700	0.3033
B3	0.081	118.600	0.2846
B4	0.069	97.300	0.2627
AVERAGE		114.48	0.2871

PITOT CONSTANT= 0.9570

November 20, 2015 Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method

Cordwood Fuel Load Calculators - 12 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 Usable Firebox Volumes up to 3.0 ft^3 - Low and Medium Fire

Nominal Required Load Density (wet basis)	12	lb/ft^3				
Usable Firebox Volume	2.67	ft^3				
Total Nom. Load Wt. Target	32.04	lb				
Total Load Wt. Allowable Range	30.44	to	33.64	lb		
Core Target Wt. Allowable Range	14.418	to	20.83	lb		
Remainder Load Wt. Allowable Range	11.21	to	17.62	lb		
						Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	4.81	to	8.01	lb		6.41
Remainder Load Pc. Wt. Allowable Range	3.20	to	9.61	lb		6.41
	Pc. #					Ordre
Core Load Piece Wt. Actual	1	5.99	lb	In Range		4.000
	2	6.84	lb	In Range		3.000
	3	5.66	lb	In Range		2.000
Core Load Total. Wt. Actual		18.49	lb	In Range		
	Pc. #					
Remainder Load Piece Wt.	1	7.47	lb	In Range		1.000
(2 or 3 Pcs.)	2	4.19	lb	In Range		5.000
	3	3.34	lb	In Range		6.000
Remainder Load Piece Weight Ratio - Small/Large		45%		In Range		≤ 67%
Remainder Load Tot. Wt. Act		15.00	lb	In Range		
Total Load Wt. Actual		33.48	lb	In Range		
Core % of Total Wt.		55%		In Range		45-65%
Remainder % of Total Wt.		45%		In Range		35-55%
Actual Load % of Nominal Target		105%		In Range		95-105%
Actual Fuel Load Density		12.5	lb/ft^3			
Allowable Charcoal Bed Wt. Range (lb)	3.4	to	6.6			Mid-Point
Actual Charcoal Bed Wt.		6.5	lb	In Range		5.0
Actual Fuel Load Ending Wt.		0.0	lb	lb		≥ 90%
Total Wt. of Fuel Burned During Test Run lb.		33.5	lb			

Fuel Piece Moisture Reading (%-dry basis)									
1	2	3	Ave.		Pc. Wt. Dry Basis				
18.2	22.6	16.8	19.2	In Range	5.03	lb	2.28	kg	
21.2	19.5	14.8	18.5	In Range	5.77	lb	2.62	kg	
19.1	23	18.2	20.1	In Range	4.71	lb	2.14	kg	
21.5	18.9	21.3	20.6	In Range	6.20	lb	2.81	kg	
25.6	18.9	14.8	19.8	In Range	3.50	lb	1.59	kg	
16.4	21.4	19.6	19.1	In Range	2.80	lb	1.27	kg	
Total Load Ave. MC % (dry basis)			19.6	In Range					
Total Load Ave. MC % (wet basis)			16.4						
Total Test Load Weight (dry basis) →					28.00	lb	12.70	kg	
Total Fuel Weight Burned During Test Run (dry basis)					28.0	lb	12.70	kg	

5.0226

30.26

Intertek Testing Services

Manufacturer:	**SBI**			RESULTS			
Model:	**3.3 Series**			**Average emission rate:(gr/hr)**			**#DIV/0!**
Date:	**6-5-19**			Burn Rate (Dry kg/hr):			12.705
Run:	**3**						
Project #:	**G103994967**						
Test Duration: (minutes)	**60**						
PRESSURE FACTOR:	0.99599			BAROMETRIC PRESSURE			
						Average:	29.8
TEMPERATURE FACTORS						Start:	29.8
DGM #1:	0.98639					End:	29.8
DGM #2:	1.14783						
				DRY GAS METER VALUES			
VOLUMES SAMPLED					DGM #1	Final:	1003.178
DGM #1:	9.33803					Initial:	993.673
DGM #2:	0.00000						
					DGM #2	Final:	0.000
TOTAL TUNNEL VOLUME (scf):	19020					Initial:	0.000
SAMPLE RATIOS				TEMPERATURES (DEG. RANKIN)			
Sample Train 1:	2036.886					DGM #1:	535.286
Sample Train 2:	#DIV/0!					DGM #2:	460.000
TOTAL EMISSIONS				CALIBRATION FACTORS			
Sample Train 1 (g):	**2.648**					DGM #1:	1.0000
Sample Train 2 (g):	**#DIV/0!**					DGM #2:	0.0000
EMISSION RATES				TUNNEL FLOW RATE:			317.008
Sample Train 1 (g/hr):	**2.65**						
Sample Train 2 (g/hr):	**#DIV/0!**			PARTICULATE CATCH (mg)			
						Total Sample Train 1:	1.3
						Total Sample Train 2:	0
						Filter and seal Sample Train 1:	0.7
MAX Allowed	7.50%					Filter and seal Sample Train 2:	
						Probe Sample Train 1:	0.6
DEVIATION:	#DIV/0!					Probe Sample Train 2:	

Time	Flue	Room	Tunnel	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	Filter 2	DGM 3	Filter 3	Meter #1	Meter #2	Draft	Tunnel	CO	CO2	O2	scale	-0.122848	Meter	Meter		
																%	%	%	Lbs	Corrected	#1	#2	Draft	Calculated
10.0	Temp 1	Temp 2	Dry Bulb 3	In 13	Out 14	15	In 16	Out 17	18	In 19	20	21	22	23	24	25	25	27	28	Scale	Cu Ft	Cu Ft		Tunnel
0.0	482.4388	80.35019	141.2006	75.00045	74.99213	79.54473	74.94018	75.02081	79.13006			365.353	252.552	0.074916	0.08866				33.458	33.58	12.90	8.92	-0.231271	-0.22784
10.0	597.7082	78.82366	130.4495	76.15973	75.40779	88.97225	75.91964	75.39159	83.85672			366.955	254.137	0.087027	0.086847				30.70943	30.83	12.95	8.97	-0.228243	-0.22829
20.0	580.0082	79.33567	127.0705	76.28041	75.52229	83.88963	75.85964	75.33614	85.42092			368.530	255.700	0.0871	0.088536				28.39618	28.52	13.01	9.03	-0.228225	-0.22787
30.0	579.7334	79.64146	126.7479	76.44922	75.6679	85.86831	76.06504	75.4477	86.91358			370.100	257.275	0.088994	0.09157				26.21529	26.34	13.06	9.08	-0.227751	-0.22711
40.0	572.711	81.4464	126.2804	76.46766	75.74284	84.59107	76.11712	75.47819	85.18936			371.682	258.837	0.088854	0.09056				24.08351	24.21	13.12	9.14	-0.227787	-0.22736
50.0	567.7726	82.0675	125.4503	76.60498	75.83867	83.57873	76.26817	75.54453	86.8058			373.292	260.410	0.086809	0.089141				22.00611	22.13	13.18	9.19	-0.228298	-0.22771
60.0	547.04	81.18532	123.2897	76.71007	75.93134	86.30101	76.24952	75.56742	82.56768			374.882	261.967	0.085723	0.089941				20.09716	20.22	13.23	9.25	-0.228569	-0.22751
70.0	521.4459	80.82128	120.1403	76.69277	75.94477	83.69889	76.27001	75.6199	86.40237			376.475	263.535	0.082464	0.094622				18.42006	18.54	13.29	9.30	-0.229384	-0.22634
80.0	511.876	81.90746	118.5641	76.80576	76.04037	85.49907	76.45363	75.73379	86.96463			378.075	265.105	0.081351	0.093801				16.88343	17.01	13.35	9.36	-0.229662	-0.22655
90.0	504.4049	82.2156	117.7749	76.93079	76.13471	86.02151	76.64387	75.82358	86.93618			379.680	266.700	0.079258	0.091899				15.41579	15.54	13.40	9.41	-0.230185	-0.22703
100.0	465.994	80.73801	113.7067	76.89002	76.1529	86.42429	76.57652	75.86421	80.21458			381.300	268.310	0.076426	0.09243				14.25294	14.38	13.46	9.47	-0.230894	-0.22689
110.0	457.3928	82.41758	112.8726	77.0395	76.23848	85.47177	76.75426	75.93318	83.87269			382.922	269.925	0.075872	0.096078				13.15085	13.27	13.52	9.53	-0.231032	-0.22598
120.0	444.5659	84.77409	111.5055	77.08078	76.27811	85.06848	76.74156	75.98902	85.22144			384.552	271.535	0.071596	0.095799				12.13225	12.26	13.57	9.59	-0.232101	-0.22605
130.0	421.0895	85.35036	109.487	77.1596	76.36527	84.89601	76.81583	76.04296	85.51488			386.212	273.175	0.070408	0.095962				11.28484	11.41	13.63	9.64	-0.232398	-0.22601
140.0	412.9781	85.16481	108.4573	77.1771	76.39648	84.77699	76.90599	76.10325	85.45418			387.885	274.817	0.070189	0.096489				10.50866	10.63	13.69	9.70	-0.232453	-0.22588
150.0	406.2263	84.89673	107.3929	77.26244	76.4532	84.49189	76.99674	76.16164	85.25187			389.552	276.455	0.069244	0.096465				9.724196	9.85	13.75	9.76	-0.232689	-0.22588
160.0	400.996	85.76308	106.9971	77.36613	76.56607	84.50628	77.12245	76.29447	85.42127			391.220	278.118	0.06781	0.097091				8.95781	9.08	13.81	9.82	-0.233048	-0.22573
170.0	390.0395	85.31659	105.8282	77.43619	76.63367	84.27252	77.22282	76.38741	85.32775			392.900	279.775	0.066046	0.095948				8.261468	8.38	13.87	9.88	-0.233488	-0.22601
180.0	382.3883	85.62619	105.3372	77.58686	76.76862	84.04792	77.37019	76.50369	85.13056			394.590	281.438	0.066035	0.09733				7.621249	7.74	13.93	9.93	-0.233491	-0.22567
190.0	383.6448	85.47357	104.9263	77.58386	76.81544	84.20335	77.38877	76.55176	84.95517			396.282	283.107	0.066587	0.096499				6.97358	7.10	13.99	9.99	-0.233353	-0.22588
200.0	389.3636	85.88756	105.0755	77.73146	76.92616	84.32522	77.50319	76.67453	84.95337			397.995	284.775	0.066585	0.095789				6.265074	6.39	14.05	10.05	-0.233354	-0.22605
210.0	390.126	85.89088	105.2715	77.77838	77.02333	84.46916	77.56048	76.75262	85.03979			399.700	286.450	0.067035	0.096414				5.603765	5.73	14.11	10.11	-0.233241	-0.2259
220.0	387.4968	84.2703	104.5673	77.88054	77.09149	84.3646	77.59999	76.80252	85.17506			401.400	288.115	0.064944	0.095357				5.073012	5.20	14.17	10.17	-0.233764	-0.22616
230.0	374.3182	85.5855	104.0113	78.02948	77.23343	84.29839	77.76306	76.93452	85.21223			403.095	289.790	0.064664	0.096122				4.630669	4.75	14.23	10.23	-0.233834	-0.22597
240.0	362.2903	86.42603	103.2345	78.10709	77.30609	84.31991	77.85272	77.04663	84.86868			404.790	291.425	0.06167	0.098272				4.301983	4.42	14.29	10.29	-0.234582	-0.22543
250.0	343.2475	86.97779	102.4097	78.20656	77.40353	84.17214	77.95303	77.14491	84.82184			406.510	293.105	0.060025	0.097518				4.017279	4.14	14.35	10.35	-0.234994	-0.22562
260.0	328.7117	86.43152	101.0167	78.34911	77.56191	84.18024	78.09021	77.28629	84.7369			408.217	294.780	0.056485	0.097766				3.768394	3.89	14.41	10.41	-0.235879	-0.22556
270.0	320.9352	86.62558	100.3731	78.4046	77.64191	83.84382	78.17557	77.34679	84.61232			409.922	296.465	0.056262	0.099178				3.536186	3.66	14.47	10.47	-0.235935	-0.22521
280.0	312.9633	86.39535	99.79912	78.51069	77.75218	83.84163	78.28873	77.45335	84.48111			411.610	298.137	0.055661	0.099833				3.294231	3.42	14.53	10.52	-0.236085	-0.22504
290.0	307.5866	86.07827	99.14279	78.58726	77.83709	83.84436	78.36075	77.55529	84.31964			413.305	299.815	0.052942	0.099266				3.077855	3.20	14.59	10.58	-0.236764	-0.22518
300.0	302.544	86.10732	98.85026	78.75248	77.99283	83.94335	78.52391	77.6986	84.34044			415.004	301.520	0.053915	0.098959				2.855997	2.98	14.65	10.64	-0.236521	-0.22526
310.0	292.8896	86.00035	97.98935	78.92343	78.09787	83.86232	78.68907	77.82648	84.31568			416.763	303.223	0.052928	0.099688				2.6934	2.82	14.71	10.70	-0.236768	-0.22508
320.0	283.2082	85.44402	97.38637	79.02542	78.24264	83.59626	78.80601	77.93683	84.302			418.499	304.936	0.051732	0.099952				2.515941	2.64	14.77	10.76	-0.237067	-0.22501
330.0	276.2035	85.1737	96.79067	79.14987	78.35926	83.6385	78.94416	78.05222	84.21145			420.268	306.662	0.048014	0.098224				2.345514	2.47	14.84	10.83	-0.237996	-0.22544
340.0	271.3895	85.31454	96.31999	79.26421	78.48484	83.69464	79.05602	78.20521	84.07275			422.051	308.392	0.048773	0.099024				2.180331	2.30	14.90	10.89	-0.237807	-0.22524
350.0	266.9627	84.96174	95.82286	79.33952	78.56766	83.77268	79.13798	78.27476	84.01924			423.818	310.105	0.048555	0.099222				2.019844	2.14	14.96	10.95	-0.237861	-0.22519
360.0	262.4463	84.92791	95.62312	79.45777	78.69632	83.68338	79.2691	78.39432	84.09211			425.572	311.826	0.047471	0.100303				1.851039	1.97	15.02	11.01	-0.238132	-0.22492
370.0	257.4275	84.47536	95.23026	79.53225	78.77456	83.61413	79.40288	78.47132	84.10477			427.317	313.586	0.045836	0.099341				1.700193	1.82	15.08	11.07	-0.238541	-0.22516
380.0	250.3934	84.57014	94.74748	79.61774	78.90654	83.5269	79.41332	78.59212	83.88395			429.062	315.257	0.045821	0.100554				1.559791	1.68	15.15	11.13	-0.238545	-0.22486
390.0	245.702	84.55499	94.44856	79.66308	78.95024	83.4476	79.46157	78.64122	83.81998			430.805	316.968	0.044273	0.098894				1.427957	1.55	15.21	11.19	-0.238932	-0.22528
400.0	242.7774	84.53119	94.09696	79.71136	78.97033	83.45441	79.48	78.67708	83.70846			432.552	318.695	0.044743	0.100441				1.280258	1.40	15.27	11.25	-0.238814	-0.22489
410.0	239.9551	84.67847	93.62705	79.74044	79.03593	83.53143	79.54889	78.68502	83.59681			434.303	320.349	0.044196	0.099611				1.164642	1.29	15.33	11.31	-0.238951	-0.2251
420.0	238.6211	84.51051	93.57636	79.80049	79.07319	83.54999	79.63092	78.73515	83.7461			436.090	322.110	0.044198	0.101168				1.022216	1.15	15.39	11.37	-0.238951	-0.22471
430.0	236.1664	84.38364	93.20063	79.8723	79.13466	83.52608	79.73923	78.80949	83.69531			437.875	323.839	0.04364	0.099804				0.87473	1.00	15.46	11.43	-0.23909	-0.22505
440.0	234.6382	84.11155	92.99979	79.92917	79.19611	83.43926	79.78324	78.86514	83.74958			439.668	325.582	0.043092	0.100559				0.747358	0.87	15.52	11.49	-0.239227	-0.22486
450.0	234.2677	84.1872	93.08374	80.00167	79.25951	83.37425	79.87192	78.96091	83.64238			441.462	327.347	0.043102	0.099699				0.611755	0.73	15.58	11.56	-0.239224	-0.22508
460.0	233.2995	83.96748	92.91775	80.02399	79.31791	83.48218	79.84407	78.9625	83.62782			443.262	329.098	0.042816	0.101872				0.467321	0.59	15.65	11.62	-0.239296	-0.22453
470.0	231.4884	84.05103	92.76662	80.04802	79.34112	83.59554	79.905	79.01682	83.5732			445.062	330.847	0.042846	0.101283				0.343121	0.47	15.71	11.68	-0.239288	-0.22468
480.0	228.4083	84.03912	92.49781	80.06966	79.35946	83.52736	79.97017	79.03184	83.61839			446.849	332.613	0.042554	0.100434				0.225222	0.35	15.77	11.74	-0.239361	-0.22489
490.0	226.585	83.88412	92.24794	80.08305	79.38695	83.42569	80.00719	79.0668	83.72236			448.631	334.392	0.043098	0.101343				0.101997	0.22	15.84	11.80	-0.239226	-0.22466
500.0	224.3252	83.81036	92.06905	80.14759	79.40839	83.30598	79.97018	79.08742	83.38709			450.406	336.080	0.043106	0.101407				-0.016062	0.11	15.90	11.86	-0.239223	-0.22465
510.0	221.6467	83.82447	91.88908	80.20857	79.47685	83.25388	79.99965	79.13806	83.32134			452.183	337.722	0.040133	0.102341				-0.122848	0.00	15.96	11.92	-0.239967	-0.22441

Intertek Testing Services

Manufacturer:	**SBI**
Model:	**3.3 Series**
Date:	**6-6-19**
Run:	**4**
Project #:	**G103994967**
Test Duration: (minutes)	**510**

PRESSURE FACTOR:	0.99599
TEMPERATURE FACTORS	
DGM #1:	0.98158
DGM #2:	0.98102

VOLUMES SAMPLED	
DGM #1:	85.22851
DGM #2:	83.88414
TOTAL TUNNEL VOLUME (scf):	168909

SAMPLE RATIOS	
Sample Train 1:	1981.835
Sample Train 2:	2013.597

TOTAL EMISSIONS	
Sample Train 1 (g):	**4.558**
Sample Train 2 (g):	**4.833**

EMISSION RATES	
Sample Train 1 (g/hr):	**0.54**
Sample Train 2 (g/hr):	**0.57**
MAX Allowed	7.50%
DEVIATION:	2.92%

RESULTS

Average emission rate:(gr/hr)	**0.552**
Burn Rate (Dry kg/hr):	1.488

BAROMETRIC PRESSURE

Average:	29.8
Start:	29.8
End:	29.8

DRY GAS METER VALUES

DGM #1	Final:	452.183
	Initial:	365.353
DGM #2	Final:	337.722
	Initial:	252.552

TEMPERATURES (DEG. RANKIN)

DGM #1:	537.907
DGM #2:	538.215

CALIBRATION FACTORS

DGM #1:	1.0040
DGM #2:	1.0080

TUNNEL FLOW RATE:	331.194

PARTICULATE CATCH (mg)

Total Sample Train 1:	2.3
Total Sample Train 2:	2.4
Filter and seal Sample Train 1:	1.6
Filter and seal Sample Train 2:	1.6
Probe Sample Train 1:	0.7
Probe Sample Train 2:	0.8

	Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
	Before	After	Before	After	Before	After	Before	After
	80	84	29.80	29.80	28.3	21.1	0	0

Average Dilution Tunnel Measurements						Sample Data	
Burn	Velocity	Flow Rate	Temp	Total Sample		Particulate Catch	
Time	(Ft/sec)	(dscf/min)	(R)	1	2	1	2
510	17.34	331.19	564.74	85.23	83.88	2.30	2.40

	Dilution Tunnel Dual Train Precision				
	Sample Ratios		Total Emissions (g)		
	Train 1	Train 2	Train 1	Train 2	Deviation (%)
	1981.84	2013.60	4.56	4.83	2.92%

Burn				Initial		Run	Average
Rate		Surface		Draft		Time	Draft
1.488		0.000		0.075		510.000	0.061

Run	Date	Burn Rate	Emission
4	2019-06-06	1.488	0.552

E&E Boiler Tunnel Traverse Worksheet

Static Pressure: **0.144**

Barometer: 29.8

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.088	132.900	0.2966
B CENTER	0.086	138.600	0.2933
A1	0.076	145.800	0.2757
A2	0.086	147.900	0.2933
A3	0.077	142.400	0.2775
A4	0.075	111.900	0.2739
B1	0.073	133.600	0.2702
B2	0.086	138.100	0.2933
B3	0.078	137.900	0.2793
B4	0.064	112.400	0.2530
AVERAGE		134.15	0.2806

PITOT CONSTANT= 0.9513

November 20, 2015 Adjunct to ASTM E XXXX Wood Heater Cordwood Test Method

Cordwood Fuel Load Calculators - 12 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 Usable Firebox Volumes up to 3.0 ft^3 - Low and Medium Fire

Nominal Required Load Density (wet basis)	12	lb/ft^3				
Usable Firebox Volume	2.67	ft^3				
Total Nom. Load Wt. Target	32.04	lb				
Total Load Wt. Allowable Range	30.44	to	33.64	lb		
Core Target Wt. Allowable Range	14.418	to	20.83	lb		
Remainder Load Wt. Allowable Range	11.21	to	17.62	lb		
						Mid-Point
Core Load Fuel Pc. Wt. Allowable Range	4.81	to	8.01	lb		6.41
Remainder Load Pc. Wt. Allowable Range	3.20	to	9.61	lb		6.41
	Pc. #					Ordre
Core Load Piece Wt. Actual	1	6.42	lb	In Range		1.000
	2	5.84	lb	In Range		4.000
	3	6.71	lb	In Range		3.000
Core Load Total. Wt. Actual		18.96	lb	In Range		
	Pc. #					
Remainder Load Piece Wt.	1	6.76	lb	In Range		2.000
(2 or 3 Pcs.)	2	3.85	lb	In Range		6.000
	3	3.88	lb	In Range		5.000
Remainder Load Piece Weight Ratio - Small/Large		57%		In Range		≤ 67%
Remainder Load Tot. Wt. Act		14.49	lb	In Range		
Total Load Wt. Actual		33.46	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		104%		In Range		95-105%
Actual Fuel Load Density		12.5	lb/ft^3			
Allowable Charcoal Bed Wt. Range (lb)	3.4	to	6.6			Mid-Point
Actual Charcoal Bed Wt.		6.5	lb	In Range		5.0
Actual Fuel Load Ending Wt.		0.0	lb	lb		≥ 90%
Total Wt. of Fuel Burned During Test Run lb.		33.5	lb			

Fuel Piece Moisture Reading (%-dry basis)

1	2	3	Ave.		Pc. Wt. Dry Basis			
21.2	17.6	18.1	19.0	In Range	5.39	lb	2.45	kg
19.7	17.6	24	20.4	In Range	4.85	lb	2.20	kg
18.7	25	15.9	19.9	In Range	5.59	lb	2.54	kg
23.5	18.7	18.3	20.2	In Range	5.63	lb	2.55	kg
20.6	22.7	21.9	21.7	In Range	3.17	lb	1.44	kg
21.4	18.6	16.1	18.7	In Range	3.27	lb	1.48	kg

Total Load Ave. MC % (dry basis)	19.9	In Range				
Total Load Ave. MC % (wet basis)	16.6					
Total Test Load Weight (dry basis) →			27.90	lb	12.65	kg
Total Fuel Weight Burned During Test Run (dry basis)			27.9	lb	12.65	kg

5.0187

30.24

Intertek Testing Services

Manufacturer:	**SBI**
Model:	**3.3 Series**
Date:	**6-6-19**
Run:	**4**
Project #:	**G103994967**
Test Duration: (minutes)	**60**

RESULTS

Average emission rate:(gr/hr)	**#DIV/0!**
Burn Rate (Dry kg/hr):	12.649

PRESSURE FACTOR:	0.99599

TEMPERATURE FACTORS

DGM #1:	0.98429
DGM #2:	1.14783

VOLUMES SAMPLED

DGM #1:	9.36372
DGM #2:	0.00000
TOTAL TUNNEL VOLUME (scf):	18683

SAMPLE RATIOS

Sample Train 1:	1995.251
Sample Train 2:	#DIV/0!

TOTAL EMISSIONS

Sample Train 1 (g):	**2.195**
Sample Train 2 (g):	**#DIV/0!**

EMISSION RATES

Sample Train 1 (g/hr):	**2.19**
Sample Train 2 (g/hr):	**#DIV/0!**
MAX Allowed	7.50%
DEVIATION:	#DIV/0!

BAROMETRIC PRESSURE

Average:	29.8
Start:	29.8
End:	29.8

DRY GAS METER VALUES

DGM #1	Final:	12.794
	Initial:	3.243
DGM #2	Final:	0.000
	Initial:	0.000

TEMPERATURES (DEG. RANKIN)

DGM #1:	536.429
DGM #2:	460.000

CALIBRATION FACTORS

DGM #1:	1.0000
DGM #2:	0.0000

TUNNEL FLOW RATE:	311.383

PARTICULATE CATCH (mg)

Total Sample Train 1:	1.1
Total Sample Train 2:	0
Filter and seal Sample Train 1:	0.8
Filter and seal Sample Train 2:	
Probe Sample Train 1:	0.3
Probe Sample Train 2:	

Filters weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure [kPa]		2019-06-03 / 101.3		2019-06-04 / 101.5		2019-06-05 / 101.5		2019-06-07 / 101.6	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1000		0.1001	
	SBI-238	10.0001	10.0001		10.0002		10.0002		10.0001	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	6h50	73.5	5h38	73.7	6h50	73.8	10h03	74.7
	End Time	RH [%]	7h30	0.2	4h45	3.2	7h45	0	10h55	2.4

Run	**Sampling train**		**Filter ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
1	1	front	69	0.1829	0.1868	0.1867	0.1867
		rear	70				
	2	front	73	0.1848	0.1885	0.1886	0.1885
		rear	74				
	3 (1 hr)	front	63	0.1856	0.187	0.1869	0.1869
		rear	64				

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
	1	front					
		rear					
	2	front					
		rear					
	3 (1 hr)	front					
		rear					

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
	1	front					
		rear					
	2	front					
		rear					
	3 (1 hr)	front					
		rear					

Filters weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-04 / 101.5		2019-06-05 / 101.5		2019-06-06 / 101.0		2019-06-07 / 101.6	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1000		0.1001	
	SBI-238	10.0001	10.0002		10.0002		10.0001		10.0001	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	5h38	73.7	6h50	73.8	6h10	75.5	10h03	74.7
	End Time	RH [%]	4h45	3.2	7h45	0	7h10	1.6	10h55	2.4

Run	**Sampling train**		**Filter ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1	front	75	0.1853	0.1869	0.1869	0.1870
		rear	76				
	2	front	79	0.1835	0.1849	0.1849	0.1849
		rear	80				
	3 (1 hr)	front	65	0.1837	0.1845	0.1845	0.1844
		rear	55				

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1	front					
		rear					
	2	front					
		rear					
	3 (1 hr)	front					
		rear					

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1	front					
		rear					
	2	front					
		rear					
	3 (1 hr)	front					
		rear					

Filters weights

General information

Project:	**G103994967 - INVALID RUN**
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-05 / 101.5		2019-06-07 / 101.6							
Calibration Record	SBI-237	0.1000	0.1000		0.1001							
	SBI-238	10.0001	10.0002		10.0001							
	SBI-238	200.0002	200.0000		200.0000							
	Start Time	Temp. [°F]	6h50	73.8	10h03	74.7						
	End Time	RH [%]	7h45	0	10h55	2.4						
Run	**Sampling train**	**Filter ID**	**Pretest Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**			
	1	front	71	0.1846		0.2044						
		rear	72									
	2	front	77	0.1843		0.2042						
		rear	78									
	3 (1 hr)	front	85	0.1873		0.1880						
		rear	86									
	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										
Run	**Sampling train**	**Filter ID**	**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**			
	1	front										
		rear										
	2	front										
		rear										
	3 (1 hr)	front										
		rear										
	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										
Run	**Sampling train**	**Filter ID**	**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**			
	1	front										
		rear										
	2	front										
		rear										
	3 (1 hr)	front										
		rear										

Filters weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-06 / 101.0		2019-06-06 / 101.6		2019-06-07 / 101.6					
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1001					
	SBI-238	10.0001	10.0001		10.0001		10.0001					
	SBI-238	200.0002	200.0000		200.0000		200.0000					
	Start Time	Temp. [°F]	6h10	75.5	19h25	75.3	10h03	74.7				
	End Time	RH [%]	7h10	1.6	19h40	1.8	10h55	2.4				
Run	**Sampling train**		**Filter ID**	**Pretest Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		
	1	front	61	0.1843		0.1859		0.1859				
		rear	62									
	2	front	83	0.1863		0.1878		0.1879				
		rear	84									
	3 (1 hr)	front	89	0.1844		0.1853		0.1852				
		rear	90									
	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										
Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		
	1	front										
		rear										
	2	front										
		rear										
	3 (1 hr)	front										
		rear										
	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										
Run	**Sampling train**		**Filter ID**	**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		**Post test Weight (g)**		
	1	front										
		rear										
	2	front										
		rear										
	3 (1 hr)	front										
		rear										

Probes weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-03 / 101.3		2019-06-03 / 101.6		2019-06-04 / 101.5		2019-06-05 / 101.5	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1000		0.1000	
	SBI-238	10.0001	10.0001		10.0001		10.0002		10.0002	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	6h50	73.5	15h05	73.6	5h38	73.7	6h50	73.8
	End Time	RH [%]	7h30	0.2	15h15	1.5	4h45	3.2	7h45	0

Run	**Sampling train**	**Probe ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
1	1	62	93.9928	93.9930	93.9934	93.9935
	2	64	94.2250	94.2252	94.2258	94.2260
	3 (1 hr)	50	94.1146	94.1142	94.1148	94.1149

	Date/Pressure		2019-06-06 / 101.0		2019-06-07 / 101.6		2019-06-10 / 103.0			
Calibration Record	SBI-237	0.1000	0.1000		0.1001		0.1000			
	SBI-238	10.0001	10.0001		10.0001		10.0002			
	SBI-238	200.0002	200.0000		200.0000		200.0000			
	Start Time	Temp. [°F]	6h10	75.5	10h03	74.7	7h00	75.7		
	End Time	RH [%]	7h10	1.6	10h55	2.4	7h49	0.1		

Run	**Sampling train**	**Probe ID**	**Post test weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
1	1	62	93.9936	93.9936		
	2	64	94.2261	94.2261		
	3 (1 hr)	50	94.1150	94.1150		

	Date/Pressure									
Calibration Record	SBI-237	0.1000								
	SBI-238	10.0001								
	SBI-238	200.0002								
	Start Time	Temp. [°F]								
	End Time	RH [%]								

Run	**Sampling train**	**Probe ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
1	1					
	2					
	3 (1 hr)					

Probes weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-04 / 101.5		2019-06-04 / 101.5		2019-06-05 / 101.5		2019-06-06 / 101.0	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1000		0.1000	
	SBI-238	10.0001	10.0002		10.0002		10.0002		10.0001	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	5h38	73.7	21h32	73.7	6h50	73.8	6h10	75.5
	End Time	RH [%]	4h45	3.2	21h45	3.0	7h45	0	7h10	1.6

Run	**Sampling train**	**Probe ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1	54	94.0684	94.0681	94.0688	94.0687
	2	51	94.2056	94.2053	94.2058	94.2057
	3 (1 hr)	32	80.7220	80.7232	80.7224	80.7225

	Date/Pressure		2019-06-07 / 101.6		2019-06-10 / 103.0					
Calibration Record	SBI-237	0.1000	0.1001		0.1000					
	SBI-238	10.0001	10.0001		10.0002					
	SBI-238	200.0002	200.0000		200.0000					
	Start Time	Temp. [°F]	10h03	74.7	7h00	75.7				
	End Time	RH [%]	10h55	2.4	7h49	0.1				

Run	**Sampling train**	**Probe ID**	**Post test weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1	54	94.0687	94.0688		
	2	51	94.2058	94.2060		
	3 (1 hr)	32	80.7222	80.7222		

	Date/Pressure									
Calibration Record	SBI-237	0.1000								
	SBI-238	10.0001								
	SBI-238	200.0002								
	Start Time	Temp. [°F]								
	End Time	RH [%]								

Run	**Sampling train**	**Probe ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
2	1					
	2					
	3 (1 hr)					

Probes weights

General information

Project:	**G103994967 - INVALID RUN**
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-05 / 101.5		2019-06-06 / 101.0		2019-06-07 / 101.6		2019-06-10 / 103.0	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1001		0.1000	
	SBI-238	10.0001	10.0002		10.0001		10.0001		10.0002	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	6h50	73.8	6h10	75.5	10h03	74.7	7h00	75.7
	End Time	RH [%]	7h45	0	7h10	1.6	10h55	2.4	7h49	0.1

Run	**Sampling train**	**Probe ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
3	1	60	94.1375	94.1388	94.1384	94.1386
	2	58	93.9171	93.9185	93.9181	93.9183
	3 (1 hr)	37	80.8603	80.8609	80.8608	80.8609

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**	**Probe ID**	**Post test weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
3	1	60				
	2	58				
	3 (1 hr)	37				

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**	**Probe ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
3	1					
	2					
	3 (1 hr)					

Probes weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date/Pressure		2019-06-06 / 101.0		2019-06-06 / 101.6		2019-06-07 / 101.6		2019-06-10 / 103.0	
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1001		0.1000	
	SBI-238	10.0001	10.0001		10.0001		10.0001		10.0002	
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000	
	Start Time	Temp. [°F]	6h10	75.5	19h25	75.3	10h03	74.7	7h00	75.7
	End Time	RH [%]	7h10	1.6	19h40	1.8	10h55	2.4	7h49	0.1

Run	**Sampling train**	**Probe ID**	**Pretest Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
4	1	59	94.3488	94.3493	94.3495	94.3495
	2	57	93.8062	93.8063	93.8068	93.8070
	3 (1 hr)	53	94.4916	94.4917	94.4919	94.4919

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**	**Probe ID**	**Post test weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
4	1					
	2					
	3 (1 hr)					

	Date/Pressure											
Calibration Record	SBI-237	0.1000										
	SBI-238	10.0001										
	SBI-238	200.0002										
	Start Time	Temp. [°F]										
	End Time	RH [%]										

Run	**Sampling train**	**Probe ID**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**	**Post test Weight (g)**
4	1					
	2					
	3 (1 hr)					

Filters weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date		2019-05-31		2019-06-03		2019-06-04		2019-06-05		2019-06-06		2019-06-07		2019-06-10									
	Pression barométrique		**101.00**		**100.30**		**101.50**		**101.50**		**101.00**		**101.60**		**103.00**									
Calibration Record	SBI-237	0.1000	0.1000		0.1000		0.1000		0.1000		0.1000		0.1001		0.1000									
	SBI-238	10.0001	10.0001		10.0001		10.0002		10.0002		10.0001		10.0001		10.0002									
	SBI-238	200.0002	200.0000		200.0000		200.0000		200.0000		200.0000		200.0000		200.0000									
	Start Time	Temp. [°F]	10h00	69.3	6h50	73.5	5h38	73.7	6h50	73.8	6h10	75.5	10h03	74.7	7h00	75.7								
	End Time	RH [%]	10H26	0.8	7h30	0.2	4h45	3.2	7h45	0	7h10	1.6	10h55	2.4	7h49	0.1								
		Filter ID	**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**		**Weight (g)**			
	front	61	0.1843		0.1842		0.1844		0.1843		0.1843													
	rear	62																						
	front	63	0.1855		0.1856																			
	rear	64																						
	front	65	0.1837		0.1837		0.1837																	
	rear	66																						
	front	69	0.1829		0.1829																			
	rear	70																						
	front	71	0.1846		0.1847		0.1846		0.1846															
	rear	72																						
	front	73	0.1847		0.1848																			
	rear	74																						
	front	75	0.1854		0.1854		0.1853																	
	rear	76																						
	front	77	0.1842		0.1843		0.1843		0.1843															
	rear	78																						
	front	79	0.1835		0.1835		0.1835																	
	rear	80																						
	front	83	0.1863		0.1864		0.1864		0.1864		0.1863													
	rear	84																						
	front	85	0.1872		0.1872		0.1872		0.1873															
	rear	86																						
	front	89	0.1843		0.1845		0.1844		0.1844		0.1844													
	rear	90																						

Probes weights

General information

Project:	G103994967
Project Engineer:	Claude Pelland
Scale ID:	SBI-206

	Date				2019-05-31	2019-06-03	2019-06-04	2019-06-05	2019-06-06	2019-06-07	2019-06-10	
	Pression barométrique				**101.00**	**100.30**	**101.50**	**101.50**	**101.00**	**101.60**	**103.00**	
Calibration Record	SBI-237	0.1000			0.1000	0.1000	0.1000	0.1000	0.1000	0.1001	0.1000	
	SBI-238	10.0001			10.0001	10.0001	10.0002	10.0002	10.0001	10.0001	10.0002	
	SBI-238	200.0002			200.0000	200.0000	200.0000	200.0000	200.0000	200.0000	200.0000	
	Start Time	Temp. [°F]			10h00 69.3	6h50 73.5	5h38 73.7	6h50 73.8	6h10 75.5	10h03 74.7	7h00 75.7	
	End Time	RH [%]			10H26 0.8	7h30 0.2	4h45 3.2	7h45 0	7h10 1.6	10h55 2.4	7h49 0.1	
	x	32			80.7220	80.7221	80.7220					
	x	37			80.8603	80.8605	80.8604	80.8603				
	x	50			94.1146	94.1146						
	x	51			94.2057	94.2056	94.2056					
	x	53			93.8063	93.8061	93.8063	93.8062	93.8062			
	x	54			94.0684	94.0685	94.0684					
	x	57			94.4918	94.4918	94.4915	94.4914	94.4916			
	x	58			93.9173	93.9171	93.9170	93.9171				
	x	59			94.3492	94.3490	94.3488	94.3488	94.3488			
	x	60			94.1376	94.1376	94.1374	94.1375				
	x	62			93.9928	93.9928						
	x	64			94.2251	94.2250						

ID Certificat de Calibration
CA0003-013-031319-ACC-USI

METTLER TOLEDO

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, OH 43240
1-800-METTLER

Accredited by the American Association for Laboratory Accreditation (A2LA)
CALIBRATION CERT #1902.01

ISO 9001 Registered
ANSI/NCSL Z540-1 Accredited

Certificat de Calibration de Précision

Accuracy Calibration Certificate

Client

Compagnie:	SBI Fabricant De Poeles		
Adresse:	250 Rue de Copenhague		
Ville:	Saint-Augustin-De-Desmaures	**Contact:**	N/D
Zip/Code Postal:	G3A 2H3		
État/Province:	Quebec		

Weighing Device

Manufacturier:	Weigh-Tronix	**Type d'Instrument:**	Weighing Instrument
Modèle:	DSL 4848-05	**# Outil:**	SBI-014 FLOOR SCALE
No. Série:	B00927386KL	**Modèle Indicateur:**	N/D
Building:	N/D	**Terminal Serial No.:**	N/D
Floor:	N/D	**Terminal Asset No.:**	N/D
Room:	N/D		

Plage	Capacité Max	Lisibilité (d)
1	500 kg	0.02 kg

Procedure

Instruction de Calibration:	EURAMET cg-18 v. 4.0 (11/2015)
Instruction de travail METTLER TOLEDO:	30260953

Ce certificat de calibration contient des mesures pour les calibrations Tel que Trouvé et Tel que Laissé.

The sensitivity/span of the weighing instrument was adjusted before As Left calibration with an external weight.

The calibration was agreed with the user below the maximum capacity of the balance.

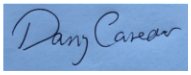
	Temperature	
Tel que Trouvé	Start: 21.0 °C	End: 21.0 °C
Tel que Laissé	Start: 20.0 °C	End: 20.0 °C

Environmental conditions have been verified to ensure the accuracy of the calibration.

This certificate is issued in accordance with the conditions of accreditation granted by A2LA, which is based on ISO/IEC 17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards.

Date calibration Tel que Trouvé:	13-Mar-2019
Date calibration Tel que Laissé:	13-Mar-2019
Date d'Émission:	13-Mar-2019
Requested Next Calibration Date:	31-Mar-2020

Authorized A2LA Signatory:



Dany Careau

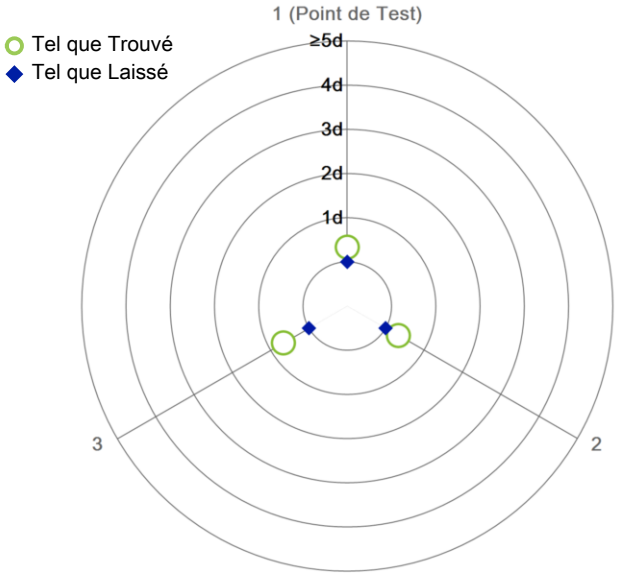
Résultats de Mesure

Répétabilité

Charge de Test: 100 kg

	Tel que Trouvé	Tel que Laissé
1	99.96 kg	100.00 kg
2	99.96 kg	100.00 kg
3	99.98 kg	100.00 kg

Écart Type	**0.012 kg**	**0.000 kg**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

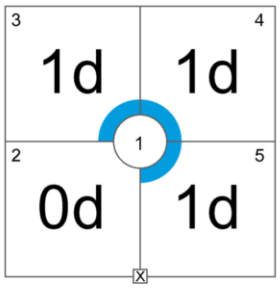
The results of this graph are based upon the absolute values of the differences from the mean value.

Excentricité

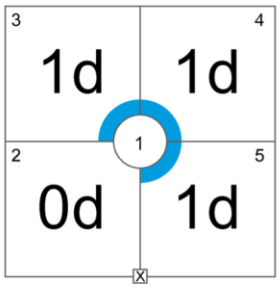
Charge de Test: 100 kg

Position	Tel que Trouvé	Tel que Laissé
1	99.94 kg	100.00 kg
2	99.94 kg	100.00 kg
3	99.96 kg	100.02 kg
4	99.92 kg	99.98 kg
5	99.92 kg	99.98 kg

Déviation Maximale	**0.02 kg**	**0.02 kg**



Tel que Trouvé



Tel que Laissé

The "d" in the graph represents the readability of the range/interval in which the test was performed.

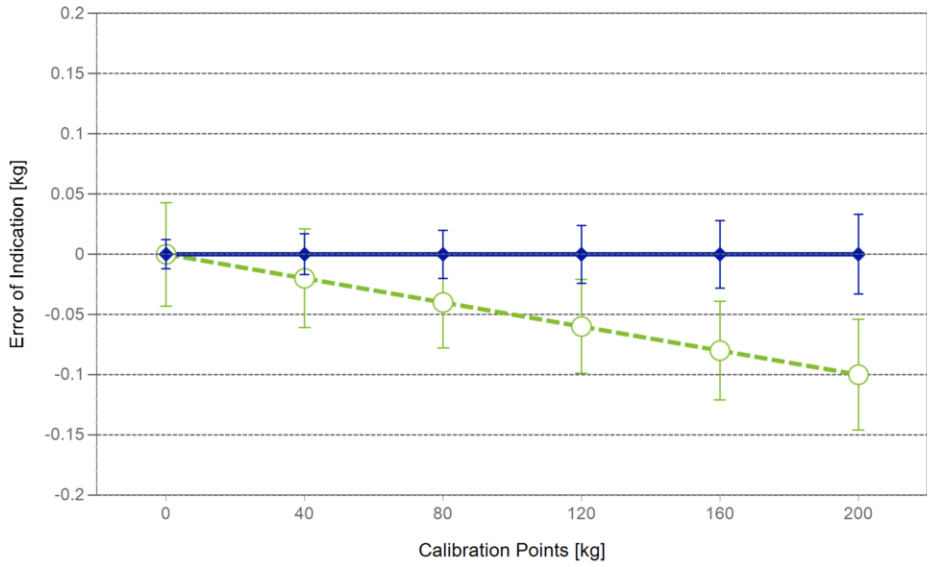
Erreur d'indication

Tel que Trouvé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0 kg	0.00 kg	0.00 kg	0.043 kg	3.31
2	40 kg	39.98 kg	-0.02 kg	0.041 kg	2.87
3	80 kg	79.96 kg	-0.04 kg	0.038 kg	2.52
4	120 kg	119.94 kg	-0.06 kg	0.039 kg	2.37
5	160 kg	159.92 kg	-0.08 kg	0.041 kg	2.28
6	200 kg	199.90 kg	-0.10 kg	0.046 kg	2.28

Tel que Laissé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0 kg	0.00 kg	0.00 kg	0.012 kg	2
2	40 kg	40.00 kg	0.00 kg	0.017 kg	2
3	80 kg	80.00 kg	0.00 kg	0.020 kg	2
4	120 kg	120.00 kg	0.00 kg	0.024 kg	2
5	160 kg	160.00 kg	0.00 kg	0.028 kg	2
6	200 kg	200.00 kg	0.00 kg	0.033 kg	2



Tel que Trouvé

Tel que Laissé

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%. The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

Tous les poids utilisés pour le contrôle métrologique sont retraçables aux étalons Nationaux et Internationaux. Les poids ont été calibrés et certifiés par un laboratoire de calibration accrédité.

Jeu de Poids 1: OIML M1

Weight Set Number:	Q	Date d'Émission:	27-Feb-2019
# Certificat:	1406972	Date de Calibration Due:	27-Feb-2020

Remarques

N/D

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Incertitude de Mesure du dispositif de pesage en opération

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Coefficient de température pour l'évaluation de l'incertitude de mesure en opération: $10.0 \cdot 10^{-6}$ / K

Plage d'opération sur le site pour l'évaluation de l'incertitude de mesure en opération: 10 K

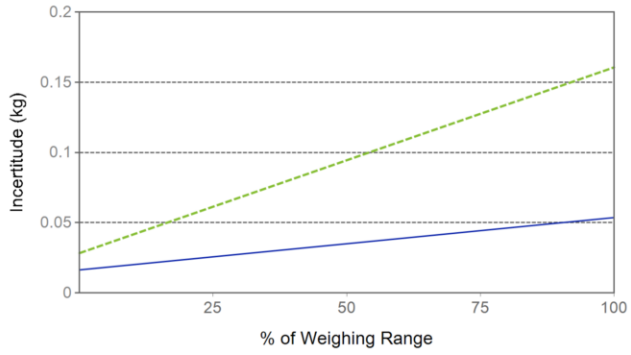
Linéarisation de l'Équation d'Incertitude

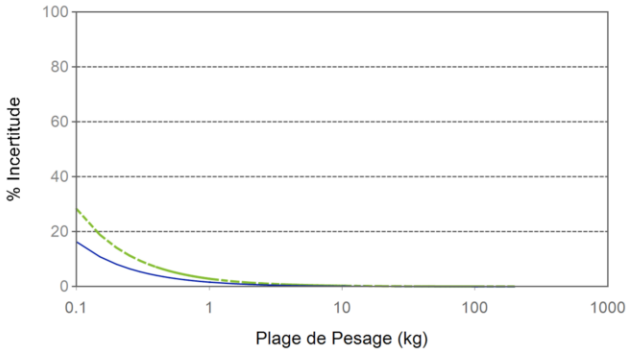
Plage		Tel que Trouvé	Tel que Laissé
1	0 kg - 500 kg	U_1 = 28 g + 0.662 g/kg · R	U_1 = 16 g + 0.186 g/kg · R

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Indication Net	Tel que Trouvé		Tel que Laissé	
0.20 kg	0.028 kg	14%	0.016 kg	8.0%
2.00 kg	0.029 kg	1.5%	0.016 kg	0.80%
20.00 kg	0.041 kg	0.21%	0.020 kg	0.10%
100.00 kg	0.094 kg	0.094%	0.035 kg	0.035%
200.00 kg	0.16 kg	0.080%	0.053 kg	0.027%





Tel que Trouvé **Tel que Laissé**

METTLER TOLEDO Service

GWP®
Certificate

No Pass/Fail statement is possible because one or more of the process requirements are not specified.

Tests Performed: ☑ ☑

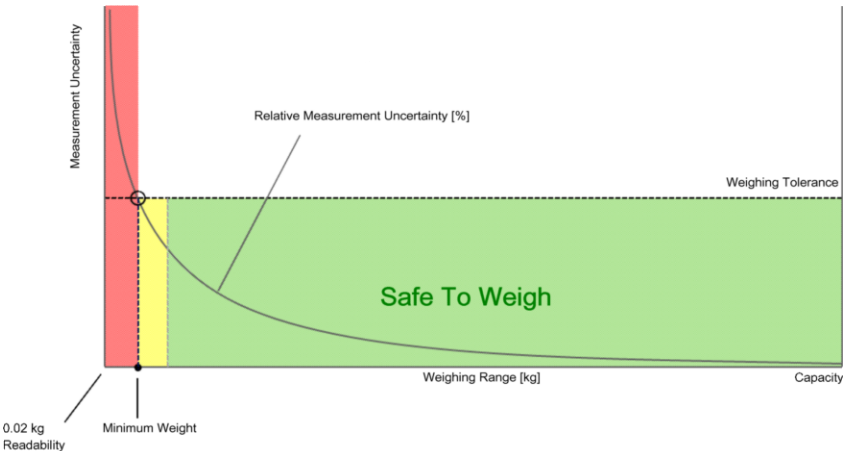
Process Requirements

Weighing Tolerance: **Not Specified**

Smallest Net Weight: **Not Specified**

Facteur de Sécurité: ***Not specified, default = 2**

Safe Weighing Range



Since the weighing tolerance is not specified, only a generic behavior curve is shown.

Poids Minimum

As Found Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	83.646 kg	N/D	N/D	N/D	N/D
0.2%	21.137 kg	83.646 kg	N/D	N/D	N/D
0.5%	6.520 kg	15.387 kg	28.149 kg	83.646 kg	N/D
1%	3.029 kg	6.520 kg	10.588 kg	21.137 kg	83.646 kg
2%	1.463 kg	3.029 kg	4.710 kg	8.473 kg	21.137 kg
5%	0.573 kg	1.162 kg	1.767 kg	3.029 kg	6.520 kg

As Left Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	20.073 kg	52.084 kg	111.191 kg	N/D	N/D
0.2%	9.004 kg	20.073 kg	34.007 kg	76.476 kg	N/D
0.5%	3.393 kg	7.058 kg	11.032 kg	20.073 kg	52.084 kg
1%	1.664 kg	3.393 kg	5.189 kg	9.004 kg	20.073 kg
2%	0.824 kg	1.664 kg	2.520 kg	4.282 kg	9.004 kg
5%	0.328 kg	0.658 kg	0.991 kg	1.664 kg	3.393 kg

À ces valeurs de poids net minimum, l'incertitude de mesure du dispositif est égale ou inférieure à 1/1 (pas de facteur de sécurité), 1/2, 1/3, 1/5 ou 1/10 de la tolérance requise. Ces valeurs sont calculées avec k=2 et basées sur la formule linéaire de l'incertitude de mesure du dispositif de pesage en opération.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Résultats de Mesure

Results Summary

	Répétabilité	Excentricité	Erreur d'indication
As Found	N/D	N/D	N/D
As Left	N/D	N/D	N/D

✔ = Passed

✘ = Failed

⚠ = Safety Factor not met

Répétabilité

Charge de Test: 100 kg

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/D	0.012 kg	N/D	0.000 kg*	N/D
0.2%	N/D		N/D		N/D
0.5%	N/D		N/D		N/D
1%	N/D		N/D		N/D
2%	N/D		N/D		N/D
5%	N/D		N/D		N/D

An assessment cannot be made because the smallest net weight is not defined.

*The calculated standard deviation is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Excentricité

Charge de Test: 100 kg

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.05 kg	0.02 kg	✓	0.02 kg	⚠
0.2%	0.10 kg		✓		✓
0.5%	0.25 kg		✓		✓
1%	0.50 kg		✓		✓
2%	1.00 kg		✓		✓
5%	2.50 kg		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Erreur d'indication

Tel que Trouvé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0 kg	0.00 kg	N/D	N/D	N/D	N/D	N/D	N/D
40 kg	-0.02 kg	0.02 kg	0.04 kg	0.10 kg	0.20 kg	0.40 kg	1.00 kg
80 kg	-0.04 kg	0.04 kg	0.08 kg	0.20 kg	0.40 kg	0.80 kg	2.00 kg
120 kg	-0.06 kg	0.06 kg	0.12 kg	0.30 kg	0.60 kg	1.20 kg	3.00 kg
160 kg	-0.08 kg	0.08 kg	0.16 kg	0.40 kg	0.80 kg	1.60 kg	4.00 kg
200 kg	-0.10 kg	0.10 kg	0.20 kg	0.50 kg	1.00 kg	2.00 kg	5.00 kg
Result		✓	✓	✓	✓	✓	✓

Tel que Laissé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0 kg	0.00 kg	N/D	N/D	N/D	N/D	N/D	N/D
40 kg	0.00 kg	0.02 kg	0.04 kg	0.10 kg	0.20 kg	0.40 kg	1.00 kg
80 kg	0.00 kg	0.04 kg	0.08 kg	0.20 kg	0.40 kg	0.80 kg	2.00 kg
120 kg	0.00 kg	0.06 kg	0.12 kg	0.30 kg	0.60 kg	1.20 kg	3.00 kg
160 kg	0.00 kg	0.08 kg	0.16 kg	0.40 kg	0.80 kg	1.60 kg	4.00 kg
200 kg	0.00 kg	0.10 kg	0.20 kg	0.50 kg	1.00 kg	2.00 kg	5.00 kg
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

METTLER TOLEDO Service

Handbook 44 Tolerance Assessment (Entretien)

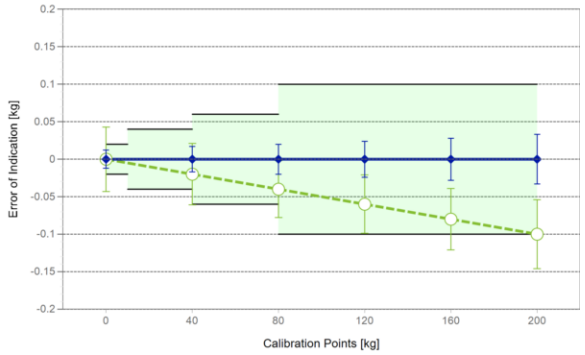
Les mesures du certificat de calibration joint ont été évaluées selon les tolérances définies par NIST HB44.

	él que Trouv	él que Laiss
Global	✓	✓

✓ = Passed
✗ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	500 kg	0.02 kg	0.02 kg	III



Tolerances according to NIST Handbook 44

Test Load		Tolérance
From	To	
0.00 kg	0.00 kg	0.005 kg
0.02 kg	10.00 kg	0.02 kg
10.02 kg	40.00 kg	0.04 kg
40.02 kg	80.00 kg	0.06 kg
80.02 kg	200.00 kg	0.1 kg

○ **Tel que Trouvé**
◆ **Tel que Laissé**
— **Tolérance**

Eccentricity and Repeatability

Test	Test Load	Tolérance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
xcentricité (Maximum Erro	100 kg	0.10 kg	0.08 kg	✓	0.02 kg	✓
Excentricité (Plage)	100 kg	0.1 kg	0.04 kg	✓	0.04 kg	✓
épétabilité (Maximum Erro	100 kg	0.1 kg	0.04 kg	✓	0.00 kg	✓
Répétabilité (Plage)	100 kg	0.10 kg	0.02 kg	✓	0.00 kg	✓

Max. Error: Maximum of the absolute values of the individual errors.
Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolérance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 kg	0.02 kg	0.00 kg	✓	0.00 kg	✓
2	40 kg	0.04 kg	-0.02 kg	✓	0.00 kg	✓
3	80 kg	0.06 kg	-0.04 kg	✓	0.00 kg	✓
4	120 kg	0.10 kg	-0.06 kg	✓	0.00 kg	✓
5	160 kg	0.10 kg	-0.08 kg	✓	0.00 kg	✓
6	200 kg	0.10 kg	-0.10 kg	✓	0.00 kg	✓

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

ACCREDITATION ISO 17025
SCC Scope Number 220

CALIBRATION CERTIFICATE

Certificate no.:	636904	**Calibration date:**	April 05, 2018
Identification:	SBI-096	**Certificate issued:**	April 05, 2018
Description:	CALIBRATOR, OMEGA CL23A	**Interval:**	12 months
Size:	TC K/J/T	**Due date:**	April 05, 2019
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.

166727 P

ULRICH
DIVISION - TIMBOT CANADA

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CALIBRATION DATA

Certificate no.: 636904
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	2018/02/26	2019/02/28

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		-200.5	-201.0	-199.0	PASS	1.7
-60.0degF		-60.1	-61.0	-59.0	PASS	3.1
-40.0degF		-40.2	-40.5	-39.5	PASS	1.5
32.0degF		31.8	31.5	32.5	PASS	1.7
300.0degF		299.8	299.5	300.5	PASS	1.1
572.0degF		571.8	571.5	572.5	PASS	1.1
1240.0degF		1239.8	1239.5	1240.5	PASS	1.1
1260.0degF		1259.7	1259.5	1260.5	PASS	1.1
2500.0degF		2499.7	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-200.2	-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
572.0degF		571.9	571.5	572.5	PASS	1.6
300.0degF		299.6	299.5	300.5	PASS	2.0
1240.0degF		1239.8	1239.5	1240.5	PASS	1.6
1260.0degF		1259.8	1259.5	1260.5	PASS	1.6
1400.0degF		1399.8	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.0	-201.0	-199.0	PASS	2.3
-60.0degF		-59.8	-61.0	-59.0	PASS	2.3
-40.0degF		-39.9	-40.5	-39.5	PASS	1.2
32.0degF		32.0	31.5	32.5	PASS	1.7
300.0degF		300.0	299.5	300.5	PASS	2.0
572.0degF		572.0	571.5	572.5	PASS	2.0

ULRICH
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PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
750.0degF		750.0	749.5	750.5	PASS	2.0
CALIBRATOR CALIBRATION						
K Type Thermocouple						
-200.0degF		-199.6	-201.0	-199.0	PASS	1.7
-60.0degF		-59.8	-61.0	-59.0	PASS	3.1
-40.0degF		-39.7	-40.5	-39.5	PASS	1.5
32.0degF		32.1	31.5	32.5	PASS	1.7
300.0degF		300.0	299.5	300.5	PASS	1.1
572.0degF		572.2	571.5	572.5	PASS	1.1
1240.0degF		1240.2	1239.5	1240.5	PASS	1.1
1260.0degF		1260.2	1259.5	1260.5	PASS	1.1
2500.0degF		2500.3	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-199.8	-201.0	-199.0	PASS	2.1
-60.0degF		-60.0	-61.0	-59.0	PASS	3.5
-40.0degF		-39.9	-40.5	-39.5	PASS	1.7
32.0degF		32.0	31.5	32.5	PASS	2.0
300.0degF		300.1	299.5	300.5	PASS	2.0
572.0degF		572.0	571.5	572.5	PASS	1.6
1240.0degF		1240.2	1239.5	1240.5	PASS	1.6
1260.0degF		1260.2	1259.5	1260.5	PASS	1.6
1400.0degF		1400.0	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.0	-201.0	-199.0	PASS	2.3
-60.0degF		-60.0	-61.0	-59.0	PASS	2.3
-40.0degF		-39.9	-40.5	-39.5	PASS	1.2
32.0degF		31.9	31.5	32.5	PASS	1.7
300.0degF		300.0	299.5	300.5	PASS	2.0
572.0degF		572.0	571.5	572.5	PASS	2.0
750.0degF		749.9	749.5	750.5	PASS	2.0

End of Test Data

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

AC-1969.00

Certificate of Calibration

Date: Jun 27, 2018 **Cert No. 551220081437093**

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12
250 DE COPENHAGUE
SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

		Work Order #:	SAC-70095825
		Purchase Order #:	LAB-17082017
MPC Control #:	DA5991	Serial Number:	79977
Asset ID:	SBI-097	Department:	N/A
Gage Type:	ANEMOMETER	Performed By:	JOSE TUMALAD
Manufacturer:	EUROTRON	Received Condition:	IN TOLERANCE
Model Number:	VT 50	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	June 26, 2018
Temp/RH:	69.6°F / 46.0%	Cal. Interval:	12 MONTHS
Location:	Calibration performed at MPC facility	Cal. Due Date:	June 26, 2019

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	-3.8	-3.8	Deg F	Passed	0.11
2	Temperature Tested at:(Deg F)	45.0	43.5	46.5	45.6	45.6	Deg F	Passed	0.11
3	Temperature Tested at:(Deg F)	90.0	87.6	92.4	91.2	91.2	Deg F	Passed	0.11
4	Temperature Tested at:(Deg F)	135.0	131.7	138.3	135.6	135.6	Deg F	Passed	0.11
5	Temperature Tested at:(Deg F)	176.0	171.8	180.1	175.6	175.6	Deg F	Passed	0.11
6	Air Velocity Tested At:	500	473	527	492	492	FPM	Passed	15
7	Air Velocity Tested At:	1,000	930	1070	982	982	FPM	Passed	29
8	Air Velocity Tested At:	2,000	1900	2100	1,972	1,972	FPM	Passed	58
9	Air Velocity Tested At:	3,000	2870	3130	2,978	2,978	FPM	Passed	87
10	Air Velocity Tested At:	4,000	3840	4160	3,947	3,947	FPM	Passed	80
11	Air Velocity Tested At:	5,000	4810	5190	4,970	4,970	FPM	Passed	100
12	Air Velocity Tested At:	5,900	5723	6077	5,867	5,867	FPM	Passed	118

Calibrating Technician: JOSE TUMALAD

QC Approval: Brian Gold

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

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

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

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

AC-1969.00

Certificate of Calibration

Date: Jun 27, 2018 **Cert No. 551220081437093**

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 31, 2018	512200813002699
CJ5100	WIND TUNNEL WITH CONTROLLER	JS-500	375/305	INTERACTIVE INSTRUMENTS	Oct 31, 2019	512200813087847
CL7223	CHUB-E4	1529-R	A07486/A07485/A07728/A476	HART SCIENTIFIC	Apr 30, 2019	512200813334456
CS0080	ANEMOMETER	HHF141	1017400	OMEGA	Mar 31, 2020	800367773

Procedures Used in this Event

Procedure Name	Description
MPC-00132	Anemometers, General, May-10-2016 rev02

Calibrating Technician: JOSE TUMALAD

QC Approval: Brian Gold

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

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

AC-1969.00

Certificate of Calibration

Date: Jun 26, 2018 **Cert No. 551220081435485**

Customer:

STOVE BUILDERS INTERNATIONAL INC.

PORTES 11-12
250 DE COPENHAGUE
SAINT-AUGUSTIN-DE-DESMAURES QC G3A 2H3

Work Order #: SAC-70095825

MPC Control #:	DA5990	Serial Number:	N/A
Asset ID:	SBI-104	Department:	N/A
Gage Type:	PITOT STATIC TUBE	Performed By:	JOSE TUMALAD
Manufacturer:	DWYER INSTRUMENTS INC.	Received Condition:	IN TOLERANCE
Model Number:	160S-24	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	June 26, 2018
Temp/RH:	69.6°F / 46.0%	Cal. Interval:	12 MONTHS
Location:	Calibration performed at MPC facility	Cal. Due Date:	June 26, 2019

Calibration Notes:

PT coefficient: 0.84

Test Points

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result	Uncertainty
1	Exhaust flow	10.0	9.0	11.0	10.1	10.1	MPS	Passed	0.29
2	Exhaust flow	20.0	18.0	22.0	20.5	20.5	MPS	Passed	0.58

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AW3587	TIMER	N/A	N/A	SPORTLINE	Sep 30, 2018	512200813010701
AW4419	MULTI-FUNCTION PRESSURE INDICATOR	DPI 145	14501283	DRUCK INC	Mar 31, 2020	512200813309719
CS0080	ANEMOMETER	HHF141	1017400	OMEGA	Mar 31, 2020	800367773
CJ5100	WIND TUNNEL WITH CONTROLLER	JS-500	375/305	INTERACTIVE INSTRUMENTS	Oct 31, 2019	512200813087847

Calibrating Technician: JOSE TUMALAD

QC Approval: Brian Gold

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, 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.

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

Certificate of Calibration

ilac-MRA ANAB ACCREDITED CALIBRATION LABORATORY AC-1969.00

Date: Jun 26, 2018 **Cert No. 551220081435485**

Procedures Used in this Event

Procedure Name	Description
MPC-ALT-001	Pitot-Static Test Sets, General Procedure, Jan-04-2018
MPC-ALT-001	Pitot-Static Test Sets, General Procedure, Jan-04-2018

Calibrating Technician: JOSE TUMALAD

QC Approval: Brian Gold

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, 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.

Date: 2019-02-20

Equipment: SBI-132 (T1) Temperature: 75 °F

Accuracy: 0.1 °F R.H.: 20.6%

Reference: SBI-096

S.D.	0.0025	%	
R.M.U.	0.14	%	
O.M.U	**0.40**	**%**	
	Ave A.D.	0.14	%
Standard	Reading	A.D.	
70	69.9	0.14	
70	69.9	0.14	
70	69.9	0.14	

S.D.	0.0026	%	
R.M.U.	0.05	%	
O.M.U	**0.32**	**%**	
	Ave A.D.	0.15	%
Standard	Reading	A.D.	
200	199.7	0.15	
200	199.7	0.15	
200	199.7	0.15	

S.D.	0.0000	%	
R.M.U.	0.02	%	
O.M.U	**0.03**	**%**	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
600	600	0.00	
600	600	0.00	
600	600	0.00	

S.D.	0.0035	%	
R.M.U.	0.01	%	
O.M.U	**0.40**	**%**	
	Ave A.D.	0.20	%
Standard	Reading	A.D.	
1000	998	0.20	
1000	998	0.20	
1000	998	0.20	

S.D.	0.0012	%	
R.M.U.	0.01	%	
O.M.U	**0.14**	**%**	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
1400	1401	0.07	
1400	1401	0.07	
1400	1401	0.07	

Technician: Claude Paré

Date: 2019-02-22

Equipment: SBI-132 (T2) Temperature: 70.5 °F
Accuracy: 0.1 R.H.: 30.8%
Reference: SBI-096

S.D.	0.00	%	
R.M.U.	0.14	%	
O.M.U	**0.90**	**%**	
	Ave A.D.	0.43	%
Standard	Reading	A.D.	
70	69.7	0.43	
70	69.7	0.43	
70	69.7	0.43	

S.D.	0.00	%	
R.M.U.	0.05	%	
O.M.U	**0.44**	**%**	
	Ave A.D.	0.22	%
Standard	Reading	A.D.	
200	199.7	0.15	
200	199.5	0.25	
200	199.5	0.25	

S.D.	0.00	%	
R.M.U.	0.02	%	
O.M.U	**0.03**	**%**	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
600	600	0.00	
600	600	0.00	
600	600	0.00	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	**0.40**	**%**	
	Ave A.D.	0.20	%
Standard	Reading	A.D.	
1000	998	0.20	
1000	998	0.20	
1000	998	0.20	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	**0.14**	**%**	
	Ave A.D.	0.07	%
Standard	Reading	A.D.	
1400	1401	0.07	
1400	1401	0.07	
1400	1401	0.07	

Technician: Claude Paré

Date: 2018-10-31

Equipment: SBI-153 Temperature: 73.5°F
Accuracy: 0.001 1 R.H.: 31.6%
Reference: SBI-194

S.D.	0.00	%	
R.M.U.	0.09	%	
O.M.U	**0.75**	**%**	
	Ave A.D.	0.36	%
Standard	Reading	A.D.	
MΩ			
1.100	1.096	0.36	

S.D.	0.00	%	
R.M.U.	0.83	%	
O.M.U	**1.67**	**%**	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
MΩ			
120	120	0.00	

Technician: Claude Paré

Digital Measurement Metrology Inc.
A Trescal company
26 Automatic Road, Unit 4
Brampton, ON, L6S 5N7
Tel. (905) 790-9400 Fax. (905) 790-9266
www.dmm.ca // service@dmm.ca

ACCREDITED
CERTIFICATE #1692.01

CALIBRATION CERTIFICATE

Description:	WEIGHT	**Calibration Date:**	Oct 02, 2018 **Certificate:** 95513
Asset Number:	SBI-190	**Property of:**	SBI ST-AUGUSTIN
Serial/Model Number:	N / A	**Address:**	250, rue de Copenhague, Doors 10-12
Manufacturer:	N / A	**City/Prov/PC:**	St-Augustin-de-Desmaures QC G3A 2H3
Instrument Capacity:	5 kg	**Country:**	Canada
Procedure:	CP34G	**Method Used:**	COMPARISON
Room Humidity:	45 % **Room Temp:** 19.6 °C	**Conformance Stds:**	ISO/IEC 17025: 2005

CALIBRATION DATA

Units: kg

Range	Std/Nominal	As Found	As Left	Min	Max	Tolerance In	Tolerance Out	Comments
	5	5.0005	5.0005	4.9995	5.0005	✔		

Remarks:
Inspected, cleaned and tested using the mfgr's specs and procedures, customer's, national or international standards, or new procedure design. Measurement uncertainty is not included when any statement of compliance is made. The user must decide on acceptance for the intended use.

Received Condition:
In tolerance.

CALIBRATION STANDARD(S) USED

Traceable No.	Asset Number	Calibration Date	Date Due
95457	DMML-2356075	Oct 01, 2018	Oct 01, 2019
W-046636-25724	DMML-21701	Jan 08, 2018	Jan 08, 2020

Weights are accurate to class F tolerance.

Estimated measurement uncertainty is ± 0.2 g.

Reported uncertainties represent a 95 % confidence level assuming a normal distribution, with a coverage factor of k=2.

This calibration was performed in the lab and is traceable to the International System of Units (SI Units) through NIST or NRC. This report is covered by our accreditation.

Calibration of the instrument expires on Oct 02, 2023

CALIBRATED BY Chris Riddle — Christopher Riddle

Q.A. APPROVAL Andrés Galeano — Andres Galeano

END OF REPORT

ACCREDITATION 17025 ISO/IEC

Date: 2018-10-26

Equipment: SBI-197
Ambiant
Accuracy: 0.01
Reference: SBI-096

Temperature: 65.8 F
R.H.: 30%
P.B.: 101.6 kPa

S.D.	0.01	%	
R.M.U.	0.01	%	
O.M.U	**1.29**	**%**	
	Ave A.D.	0.64	%
Standard	Reading	A.D.	
°F	°F		
70.0	69.55	0.64	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	**0.49**	**%**	
	Ave A.D.	0.25	%
Standard	Reading	A.D.	
°F	°F		
200.0	199.51	0.25	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	**0.11**	**%**	
	Ave A.D.	0.05	%
Standard	Reading	A.D.	
°F	°F		
600.0	599.68	0.05	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	**0.04**	**%**	
	Ave A.D.	0.02	%
Standard	Reading	A.D.	
°F	°F		
1000.0	999.82	0.02	

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	**0.03**	**%**	
	Ave A.D.	0.01	%
Standard	Reading	A.D.	
°F	°F		
1400.0	1399.80	0.01	

Claude Paré

ID Certificat de Calibration
CA0003-010-031319-ACC-USL

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, OH 43240
1-800-METTLER

Accredited by the American Association for Laboratory Accreditation (A2LA)
CALIBRATION CERT #1788.01
ISO 17025 Accredited
ANSI/NCSL Z540-1 Accredited

Certificat de Calibration de Précision

Accuracy Calibration Certificate

Client

Compagnie:	SBI Fabricant De Poeles		
Adresse:	250 Rue de Copenhague		
Ville:	Saint-Augustin-De-Desmaures	**Contact:**	N/D
Zip/Code Postal:	G3A 2H3		
État/Province:	Quebec		

Weighing Device

Manufacturier:	SARTORIUS	**Type d'Instrument:**	Weighing Instrument
Modèle:	TE214S	**# Outil:**	SBI-206 BAL. ANALYTIQUE
No. Série:	25851066	**Modèle Indicateur:**	N/D
Building:	N/D	**Terminal Serial No.:**	N/D
Floor:	N/D	**Terminal Asset No.:**	N/D
Room:	N/D		

Plage	Capacité Max	Lisibilité (d)
1	210 g	0.0001 g

Procedure

Instruction de Calibration:	EURAMET cg-18 v. 4.0 (11/2015)
Instruction de travail METTLER TOLEDO:	30260953

Ce certificat de calibration contient des mesures pour les calibrations Tel que Trouvé et Tel que Laissé.

The sensitivity/span of the weighing instrument was adjusted before As Left calibration with an external weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

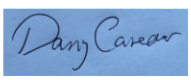
	Temperature	
Tel que Trouvé	Start: 71.2 °F	End: 71.2 °F
Tel que Laissé	Start: 71.2 °F	End: 71.2 °F

Environmental conditions have been verified to ensure the accuracy of the calibration.

This certificate is issued in accordance with the conditions of accreditation granted by A2LA, which is based on ISO/IEC 17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards.

Date calibration Tel que Trouvé:	13-Mar-2019
Date calibration Tel que Laissé:	13-Mar-2019
Date d'Émission:	13-Mar-2019
Requested Next Calibration Date:	31-Mar-2020

Authorized A2LA Signatory:



Dany Careau

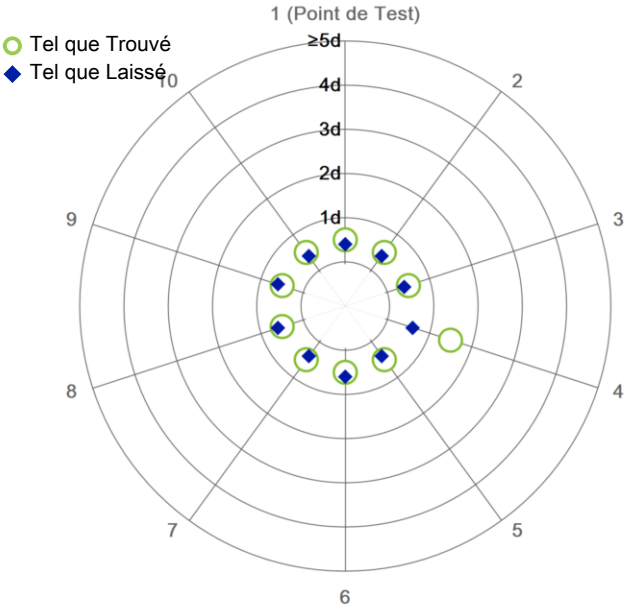
Résultats de Mesure

Répétabilité

Charge de Test: 10 g

	Tel que Trouvé	Tel que Laissé
1	10.0000 g	10.0000 g
2	10.0000 g	10.0000 g
3	10.0000 g	10.0000 g
4	10.0002 g	9.9999 g
5	10.0001 g	10.0000 g
6	10.0000 g	9.9999 g
7	10.0001 g	10.0000 g
8	10.0000 g	9.9999 g
9	10.0001 g	9.9999 g
10	10.0000 g	10.0000 g

Écart Type	**0.00007 g**	**0.00005 g**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

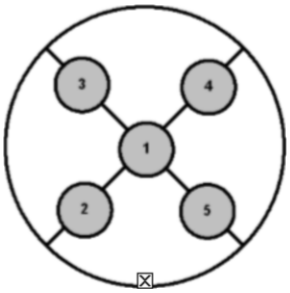
The results of this graph are based upon the absolute values of the differences from the mean value.

Excentricité

Charge de Test: 100 g

Position	Tel que Trouvé	Tel que Laissé
1	99.9998 g	100.0000 g
2	99.9999 g	100.0001 g
3	99.9998 g	99.9999 g
4	99.9999 g	100.0000 g
5	99.9999 g	100.0001 g

Déviation Maximale	**0.0001 g**	**0.0001 g**



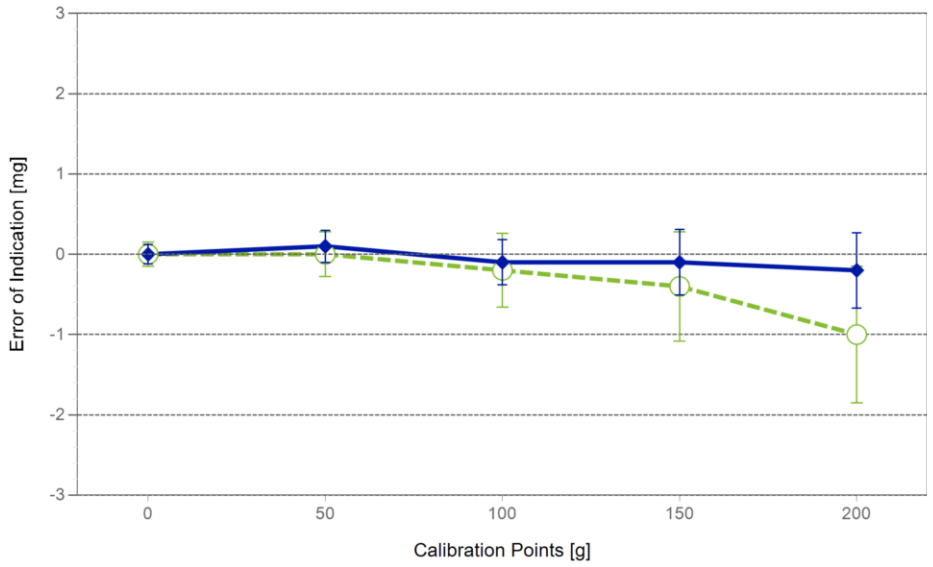
Erreur d'indication

Tel que Trouvé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0.0000 g	0.0000 g	0.0000 g	0.15 mg	2
2	50.0000 g	50.0000 g	0.0000 g	0.28 mg	2
3	100.0001 g	99.9999 g	-0.0002 g	0.46 mg	2
4	150.0001 g	149.9997 g	-0.0004 g	0.68 mg	2
5	200.0001 g	199.9991 g	-0.0010 g	0.85 mg	2

Tel que Laissé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0.0000 g	0.0000 g	0.0000 g	0.12 mg	2
2	50.0000 g	50.0001 g	0.0001 g	0.20 mg	2
3	100.0001 g	100.0000 g	-0.0001 g	0.28 mg	2
4	150.0001 g	150.0000 g	-0.0001 g	0.41 mg	2
5	200.0001 g	199.9999 g	-0.0002 g	0.47 mg	2



Tel que Trouvé

Tel que Laissé

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%. The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

Tous les poids utilisés pour le contrôle métrologique sont retraçables aux étalons Nationaux et Internationaux. Les poids ont été calibrés et certifiés par un laboratoire de calibration accrédité.

Jeu de Poids 1: OIML E2

Weight Set Number:	510	Date d'Émission:	19-Feb-2019
# Certificat:	01060642-1	Date de Calibration Due:	29-Feb-2020

Remarques

N/D

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Incertitude de Mesure du dispositif de pesage en opération

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Coefficient de température pour l'évaluation de l'incertitude de mesure en opération: $3.0 \cdot 10^{-6}$ / K

Plage d'opération sur le site pour l'évaluation de l'incertitude de mesure en opération: 7 °F

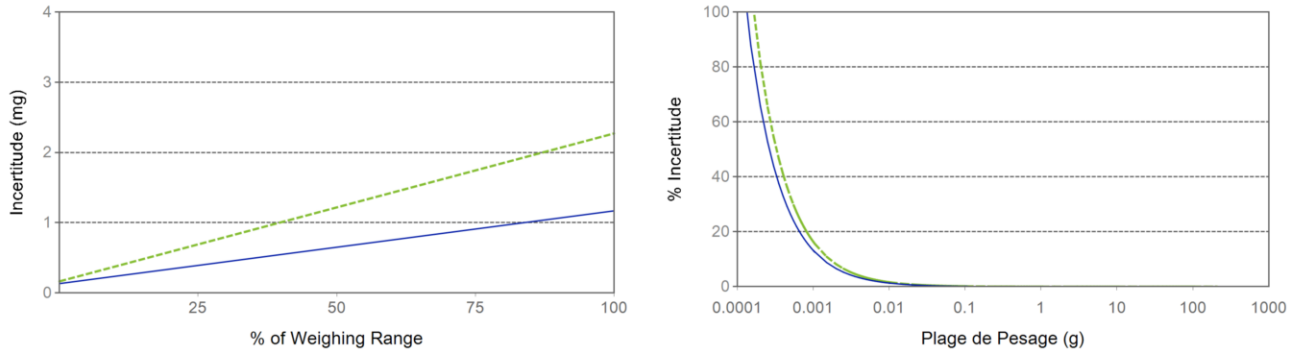
Linéarisation de l'Équation d'Incertitude

Plage		Tel que Trouvé	Tel que Laissé
1	0 g - 210 g	U_1 = 0.16 mg + 0.0100 mg/g · R	U_1 = 0.13 mg + 0.00494 mg/g · R

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Indication Net	Tel que Trouvé		Tel que Laissé	
0.0210 g	0.16 mg	0.76%	0.13 mg	0.62%
0.2100 g	0.16 mg	0.076%	0.13 mg	0.062%
2.1000 g	0.18 mg	0.0086%	0.14 mg	0.0067%
21.0000 g	0.37 mg	0.0018%	0.23 mg	0.0011%
210.0000 g	2.3 mg	0.0011%	1.2 mg	0.00056%



Tel que Trouvé Tel que Laissé

METTLER TOLEDO Service

GWP®
Certificate

No Pass/Fail statement is possible because one or more of the process requirements are not specified.

Tests Performed: ☑ ☑

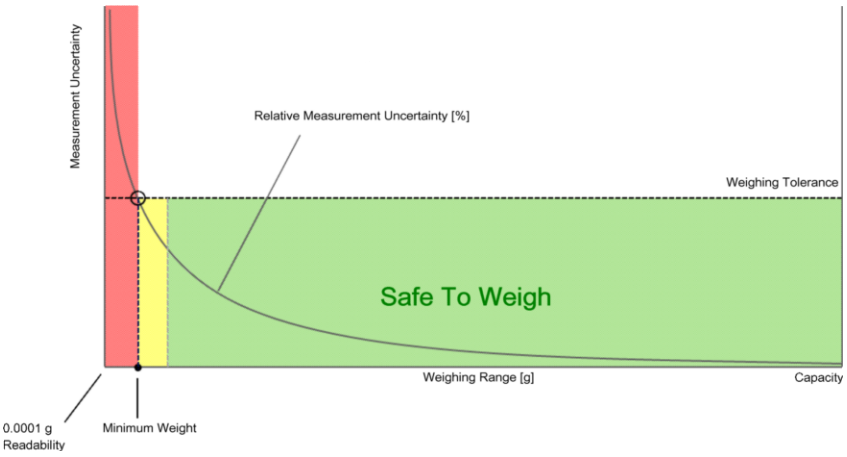
Process Requirements

Weighing Tolerance: **Not Specified**

Smallest Net Weight: **Not Specified**

Facteur de Sécurité: ***Not specified, default = 2**

Safe Weighing Range



Since the weighing tolerance is not specified, only a generic behavior curve is shown.

Poids Minimum

As Found Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	0.16496 g	0.33329 g	0.50511 g	0.85964 g	1.81521 g
0.2%	0.08206 g	0.16496 g	0.24869 g	0.41876 g	0.85964 g
0.5%	0.03273 g	0.06558 g	0.09857 g	0.16496 g	0.33329 g
1%	0.01635 g	0.03273 g	0.04914 g	0.08206 g	0.16496 g
2%	0.00817 g	0.01635 g	0.02453 g	0.04093 g	0.08206 g
5%	0.00327 g	0.00653 g	0.00980 g	0.01635 g	0.03273 g

As Left Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	0.13231 g	0.26594 g	0.40090 g	0.67494 g	1.38492 g
0.2%	0.06599 g	0.13231 g	0.19896 g	0.33325 g	0.67494 g
0.5%	0.02636 g	0.05277 g	0.07923 g	0.13231 g	0.26594 g
1%	0.01317 g	0.02636 g	0.03956 g	0.06599 g	0.13231 g
2%	0.00658 g	0.01317 g	0.01976 g	0.03295 g	0.06599 g
5%	0.00263 g	0.00527 g	0.00790 g	0.01317 g	0.02636 g

À ces valeurs de poids net minimum, l'incertitude de mesure du dispositif est égale ou inférieure à 1/1 (pas de facteur de sécurité), 1/2, 1/3, 1/5 ou 1/10 de la tolérance requise. Ces valeurs sont calculées avec k=2 et basées sur la formule linéaire de l'incertitude de mesure du dispositif de pesage en opération.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Résultats de Mesure

Results Summary

	Répétabilité	Excentricité	Erreur d'indication
As Found	N/D	N/D	N/D
As Left	N/D	N/D	N/D

✔ = Passed

✘ = Failed

⚠ = Safety Factor not met

Répétabilité

Charge de Test: 10 g

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/D	0.00007 g	N/D	0.00005 g	N/D
0.2%	N/D		N/D		N/D
0.5%	N/D		N/D		N/D
1%	N/D		N/D		N/D
2%	N/D		N/D		N/D
5%	N/D		N/D		N/D

An assessment cannot be made because the smallest net weight is not defined.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Excentricité

Charge de Test: 100 g

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Erreur d'indication

Tel que Trouvé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/D	N/D	N/D	N/D	N/D	N/D
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0002 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0004 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	-0.0010 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

Tel que Laissé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/D	N/D	N/D	N/D	N/D	N/D
50.0000 g	0.0001 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	-0.0002 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

METTLER TOLEDO Service

Handbook 44 Tolerance Assessment (Entretien)

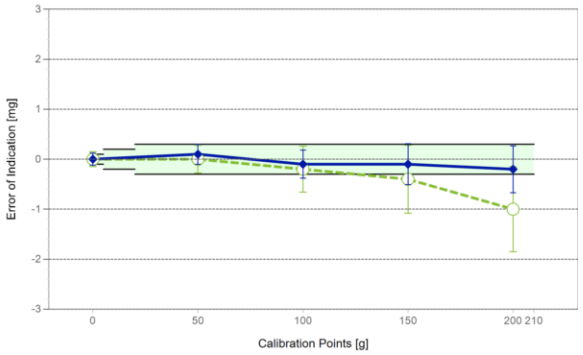
Les mesures du certificat de calibration joint ont été évaluées selon les tolérances définies par NIST HB44.

	el que Trou	el que Laiss
Global	✗	✓

✓ = Passed
✗ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	210 g	0.0001 g	0.0001 g	I



Tolerances according to NIST Handbook 44

Test Load		Tolérance
From	To	
0.0000 g	0.0000 g	0.000025 g
0.0001 g	5.0000 g	0.0001 g
5.0001 g	20.0000 g	0.0002 g
20.0001 g	210.0000 g	0.0003 g

○ Tel que Trouvé
◆ Tel que Laissé
— Tolérance

Eccentricity and Repeatability

Test	Test Load	Tolérance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
xcentricité (Maximum Erro	100 g	0.0003 g	0.0003 g	✓	0.0002 g	✓
Excentricité (Plage)	100 g	0.0003 g	0.0001 g	✓	0.0002 g	✓
épétabilité (Maximum Erro	10 g	0.0002 g	0.0002 g	✓	0.0001 g	✓
Répétabilité (Plage)	10 g	0.0002 g	0.0002 g	✓	0.0001 g	✓

Max. Error: Maximum of the absolute values of the individual errors.
Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolérance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0.0000 g	0.0001 g	0.0000 g	✓	0.0000 g	✓
2	50.0000 g	0.0003 g	0.0000 g	✓	0.0001 g	✓
3	100.0001 g	0.0003 g	-0.0002 g	✓	-0.0001 g	✓
4	150.0001 g	0.0003 g	-0.0004 g	✗	-0.0001 g	✓
5	200.0001 g	0.0003 g	-0.0010 g	✗	-0.0002 g	✓

ULRICH
DIVISION - TEMBEC CANADA

Ulrich Métrologie inc.
Ulrich Metrology Inc.
9900, Côte-de-Liesse
Montréal (Québec) H8T 1A1

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

ACCREDITATION
ISO 17025
SCC Scope Number 220

CALIBRATION CERTIFICATE

Certificate no.:	648826	**Calibration date:**	June 19, 2018
Identification:	SBI-212	**Certificate issued:**	June 19, 2018
Description:	THERMO-HYGROMETER, AMPROBE TH-3	**Interval:**	12 months
Manufacturer:	AMPROBE	**Due date:**	June 19, 2019
Model no.:	TH-3	**Procedure no.:**	MET/CAL
Serial no.:	100906351	**Environment:**	CLAS Type 2 Laboratory
		Temperature:	23 ± 2°C
		Humidity:	35 - 55% RH
		Metrologist:	MIC

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.

234528P

Ulrich Métrologie inc.
Ulrich Metrology Inc.
9900, Côte-de-Liesse
Montréal (Québec) H8T 1A1

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

CALIBRATION DATA

Certificate no.: 648826
Identification: SBI-212
Description: THERMO-HYGROMETER
Serial no.: 100906351
Procedure: Amprobe TH-3: 2500ST-LT-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
1304953	HUMIDITY GENERATOR	THUNDER SCIENTIFIC	2500ST-LT	2017/07/25	2018/07/31

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
TEMPERATURE CALIBRATION						
23°C						
23.00degC		23.72	22.20	23.80	PASS	
RELATIVE HUMIDITY CALIBRATION AT 23°C						
20% RH						
20.01%		21.90	17.01	23.01	PASS	
50% RH						
50.03%		50.40	47.03	53.03	PASS	
80% RH						
80.03%		77.30	77.03	83.03	PASS	

End of Test Data

ID Certificat de Calibration
CA0003-011-031319-ACC-USI

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, OH 43240
1-800-METTLER

Accredited by the American Association for Laboratory Accreditation (A2LA)
CALIBRATION CERT #1902.01

ISO 9001 Registered
ANSI/NCSL Z540-1 Accredited

Certificat de Calibration de Précision

Accuracy Calibration Certificate

Client

Compagnie:	SBI Fabricant De Poeles		
Adresse:	250 Rue de Copenhague		
Ville:	Saint-Augustin-De-Desmaures	**Contact:**	N/D
Zip/Code Postal:	G3A 2H3		
État/Province:	Quebec		

Weighing Device

Manufacturier:	Ohaus	**Type d'Instrument:**	Weighing Instrument
Modèle:	FD15	**# Outil:**	SBI-222 BALANCE BENCH
No. Série:	B144397174	**Modèle Indicateur:**	N/D
Building:	N/D	**Terminal Serial No.:**	N/D
Floor:	N/D	**Terminal Asset No.:**	N/D
Room:	N/D		

Plage	Capacité Max	Lisibilité (d)
1	15000 g	1 g

Procedure

Instruction de Calibration:	EURAMET cg-18 v. 4.0 (11/2015)
Instruction de travail METTLER TOLEDO:	30260953

Ce certificat de calibration contient des mesures pour la calibration Tel que Trouvé. Aucune calibration Tel que Laissé n'a été effectuée puisque l'appareil n'a pas été modifié suite à la calibration Tel que Trouvé. Par conséquent, les résultats Tel que Laissé correspondent aux résultats Tel que Trouvé.

	Temperature	
Tel que Trouvé	Start: 21.0 °C	End: 21.0 °C

Environmental conditions have been verified to ensure the accuracy of the calibration.

This certificate is issued in accordance with the conditions of accreditation granted by A2LA, which is based on ISO/IEC 17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards.

Date calibration Tel que Trouvé:	13-Mar-2019	**Authorized A2LA Signatory:**	Dany Careau
Date calibration Tel que Laissé:	N/D		
Date d'Émission:	13-Mar-2019		
Requested Next Calibration Date:	31-Mar-2020		

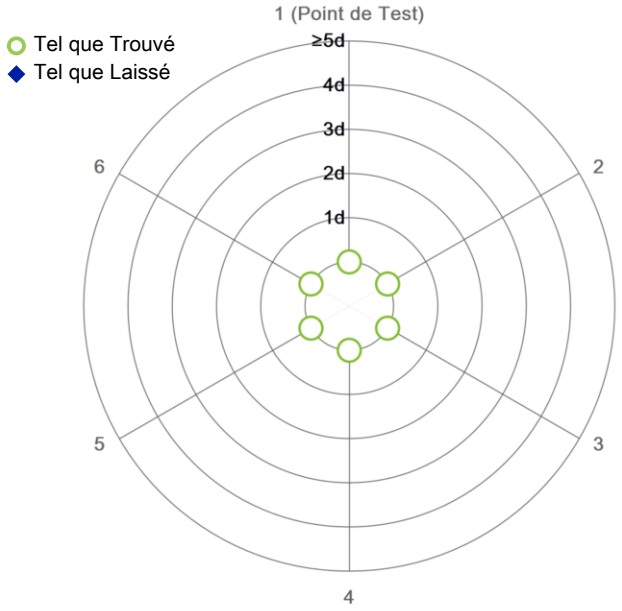
Résultats de Mesure

Répétabilité

Charge de Test: 5000 g

	Tel que Trouvé	Tel que Laissé
1	5000 g	N/D
2	5000 g	N/D
3	5000 g	N/D
4	5000 g	N/D
5	5000 g	N/D
6	5000 g	N/D

Écart Type	**0.0 g**	**N/D**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

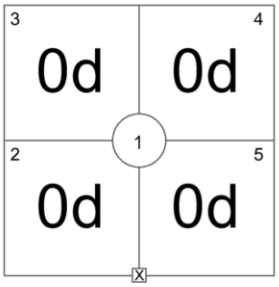
The results of this graph are based upon the absolute values of the differences from the mean value.

Excentricité

Charge de Test: 5000 g

Position	Tel que Trouvé	Tel que Laissé
1	5000 g	N/D
2	5000 g	N/D
3	5000 g	N/D
4	5000 g	N/D
5	5000 g	N/D

Déviation Maximale	**0 g**	**N/A**



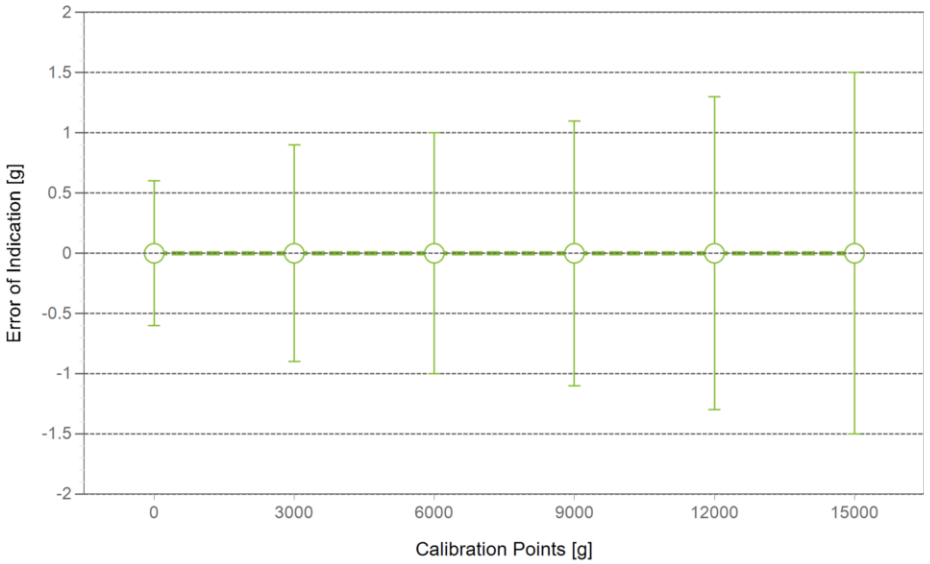
Tel que Trouvé

The "d" in the graph represents the readability of the range/interval in which the test was performed.

Erreur d'indication

Tel que Trouvé

	Reference Value	Indication	Erreur d'indication	Incertitude Élargie	k
1	0 g	0 g	0 g	0.6 g	2
2	3000 g	3000 g	0 g	0.9 g	2
3	6000 g	6000 g	0 g	1.0 g	2
4	9000 g	9000 g	0 g	1.1 g	2
5	12000 g	12000 g	0 g	1.3 g	2
6	15000 g	15000 g	0 g	1.5 g	2



Tel que Trouvé

Tel que Laissé

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%. The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

Tous les poids utilisés pour le contrôle métrologique sont retraçables aux étalons Nationaux et Internationaux. Les poids ont été calibrés et certifiés par un laboratoire de calibration accrédité.

Jeu de Poids 1: OIML M1

Weight Set Number:	42260	Date d'Émission:	24-Aug-2018
# Certificat:	M18-0321	Date de Calibration Due:	24-Aug-2019

Remarques

N/D

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Incertitude de Mesure du dispositif de pesage en opération

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Coefficient de température pour l'évaluation de l'incertitude de mesure en opération: $10.0 \cdot 10^{-6}$ / K

Plage d'opération sur le site pour l'évaluation de l'incertitude de mesure en opération: 10 K

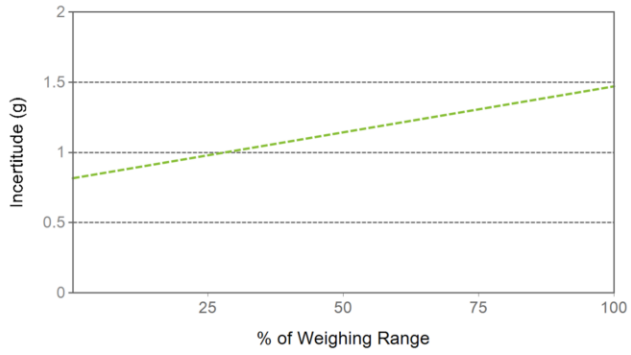
Linéarisation de l'Équation d'Incertitude

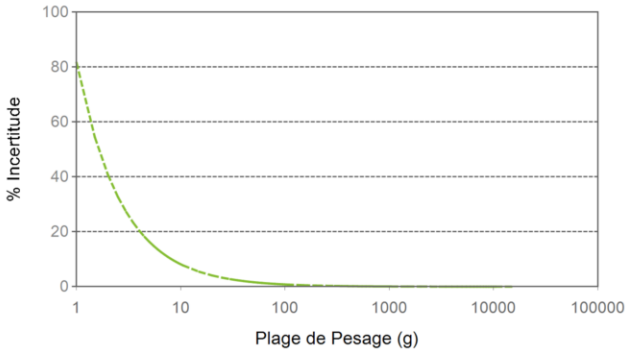
Plage		Tel que Trouvé	Tel que Laissé
1	0 g - 15000 g	U_1 = 816 mg + 0.0436 mg/g · R	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Indication Net	Tel que Trouvé		Tel que Laissé	
15 g	0.82 g	5.3%	N/A	N/A
150 g	0.82 g	0.53%	N/A	N/A
1500 g	0.88 g	0.060%	N/A	N/A
7500 g	1.1 g	0.015%	N/A	N/A
15000 g	1.5 g	0.010%	N/A	N/A





Tel que Trouvé Tel que Laissé

METTLER TOLEDO Service

GWP® Certificate

No Pass/Fail statement is possible because one or more of the process requirements are not specified.

Tests Performed: ☑ ☐ ☑ No adjustments/modifications made. As Left results correspond to As Found.

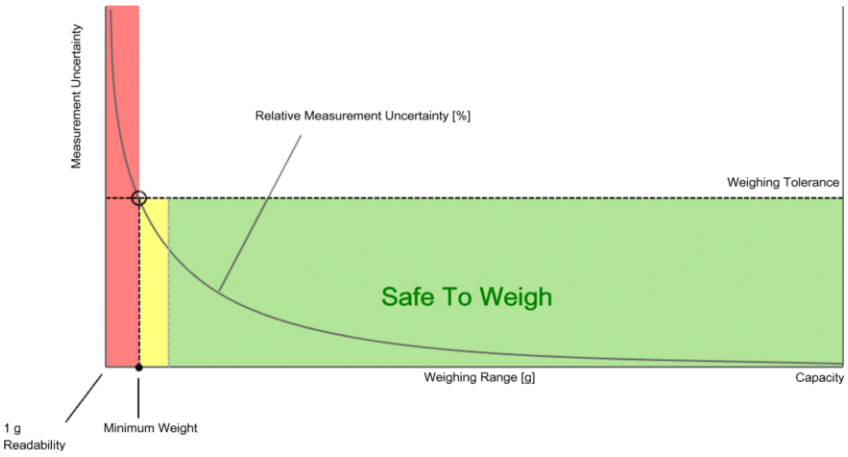
Process Requirements

Weighing Tolerance: **Not Specified**

Smallest Net Weight: **Not Specified**

Facteur de Sécurité: ***Not specified, default = 2**

Safe Weighing Range



Since the weighing tolerance is not specified, only a generic behavior curve is shown.

Poids Minimum

As Found Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	853.8 g	1789.2 g	2818.6 g	5222.2 g	14489.6 g
0.2%	417.4 g	853.8 g	1310.6 g	2291.3 g	5222.2 g
0.5%	164.7 g	332.4 g	503.1 g	853.8 g	1789.2 g
1%	82.0 g	164.7 g	248.2 g	417.4 g	853.8 g
2%	40.9 g	82.0 g	123.3 g	206.4 g	417.4 g
5%	16.3 g	32.7 g	49.1 g	82.0 g	164.7 g

As Left Minimum Weight Table

Poids minimum pour différentes tolérances de pesage et facteurs de sécurité					
	Facteur de Sécurité				
Tolérance	**1**	**2**	**3**	**5**	**10**
0.1%	853.8 g	1789.2 g	2818.6 g	5222.2 g	14489.6 g
0.2%	417.4 g	853.8 g	1310.6 g	2291.3 g	5222.2 g
0.5%	164.7 g	332.4 g	503.1 g	853.8 g	1789.2 g
1%	82.0 g	164.7 g	248.2 g	417.4 g	853.8 g
2%	40.9 g	82.0 g	123.3 g	206.4 g	417.4 g
5%	16.3 g	32.7 g	49.1 g	82.0 g	164.7 g

À ces valeurs de poids net minimum, l'incertitude de mesure du dispositif est égale ou inférieure à 1/1 (pas de facteur de sécurité), 1/2, 1/3, 1/5 ou 1/10 de la tolérance requise. Ces valeurs sont calculées avec k=2 et basées sur la formule linéaire de l'incertitude de mesure du dispositif de pesage en opération.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Résultats de Mesure

Results Summary

	Répétabilité	Excentricité	Erreur d'indication
As Found	N/D	N/D	N/D
As Left	N/D	N/D	N/D

✔ = Passed

✘ = Failed

⚠ = Safety Factor not met

Répétabilité

Charge de Test: 5000 g

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/D	0.0 g*	N/D	0.0 g*	N/D
0.2%	N/D		N/D		N/D
0.5%	N/D		N/D		N/D
1%	N/D		N/D		N/D
2%	N/D		N/D		N/D
5%	N/D		N/D		N/D

An assessment cannot be made because the smallest net weight is not defined.

*The calculated standard deviation is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Excentricité

Charge de Test: 5000 g

		Tel que Trouvé		Tel que Laissé	
Tolérance	Control Limit	Deviation	Result	Deviation	Result
0.1%	3 g	0 g	✓	0 g	✓
0.2%	5 g		✓		✓
0.5%	13 g		✓		✓
1%	25 g		✓		✓
2%	50 g		✓		✓
5%	125 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Erreur d'indication

Tel que Trouvé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0 g	0 g	N/D	N/D	N/D	N/D	N/D	N/D
3000 g	0 g	2 g	3 g	8 g	15 g	30 g	75 g
6000 g	0 g	3 g	6 g	15 g	30 g	60 g	150 g
9000 g	0 g	5 g	9 g	23 g	45 g	90 g	225 g
12000 g	0 g	6 g	12 g	30 g	60 g	120 g	300 g
15000 g	0 g	8 g	15 g	38 g	75 g	150 g	375 g
Result		✓	✓	✓	✓	✓	✓

Tel que Laissé

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0 g	0 g	N/D	N/D	N/D	N/D	N/D	N/D
3000 g	0 g	2 g	3 g	8 g	15 g	30 g	75 g
6000 g	0 g	3 g	6 g	15 g	30 g	60 g	150 g
9000 g	0 g	5 g	9 g	23 g	45 g	90 g	225 g
12000 g	0 g	6 g	12 g	30 g	60 g	120 g	300 g
15000 g	0 g	8 g	15 g	38 g	75 g	150 g	375 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

METTLER TOLEDO Service

Handbook 44 Tolerance Assessment (Entretien)

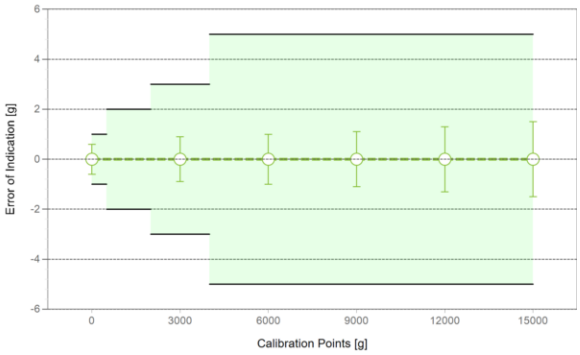
Les mesures du certificat de calibration joint ont été évaluées selon les tolérances définies par NIST HB44.

	el que Trouv	el que Laiss
Global	✓	N/D

✓ = Passed
✗ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	15000 g	1 g	1 g	III



Tolerances according to NIST Handbook 44

Test Load		Tolérance
From	To	
0 g	0 g	0.25 g
1 g	500 g	1 g
501 g	2000 g	2 g
2001 g	4000 g	3 g
4001 g	15000 g	5 g

○ Tel que Trouvé
◆ Tel que Laissé
— Tolérance

Eccentricity and Repeatability

Test	Test Load	Tolérance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
xcentricité (Maximum Erro	5000 g	5 g	0 g	✓	N/D	N/D
Excentricité (Plage)	5000 g	5 g	0 g	✓	N/D	N/D
épétabilité (Maximum Erro	5000 g	5 g	0 g	✓	N/D	N/D
Répétabilité (Plage)	5000 g	5 g	0 g	✓	N/D	N/D

Max. Error: Maximum of the absolute values of the individual errors.
Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolérance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 g	1 g	0 g	✓	0 g	✓
2	3000 g	3 g	0 g	✓	0 g	✓
3	6000 g	5 g	0 g	✓	0 g	✓
4	9000 g	5 g	0 g	✓	0 g	✓
5	12000 g	5 g	0 g	✓	0 g	✓
6	15000 g	5 g	0 g	✓	0 g	✓

Certificate No: 01037944A-1

METTLER TOLEDO

METTLER-TOLEDO, LLC
201 Wolf Dr
Thorofare NJ 08086
1-800-METTLER

NVLAP CALIBRATION
NVLAP LAB CODE 105013-0

ilac-MRA

Mass Calibration Certificate

Customer Information

Customer Name:	Stove Builder International, Inc.	*City:*	
Address:	250 de Copenhauge St.-Augustin-de-Desmaures	*State / Province:*	QC
Purchase Order:	220309982	*Zip / Postal Code:*	G3A 2H3

Measurement and Test Equipment Identification

Serial Number:	B316238717	*Date Received:*	03-OCT-2018
Manufacturer:	Mettler Toledo	*Condition:*	Good
Asset Number:	SBI-237	*Tolerance Class:*	OIML R111 Class E2

Environmental Conditions

Temperature: 21.51 °C *Barometric Pressure:* 770.05 mm Hg *Relative Humidity:* 50 %RH

The standards used to perform this calibration have been compared to reference mass standards that are traceable to the SI through the National Institute of Standards and Technology under Test No 684/289871-17.

The weights calibrated for this report have been calibrated in accordance with the calibration laboratory's process. The calibration performed meets the criteria as described in the current revisions of ASTM E617 and OIML R111. This calibration also meets specifications as outlined in ISO/IEC 17025, ANSI/NCSL Z540-1-1994, and applicable documents.

Calibration Date:	09-OCT-2018	*Next Calibration Due:*	09-OCT-2023
Calibration Technician:	Robotic Calibration	*Signature:*	Joseph Moran, Metrology Manager Approved Signatory 10-OCT-2018

Certificate No: 01037944A-1

As Found Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
100 mg	B316238717	0.0999983	0.0999983	0.0025	0.0160	8.00

Certificate No: 01037944A-1

As Left Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
100 mg	B316238717	0.0999983	0.0999983	0.0025	0.0160	8.00

Certificate No: 01037944A-1

Standards and Comparators Used

Nominal Value&Suffix	Serial Number	Standard Set No.	Cal Due	Comparator Used		Cal Due	Procedure Used
100 mg	B316238717	A031	07/01/19	A5XL	131	01/01/19	Multi A-B

Comments

No remarks

1 As Found / 1 Total

Definitions

Nominal Value - The value as labeled on the weight or defined by shape in accordance with OIML R111 for milligram weights.

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

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

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

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

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

Calibration Process - This calibration was performed in the Level I Mass Metrology Laboratory at 201 Wolf Dr Thorofare, New Jersey 08086 unless otherwise noted in Comments.

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

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

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

Certificate No: 01037944B-1

METTLER TOLEDO

METTLER-TOLEDO, LLC
201 Wolf Dr
Thorofare NJ 08086
1-800-METTLER

NVLAP CALIBRATION NVLAP LAB CODE 105013-0

ilac-MRA

Mass Calibration Certificate

Customer Information

Customer Name:	Stove Builder International, Inc.	*City:*	
Address:	250 de Copenhauge St.-Augustin-de-Desmaures	*State / Province:*	QC
Purchase Order:	220309982	*Zip / Postal Code:*	G3A 2H3

Measurement and Test Equipment Identification

Serial Number:	B316238717	*Date Received:*	03-OCT-2018
Manufacturer:	Mettler Toledo	*Condition:*	Good
Asset Number:	SBI-238	*Tolerance Class:*	OIML R111 Class F1

Environmental Conditions

Temperature: 21.29 °C *Barometric Pressure:* 770.34 mm Hg *Relative Humidity:* 52 %RH

The standards used to perform this calibration have been compared to reference mass standards that are traceable to the SI through the National Institute of Standards and Technology under Test No 684/289871-17.

The weights calibrated for this report have been calibrated in accordance with the calibration laboratory's process. The calibration performed meets the criteria as described in the current revisions of ASTM E617 and OIML R111. This calibration also meets specifications as outlined in ISO/IEC 17025, ANSI/NCSL Z540-1-1994, and applicable documents.

Calibration Date:	09-OCT-2018	*Next Calibration Due:*	09-OCT-2023
Calibration Technician:	Robotic Calibration	*Signature:*	Joseph Moran, Metrology Manager Approved Signatory 10-OCT-2018

Certificate No: 01037944B-1

As Found Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
10 g	B316238717	10.000070	10.000060	0.012	0.200	7.95

Certificate No: 01037944B-1

As Left Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
10 g	B316238717	10.000070	10.000060	0.012	0.200	7.95

1 As Found / 1 Total

Certificate No: 01037944B-1

Standards and Comparators Used

Nominal Value&Suffix	Serial Number	Standard Set No.	Cal Due	Comparator Used		Cal Due	Procedure Used
10 g	B316238717	MS002	08/01/19	A200XXL	132	01/01/19	Multi A-B

Comments

No remarks

1 As Found / 1 Total

Definitions

Nominal Value - The value as labeled on the weight or defined by shape in accordance with OIML R111 for milligram weights.

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

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

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

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

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

Calibration Process - This calibration was performed in the Level I Mass Metrology Laboratory at 201 Wolf Dr Thorofare, New Jersey 08086 unless otherwise noted in Comments.

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

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

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

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018004298

Manufacturer:	Dwyer	***RMA:***	AC18061323
Model:	MS-121-LCD	***Workorder:***	2018004298
Description:	Digital Pressure Gauge	***Barcode:***	AL0015069-P
Serial:	E51U01003612	***Received Conditions:***	In Tolerance
ID:	SBI-253	***Calibration Date:***	27-Jun-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	27-Jun-2019
		Temperature:	20.89°C
		Humidity:	59.2%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.

STANDARDS USED

Description	***Model***	***ID***	***Cal Date***	***Due Date***
Multimeter	Fluke 8845A	ELC-MTR-04	08-Jan-2018	08-Jan-2019
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	16-Oct-2017	16-Oct-2018

Notes: Calibrated 0 to 0.25" Only.

Performed by: Anthony Morra (digitally signed)

Reviewed by: Slava Peciurov (digitally signed)

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.25 inH2O/7520lp 8845A (1.0.A) **Found / Left (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
Range: 0 to 0.25 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading						0	
Output @ 0.0000 inH2O, mA						4.01	
0.0000 inH2O	0.0000 inH2O	0.0002 inH2O	±0.0025 inH2O	-0.0025 inH2O	0.0025 inH2O	Pass	0.00015 inH2O
Display Reading						.0002	
Output @ 0.0625 inH2O, mA						7.9	
0.0625 inH2O	0.0625 inH2O	0.0609 inH2O	±0.0025 inH2O	0.0600 inH2O	0.0650 inH2O	Pass	0.00015 inH2O
Display Reading						.0608	
Output @ 0.1250 inH2O, mA						11.875	
0.1250 inH2O	0.1250 inH2O	0.1230 inH2O	±0.0025 inH2O	0.1225 inH2O	0.1275 inH2O	Pass	0.00015 inH2O
Display Reading						.1230	
Output @ 0.1875 inH2O, mA						15.92	
0.1875 inH2O	0.1875 inH2O	0.1863 inH2O	±0.0025 inH2O	0.1850 inH2O	0.1900 inH2O	Pass	0.00015 inH2O
Display Reading						.1855	
Output @ 0.2500 inH2O, mA						19.875	
0.2500 inH2O	0.2500 inH2O	0.2480 inH2O	±0.0025 inH2O	0.2475 inH2O	0.2525 inH2O	Pass	0.00015 inH2O
Display Reading						.2483	
Output @ 0.1875 inH2O, mA						15.96	
0.1875 inH2O	0.1875 inH2O	0.1869 inH2O	±0.0025 inH2O	0.1850 inH2O	0.1900 inH2O	Pass	0.00015 inH2O
Display Reading						.1868	
Output @ 0.1250 inH2O, mA						11.94	
0.1250 inH2O	0.1250 inH2O	0.1241 inH2O	±0.0025 inH2O	0.1225 inH2O	0.1275 inH2O	Pass	0.00015 inH2O
Display Reading						.1243	
Output @ 0.0625 inH2O, mA						7.947	
0.0625 inH2O	0.0625 inH2O	0.0617 inH2O	±0.0025 inH2O	0.0600 inH2O	0.0650 inH2O	Pass	0.00015 inH2O
Display Reading						.0618	
Output @ 0.0000 inH2O, mA						3.965	
0.0000 inH2O	0.0000 inH2O	-0.0005 inH2O	±0.0025 inH2O	-0.0025 inH2O	0.0025 inH2O	Pass	0.00015 inH2O

END OF CERTIFICATE

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018006288

Manufacturer:	Dwyer Instruments Inc.	***RMA:***	AC18091585
Model:	MS-121-LCD	***Workorder:***	2018006288
Description:	Digital Pressure Gauge	***Barcode:***	AL0015074-P
Serial:	E52U01007512	***Received Conditions:***	In Tolerance
ID:	SBI-254	***Calibration Date:***	10-Oct-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	10-Oct-2019
		Temperature:	22.07°C
		Humidity:	61.2%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.

STANDARDS USED

Description	*Model*	*ID*	*Cal Date*	*Due Date*
Multimeter	Fluke 8845A	ELC-MTR-04	08-Jan-2018	08-Jan-2019
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	16-Oct-2017	16-Oct-2018

Notes: Unit was calibrated in vertical position.

Performed by: Roy Mathew (digitally signed)

Reviewed by: Slava Peciurov (digitally signed)

Procedure: Dwyer MS-121-LCD 0 to 0.1;0.5 inH2O/7520Ip 8845A (1.0.A) **Found / Left (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
Range: 0 to 0.5 inH2O							
Output signal: 4 to 20 mA							
PRESSURE TEST							
Display Reading						0	
Output @ 0.0000 inH2O, mA						4.0141	
0.0000 inH2O	0.0000 inH2O	0.0040 inH2O	±0.0050 inH2O	-0.0050 inH2O	0.0050 inH2O	Pass	0.00015 inH2O
Display Reading						0.1245	
Output @ 0.1250 inH2O, mA						7.9852	
0.1250 inH2O	0.1250 inH2O	0.1245 inH2O	±0.0050 inH2O	0.1200 inH2O	0.1300 inH2O	Pass	0.00015 inH2O
Display Reading						0.2505	
Output @ 0.2500 inH2O, mA						12.0045	
0.2500 inH2O	0.2500 inH2O	0.2501 inH2O	±0.0050 inH2O	0.2450 inH2O	0.2550 inH2O	Pass	0.00015 inH2O
Display Reading						0.3770	
Output @ 0.3750 inH2O, mA						16.058	
0.3750 inH2O	0.3750 inH2O	0.3768 inH2O	±0.0050 inH2O	0.3700 inH2O	0.3800 inH2O	Pass	0.00015 inH2O
Display Reading						0.5002	
Output @ 0.5000 inH2O, mA						19.9790	
0.5000 inH2O	0.5000 inH2O	0.4993 inH2O	±0.0050 inH2O	0.4950 inH2O	0.5050 inH2O	Pass	0.00015 inH2O
Display Reading						0.3784	
Output @ 0.3750 inH2O, mA						16.079	
0.3750 inH2O	0.3750 inH2O	0.3775 inH2O	±0.0050 inH2O	0.3700 inH2O	0.3800 inH2O	Pass	0.00015 inH2O
Display Reading						0.2515	
Output @ 0.2500 inH2O, mA						12.050	
0.2500 inH2O	0.2500 inH2O	0.2516 inH2O	±0.0050 inH2O	0.2450 inH2O	0.2550 inH2O	Pass	0.00015 inH2O
Display Reading						0.1265	
Output @ 0.1250 inH2O, mA						8.0369	
0.1250 inH2O	0.1250 inH2O	0.1262 inH2O	±0.0050 inH2O	0.1200 inH2O	0.1300 inH2O	Pass	0.00015 inH2O
Display Reading						0.0002	
Output @ 0.0000 inH2O, mA						4.0139	
0.000 inH2O	0.0000 inH2O	0.0004 inH2O	±0.0050 inH2O	-0.0050 inH2O	0.0050 inH2O	Pass	0.00015 inH2O

END OF CERTIFICATE

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018004300

Manufacturer:	Dwyer	***RMA:***	AC18061323
Model:	626-06-GH-P1-E1-S1	***Workorder:***	2018004300
Description:	Pressure Transmitter	***Barcode:***	AL00023150-P
Serial:	N/A	***Received Conditions:***	In Tolerance
ID:	SBI-293	***Calibration Date:***	26-Jun-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	26-Jun-2019
		Temperature:	19.42°C
		Humidity:	42.6%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.

STANDARDS USED

Description	***Model***	***ID***	***Cal Date***	***Due Date***
Multimeter	Fluke 8845A	ELC-MTR-04	08-Jan-2018	08-Jan-2019
Pressure Controller/Calibrator	DH Instruments PPC3	PRE-CAL-04	21-May-2018	21-May-2019

Notes: Transmitter was calibrated in vertical position.
Unit is not adjustable.
Tolerance specified by customer.

Performed by: Anthony Morra (digitally signed)

Reviewed by: Slava Peciurov (digitally signed)

Procedure: Pressure Transmitter: psi/4-20mA: CAL VER /PPC3,8845 (1.1.A) **FOUND-LEFT (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
Calibrated in the vertical position.							
Range: 0 to 5 psi							
Output: 4-20 mA							
PRESSURE TEST							
Output=4.004 mA							
0.0000 psi	0.0000 psi	0.001 psi	±0.0200 psi	-0.020 psi	0.020 psi	Pass	4.5e-003 psi
Output=7.982 mA							
1.2500 psi	1.2500 psi	1.244 psi	±0.0200 psi	1.230 psi	1.270 psi	Pass	5.7e-003 psi
Output=11.967 mA							
2.5000 psi	2.5000 psi	2.489 psi	±0.0200 psi	2.480 psi	2.520 psi	Pass	7.0e-003 psi
Output=15.97 mA							
3.7500 psi	3.7500 psi	3.741 psi	±0.0200 psi	3.730 psi	3.770 psi	Pass	8.2e-003 psi
Output=19.996 mA							
5.0000 psi	5.0000 psi	4.999 psi	±0.0200 psi	4.980 psi	5.020 psi	Pass	9.4e-003 psi
Output=15.976 mA							
3.7500 psi	3.7500 psi	3.743 psi	±0.0200 psi	3.730 psi	3.770 psi	Pass	8.2e-003 psi
Output=11.969 mA							
2.5000 psi	2.5000 psi	2.490 psi	±0.0200 psi	2.480 psi	2.520 psi	Pass	7.0e-003 psi
Output=7.98 mA							
1.2500 psi	1.2500 psi	1.244 psi	±0.0200 psi	1.230 psi	1.270 psi	Pass	5.7e-003 psi
Output=4.009 mA							
0.0000 psi	0.0000 psi	0.002 psi	±0.0200 psi	-0.020 psi	0.020 psi	Pass	4.5e-003 psi

END OF CERTIFICATE

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018006291

Manufacturer:	Dwyer Instruments Inc.	***RMA:***	AC18091585
Model:	626-06-GH-PA-E1-S1	***Workorder:***	2018006291
Description:	Pressure Transmitter	***Barcode:***	AL00023736-P
Serial:	N/A	***Received Conditions:***	In Tolerance
ID:	SBI-298	***Calibration Date:***	15-Oct-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	15-Oct-2019
		Temperature:	22.09°C
		Humidity:	47.7%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.

STANDARDS USED

Description	*Model*	*ID*	*Cal Date*	*Due Date*
Multimeter	Fluke 8845A	ELC-MTR-04	08-Jan-2018	08-Jan-2019
Pressure Controller/Calibrator	DH Instruments PPC3	PRE-CAL-04	21-May-2018	21-May-2019

Notes: Unit was calibrated in vertical position.

Performed by: Roy Mathew (digitally signed)

Reviewed by: Lauren Lazar (digitally signed)

Procedure: Pressure Transmitter: psi/4-20mA: CAL VER /PPC3,8845 (1.1.A) **FOUND-LEFT (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
Calibrated in the vertical position.							
Range: 0 to 5 psi							
Output: 4-20 mA							
PRESSURE TEST							
Output=4.074 mA							
0.0000 psi	0.0000 psi	0.023 psi	±0.0300 psi	-0.030 psi	0.030 psi	Pass	4.6e-003 psi
Output=8.075 mA							
1.2500 psi	1.2500 psi	1.273 psi	±0.0300 psi	1.220 psi	1.280 psi	Pass	5.8e-003 psi
Output=12.045 mA							
2.5000 psi	2.5000 psi	2.515 psi	±0.0300 psi	2.470 psi	2.530 psi	Pass	7.0e-003 psi
Output=16.041 mA							
3.7500 psi	3.7500 psi	3.763 psi	±0.0300 psi	3.720 psi	3.780 psi	Pass	8.2e-003 psi
Output=20.074 mA							
5.0000 psi	5.0000 psi	5.023 psi	±0.0300 psi	4.970 psi	5.030 psi	Pass	9.5e-003 psi
Output=16.058 mA							
3.7500 psi	3.7500 psi	3.768 psi	±0.0300 psi	3.720 psi	3.780 psi	Pass	8.2e-003 psi
Output=12.054 mA							
2.5000 psi	2.5000 psi	2.517 psi	±0.0300 psi	2.470 psi	2.530 psi	Pass	7.0e-003 psi
Output=8.058 mA							
1.2500 psi	1.2500 psi	1.268 psi	±0.0300 psi	1.220 psi	1.280 psi	Pass	5.8e-003 psi
Output=4.074 mA							
0.0000 psi	0.0000 psi	0.023 psi	±0.0300 psi	-0.030 psi	0.030 psi	Pass	4.6e-003 psi

END OF CERTIFICATE

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018004303

Manufacturer:	Dwyer	***RMA:***	AC18061323
Model:	628-00C-GH-P1-E1-S1	***Workorder:***	2018004303
Description:	Pressure Transmitter	***Barcode:***	AL00023154-P
Serial:	N/A	***Received Conditions:***	In Tolerance
ID:	SBI-302	***Calibration Date:***	27-Jun-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	27-Jun-2019
		Temperature:	21.63°C
		Humidity:	58.1%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.

STANDARDS USED

Description	***Model***	***ID***	***Cal Date***	***Due Date***
Multimeter	Fluke 8845A	ELC-MTR-04	08-Jan-2018	08-Jan-2019
Pressure Controller/Calibrator	DH Instruments PPC3	PRE-CAL-04	21-May-2018	21-May-2019
Reference Pressure Monitor	Fluke RPM4	PRE-MTR-04	18-May-2018	18-May-2019

Notes: Calibrated in the vertical position. Unit is not adjustable.

Performed by: Anthony Morra (digitally signed)

Reviewed by: Slava Peciurov (digitally signed)

Procedure: Pressure/Vacuum: CAL VER /DHI PPC3 (2.3.A) **FOUND-LEFT (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
PRESSURE TEST							
MEASUREMENT UNITS: inHg							
OUT = 4.925 mA							
-28.50	-28.50	-28.3	±0.30	-28.8	-28.2	Pass	5.8e-002
OUT = 7.747 mA							
-23.00	-23.00	-23.0	±0.30	-23.3	-22.7	Pass	5.8e-002
OUT = 11 mA							
-17.00	-17.00	-16.9	±0.30	-17.3	-16.7	Pass	5.8e-002
OUT = 14.2 mA							
-11.00	-11.00	-10.9	±0.30	-11.3	-10.7	Pass	5.8e-002
OUT = 16.86 mA							
-6.00	-6.00	-5.9	±0.30	-6.3	-5.7	Pass	5.8e-002
OUT = 20.05 mA							
0.00	0.00	0.1	±0.30	-0.3	0.3	Pass	5.8e-002
OUT = 16.88 mA							
-6.00	-6.00	-5.8	±0.30	-6.3	-5.7	Pass	5.8e-002
OUT = 14.235 mA							
-11.00	-11.00	-10.8	±0.30	-11.3	-10.7	Pass	5.8e-002
OUT = 11.05 mA							
-17.00	-17.00	-16.8	±0.30	-17.3	-16.7	Pass	5.8e-002
OUT = 7.863 mA							
-23.00	-23.00	-22.8	±0.30	-23.3	-22.7	Pass	5.8e-002
OUT = 4.922 mA							
-28.50	-28.50	-28.3	±0.30	-28.8	-28.2	Pass	5.8e-002

END OF CERTIFICATE

CERTIFICATE OF CALIBRATION

ACCREDITED
CALIBRATION
CERT #2260.01

Certificate Number: 2018006292

Manufacturer:	Dwyer Instruments Inc.	***RMA:***	AC18091585
Model:	628-00C-GH-P1-E1-S1	***Workorder:***	2018006292
Description:	Pressure Transmitter	***Barcode:***	AL00023737-P
Serial:	N/A	***Received Conditions:***	In Tolerance
ID:	SBI-305	***Calibration Date:***	12-Oct-2018
Customer:	STOVE BUILDER INTERNATIONAL INC. 250 RUE DE COPENHAGUE ST-AUGUSTIN-DE-DESMAURES QC G3A 2H3	***Calibration Due:***	12-Oct-2019
		Temperature:	20.42°C
		Humidity:	31.8%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.

STANDARDS USED

Description	*Model*	*ID*	*Cal Date*	*Due Date*
Pressure Controller/Calibrator	DH Instruments PPC3	PRE-CAL-04	21-May-2018	21-May-2019
Reference Pressure Monitor	Fluke RPM4	PRE-MTR-04	18-May-2018	18-May-2019

Notes: Unit was calibrated in vertical position.

Performed by: Roy Mathew (digitally signed)

Reviewed by: Slava Peciurov (digitally signed)

Procedure: Pressure/Vacuum: CAL VER /DHI PPC3 (2.3.A) **FOUND-LEFT (Pass)**

Test Description	True Value	Test Results	Tolerance	Lower Limit	Upper Limit	Status	Uncertainty
VACUUM TEST							
MEASUREMENT UNITS: inHg							
OUT = 4.9087 mA							
-28.400	-28.400	-28.30	±0.300	-28.70	-28.10	Pass	6.1e-003
OUT = 8.049 mA							
-22.500	-22.500	-22.41	±0.300	-22.80	-22.20	Pass	6.1e-003
OUT = 12.056 mA							
-15.000	-15.000	-14.90	±0.300	-15.30	-14.70	Pass	6.1e-003
OUT = 16.087 mA							
-7.500	-7.500	-7.34	±0.300	-7.80	-7.20	Pass	6.1e-003
OUT = 20.098 mA							
0.000	0.000	0.18	±0.300	-0.30	0.30	Pass	6.1e-003
OUT = 16.119 mA							
-7.500	-7.500	-7.28	±0.300	-7.80	-7.20	Pass	6.1e-003
OUT = 12.125 mA							
-15.000	-15.000	-14.77	±0.300	-15.30	-14.70	Pass	6.1e-003
OUT = 8.126 mA							
-22.500	-22.500	-22.26	±0.300	-22.80	-22.20	Pass	6.1e-003
OUT = 4.907 mA							
-28.400	-28.400	-28.30	±0.300	-28.70	-28.10	Pass	6.1e-003

END OF CERTIFICATE

Certificate No: 01037944-1

METTLER TOLEDO

METTLER-TOLEDO, LLC
201 Wolf Dr
Thorofare NJ 08086
1-800-METTLER

NVLAP® CALIBRATION NVLAP LAB CODE 105013-0

ilac-MRA

Mass Calibration Certificate

Customer Information

Customer Name:	Stove Builder International, Inc.	*City:*	
Address:	250 de Copenhauge St.-Augustin-de-Desmaures	*State / Province:*	QC
Purchase Order:	220309982	*Zip / Postal Code:*	G3A 2H3

Measurement and Test Equipment Identification

Serial Number:	B739752165	*Date Received:*	03-OCT-2018
Manufacturer:	Mettler Toledo	*Condition:*	Good
Asset Number:	SBI-312	*Tolerance Class:*	OIML R111 Class E2

Environmental Conditions

Temperature: 21.07 °C *Barometric Pressure:* 769.28 mm Hg *Relative Humidity:* 52 %RH

The standards used to perform this calibration have been compared to reference mass standards that are traceable to the SI through the National Institute of Standards and Technology under Test No 684/289871-17.

The weights calibrated for this report have been calibrated in accordance with the calibration laboratory's process. The calibration performed meets the criteria as described in the current revisions of ASTM E617 and OIML R111. This calibration also meets specifications as outlined in ISO/IEC 17025, ANSI/NCSL Z540-1-1994, and applicable documents.

Calibration Date:	09-OCT-2018	*Next Calibration Due:*	09-OCT-2023
Calibration Technician:	Robotic Calibration	*Signature:*	Joseph Moran, Metrology Manager Approved Signatory 10-OCT-2018

Certificate No: 01037944-1

As Found Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
200 g	B739752165	200.00009	200.00009	0.06	0.30	8.00

1 As Found / 1 Total

Certificate No: 01037944-1

As Left Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
200 g	B739752165	200.00009	200.00009	0.06	0.30	8.00

1 As Found / 1 Total

Certificate No: 01037944-1

Standards and Comparators Used

Nominal Value&Suffix	Serial Number	Standard Set No.	Cal Due	Comparator Used		Cal Due	Procedure Used
200 g	B739752165	MS002	08/01/19	A200XXL	132	01/01/19	Multi A-B

Comments

1 As Found / 1 Total

Definitions

Nominal Value - The value as labeled on the weight or defined by shape in accordance with OIML R111 for milligram weights.

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

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

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

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

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

Calibration Process - This calibration was performed in the Level I Mass Metrology Laboratory at 201 Wolf Dr Thorofare, New Jersey 08086 unless otherwise noted in Comments.

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

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

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

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

Intertek
Sept./Sept. 2019
Control number: 4002461

LISTED SOLID FUEL BURNING APPLIANCE

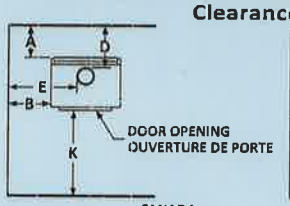
POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

MODEL / MODÈLE :

AUSTRAL III

Serial Number / No. de Série: 1

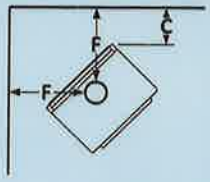
Clearances to combustibles / Dégagements aux combustibles



CANADA

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13.25 in./po.	(337 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 18 in./po.	(457 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



U.S.A.

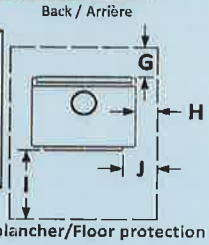
MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A: 9 in./po.	(229 mm)	D: 13.75 in./po.	(349 mm)
B: 19 in./po.	(483 mm)	E: 29.875 in./po.	(759 mm)
C: 10 in./po.	(254 mm)	F: 20.75 in./po.	(527 mm)

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13 in./po.	(330 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 17.75 in./po.	(451 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po.	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G: 8 in./po.	(203 mm)	I: 16 in./po.	(406 mm)
H: 8 in./po	(203 mm)	J: 8 in./po.	(203 mm)
I: 18 in./po.	(457 mm)	K: 36 in./po.	(914 mm)
K: 48 in./po.	(1219 mm)		

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu. Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette
- Poêle approuvé pour maison mobile. La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz) — Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.
AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h

Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(II))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm.
(For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27811

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE REFERER AU REPERTOIRE DES PRODUITS HOMOLOGUES D'INTERTEK POUR PLUS D'INFORMATION

C ETL US

Intertek
Sept./Sept. 2019
Control number: 4002461

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

LISTED SOLID FUEL BURNING APPLIANCE

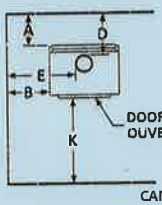
POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

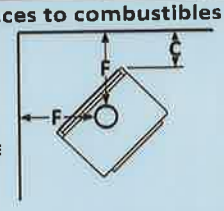
MODEL / MODÈLE :

BLACK STAG II

Serial Number / No. de Série: 1

Clearances to combustibles / Dégagements aux combustibles

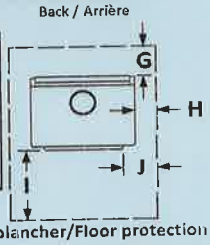




MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A: 9 in./po.	(229 mm)	D: 13.75 in./po.	(349 mm)
B: 19 in./po.	(483 mm)	E: 29.875 in./po.	(759 mm)
C: 10 in./po.	(254 mm)	F: 20.75 in./po.	(527 mm)

Back / Arrière



CANADA

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13.25 in./po.	(337 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 18 in./po.	(457 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)

U.S.A.

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13 in./po.	(330 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 17.75 in./po.	(451 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po.	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Protection de plancher/Floor protection

CANADA		U.S.A.	
G: 8 in./po.	(203 mm)	I: 16 in./po.	(406 mm)
H: 8 in./po	(203 mm)	I: 8 in./po.	(203 mm)
I: 18 in./po.	(457 mm)	K: 36 in./po.	(914 mm)
K: 48 in./po.	(1219 mm)		

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu.Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette
- Poêle approuvé pour maison mobile.La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz)

Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.

AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h

Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm.
(For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27809

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

C ETL US LISTED

Intertek

Sept./Sept. 2019

Control number: 4002461

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

LISTED SOLID FUEL BURNING APPLIANCE

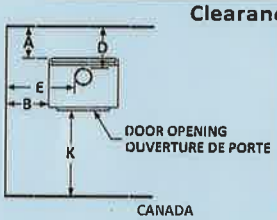
POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

MODEL / MODÈLE :

ESCAPE 1900

Serial Number / No. de Série: 1

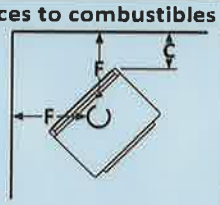
Clearances to combustibles / Dégagements aux combustibles



CANADA

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13.25 in./po.	(337 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 18 in./po.	(457 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



U.S.A.

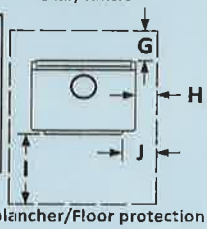
MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A: 9 in./po.	(229 mm)	D: 13.75 in./po.	(349 mm)
B: 19 in./po.	(483 mm)	E: 29.875 in./po.	(759 mm)
C: 10 in./po.	(254 mm)	F: 20.75 in./po.	(527 mm)

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13 in./po.	(330 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 17.75 in./po.	(451 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po.	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G: 8 in./po.	(203 mm)	I: 16 in./po.	(406 mm)
H: 8 in./po	(203 mm)	J: 8 in./po.	(203 mm)
I: 18 in./po.	(457 mm)	K: 36 in./po.	(914 mm)
K: 48 in./po.	(1219 mm)		

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu. Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette.
- Poêle approuvé pour maison mobile. La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz) — Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.

AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h

Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. (For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27808

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

Intertek
Sept./Sept. 2019
Control number: 4002461

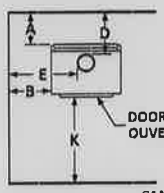
LISTED SOLID FUEL BURNING APPLIANCE

POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

MODEL / MODÈLE : GATEWAY 3300

Serial Number / No. de Série: 1

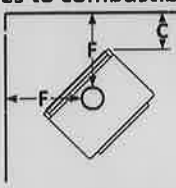
Clearances to combustibles / Dégagements aux combustibles



CANADA

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13.25 in./po. (337 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po. (184 mm)	7 in./po. (178 mm)
D:	18 in./po. (457 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po(632 mm)	24.875 in./po(632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



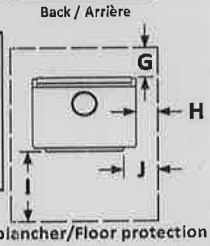
U.S.A.

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13 in./po. (330 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po. (184 mm)	7 in./po. (178 mm)
D:	17.75 in./po. (451 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po(632 mm)	24.875 in./po. (632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A:	9 in./po. (229 mm)	D:	13.75 in./po. (349 mm)
B:	19 in./po. (483 mm)	E:	29.875 in./po. (759 mm)
C:	10 in./po. (254 mm)	F:	20.75 in./po. (527 mm)

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G:	8 in./po. (203 mm)	I:	16 in./po. (406 mm)
H:	8 in./po (203 mm)	J:	8 in./po. (203 mm)
I:	18 in./po. (457 mm)	K:	36 in./po. (914 mm)
K:	48 in./po. (1219 mm)		

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu. Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette.
- Poêle approuvé pour maison mobile. La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz)
Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.
AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h

Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. (For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

EMPIRE
SINCE 1932

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27813

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

Intertek
Sept./Sept. 2019
Control number: 4002461

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

LISTED SOLID FUEL BURNING APPLIANCE

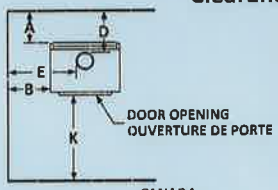
POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

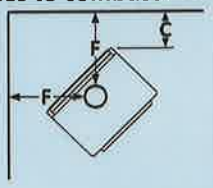
MODEL / MODÈLE :

LEGEND III

Serial Number / No. de Série: 1

Clearances to combustibles / Dégagements aux combustibles



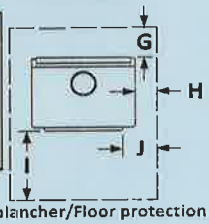


MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A: 9 in./po.	(229 mm)	D: 13.75 in./po.	(349 mm)
B: 19 in./po.	(483 mm)	E: 29.875 in./po.	(759 mm)
C: 10 in./po.	(254 mm)	F: 20.75 in./po.	(527 mm)

U.S.A.

Back / Arrière



CANADA

	Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A:	13.25 in./po.	(337 mm)	A: 6 in./po.	(152 mm)
B:	14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C:	7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D:	18 in./po.	(457 mm)	D: 10.75 in./po.	(273 mm)
E:	24.875 in./po	(632 mm)	E: 24.875 in./po	(632 mm)
F:	18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)

U.S.A.

	Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A:	13 in./po.	(330 mm)	A: 6 in./po.	(152 mm)
B:	14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C:	7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D:	17.75 in./po.	(451 mm)	D: 10.75 in./po.	(273 mm)
E:	24.875 in./po	(632 mm)	E: 24.875 in./po.	(632 mm)
F:	18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Protection de plancher/Floor protection

CANADA		U.S.A.	
G:	8 in./po. (203 mm)	I:	16 in./po. (406 mm)
H:	8 in./po (203 mm)	J:	8 in./po. (203 mm)
I:	18 in./po. (457 mm)	K:	36 in./po. (914 mm)
K:	48 in./po. (1219 mm)		

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

PREVENT HOUSE FIRES

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- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
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- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu.Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette.
- Poêle approuvé pour maison mobile.La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
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Optional blower: (115V, 0.8A, 60Hz) — Option ventilateur: (115V, 0.8A, 60Hz)

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AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h
Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm.
(For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27812

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

C ETL US LISTED

Intertek
Sept./Sept. 2019
Control number: 4002461

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

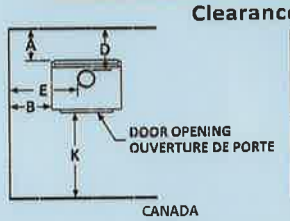
LISTED SOLID FUEL BURNING APPLIANCE

POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

MODEL / MODÈLE : MYRIAD III

Serial Number / No. de Série: 1

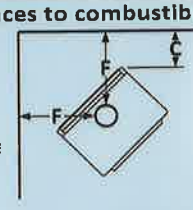
Clearances to combustibles / Dégagements aux combustibles



CANADA

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13.25 in./po. (337 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po. (184 mm)	7 in./po. (178 mm)
D:	18 in./po. (457 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po (632 mm)	24.875 in./po (632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



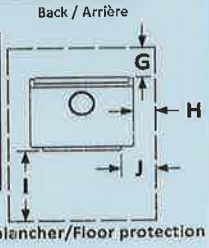
U.S.A.

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13 in./po. (330 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po. (184 mm)	7 in./po. (178 mm)
D:	17.75 in./po. (451 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po (632 mm)	24.875 in./po. (632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A:	9 in./po. (229 mm)	D:	13.75 in./po. (349 mm)
B:	19 in./po. (483 mm)	E:	29.875 in./po. (759 mm)
C:	10 in./po. (254 mm)	F:	20.75 in./po. (527 mm)

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G:	8 in./po. (203 mm)	I:	16 in./po. (406 mm)
H:	8 in./po (203 mm)	J:	8 in./po. (203 mm)
I:	18 in./po. (457 mm)	K:	36 in./po. (914 mm)
K:	48 in./po. (1219 mm)		

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu.Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette
- Poêle approuvé pour maison mobile.La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz) — Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.
AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h
Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm.
(For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27810

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

STANDARDS / NORMES D'ESSAI:

Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

Intertek
Sept./Sept. 2019
Control number: 4002461

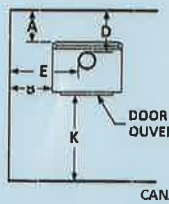
LISTED SOLID FUEL BURNING APPLIANCE

POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

MODEL / MODÈLE : SOLUTION 3.3

Serial Number / No. de Série: 1

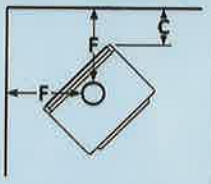
Clearances to combustibles / Dégagements aux combustibles



CANADA

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13.25 in./po. (337 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po (184 mm)	7 in./po. (178 mm)
D:	18 in./po. (457 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po (632 mm)	24.875 in./po (632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



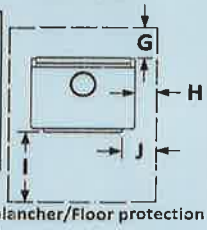
U.S.A.

	Single wall connector / Tuyau à paroi simple	Double wall connector / Tuyau à paroi double
A:	13 in./po. (330 mm)	6 in./po. (152 mm)
B:	14 in./po. (356 mm)	14 in./po. (356 mm)
C:	7.25 in./po. (184 mm)	7 in./po. (178 mm)
D:	17.75 in./po. (451 mm)	10.75 in./po. (273 mm)
E:	24.875 in./po (632 mm)	24.875 in./po. (632 mm)
F:	18 in./po. (457 mm)	17.75 in./po. (451 mm)

MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A:	9 in./po. (229 mm)	D:	13.75 in./po. (349 mm)
B:	19 in./po. (483 mm)	E:	29.875 in./po. (759 mm)
C:	10 in./po. (254 mm)	F:	20.75 in./po. (527 mm)

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G:	8 in./po. (203 mm)	I:	16 in./po. (406 mm)
H:	8 in./po (203 mm)	J:	8 in./po. (203 mm)
I:	18 in./po. (457 mm)	K:	36 in./po. (914 mm)
K:	48 in./po. (1219 mm)		

* See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu.Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette
- Poêle approuvé pour maison mobile.La protection de plancher peut varier entre la version piédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz)

Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.

AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h

Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. (For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
03/09/2019 (# test)

27807

REFER TO INTERTEK'S DIRECTORY OF BUILDING PRODUCTS FOR DETAILED INFORMATION
SE RÉFÉRER AU RÉPERTOIRE DES PRODUITS HOMOLOGUÉS D'INTERTEK POUR PLUS D'INFORMATION

STANDARDS / NORMES D'ESSAI:

LISTED SOLID FUEL BURNING APPLIANCE

POÊLE À COMBUSTIBLE SOLIDE HOMOLOGUÉ

Intertek
June/Juin 2019
Control number: 4002461

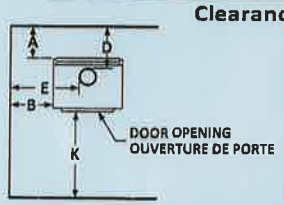
Certified to/Certifié selon CSA B415.1-10
Certified to/Certifié selon ASTM E3053-17
Certified to/Certifié selon ASTM E2515-11 (R2017)

MODEL / MODÈLE :

OSBURN 3300

Serial Number / No. de Série: 1

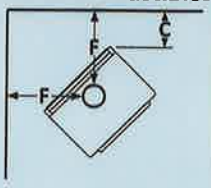
Clearances to combustibles / Dégagements aux combustibles



CANADA

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13.25 in./po.	(337 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 18 in./po.	(457 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

Floor-ceiling/plancher-plafond: 84 in./po. (213cm)



U.S.A.

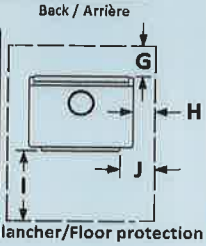
MOBILE HOME
MAISONS MOBILES
Double wall connector
Tuyau à paroi double

A: 9 in./po.	(229 mm)	D: 13.75 in./po.	(349 mm)
B: 19 in./po.	(483 mm)	E: 29.875 in./po.	(759 mm)
C: 10 in./po.	(254 mm)	F: 20.75 in./po.	(527 mm)

Single wall connector / Tuyau à paroi simple		Double wall connector / Tuyau à paroi double	
A: 13 in./po.	(330 mm)	A: 6 in./po.	(152 mm)
B: 14 in./po.	(356 mm)	B: 14 in./po.	(356 mm)
C: 7.25 in./po.	(184 mm)	C: 7 in./po.	(178 mm)
D: 17.75 in./po.	(451 mm)	D: 10.75 in./po.	(273 mm)
E: 24.875 in./po	(632 mm)	E: 24.875 in./po.	(632 mm)
F: 18 in./po.	(457 mm)	F: 17.75 in./po.	(451 mm)

✱ See owner's manual for other clearances with lowered ceiling/
voir manuel d'installation pour autres dégagements avec plafond abaissé

Back / Arrière



Protection de plancher/Floor protection

CANADA		U.S.A.	
G: 8 in./po.	(203 mm)	I: 16 in./po.	(406 mm)
H: 8 in./po	(203 mm)	J: 8 in./po.	(203 mm)
I: 18 in./po.	(457 mm)	K: 36 in./po.	(914 mm)
K: 48 in./po.	(1219 mm)		

PREVENT HOUSE FIRES

- Install and use only in accordance with the manufacturer's installation and operating instructions.
- Contact local building or fire officials about restrictions and installation inspection in your area.
- Use listed 152 mm /6 in. diameter single or double wall connectors with prefabricated chimneys approved UL 103 HT (US) and ULC S629 (CAN) suitable for solid fuels or lined masonry chimneys.
- See local building code and manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling.
- Do not pass connector through combustible wall or ceiling.
- Do not connect this unit to a chimney serving another appliance.
- Use with wood only. Do not use other fuels.
- Operate only with door closed or door open with firescreen installed. Open door or remove firescreen to feed the stove only.
- Do not obstruct the space underneath the stove.
- Do not use grate or elevate fire. Build fire directly on hearth.
- Do not overfire. If heater or chimney connector glows, you are overfiring.
- Inspect and clean chimney frequently. Under certain condition of use, creosote buildup may occur rapidly.
- Replace glass with ceramic type only.
- Install unit on a non-combustible material extending as shown above on this label.
- Suitable for mobile-home installation. Floor protection may vary from pedestal to legs version refer to owner's manual.
- Combustion air openings shall not be obstructed.
- This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against US federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

PRÉVENEZ LES INCENDIES

- Installer et utiliser conformément au manuel d'utilisation du fabricant.
- Contacter les autorités de votre localité ayant juridiction concernant les restrictions et inspections d'installation.
- Utiliser des tuyaux d'évacuation à parois simple ou double homologués d'un diamètre de 6 po. (152 mm) avec une cheminée préfabriquée approuvée UL 103 HT (US) et ULC S629 (CAN) pour utilisation au bois ou une cheminée de maçonnerie gainée.
- Voir les codes locaux et le manuel d'installation du manufacturier pour le passage de la cheminée à travers un mur ou un plafond combustible.
- Ne pas traverser un plafond ou un mur combustible avec un tuyau d'évacuation.
- Ne pas raccorder cet appareil à une cheminée déservant un autre appareil.
- Brûler du bois seulement. Ne pas utiliser d'autres combustibles.
- Garder la porte fermée ou le pare-étincelle en place en tout temps. Ouvrir la porte ou retirer le pare-étincelle que lors du chargement.
- Ne rien entreposer sous l'appareil.
- Ne pas utiliser de grilles ou de chenets pour surélever le feu. Préparer le feu directement sur l'âtre.
- Ne pas surchauffer. Si l'appareil ou le tuyau rougit, il y a surchauffe.
- Inspecter et nettoyer la cheminée fréquemment. Sous certaines conditions, l'accumulation de créosote peut être rapide.
- Remplacer la vitre seulement avec un verre de céramique.
- Installer l'appareil sur une plaque non combustible tel qu'indiqué sur l'étiquette.
- Poêle approuvé pour maison mobile. La protection de plancher peut varier entre la version plédestal et sur pattes. Voir le manuel d'instructions.
- Les entrées d'air servant à la combustion ne doivent pas être obstruées.
- Cet appareil de chauffage requiert des inspections et réparations périodiques. Consulter le manuel de l'utilisateur pour plus d'information. Opérer cet appareil de chauffage de façon inconsistente par rapport au manuel de l'utilisateur consiste une violation de la loi fédérale (USA).

Optional blower: (115V, 0.8A, 60Hz) — Option ventilateur: (115V, 0.8A, 60Hz)

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using cordwood.
AGENCE DE PROTECTION DE L'ENVIRONNEMENT DES É.-U. Conforme aux normes d'émission de particules de 2020 avec bûche de bois.

Weighted average emission rate / Moyenne pondérée des émissions : 0.95 g/h
Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii))

WARNING: This product can expose you to carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. (For more information go to www.p65warnings.ca.gov)

CAUTION

- HOT WHILE IN OPERATION.
- DO NOT TOUCH. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY.
- CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS.

ATTENTION

- CHAUD EN FONCTIONNEMENT.
- NE PAS TOUCHER. GARDER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES ÉLOIGNÉS.
- UN CONTACT AVEC LA PEAU PEUT OCCASIONNER DES BRÛLURES. VOIR LES INSTRUCTIONS.

Made in St-Augustin-de-Desmaures (Qc), Canada
25/06/2019 (# test)

SBI
Fabricant de poêles international
Stove Builder International

Fabriqué à St-Augustin-de-Desmaures (Qc), Canada
25/06/2019 (# test)

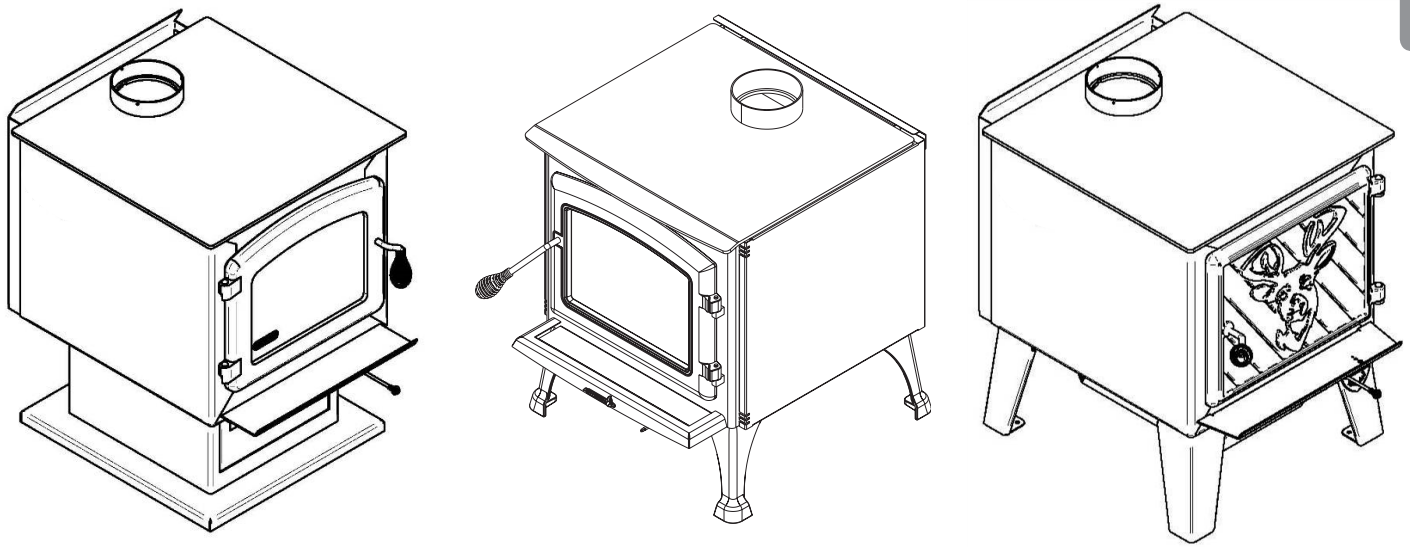
27792

Manuel d'installation et d'utilisation

SÉRIE 3.3

Austral III
Myriad III
Légende III
Escape 1900
Black Stag II
Osburn 3300
Solution 3.3
Gateway 3300

FRANÇAIS



Poêle à bois homologué conformément à la phase II de l'agence de protection de l'environnement EPA et certifié conforme à la norme 2020 bois de corde.

EPA ≤2.5 g/h

CONSULTER LE CODE DU BÂTIMENT LOCAL OU CONTACTER LE SERVICE MUNICIPAL DES INCENDIES POUR CONNAÎTRE LES RESTRICTIONS ET LES EXIGENCES D'INSPECTION ET D'INSTALLATION DE LA RÉGION.

LIRE CE MANUEL AU COMPLET AVANT L'INSTALLATION DE CE POÊLE À BOIS. IL EST IMPORTANT DE RESPECTER INTÉGRALEMENT LES DIRECTIVES D'INSTALLATION. SI LE POÊLE N'EST PAS INSTALLÉ CORRECTEMENT, IL PEUT EN RÉSULTER UN INCENDIE, DES BLESSURES CORPORELLES OU MÊME LE DÉCÈS.

LIRE LE PRÉSENT MANUEL ET LE CONSERVER POUR CONSULTATION

2019-08-26

Imprimé au Canada

CERTIFICATION_F

MERCI D'AVOIR CHOISI CE POÊLE À BOIS.

Lorsque l'appareil n'est pas installé correctement, les matériaux combustibles à proximité peuvent surchauffer et s'enflammer.

Pour réduire les risques d'incendie, suivre les instructions d'installation de ce manuel.

Fabricant de poêles international est l'un des plus importants et des plus réputés fabricants de poêles à bois et de foyers en Amérique du Nord et est fière de la qualité et du rendement de tous ses produits.

Dans les pages qui suivent se trouvent des conseils d'ordre général sur le chauffage au bois, des instructions détaillées pour une installation sûre et efficace et des indications sur la façon d'obtenir le meilleur rendement de ce poêle.

Il est fortement recommandé que cet appareil de chauffage au bois soit installé et entretenu par des professionnels certifiés par une agence qualifiée tels que NFI (National Fireplace Institute®) ou CSIA (Chimney Safety Institute of America) aux États-Unis, au Canada par WETT (Wood Energy Technology Transfer) ou au Québec par l'APC (Association des Professionnels du Chauffage).

Consulter le code du bâtiment local ou contacter le service des incendies pour connaître les restrictions et les exigences d'inspection et d'installation de la région.

Il se peut qu'un permis soit requis pour l'installation du poêle et de la cheminée à laquelle il est branché. Il est également recommandé d'aviser sa compagnie d'assurance habitation.

Lire ce manuel au complet avant l'installation et l'utilisation du poêle.

Une source de chauffage primaire doit être disponible dans la résidence. Cet appareil de chauffage doit être utilisé comme chauffage d'appoint. En cas de bris, le manufacturier ne peut être tenu responsable des coûts de chauffage additionnels pouvant être engendrés par une source de chauffage alternative.

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PARTIE A – UTILISATION ET ENTRETIEN

1. Sécurité

- **BRÛLANT LORSQU'EN FONCTION, ÉLOIGNER LES ENFANTS, LES VÊTEMENTS ET LES MEUBLES. TOUT CONTACT AVEC LA PEAU PEUT CAUSER DES BRÛLURES. DES GANTS PEUVENT ÊTRE NÉCESSAIRES LORS DE L'UTILISATION DU POÊLE.**

- Le fait d'utiliser un appareil dont des éléments comme la vitre, les briques réfractaires ou le coupe-feu sont fissurés ou brisés peut être dangereux et peut endommager l'appareil.

- Ouvrir complètement l'admission d'air avant d'ouvrir la porte de chargement.

- **NE JAMAIS UTILISER D'ESSENCE, DE COMBUSTIBLE À LANTERNE (NAPHTA), DE MAZOUT, D'HUILE À MOTEUR, DE KÉROSÈNE, DE LIQUIDE D'ALLUMAGE POUR CHARBON DE BOIS, DE LIQUIDES SIMILAIRES OU D'AÉROSOLS POUR ALLUMER UN FEU. GARDER TOUS CES LIQUIDES OU AÉROSOLS LOIN DE L'APPAREIL LORSQU'IL EST EN FONCTION.**

- Ne pas entreposer de carburant en deçà des dégagements minimums de l'appareil.

- Brûler seulement du bois de chauffage naturel sec.

- L'appareil doit être entretenu et utilisé en tout temps conformément aux présentes directives.

- Ne pas surélever le feu en plaçant un chenet dans le poêle.

- Ne pas utiliser de matériaux de fortune et ne faites aucun compromis lors de l'installation de cet appareil.

- Cet appareil de chauffage nécessite des inspections et réparations périodiques pour une utilisation optimale. Il est contre la réglementation fédérale d'utiliser cet appareil de façon incohérente avec les instructions de ce manuel.

- Un détecteur de fumée, un détecteur de monoxyde de carbone ainsi qu'un extincteur devraient être installés dans la maison. L'emplacement des détecteurs doit être choisi judicieusement pour éviter les fausses alertes lors du rechargement de l'appareil. L'emplacement de l'extincteur devrait être connu de tous les membres de la famille.

Ce produit peut vous exposer à des agents chimiques, y compris du monoxyde de carbone, identifié par l'État de la Californie comme pouvant causer le cancer ou des malformations congénitales et autres troubles de l'appareil reproducteur. Pour de plus amples informations, prière de consulter le www.P65warnings.ca.gov/

2. Informations générales

2.1 Performances

Valeurs telles qu'obtenues en test, à l'exception du volume de la chambre à combustion et la puissance thermique maximale.

Modèles	Austral III, Myriad III, Légende III, Escape 1900, Black Stag II, Osburn 3300, Solution 3.3, Gateway 3300	
Type de combustible	Bûches de bois sec	
Technologie de combustion	Non-catalytique	
Volume nominal de la chambre à combustion	3.4 ft^3 (0.096 m^3)	
Puissance thermique maximale (bûches de bois sec)[2]	90,000 BTU/h (26.4 kW)	
Puissance thermique globale (min. à max.)[1] [2]	15,841 BTU/h à 57,041 BTU/h (4.64 kW à 16.72 kW)	
Rendement moyen global[3] (Bûches de bois sec)	71.1 % (PCS)[3]	76.6 % (PCI)[4]
Rendement optimal[5]	78 %	
Taux moyen d'émission de particules[6]	0.95 g/h (EPA / CSA B415.1-10)[7]	
Taux moyen de CO[8]	61.3 g/h	

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[1] La puissance thermique maximale (bûches de bois sec) tient compte d'une densité de chargement variant entre 15 lb/pi^3 et 20 lb/pi^3. Les autres données de performance sont basées sur une charge d'essai prescrite par la norme. La densité de chargement spécifiée varie entre 7 lb/pi^3 et 12 lb/pi^3. L'humidité varie entre 19% et 25%.
[2] Telle que mesurée selon CSA B415.1-10.
[3] Pouvoir calorifique supérieur du combustible.
[4] Pouvoir calorifique inférieur du combustible.
[5] Rendement optimal à un taux de combustion donné (PCI).
[6] Cet appareil est officiellement testé et certifié par un organisme indépendant.
[7] Testé et certifié selon CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii) et ASTM E3053-17.
[8] Monoxyde de carbone.

2.2 Spécifications

Longueur maximale des bûches[9]	20 po (508 mm) Nord-Sud
Diamètre de la buse de raccordement	6 po (150 mm)
Diamètre du tuyau de raccordement recommandé	6 po (150 mm)
Type de cheminée	ULC-S629, UL 103 HT (2100 °F)
Matériau du coupe-feu	C-Cast ou Vermiculite
Type de porte	Simple, vitrée ou non, avec cadre en fonte
Type de vitre	Verre céramique
Ventilateur	Inclus ou Optionnel (jusqu'à 100 PCM)
Normes d'émissions de particules[10]	EPA / CSA B415.1-10

2.3 Matériaux

Le **caisson** du poêle, qui représente la plus grande partie de son poids, est fait d'acier. Si cela devenait nécessaire dans plusieurs années, presque tout le poêle peut être recyclé en nouveaux produits, ce qui évite d'avoir à extraire du nouveau minerai.

La couche de **peinture** est très mince et sa teneur en COV (composés organiques volatils) est très basse. Les COV peuvent provoquer du smog, de sorte que toute la peinture utilisée pendant la fabrication est conforme aux plus récentes exigences sur la qualité de l'air, en ce qui a trait à la réduction ou l'élimination des COV.

Les **tubes d'air** sont faits d'acier inoxydable, qui peut aussi être recyclé.

Le **coupe-feu** est fait d'un matériau en fibres d'aluminosilicate comprimées avec un liant pour former une planche rigide. Le C-Cast peut résister à des températures de plus de 2000 °F. Il n'est pas considéré comme un déchet dangereux. Il est recommandé de l'envoyer à l'écocentre.

La **brique réfractaire** est surtout composée de dioxyde de silicium, aussi appelé silice, un produit transformé à partir d'un minerai extrait. On le trouve communément dans la nature sous forme de sable ou d'argile. Il est recommandé de l'envoyer à l'écocentre.

Les **joints d'étanchéité** de la porte et de la vitre sont faits de fibre de verre qui est tissée à partir de sable fondu. Les joints d'étanchéité noirs ont été trempés dans une solution sans solvants. Il est recommandé de les envoyer à l'écocentre.

La **vitre** de la porte est faite de céramique de 5/32" (4 mm) d'épais qui ne contient aucun produit chimique toxique. Elle est faite de matières premières provenant du sol comme le sable et le quartz qui sont fusionnées de façon à former de la vitre à haute température. Le verre céramique ne peut être recyclé de la même façon que le verre ordinaire, de sorte qu'il ne doit pas être recyclé avec les produits domestiques courants. Il est recommandé de l'envoyer à l'écocentre.

[9] Orientation est-ouest : côté longitudinal des bûches visible; orientation nord-sud : extrémité des bûches visible.
[10] Testé et certifié selon CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii) et ASTM E3053-17.

2.4 Chauffage par zone

Ce poêle au bois sert au chauffage local, ce qui signifie qu'il est prévu pour chauffer le secteur où il est installé, de même que les pièces qui y sont reliées, bien qu'à une température inférieure. Cela s'appelle le chauffage par zone et c'est une façon de plus en plus répandue de chauffer des résidences ou des espaces à l'intérieur des résidences.

Le chauffage par zone peut être utilisé comme appoint pour un autre système de chauffage, en chauffant un espace de la résidence en particulier, comme une salle familiale au sous-sol ou un agrandissement qui n'a pas d'autre système de chauffage.

Les maisons de grandeur moyenne et relativement neuve peuvent être chauffées à l'aide d'un poêle au bois bien situé et de la bonne grosseur. Le chauffage par zone de toute une maison fonctionne mieux lorsque le poêle est placé dans la partie de la maison où la famille passe le plus de temps. Il s'agit généralement du secteur principal où se trouvent la cuisine, la salle à manger et le salon.

En plaçant le poêle dans ce secteur, il sera possible de profiter au maximum de la chaleur qu'il produit, de retirer le maximum de confort et d'obtenir le rendement énergétique le plus élevé. La pièce la plus occupée sera plus chaude, alors que les chambres et le sous-sol (s'il y en a un) resteront plus frais. De cette façon, moins de bois est brûlé qu'avec les autres formes de chauffage.

Bien que le poêle soit capable de chauffer les secteurs principaux de la maison à une température adéquate, il est fortement recommandé d'avoir aussi un système de chauffage conventionnel au mazout, au gaz ou à l'électricité comme source de chauffage complémentaire.

Plusieurs facteurs feront en sorte que le chauffage par zone réussira, y compris le bon emplacement et la bonne grosseur du poêle, la dimension, la disposition et l'âge de la résidence, de même que la zone climatique. Les résidences secondaires utilisées trois saisons par année peuvent généralement être chauffées par des poêles plus petits que les maisons qui sont chauffées tout l'hiver.

2.5 Émissions et rendement

Les faibles émissions de particules qui résultent de la technologie utilisée dans ce poêle signifient que la maisonnée rejettera jusqu'à 90% moins de particules fines dans l'environnement que si un ancien poêle conventionnel était utilisé. Mais la technologie du contrôle des rejets signifie plus que la protection de l'environnement.

La fumée qui provient du bois lorsqu'il est chauffé contient environ la moitié de l'énergie contenue dans ce combustible. En brûlant le bois complètement, le poêle libère toute l'énergie calorifique du bois, plutôt que de la gaspiller en fumée qui s'échappe par la cheminée. De plus, les caractéristiques de la chambre à combustion permettent de réduire l'arrivée d'air afin de contrôler le rendement calorifique, tout en maintenant une flamme de combustion propre et efficace, ce qui augmente la distribution efficace de chaleur dans la maison.

Le contrôle des rejets et la technologie de combustion évoluée de ce poêle ne peuvent bien fonctionner que si le combustible utilisé contient un taux d'humidité moyen convenable de 15% à 20%. Voir la section suivante pour des suggestions sur la préparation du bois de chauffage et l'évaluation de son taux d'humidité.

3. Combustibles

Le bon bois de chauffage est celui qui a été coupé à la bonne longueur pour le poêle, fendu en différentes grosseurs et cordé à l'extérieur jusqu'à ce que sa teneur en humidité ne soit plus que de 15% à 20%.

NE PAS BRÛLER:

- **DES ORDURES;**
- **DE LA PELOUSE OU DES DÉCHETS DE JARDIN;**
- **DES MATÉRIAUX CONTENANT DU CAOUTCHOUC, Y COMPRIS LES PNEUS;**
- **DES MATÉRIAUX CONTENANT DU PLASTIQUE;**
- **DES DÉCHETS CONTENANT DU PÉTROLE, DE LA PEINTURE, DU DILUANT À PEINTURE OU DES PRODUITS À BASE D'ASPHALTE;**
- **DES MATÉRIAUX CONTENANT DE L'AMIANTE;**
- **DES DÉBRIS DE CONSTRUCTION OU DE DÉMOLITION;**
- **DES TRAVERS DE CHEMIN DE FER OU DU BOIS TRAITÉ;**
- **DU FUMIER OU DES CARCASSES D'ANIMAUX;**
- **DU BOIS D'ÉPAVE OU AUTRES MATÉRIAUX SATURÉS A L'EAU SALÉE;**
- **DU BOIS VERT; OU**
- **DES PRODUITS DU PAPIER, DU CARTON, DU CONTREPLAQUÉ OU DES PANNEAUX DE PARTICULES. L'INTERDICTION DE BRÛLER CES MATÉRIAUX N'INTERDIT PAS L'UTILISATION D'ALLUME FEU FABRIQUÉ À PARTIR DE PAPIER, DE CARTON, DE SCIURE DE BOIS, DE CIRE ET DE SUBSTANCES SIMILAIRES POUR ALLUMER UN FEU.**

BRÛLER CES MATÉRIAUX POURRAIT PRODUIRE UNE ÉMANATION DE FUMÉE TOXIQUE, RENDRE L'APPAREIL INEFFICACE ET CAUSER DE LA FUMÉE.

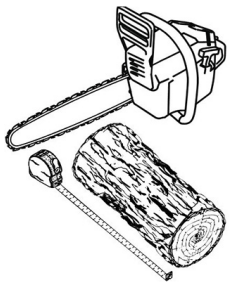
3.1 Essences d'arbres

Les essences d'arbres d'où provient le bois de chauffage sont moins importantes que sa teneur en humidité. La principale différence entre les différentes essences d'arbres est la densité du bois. Le bois franc est plus dense que le bois mou.

Les propriétaires de maison qui peuvent obtenir à la fois du bois franc et du bois mou utilisent les deux sortes de bois à différentes fins. Le bois mou est un bon combustible par temps relativement doux au printemps et à l'automne parce qu'il s'enflamme rapidement et produit moins de chaleur. Le bois mou n'est pas aussi dense que le bois franc, de sorte qu'un volume donné de bois contient moins d'énergie. L'utilisation du bois mou évite de surchauffer la maison, ce qui peut être un problème répandu avec le chauffage au bois par temps doux. Le bois franc est meilleur pour les temps froids d'hiver lorsqu'il faut plus de chaleur et un cycle de combustion plus long.

Le bois franc comme le chêne, l'érable, le frêne et le hêtre prend plus de temps à pousser et vit plus longtemps que le bois mou comme le peuplier et le bouleau. Cela donne plus de valeurs aux essences de bois franc. Le conseil voulant que seul le bois franc soit bon à brûler est dépassé. Les vieux poêles à bois de fonte qui fuyaient n'auraient pas pu chauffer toute la nuit à moins qu'on ne les alimente avec de grosses bûches de bois franc.

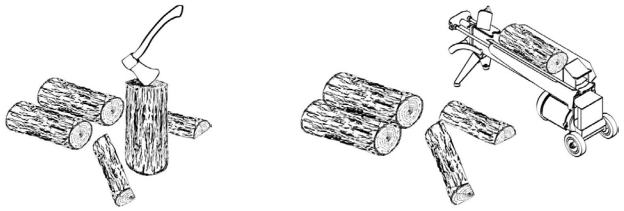
3.2 Longueur des bûches



Les bûches devraient être coupées pour avoir au moins 1" (25 mm) de moins que la chambre à combustion, de façon à y pénétrer facilement. Il est très difficile d'alimenter le poêle avec des bûches qui sont juste un peu trop longues. La longueur la plus commune pour le bois de chauffage est de 16" (400 mm.)

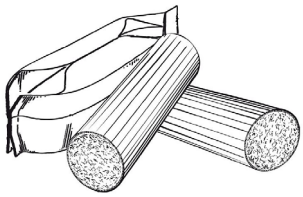
3.3 Grosseur des bûches

Le bois de chauffage sèche plus rapidement lorsqu'il est fendu. Les gros rondins qui ne sont pas fendus peuvent mettre des années à sécher suffisamment pour qu'on puisse les brûler. Même lorsqu'elles sont sèches, les bûches non fendues sont difficiles à allumer parce qu'elles n'ont pas d'arêtes vives où les flammes prennent en premier.



Le bois devrait être fendu de différentes grosseurs, allant de 3" à 6" (75 mm à 150 mm) d'épaisseur. Il est beaucoup plus facile d'allumer et de raviver un feu avec des bûches de différentes grosseurs.

3.4 Bûches densifiées



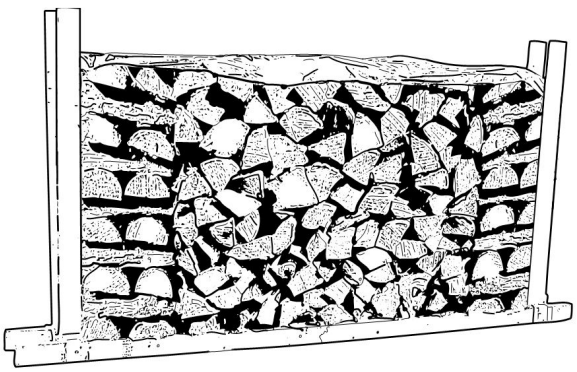
Les bûches densifiées faites à 100 % de sciure comprimée peuvent être brûlées, à condition de ne pas brûler trop de ces bûches à la fois. Ne pas brûler de bûches densifiées contenant de la sciure imprégnée de cire ou de bûches contenant des additifs chimiques. Suivre les instructions et les mises en garde du fabricant.

3.5 Séchage du bois

Le bois de chauffage qui n'est pas suffisamment sec est la cause de la plupart des plaintes concernant les appareils de chauffage au bois. Brûler constamment du bois vert produit plus de créosote et implique généralement un manque de chaleur et des vitres de porte sales.

Du bois de chauffage avec une teneur en humidité de 15% à 20% permettra au poêle d'atteindre son rendement le plus élevé.

Voici quelques faits à retenir sur le processus de séchage du bois:



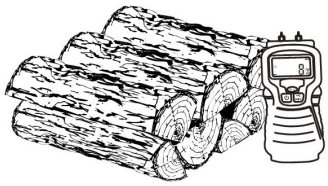
- Le bois de chauffage acheté d'un vendeur est rarement suffisamment sec pour être brûlé, il est donc conseillé d'acheter le bois au printemps et de le faire sécher soi-même;
- Le séchage est plus rapide dans un climat sec que dans un climat maritime humide;
- Le séchage est plus rapide l'été par temps chaud que l'hiver;
- Les bûches fendues sèchent plus rapidement que le bois rond;
- Le bois mou sèche comme le pin, l'épinette, le peuplier et le tremble plus rapidement que le bois franc. Il peut être suffisamment sec pour faire du feu après avoir été cordé à l'extérieur seulement pendant les mois d'été;

– Le bois franc comme le chêne, l'érable et le frêne peut mettre un ou même deux ans à sécher complètement, surtout s'il s'agit de grosses bûches;

– Le bois de chauffage sèche plus rapidement lorsqu'il est cordé à l'extérieur où il est exposé au soleil et au vent; il prend beaucoup plus de temps à sécher lorsqu'il est cordé dans une remise à bois;

Le bois de chauffage est suffisamment sec pour brûler, lorsque :

– des fissures apparaissent à l'extrémité des bûches;
– le bois passe d'une coloration blanche ou crémeuse à gris ou jaune;
– deux morceaux de bois frappés ensemble sonnent creux;
– la face mise à jour d'une bûche fraîchement coupée semble chaude et sèche au toucher;
– le taux d'humidité lu sur un humidimètre est entre 15% à 20%.

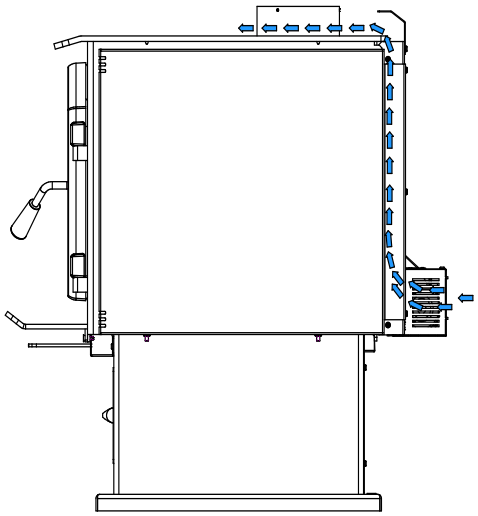


4. Utilisation du poêle

Le taux de combustion minimum de ce poêle à bois a été défini par le fabricant et ne doit pas être modifié. Il est contre la réglementation fédérale de modifier ce réglage ou d'utiliser ce poêle à bois d'une manière non conforme aux instructions d'utilisation de ce manuel.

4.1 Fonctionnement du ventilateur

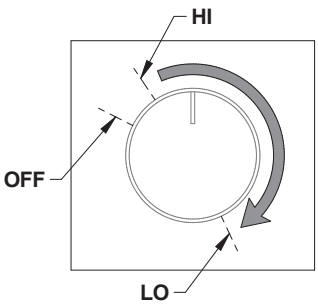
Un ventilateur est inclus avec cet appareil. Le ventilateur se trouve dans la chambre à combustion et s'installe à l'arrière du poêle pour accroître la circulation d'air dans l'échangeur de chaleur et améliorer la circulation d'air chaud dans la pièce. Voir "Annexe 1: Installation du ventilateur"



S'il est utilisé sur une base régulière, le ventilateur peut accroître le rendement jusqu'à 2%. Cependant, le ventilateur ne doit pas servir à augmenter le rendement d'un poêle trop petit pour l'espace à chauffer.

Le cordon électrique du ventilateur ne doit toucher à aucune des surfaces du poêle de façon à éviter les décharges électriques ou les incendies. Ne faites pas passer le cordon électrique sous le poêle.

Le ventilateur est muni d'un contrôle de vitesse variable comprenant trois différentes positions d'ajustement; soit de élevé (HI) à faible (LO), ou fermé (OFF). Il est recommandé de laisser le poêle atteindre sa température de fonctionnement (environ une heure) avant d'actionner le ventilateur. L'augmentation du courant d'air produit par le ventilateur refroidit la chambre à combustion et peut nuire au rendement d'un début de combustion si le ventilateur démarre trop tôt.



Un capteur de chaleur qui fonctionne avec le ventilateur est aussi inclus avec le poêle. Il se trouve dans la chambre à combustion et il s'installe à l'arrière du poêle. Lorsque le ventilateur est en marche (position entre LO et HI), le capteur de chaleur mettra le ventilateur en marche automatiquement lorsque le poêle sera assez chaud et l'arrêtera lorsque le poêle aura refroidi. Par conséquent, le contrôle de vitesse variable peut être laissé à la vitesse désirée.

5. Combustion efficace du bois

5.1 Première utilisation

Deux choses se produisent lors des premières attisées: la peinture durcit et les composantes intérieures se conditionnent. Au fur et à mesure que la peinture durcit, certains éléments chimiques se vaporisent. Les vapeurs ne sont pas nocives, mais elles sentent mauvais. Les vapeurs de peinture fraîche peuvent aussi déclencher de fausses alarmes dans les détecteurs de fumée. Par conséquent, lors du premier allumage, il peut être judicieux d'ouvrir les portes et les fenêtres pour ventiler la maison.

Faire deux ou trois petits feux pour amorcer le processus de durcissement et de conditionnement. Faire ensuite des feux plus gros et plus chauds jusqu'à ce que l'appareil ne dégage plus d'odeur de peinture. Plus les feux sont chauds, plus les surfaces peintes atteignent le point de durcissement de la peinture. L'odeur de la peinture qui durcit ne disparaîtra qu'après avoir fait un ou deux feux très chauds.

5.2 Allumer un feu

Chaque personne qui chauffe au bois développe sa façon préférée de faire du feu. Peu importe la méthode choisie, le but devrait être d'avoir un feu chaud, rapidement. Un feu qui prend rapidement produit moins de fumée et crée moins de créosote dans la cheminée.

Ne pas utiliser de liquides inflammables comme l'essence, le naphte, le mazout, l'huile à moteur ou des aérosols pour allumer ou raviver le feu. Tenir ces liquides éloignés du poêle lors de son utilisation.

Voici trois façons répandues et efficaces pour faire un feu de bois.

5.2.1 Méthode traditionnelle

La méthode traditionnelle pour faire un feu de bois est de chiffonner 5 à 10 feuilles de papier journal, les placer dans la chambre à combustion et les maintenir en place avec une dizaine de morceaux de bois d'allumage. Le bois d'allumage devrait être placé sur et derrière le papier journal.

Ajouter ensuite deux ou trois petits morceaux de bois de chauffage. Ouvrir le contrôle d'admission d'air complètement et allumer le papier journal. Laisser la porte légèrement entrouverte.

Lorsque le feu est allumé, fermer la porte en conservant le contrôle d'admission d'air ouvert. Lorsque le bois d'allumage est presque entièrement brûlé, ajouter des morceaux de bois jusqu'à ce que le feu soit bien parti.

L'appareil ne doit pas être laissé sans surveillance lorsque la porte est légèrement ouverte. Toujours fermer et verrouiller la porte lorsque le feu est allumé.

5.2.2 Méthode du feu descendant

Cette méthode procède à l'inverse de la méthode traditionnelle et ne fonctionne que si du bois très sec est utilisé.

Placer trois ou quatre petites bûches fendues et sèches dans la chambre à combustion. Disposer le bois d'allumage sur les bûches en deux couches à angles droits et placer une dizaine d'éclats fins sur la deuxième rangée.

Il est possible d'utiliser du papier chiffonné, mais il risque de ne pas tenir en place puisqu'il a tendance à rouler pendant qu'il brûle. Le mieux est d'enrouler une feuille sur elle-même, de saisir les extrémités du rouleau et de faire un noeud. Utiliser quatre ou cinq feuilles de papier ainsi nouées et les mettre sur le dessus et autour du bois d'allumage. Ouvrir complètement le contrôle d'admission d'air, mettre le feu au papier et refermer la porte.

La méthode du feu descendant présente deux avantages par rapport à la méthode traditionnelle: tout d'abord, le feu ne s'effondre pas sur lui-même, et il n'est pas nécessaire de grossir le feu graduellement puisque la chambre à combustion est pleine avant que le feu soit allumé.

5.2.3 Deux bûches parallèles

Placer deux bûches fendues dans la chambre à combustion, avec quelques feuilles de papier journal tordu entre les bûches. Placer quelques éclats fins de travers sur les bûches et des éclats plus gros par-dessus, comme une cabane en bois rond. Allumer le papier journal.

5.2.4 Utilisation des allume-feu

Des allume-feu commerciaux peuvent être utilisés plutôt que du papier journal. Certains de ces allume-feu sont faits de sciure et de cire et d'autres sont faits de produits chimiques spéciaux inflammables. Toujours suivre les instructions sur l'emballage lors de l'utilisation. Un allume-feu en gel peut aussi être utilisé, mais seulement pour allumer un feu, dans une chambre à combustion froide et sans braises chaudes à l'intérieur.

5.3 Cycle de combustion

Le chauffage au bois par zone est très différent des autres types de chauffage. Il y aura des différences de température dans différents endroits de la maison et il y aura des variations de température le jour et la nuit. Cela est normal et pour les gens qui ont de l'expérience dans le chauffage au bois, ce sont les avantages du chauffage au bois par zones.

Un appareil au bois ne produit pas une chaleur stable. Il est normal que la température augmente après qu'une nouvelle charge de bois soit allumée et que la température diminue graduellement tout au long du cycle de combustion. L'augmentation et la diminution de la température peuvent être synchronisées avec la routine domestique. Par exemple, la température de la zone peut être plus fraîche lorsque la maisonnée est active et plus chaude lorsqu'elle est inactive.

Le bois brûle mieux en cycles. Un cycle commence lorsqu'une nouvelle charge de bois est allumée par les braises chaudes et se termine lorsque celle-ci est consumée et qu'il n'en reste que des braises de la grosseur de celles qui se trouvaient dans le feu lorsque le bois a été rajouté.

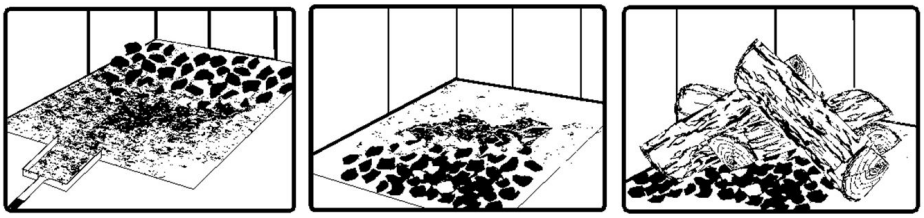
Il est déconseillé d'essayer d'obtenir un dégagement de chaleur stable en plaçant une seule bûche dans le feu à intervalles réguliers. Mettre au moins trois bûches à la fois et plus de préférence, de sorte que la chaleur produite par une bûche aide à allumer ses voisines. Chaque charge de bois devrait fournir plusieurs heures de chauffage. La grosseur de chaque charge peut varier selon la quantité de chaleur nécessaire.

En alimentant le feu par cycles, la porte est ouverte moins souvent durant la combustion du bois. Ceci est un avantage puisqu'il évite que de la fumée s'échappe de l'appareil lors de l'ouverture de la porte durant un cycle de combustion. Ceci est particulièrement vrai si la cheminée est fixée au mur extérieur de la maison.

Si la porte doit être ouverte durant un cycle de combustion, ouvrir le contrôle d'admission d'air complètement, puis ouvrir la porte lentement.

5.4 Raviver un feu

Lorsque la température de la pièce est plus basse et qu'il ne reste que des braises, il est temps de remettre une charge de bois. La plupart des braises restantes seront situées au fond de la chambre à combustion. Retirer l'excès de cendres à l'avant de la chambre à combustion, puis déplacer les braises vers l'avant avant de remettre du bois. Placer la nouvelle charge de bois sur, et à l'arrière des braises. Ouvrir le contrôle d'air complètement et fermer la porte.



Le déplacement des braises est utile pour deux raisons. Tout d'abord, cela les rassemble près de l'endroit où la plus grande partie de l'air entre dans la chambre à combustion. Elles enflammeront donc la nouvelle charge rapidement. Deuxièmement, les braises ne seront pas étouffées par la nouvelle charge de bois. Lorsque les braises sont simplement étalées, la nouvelle charge brûle en amortissant longtemps avant de s'enflammer.

Fermer le contrôle d'air seulement lorsque les flammes envahissent toute la chambre à combustion, que le bois est noirci et que ses rebords sont rougeoyants.

L'appareil ne doit pas être laissé sans surveillance lors de l'allumage et le feu ne devrait pas brûler à pleine intensité plus de quelques minutes.

Lors de l'allumage d'une nouvelle charge, l'appareil produit une poussée de chaleur. Cette poussée de chaleur est agréable lorsque la température de la pièce est fraîche, mais peut être désagréable lorsque la pièce est déjà chaude. Par conséquent, il est préférable de laisser chaque charge de bois brûler complètement afin que la pièce refroidisse avant de remettre une charge de bois.

5.5 Retirer la cendre

La cendre doit être retirée de la chambre à combustion tous les deux ou trois jours environ en période de chauffage à temps plein. La cendre ne doit pas s'accumuler de façon excessive dans la chambre à combustion puisqu'elle nuira au bon fonctionnement de l'appareil.

Le meilleur moment pour retirer la cendre est le matin, après avoir chauffé toute la nuit lorsque l'appareil est relativement froid, mais qu'il y a encore un peu de tirage pour aspirer la poussière de cendres vers l'intérieur de l'appareil et l'empêcher de sortir dans la pièce.

La cendre doit être placée dans un contenant métallique avec un couvert étanche. Le contenant doit être déposé sur un plancher non combustible ou sur le sol loin de tout matériau inflammable.

Les cendres peuvent contenir des braises brûlantes qui peuvent rester chaudes pendant plusieurs jours et qui libèrent du monoxyde de carbone. Si les cendres sont disposées par enfouissement dans le sol ou dispersées sur place, elles devraient être maintenues dans le contenant métallique fermé, jusqu'à ce qu'elles soient complètement refroidies. Aucun autre déchet ne doit être placé dans ce contenant.

LES CENDRES NE DEVRAIENT JAMAIS ÊTRE CONSERVÉES À L'INTÉRIEUR, NI DANS UN CONTENANT NON MÉTALLIQUE NI SUR UNE GALERIE EN BOIS.

5.6 Contrôle de l'admission d'air

Lorsque le bois de chauffage, la chambre à combustion et la cheminée sont chauds, l'admission d'air peut être réduite pour obtenir une combustion stable.

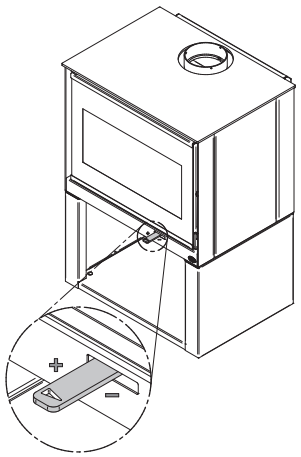
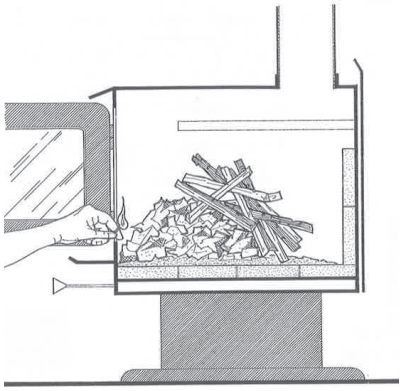


Figure 1: Air Intake Control

Lorsque l'admission d'air est réduite, le taux de combustion diminue. Ceci a pour effet de répartir l'énergie thermique du combustible sur une plus grande période de temps. De plus, le taux d'évacuation de l'appareil et de la cheminée ralentit, ce qui augmente la durée du transfert d'énergie des gaz évacués. Plus l'admission d'air est réduite, plus les flammes diminuent. Si les flammes diminuent au point de disparaître, c'est que l'air a été réduit trop tôt dans le cycle de combustion ou que le bois utilisé est trop humide. Si le bois est sec et que le contrôle d'air est utilisé correctement, les flammes devraient diminuer, mais rester vives et stables.

D'un autre côté, une trop grande admission d'air peut rendre le feu incontrôlable, créant des températures très élevées dans l'appareil ainsi que dans la cheminée et les endommager sérieusement. Une lueur rougeâtre sur l'appareil ainsi que sur les composants de la cheminée indique une surchauffe. Des températures excessives peuvent provoquer un feu de cheminée.

5.7 Types de feux



L'utilisation du contrôle de l'admission d'air n'est pas la seule façon de synchroniser le rendement thermique de l'appareil et les besoins en chauffage. Une maison nécessite beaucoup moins de chauffage en octobre qu'en janvier pour conserver une température confortable. Une chambre à combustion remplie en automne surchauffera la pièce. Sinon, la combustion devra être réduite au minimum et le feu brûlera en amortissant et sera inefficace.

Voici quelques suggestions pour faire des feux convenant à différents besoins de chauffage.

5.7.1 Feu éclair

Pour faire un petit feu qui produira peu de chaleur et qui chassera l'humidité de la maison, utiliser de petits morceaux de bois, placés en croisé dans la chambre à combustion. Les morceaux ne devraient avoir que 3" (80 mm) ou 4" (100 mm) de diamètre. Lorsque les braises sont ramenées à l'avant, placer deux morceaux l'un à côté de l'autre, en diagonale dans la chambre à combustion, puis deux autres par-dessus en croisé. Ouvrir le contrôle d'air complètement et ne réduire l'air qu'une fois le bois totalement enflammé.

Ce type de feu est bon pour les températures modérées et devrait fournir suffisamment de chaleur pendant environ quatre heures. C'est le bon moment pour utiliser du bois mou et éviter de surchauffer la maison.

5.7.2 Feu de longue durée

Pour avoir un feu qui durera jusqu'à huit heures, mais qui ne produira pas de chaleur intense, utiliser du bois mou et placer les bûches de façon compacte dans la chambre à combustion. Avant de réduire l'admission d'air, la charge devra brûler à pleine chaleur pendant assez longtemps pour que la surface des bûches devienne complètement noircie. La flamme doit être vive avant de laisser le feu brûler par lui-même.

5.7.3 Feu par temps froid

Lorsque les besoins de chauffage sont élevés par temps froid, le feu devra être stable et vif. C'est le temps de brûler de grosses bûches de bois franc. Placer les plus grosses bûches au fond de la chambre à combustion et placer le reste des bûches de façon compacte. Un feu aussi dense produira la combustion la plus longue que le poêle peut donner. Une attention particulière doit être apportée en faisant ce type de feu, puisque si l'admission d'air est réduite trop vite, le feu brûlera en amortissant. La flamme doit être vive avant de laisser le feu brûler par lui-même.

5.7.4 Temps de combustion

Le temps de combustion est la période entre l'ajout de bois sur un lit de braises et la combustion de ce bois en braises de même dimension. La phase des flammes du feu est la première partie du cycle de combustion et la deuxième partie est la phase des braises, pendant laquelle il y a peu ou pas de flamme.

La durée de combustion dont est capable ce poêle, comprenant les deux phases, variera selon des éléments comme :

- la dimension de la chambre à combustion;
- la quantité de bois;
- l'essence du bois de chauffage;
- la teneur en humidité du bois;
- la dimension de la pièce à chauffer;
- la zone climatique où se trouve l'habitation; et
- la période de l'année.

Le tableau suivant donne un temps approximatif de combustion maximum, selon le volume de la chambre à combustion.

Tableau 1 : Temps approximatif de combustion maximum

VOLUME DE LA CHAMBRE À COMBUSTION	TEMPS DE COMBUSTION MAXIMUM
< 1.5 pi. cu.	3 à 5 heures
1.5 pi. cu. à 2 pi. cu	5 à 6 heures
2 pi. cu. à 2.5 pi. cu.	6 à 8 heures
2.5 pi. cu. à 3.0 pi. cu.	8 à 9 heures
>3.0 pi. cu	9 à 10 heures

Un temps de combustion plus long n'indique pas nécessairement que le rendement de l'appareil est bon. Il est préférable de faire de petits feux qui fourniront de trois à quatre heures de chaleur, plutôt que de remplir la chambre à combustion pour avoir une combustion plus longue. Il est plus facile d'ajuster la quantité de chaleur nécessaire au besoin de chauffage de la pièce avec des cycles de combustion plus courts.

5.7.5 Orientation des bûches

Dans une chambre à combustion relativement carrée, le bois peut être placé droit (extrémité des bûches visible) ou sur le côté (côté des bûches visible).

Les charges placées droites permettent une plus grande quantité de bois à la fois. Par contre, elles se brisent en petits morceaux plus rapidement. Ce type de chargement est utile pour des feux à haut rendement qui durent longtemps par temps froid.

Les charges sur le côté permettent une quantité limitée de bois puisqu'une trop grande quantité de bûches risquerait de les faire tomber sur la vitre. Placées de façon compacte, elles mettent longtemps avant de se défaire. Elles sont excellentes pour des feux à basse intensité, qui durent longtemps par temps relativement doux.

5.7.6 Monoxyde de carbone

Lorsqu'il reste des bûches non brûlées dans la chambre à combustion et que la flamme disparaît, sortir à l'extérieur et regarder la sortie de la cheminée. S'il y a de la fumée visible, cela signifie qu'il reste du combustible à brûler, mais que le feu manque d'air pour brûler correctement. Dans cette situation, le taux de CO augmentera. Il est donc important de réagir. Ouvrir légèrement la porte et déplacer la bûche avec un tisonnier. Retournez-la et créer un passage pour l'air en dessous, en faisant une tranchée avec le lit de charbon. Ajouter de petits morceaux de bois pour redémarrer la combustion.

6. Entretien

Cet appareil donnera des années de bon service s'il est utilisé et entretenu correctement. Les composants internes de la chambre à combustion, comme les briques réfractaires, le coupe-feu et les tubes d'air s'useront avec le temps. Les pièces défectueuses devraient toujours être remplacées par des pièces d'origine.

Pour éviter la détérioration prématurée, suivre les directives d'allumage et de recharge présentée à la section "5. Combustion efficace du bois" et éviter de faire fonctionner l'appareil avec le contrôle d'air complètement ouvert durant des cycles de combustion complets.

6.1 Nettoyage et peinture

Les surfaces peintes ou plaquées peuvent être essuyées avec un linge doux et humide. Si la peinture est rayée ou endommagée, il est possible de repeindre l'appareil à l'aide d'une peinture résistante à la chaleur. **Ne pas nettoyer ou peindre l'appareil lorsqu'il est chaud.** Avant de peindre, la surface doit être poncée légèrement à l'aide de papier sablé et par la suite essuyée pour enlever la poussière. Appliquer deux minces couches de peinture.

6.2 Matériaux réfractaires et coupe-feu

Inspecter les briques ou les pierres réfractaires et le coupe-feu périodiquement. Remplacer ce qui est cassé ou endommagé.

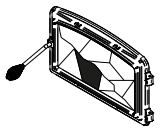
L'utilisation de l'appareil avec un coupe-feu endommagé ou manquant pourrait créer des températures et des conditions dangereuses et annulera la garantie.

6.3 Vitre

6.3.1 Nettoyage

Dans des conditions normales, la vitre devrait rester relativement propre. Si le bois de chauffage est suffisamment sec et que les instructions d'utilisation de ce manuel sont suivies, il se formera un dépôt blanchâtre et poussiéreux sur la surface intérieure de la vitre après environ une semaine d'utilisation. Cela est normal et s'enlève facilement lorsque l'appareil est froid, en essuyant la vitre à l'aide d'un linge humide ou d'un essuie-tout, puis en l'asséchant. Lorsque le poêle fonctionne à bas régime, il se peut qu'il se forme des taches brun pâle, surtout dans les coins inférieurs de la vitre. Cela indique que le bois brûle en fumant et qu'une partie de la fumée s'est condensée sur la vitre. Ces taches indiquent aussi une combustion incomplète du bois, ce qui signifie aussi plus de rejets de fumée et une formation plus rapide de créosote dans la cheminée. Les dépôts qui se forment sur la vitre sont la meilleure indication de la qualité du combustible et de la réussite à bien utiliser le poêle. Ces taches peuvent être nettoyées à l'aide d'un nettoyant spécial pour vitre de poêle à bois. **Ne pas utiliser de produits abrasifs pour nettoyer la vitre.**

Le but devrait être d'avoir une vitre propre, sans taches brunes. Si des taches brunes se forment régulièrement sur la vitre, quelque chose doit être changé soit dans la façon d'opérer l'appareil soit dans le combustible. Lorsque les traces brunes proviennent du rebord de la vitre, il est temps de changer le joint d'étanchéité autour de la vitre. Le joint d'étanchéité doit être auto-adhésif. Toujours remplacer le joint d'étanchéité par un autre d'origine.



Ne pas nettoyer la vitre lorsque le poêle est chaud.

Ne jamais faire un usage abusif de la porte en la frappant ou en la claquant.

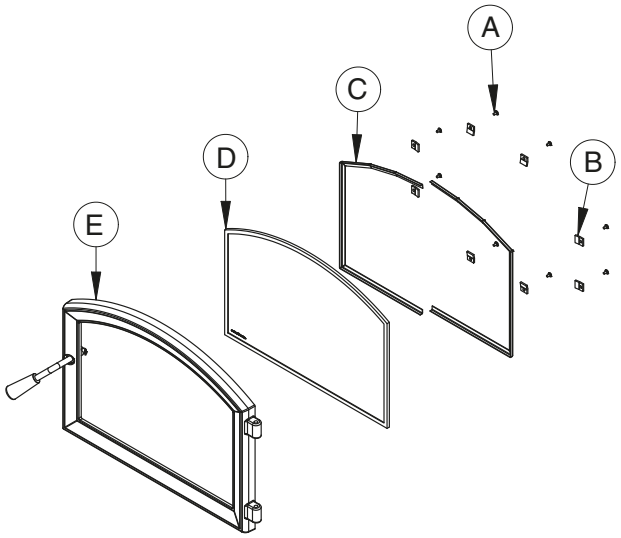
Ne pas utiliser l'appareil si la vitre est craquée ou brisée.

6.3.2 Remplacement

La vitre utilisée est un verre céramique 5/32" (4 mm) d'épaisseur, 18 ¾" x 12 ½" (476 mm x 318 mm), testée pour des températures pouvant atteindre 1400 °F. Si la vitre se brise, il faudra la remplacer avec un verre céramique ayant les mêmes spécifications.

Pour retirer ou remplacer la vitre **(D)**:

1. Soulever la porte **(E)** pour la retirer de ses pentures et la déposer sur une surface douce et plane.
2. Retirer les vis **(A)**, les dispositifs de retenue de vitre **(B)**, ainsi que les cadres retiens vitre en métal **(C)**.
3. Retirer la vitre. Si elle est endommagée, installer une nouvelle vitre en place. La nouvelle vitre doit avoir un joint d'étanchéité tout le tour. Voir la procédure d'installation.
4. Réinstaller la vitre, en prenant soin de bien la centrer dans la porte. Ne pas trop serrer les vis.

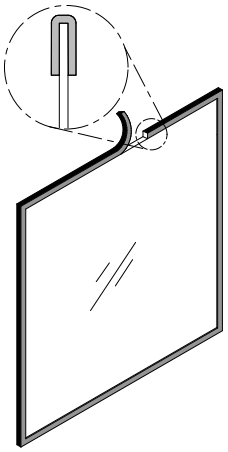


Les deux principales causes de bris de vitre sont un positionnement inégal dans la porte et des vis de rétention trop serrées.

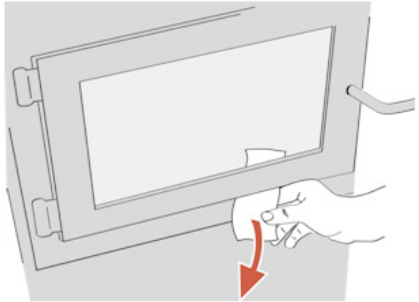
6.3.3 Joint d'étanchéité

Le nouveau joint est plat, encollé et est fait de fibre de verre tressée. Le joint doit être centré sur la vitre.

1. Suivre les instructions de la section précédente pour retirer la vitre. Retirer le vieux joint d'étanchéité et laver la vitre soigneusement.
2. Retirer une partie du papier qui recouvre l'adhésif et placer le joint sur une table, adhésif vers le haut.
3. Coller l'extrémité du joint au milieu d'un des côtés de la vitre, puis presser la vitre sur le joint, en prenant soin de bien la centrer sur le joint.
4. Retirer une plus grande partie du papier et tourner la vitre. Le joint ne doit pas être étiré durant l'installation.
5. Couper le joint à la longueur nécessaire. Pincer le joint sur la vitre en faisant chevaucher le rebord, sur tout le pourtour.



6.4 Porte



Afin d'obtenir un rendement optimal, la porte doit être parfaitement étanche avec la chambre à combustion. L'étanchéité de la porte peut être vérifiée en fermant et en verrouillant la porte sur un bout de papier.

Le tour complet de la porte doit être vérifié. Si le papier glisse facilement à n'importe quel endroit, il faut soit ajuster la porte ou remplacer le joint d'étanchéité.

FRANÇAIS

6.4.1 Ajustement

L'étanchéité de la porte peut être améliorée avec un ajustement simple du mécanisme de verrouillage :

1. Retirer la goupille de retenue fendue en tirant et tournant à l'aide d'une pince.
2. Tourner la poignée d'un tour dans le sens contraire des aiguilles d'une montre afin d'augmenter la pression entre le cadrage de la porte et la structure du poêle.
3. Réinstaller la goupille de retenue fendue en utilisant un petit marteau.

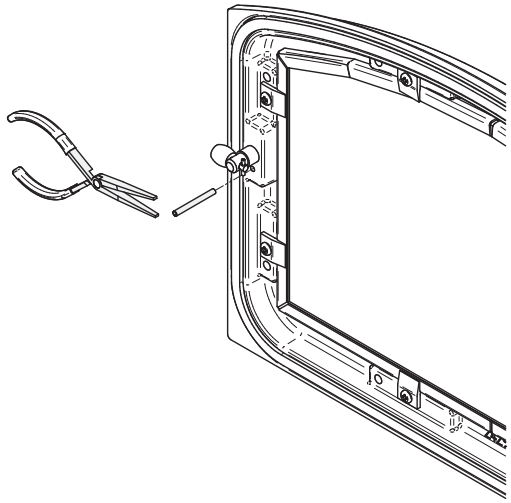


Figure 2: Retrait de la goupille de retenue

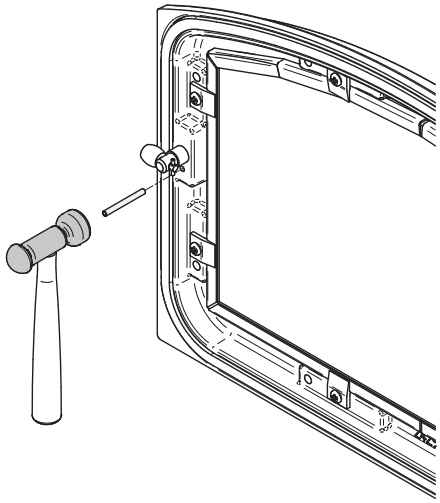
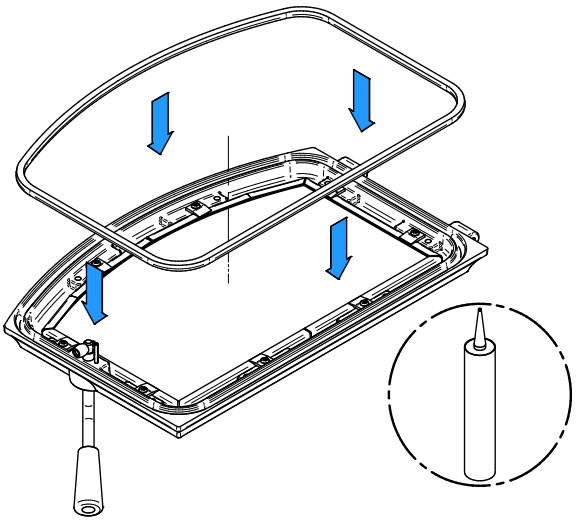


Figure 3: Installation de la goupille de retenue

6.4.2 Joint d'étanchéité

Il est important de remplacer le joint d'étanchéité avec un autre ayant le même diamètre et la même densité afin de conserver une bonne étanchéité.

1. Retirer la porte et la placer face vers le bas sur une surface douce comme un torchon ou un morceau de tapis.
2. Retirer le vieux joint d'étanchéité de la porte. Utiliser un tournevis pour gratter la vieille colle à joint qui se trouve dans la rainure de la porte.
3. Appliquer un cordon d'environ 3/16" (5 mm) de silicone haute température dans la rainure de la porte. En partant du centre, côté charnières, installer le joint dans la rainure. Le joint ne doit pas être étiré lors de l'installation.
4. Laisser environ ½" (10 mm) de joint dépasser au moment de le couper et pousser l'extrémité dans la rainure. Repousser les fibres qui dépassent sous le joint vers le silicone.



5. Fermer la porte. Ne pas utiliser le poêle pendant 24 heures.

6.5 Système d'évacuation

La fumée de bois se condense à l'intérieur de la cheminée, formant un dépôt inflammable appelé créosote. Lorsque la créosote s'accumule dans le système d'évacuation, elle peut s'enflammer lorsqu'un feu très chaud est fait dans le poêle. Un feu extrêmement chaud peut progresser jusqu'à l'extrémité de la cheminée. De graves feux de cheminée peuvent endommager même les meilleures cheminées. Des feux fumants peuvent rapidement causer la formation d'une épaisse couche de créosote. Lors d'une bonne combustion, les gaz sortant de la cheminée sont presque transparents, donc la créosote se forme plus lentement.

Créosote - Formation et nécessité de la retirer

Lorsque le bois brûle lentement, il produit du goudron et d'autres vapeurs organiques qui se combinent à la vapeur d'eau évacuée pour former de la créosote. Ces vapeurs se condensent dans un conduit de cheminée relativement froid d'un appareil qui brûle lentement. Par conséquent, les résidus de créosote s'accumulent dans le conduit. Lorsqu'elle prend feu, la créosote produit un feu extrêmement chaud.

Le raccord de cheminée et la cheminée doivent être inspectés au moins une fois tous les deux mois pendant la saison de chauffage pour déterminer si une accumulation de créosote s'est produite. Si la créosote s'est accumulée (⅛" [3mm] ou plus), il faut l'enlever pour réduire le risque de feu de cheminée »

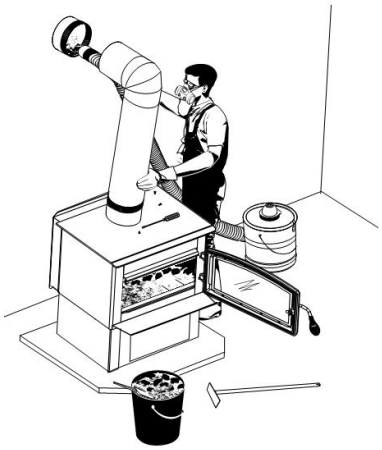
6.5.1 Fréquence de nettoyage

Il n'est pas possible de prédire en combien de temps ou combien de créosote se formera dans la cheminée. Il est important, par conséquent, de vérifier mensuellement s'il y a des dépôts dans la cheminée, jusqu'à ce que le taux de formation de la créosote soit connu. Même si la créosote se forme lentement dans le système, la cheminée devrait être inspectée et nettoyée au moins une fois par année.

Établir une routine pour le bois, le poêle à bois et la technique d'allumage. Vérifier quotidiennement l'accumulation de créosote jusqu'à ce que l'expérience montre à quelle fréquence le nettoyage doit être fait. Plus le feu est chaud, moins de créosote est déposée. Un nettoyage hebdomadaire peut être nécessaire par temps doux, bien qu'un nettoyage mensuel puisse être suffisant pendant les mois les plus froids. Contacter les services d'incendie municipaux ou provinciaux de la région pour savoir comment gérer un feu de cheminée. Avoir un plan bien compris pour gérer un feu de cheminée.

6.5.2 Ramonage de la cheminée

Le ramonage de la cheminée peut être difficile et dangereux. Les personnes n'ayant pas d'expérience dans le ramonage de cheminées préféreront souvent engager un ramoneur professionnel pour inspecter et nettoyer le système pour la première fois. Après avoir vu comment se déroule le ramonage, certains choisiront de le faire eux-mêmes. La cheminée devrait être vérifiée régulièrement afin d'éviter une accumulation de créosote.



L'inspection et le nettoyage de la cheminée peuvent être facilités en retirant le coupe-feu. Voir "Annexe 3: Installation des tubes d'air et du coupe-feu" pour plus de détails.

6.5.3 Feu de cheminée

L'entretien et l'inspection régulière du système de cheminée peuvent éviter les feux de cheminée. Si un feu de cheminée se déclare, procéder comme suit :

1. Fermer la porte et le contrôle d'admission d'air du poêle;
2. Alerter les occupants de la maison du danger;
3. Si vous avez besoin d'aide, appeler le service d'incendies;
4. Si possible, utiliser un extincteur chimique à poudre, du soda à pâte ou du sable pour maîtriser le feu. *Ne pas utiliser d'eau*, car il pourrait se produire une explosion de vapeur;

L'inspection et le nettoyage du poêle par un ramoneur qualifié ou le service des incendies sont obligatoires avant la remise en service de l'appareil.

PARTIE B - INSTALLATION

7. Sécurité et normes

- Les informations inscrites sur la plaque d'homologation de l'appareil ont toujours préséance sur les informations contenues dans tout autre média publié (manuels, catalogues, circulaires, revues et les sites web).
- Le fait de mélanger des composantes provenant de diverses sources ou de modifier des éléments peut amener des situations dangereuses. Lorsque de tels changements sont prévus, Fabricant de poêle international inc. doit être contacté à l'avance.
- Toute modification de l'appareil qui n'a pas été approuvée par écrit par l'autorité d'homologation ou le manufacturier viole les normes CSA B365 (Canada) et ANSI NFPA 211 (É.-U.).
- **NE PAS RELIER À UN SYSTÈME OU À UN CONDUIT DE DISTRIBUTION D'AIR SAUF SI APPROUVÉ EXPRESSÉMENT POUR UNE TELLE INSTALLATION.**
- **NE PAS RACCORDER CET APPAREIL À UN CONDUIT DE CHEMINÉE DESSERVANT UN AUTRE APPAREIL.**
- Brancher le poêle seulement à une cheminée préfabriquée homologuée pour utilisation avec du combustible solide ou à une cheminée de maçonnerie conforme aux codes du bâtiment national et local.
- Si nécessaire, un apport d'air de combustion doit être apporté à la pièce.

7.1 Maison mobile

- Cet appareil peut être installé dans une maison mobile. Son installation requiert l'installation d'un ensemble d'entrée d'air frais, vendu séparément.
- **AVERTISSEMENT : NE PAS INSTALLER DANS UNE CHAMBRE À COUCHER.**
- **LE POÊLE DOIT ÊTRE FIXÉ À LA STRUCTURE DE LA MAISON MOBILE.**
- **ATTENTION : L'INTÉGRITÉ STRUCTURALE DU PLANCHER, DES MURS, DU PLAFOND ET DU TOIT DE LA MAISON MOBILE DOIT ÊTRE MAINTENUE.**

7.2 Règlements régissant l'installation d'un poêle

Lorsqu'il est installé et utilisé tel que décrit dans les présentes instructions, ce poêle à bois convient comme appareil de chauffage autoportant pour installation résidentielle.

Au Canada, il faut respecter le CSA B365 Installation des appareils de chauffage à combustible solide et du matériel connexe et le CSA C22.1 Code canadien de l'électricité en l'absence de code local. Aux États-Unis, il faut suivre le ANSI NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances et le ANSI NFPA 70 National Electrical Code en l'absence de code local.

Ce poêle doit être raccordé à une cheminée conforme aux exigences de cheminées de type HT dans la norme pour cheminées préfabriquées de type résidentiel et appareils de chauffage de bâtiment, UL 103 et ULC S629 ou à une cheminée de maçonnerie approuvé selon le code avec une gaine de cheminée.

7.3 Localisation de la plaque d'homologation

Puisque les informations inscrites sur la plaque d'homologation de l'appareil ont toujours préséance sur les informations contenues dans tout autre média publié (manuels, catalogues, circulaires, revues et sites web) il est important de s'y référer afin d'avoir une installation sécuritaire et conforme. De plus, des informations importantes concernant l'appareil s'y trouvent (modèle, numéro de série, etc.). La plaque d'homologation est située au dos de l'appareil.

Il est recommandé de noter le numéro de série de l'appareil car il sera nécessaire pour identifier précisément la version de l'appareil, dans le cas où des pièces de rechange ou une assistance technique seraient nécessaires.

8. Le système d'évacuation

Le système d'évacuation, composé de la cheminée et du tuyau qui raccorde le poêle à la cheminée, agit comme le moteur qui entraîne le système de chauffage au bois. Même le meilleur des poêles ne fonctionnera pas de façon aussi sécuritaire et efficace s'il n'est pas raccordé à une cheminée adéquate.

La chaleur contenue dans les gaz d'évacuation qui passent du poêle au raccord de cheminée, puis à la cheminée, n'est pas de la chaleur perdue. Cette chaleur est utilisée par la cheminée pour créer le tirage qui aspire l'air de combustion, garde la fumée dans le poêle et évacue les gaz de façon sécuritaire vers l'air libre. La chaleur contenue dans les gaz d'évacuation peut être vue comme le combustible dont se sert la cheminée pour créer le tirage.

8.1 Des cheminées appropriées

Ce poêle à bois a une performance et une efficacité optimale lorsqu'il est raccordé à une cheminée ayant un conduit de fumée de 6" (150 mm) de diamètre. Le raccordement à une cheminée ayant un diamètre au minimum de 5" (130 mm) (Canada seulement) ou d'au plus 7" (180 mm) est toléré, s'il permet l'évacuation adéquate des gaz de combustion et que cette application est vérifiée et autorisée par un installateur qualifié. Autrement, le diamètre du conduit de fumée doit être de 6" (150 mm).

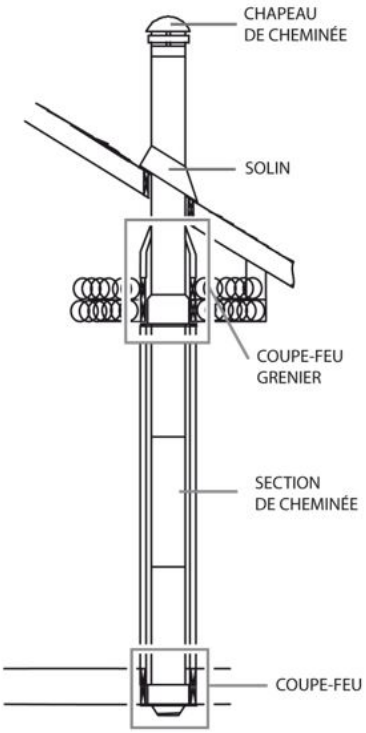
Pour être appropriée, une cheminée de métal préfabriquée doit être conforme aux normes UL 103 HT (É.-U.) ou ULC S629 (Canada).

8.1.1 Cheminée de métal préfabriquée

Ces cheminées sont souvent appelées cheminées «à haute température», parce qu'elles possèdent des caractéristiques spéciales pour supporter les températures qui peuvent être générées par les poêles à bois. Les cheminées préfabriquées subissent des essais en tant que système comportant tous les éléments nécessaires pour l'installation.

Les instructions fournies avec la cheminée par le fabricant sont les seules sources de directives d'installation fiables. Pour être sécuritaire et efficace, la cheminée doit être installée exactement selon les instructions du fabricant. Seulement des éléments conçus pour la marque et le modèle de cheminée doivent être utilisés.

Aucun composant de la cheminée ne devrait être fabriqué ou remplacé par d'autres provenant de marques de cheminée différentes. La cheminée doit être d'un type approprié pour les combustibles solides.

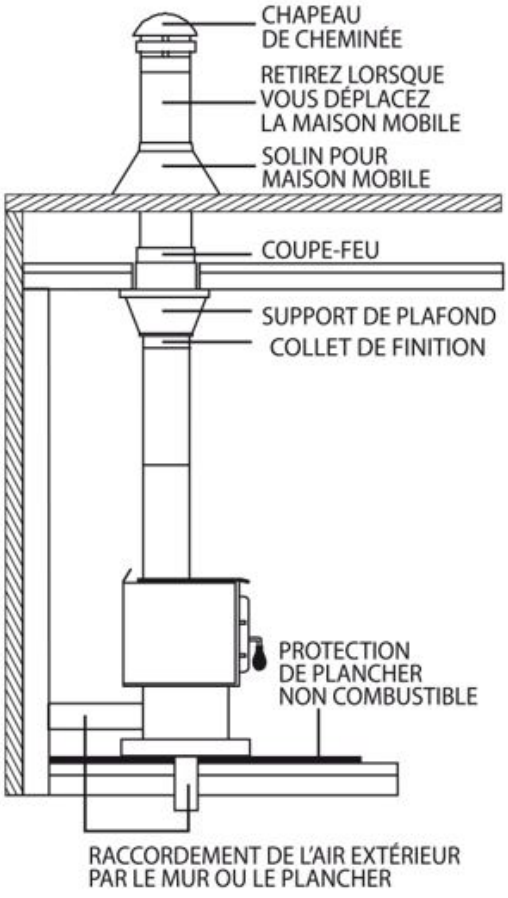


8.1.2 Cheminée de métal préfabriquée pour maison mobile

Pour une utilisation dans une maison mobile, ce poêle doit être raccordé à un tuyau préfabriqué à double paroi de 6" (150 mm) de diamètre conforme à la norme ULC S629 ou UL 103HT, pour les cheminées préfabriquées pour des températures n'excédant pas 650°C.

La longueur totale du système de cheminée, incluant les coudes, doit être au moins 12' (3,6 m) à partir du dessus poêle.

Pour maintenir une barrière efficace contre la vapeur, une bonne isolation et l'imperméabilité, à la cheminée et aux ouvertures par lesquelles entrent les sections de cheminées extérieures, un solin de toit pour maison mobile doit être installé et scellé avec un adhésif à base de silicone.

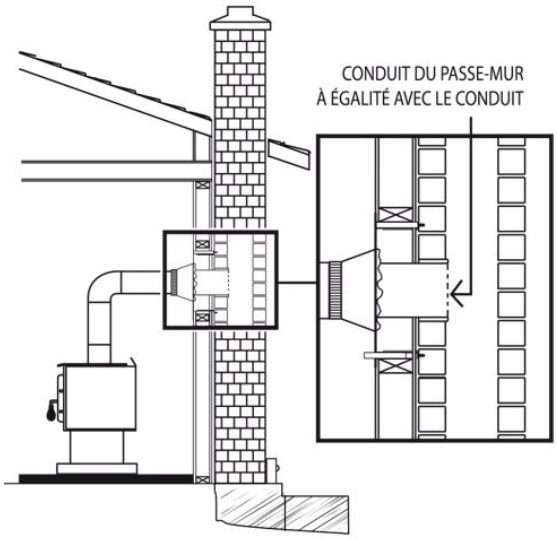


8.1.3 Cheminée de maçonnerie

Le poêle peut aussi être raccordé à une cheminée de maçonnerie, pourvu que la cheminée soit conforme aux règles de construction du code du bâtiment local.

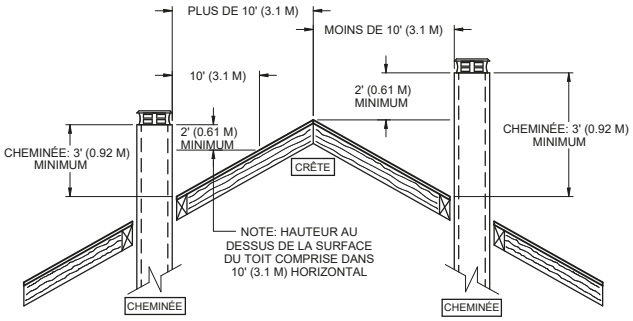
La cheminée doit être munie d'un conduit d'argile ou d'une chemise d'acier inoxydable (gaine) homologuée appropriée. Si la cheminée de maçonnerie a une chemise carrée ou rectangulaire dont la section transversale est supérieure à celle d'une cheminée ronde de 6" (150 mm), il faut y insérer une chemise d'acier inoxydable (gaine) de 6" (150 mm) homologuée appropriée.

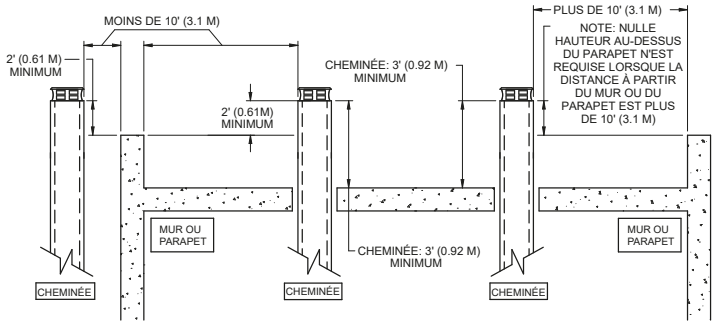
Le conduit de fumée ne doit pas être réduit à moins de 6" (150 mm) à moins que le système d'évacuation ne soit droit et excède 25' (7,6 m) de hauteur. Si un mur combustible doit être traversé, un coupe-feu isolé homologué est obligatoire.



8.2 Hauteur minimale de la cheminée

L'extrémité de la cheminée doit être suffisamment haute pour dépasser la turbulence d'air causée par le vent contre la maison et le toit. La cheminée doit dépasser d'au moins 3' (1 m) au-dessus de son point de sortie du toit le plus haut et d'au moins 2'. (60 cm) toute portion du toit ou d'un obstacle situé à une distance horizontale de moins de 10 pi. (3 m). La hauteur totale du système, à partir de la base de l'appareil jusqu'au sommet de la cheminée, ne doit jamais être inférieure à 15 pieds (4,6 m).





8.3 Emplacement de la cheminée

L'emplacement de la cheminée est crucial pour le bon fonctionnement de l'appareil. La cheminée doit être installée à l'intérieur plutôt que sur un mur extérieur et doit monter directement à travers la partie la plus haute de la maison. Cette installation profite de l'environnement chaud pour produire une tire plus puissante, accumule moins de dépôts de créosote et ne sera pas affectée par les températures froides ou les vents violents.

Les cheminées extérieures conduiront à des courants d'air froids lorsqu'il n'y a pas de feu dans le poêle, à l'allumage lent des nouveaux feux et au dégagement de fumée lorsque la porte est ouverte pour le chargement.

D’un autre côté, un tirage excessif peut rendre le feu incontrôlable, créant des températures très élevées dans l’appareil ainsi que dans la cheminée et les endommager gravement. Une lueur rougeâtre sur l’appareil et sur les composants de la cheminée indique une surchauffe. Des températures excessives peuvent provoquer un feu de cheminée.

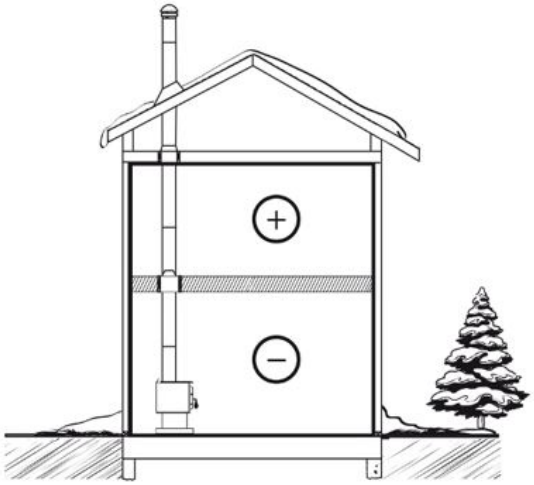


Figure 4: Bonne conception du système

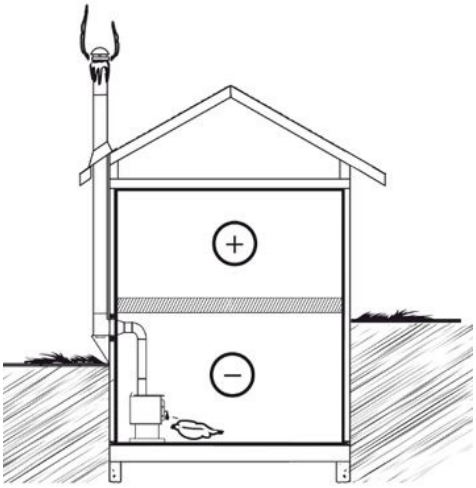


Figure 5: Conception de système inférieure

8.4 Apport d’air de combustion

8.4.1 Maisons mobile

Ce poêle est homologué pour être installé dans une maison mobile. Il doit donc avoir un apport d’air de combustion provenant de l’extérieur. Il est interdit de puiser l’air du sous-sol, du grenier, d’un garage ou de tout espace clos. L’air doit être puisé à partir d’un vide sanitaire ventilé sous le plancher ou directement à l’extérieur. Installer un conduit isolé, souple ou rigide, de type HVAC (dois être conforme aux normes ULC S110 ou UL 181, classe 0 ou classe 1) sur l’adaptateur d’air frais. L’extrémité extérieure devrait être munie d’un capuchon contre les intempéries avec grillage. Lorsqu’une maison mobile a été transformée en maison standard en l’installant sur une fondation permanente, l’approvisionnement en air extérieur n’est pas obligatoire.

8.4.2 Maisons conventionnelle

L’apport d’air de combustion le plus sûr et le plus fiable pour le poêle à bois provient de la pièce dans laquelle il est installé. L’air de la pièce est déjà préchauffé de sorte qu’il ne refroidira pas le feu et sa disponibilité n’est pas affectée par la pression du vent sur la maison. La plupart des maisons ont suffisamment de fuites naturelles pour fournir la petite quantité d’air dont le pôele a besoin. Le seul cas où le poêle à bois peut ne pas avoir suffisamment d’apport d’air de combustion est lorsqu’un puissant appareil de ventilation (comme une hotte de cuisinière) rend la pression d’air de la maison négative par rapport à l’air extérieur.

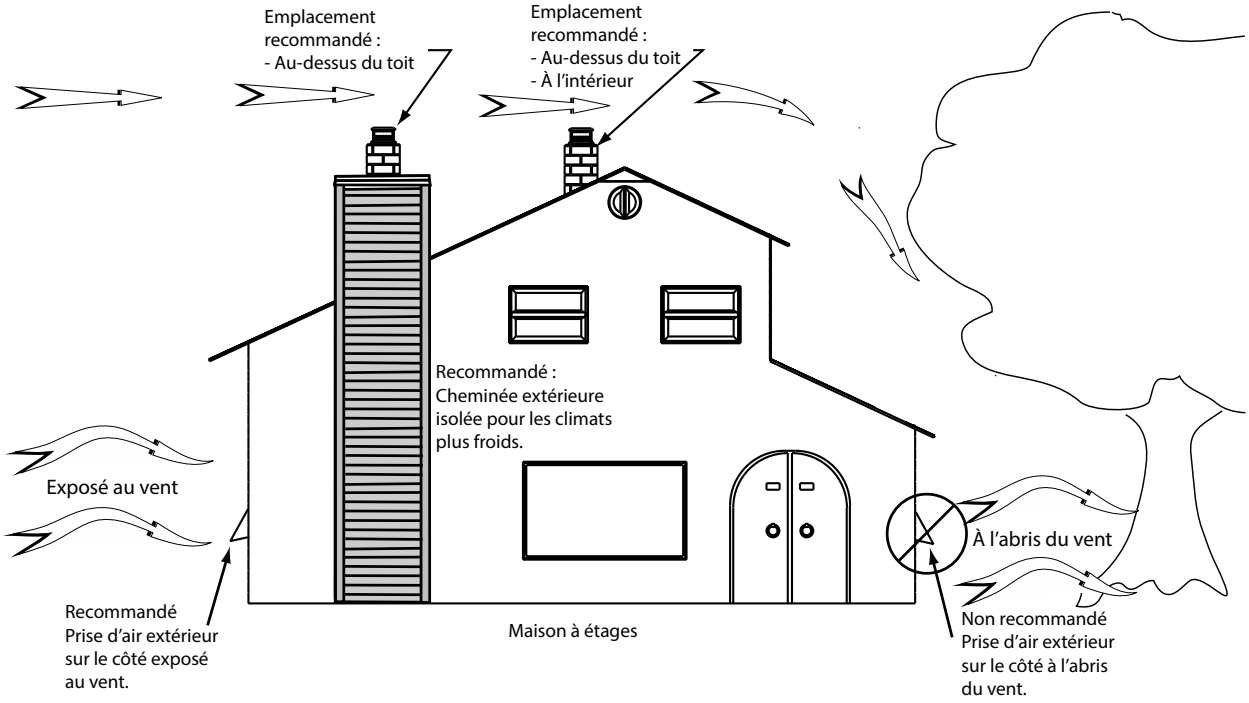


Figure 6: Apport d'air dans les maisons conventionnelles

Si une entrée d'air est installée sur le mur extérieur de la maison, sa pression peut varier par temps venteux. Si des bouffées de fumée sortent du poêle, le conduit d'apport d'air devrait être débranché afin de vérifier si ce dernier constitue la cause du problème.

Dans certaines conditions venteuses, la pression négative près de la grille peut aspirer la fumée chaude du poêle dans le conduit, vers l'extérieur. Vérifier s'il n'y a pas de dépôts de suie sur le conduit d'apport d'air extérieur lors du nettoyage et de l'inspection du système, une fois l'an.

8.5 Installation du raccord de cheminée

Le raccord de cheminée est le tuyau à paroi simple ou double, installé entre la buse du poêle et la bague de cheminée.

Les raccords de cheminée à paroi double ont subi des essais et sont homologués. Les règles concernant l'installation se trouvent dans les instructions d'installation du fabricant.

Les raccords de tuyau à paroi simple se vendent dans la plupart des quincailleries et magasins de matériaux de construction. Ils n'ont généralement pas subi d'essais selon une norme précise, ni été homologuées. Par conséquent, une série de règles que l'on retrouve dans les codes d'installation pour appareil de chauffage au combustible solide s'appliquent à l'installation de tuyau à paroi simple.

8.5.1 Configuration d'installation

La meilleure configuration d'installation est celle qui monte directement du poêle jusqu'à la base de la cheminée sans aucun coude. Les installations droites causeront moins de problèmes, comme les retours de fumée, lorsque la porte est ouverte pour recharger le poêle. Elles sont aussi plus stables et plus faciles à entretenir que les installations comportant des coudes. Il faut éviter autant que possible les sections horizontales de tuyau de fumée parce qu'elles réduisent le tirage de la cheminée.

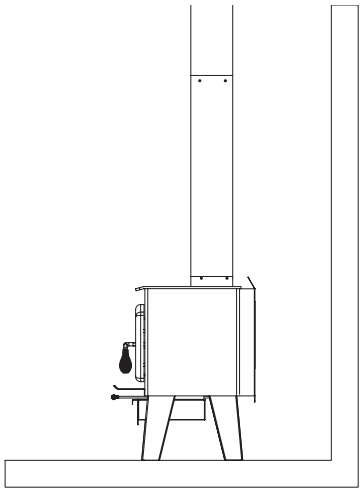


Figure 7: Meilleure

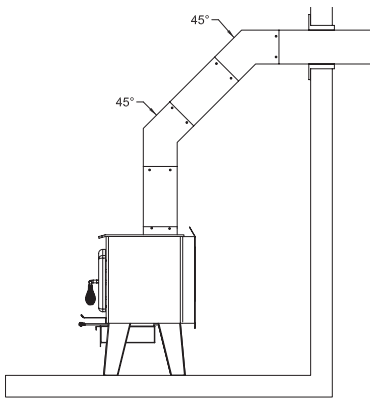


Figure 8: Acceptable

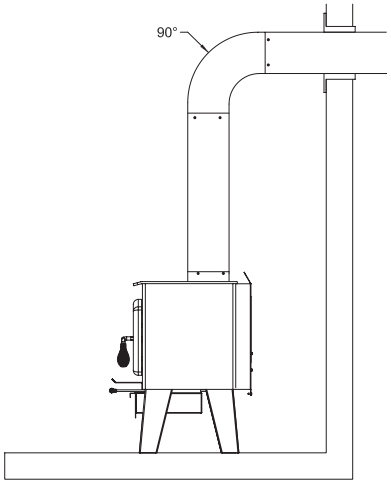


Figure 9: Éviter

8.5.2 Règles d'installation

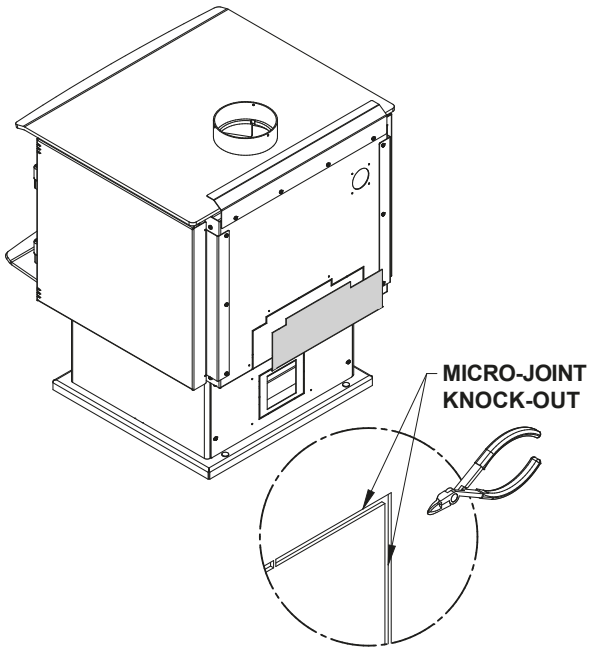
Une mauvaise installation du raccord de cheminée peut provoquer un incendie. Les règles ci-dessous sont basées sur celles que l'on retrouve dans le code d'installation CSA B365. Suivre soigneusement ces instructions d'installation ou celles en vigueur dans la région.

- Longueur maximum de tuyau horizontal : 10' (3 m) incluant les coudes.
- Dégagement minimum par rapport aux matériaux inflammables : 18" (450 mm). Le dégagement minimum peut être réduit de 50%, à 9" (225 mm), si un écran approprié est installé, soit sur le tuyau, soit sur la surface inflammable.
- L'installation doit être aussi courte et droite que possible entre le poêle et la cheminée. Il est préférable d'utiliser deux coudes à 45º plutôt qu'un seul coude à 90º.
- La hauteur minimale hors tout du système de cheminée, mesurée du dessus du poêle au chapeau de la cheminée, doit être d'au moins 12' (3,66 m). Une cheminée trop courte peut ne pas avoir «l'effet de cheminée» nécessaire pour obtenir un tirage adéquat.
- Nombre maximal de coudes à 90º : 2.
- Longueur horizontale maximum sans support : 3' (1 m)
- Les tuyaux de fumée galvanisés ne doivent pas être utilisés parce que leur enduit se vaporise à haute température et produit des gaz dangereux. Utiliser des tuyaux de fumée noirs.
- Les tuyaux de fumée doivent avoir une épaisseur de 24ga au moins.
- Les raccords des tuyaux de fumée doivent se chevaucher sur au moins 1 ¼". (30 mm)
- Chaque raccord de l'installation doit être fixé à l'aide d'au moins trois vis.
- L'installation doit pouvoir prendre de l'expansion : les coudes d'une installation permettent l'expansion; les installations droites doivent comporter un tuyau d'accouplement dont une extrémité doit être sans attache ou encore une section télescopique.
- Pente ascendante minimum vers la cheminée : 1/4" /pieds. (20 mm/m).
- L'une des extrémités de l'installation doit être fixée solidement à la buse du poêle à l'aide de trois vis à métaux et l'autre extrémité fixée solidement à la cheminée.

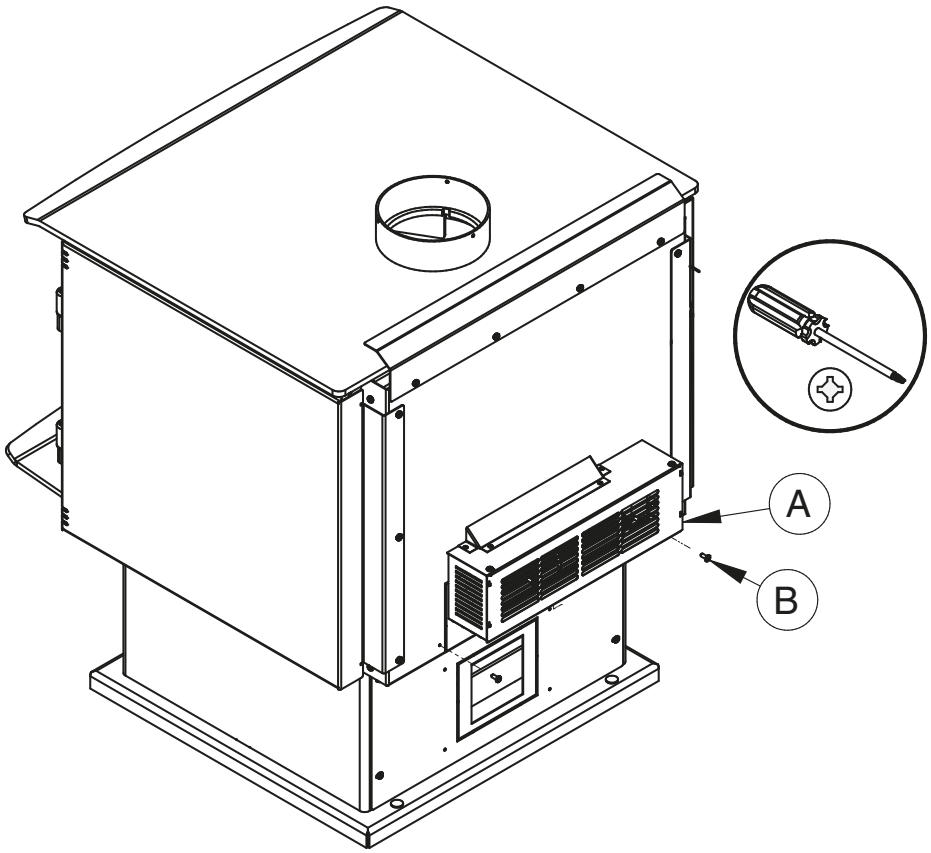
- Il doit être possible de nettoyer les tuyaux, soit par un regard ou en enlevant les tuyaux. L'enlèvement des tuyaux ne doit pas exiger le déplacement du poêle.
- Les parties mâles des sections de tuyau doivent être orientées vers l'appareil de sorte que la cendre et la condensation restent à l'intérieur du tuyau.
- Un tuyau de fumée ne doit jamais traverser un plancher ou un plafond inflammable ou traverser un grenier, un faux comble, un placard ou un vide dissimulé. Lorsque le passage à travers un mur ou une cloison en matériaux combustibles est souhaité, l'installation doit être conforme à la norme CSA B365, code d'installation des appareils à combustibles solides et du matériel connexe.
- Le raccord de cheminée doit être propre et en bon état.

ANNEXE 1: INSTALLATION DU VENTILATEUR

1. Retirer la plaque à l'arrière du poêle en coupant les microjoints avec des pinces.

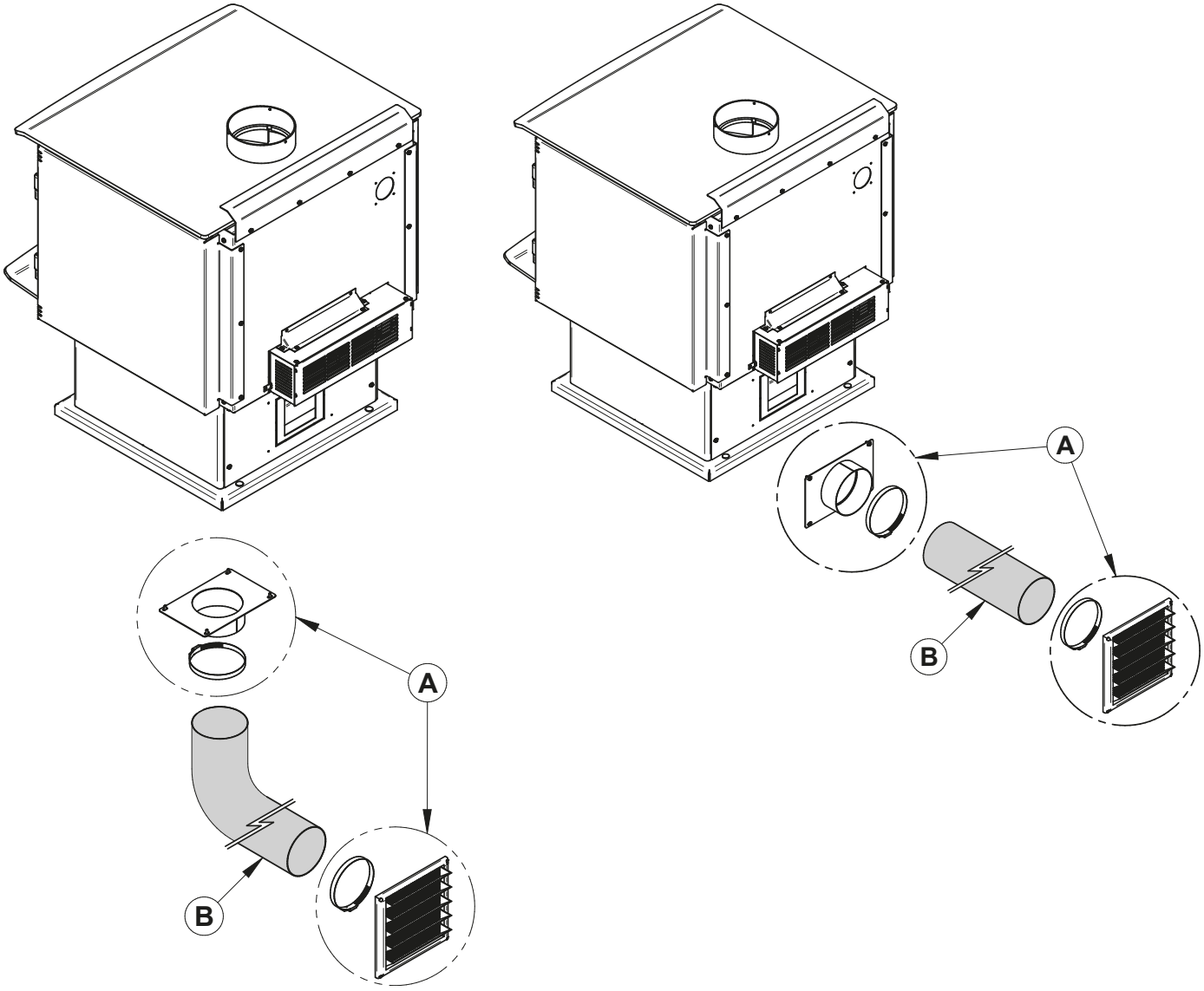


2. Visser le ventilateur **(A)** en place en utilisant les vis **(B)** incluses dans le manuel d'installation. **Le cordon électrique du ventilateur ne doit pas toucher à aucune surface du poêle de façon à éviter les décharges électriques ou les incendies. Le cordon électrique ne doit pas passer sous le poêle.**



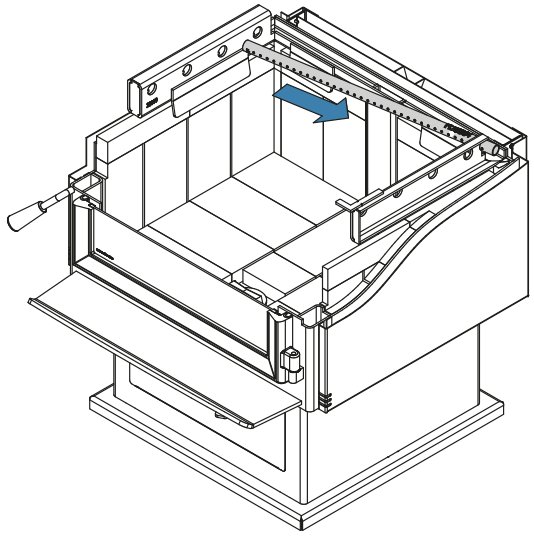
ANNEXE 2: INSTALLATION DE L'ENTRÉE D'AIR FRAIS OPTIONNEL

Ce poêle, approuvé maison mobile, requiert l'installation d'un ensemble d'entrée d'air frais **(A)** et d'un tuyau isolé flexible **(B)** de type HVAC (doit être conforme aux normes ULC S110 ou UL 181, classe 0 ou classe 1), vendu séparément. Voir le manuel d'installation de l'ensemble d'entrée d'air frais pour plus de détails.

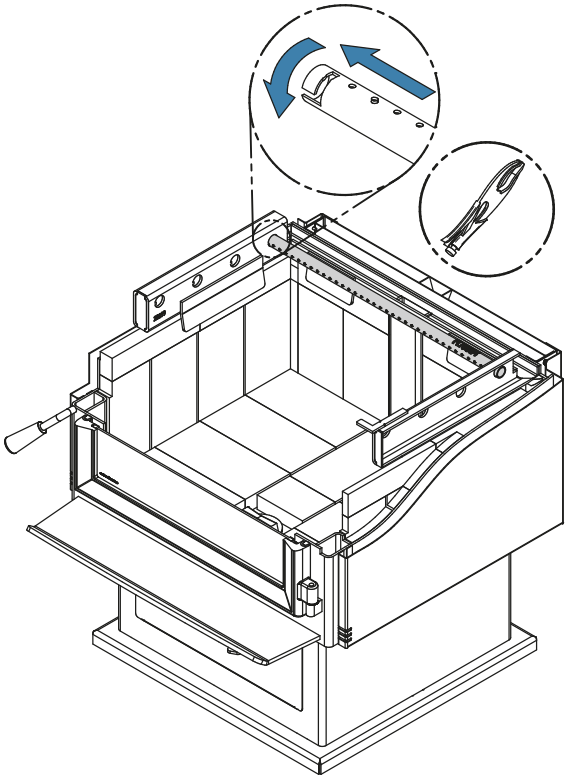


ANNEXE 3: INSTALLATION DES TUBES D'AIR ET DU COUPE-FEU

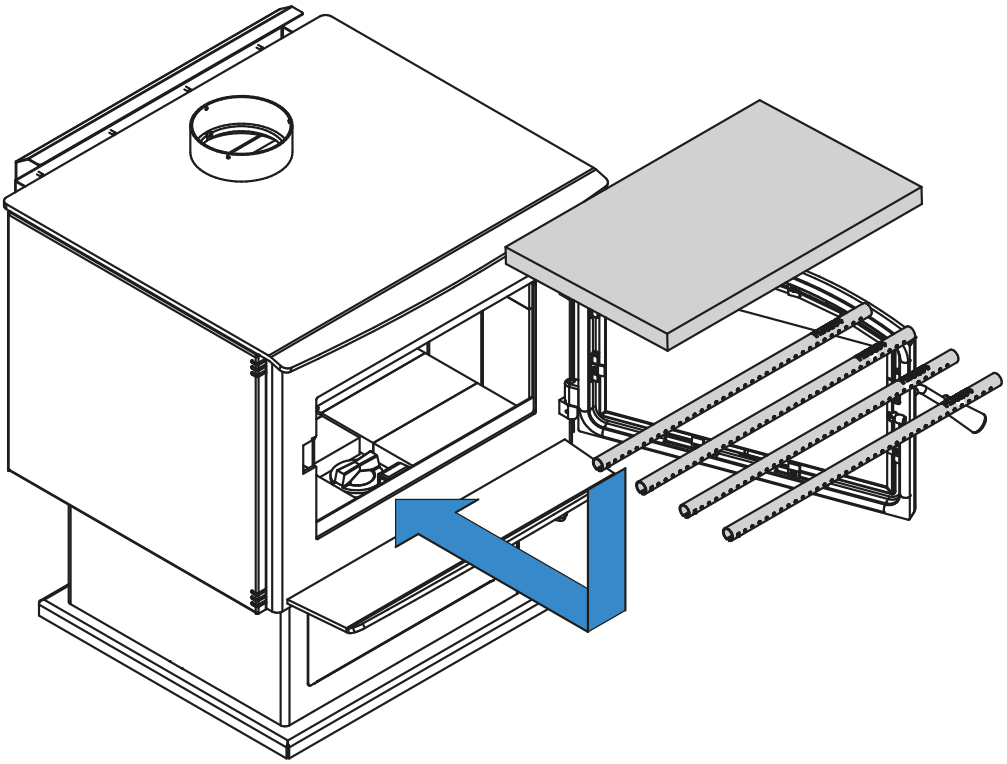
1. En commençant vers l'arrière, incliner et insérer le tube d'air secondaire arrière dans le trou du fond de la canalisation droite. Ensuite, lever et pousser le tube vers la gauche dans le trou correspondant de la canalisation de gauche.

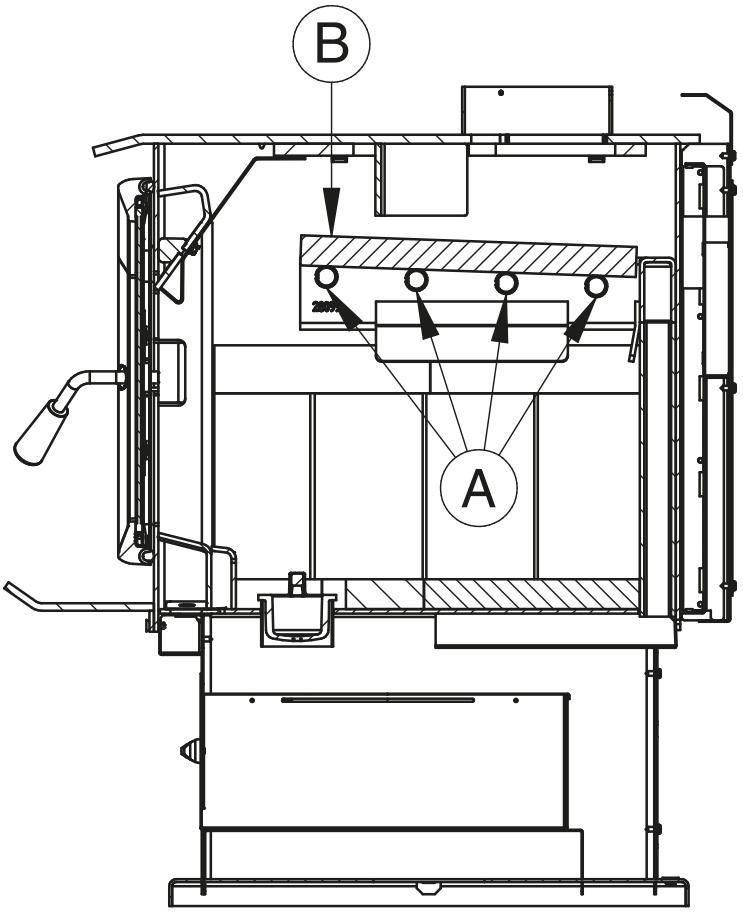


2. Aligner le chemin du tube et la dent dans le trou de la canalisation. Tenir le tube à l'aide d'une pince de serrage et suivre le mouvement décrit dans la figure ci-contre, pour le sécuriser en place. S'assurer que la dent touche le fond du chemin du tube.
3. Installer le coupe-feu
4. Répéter les étapes 1 et 2 pour les autres tubes d'air secondaire.
5. Retirer dans l'ordre inverse.



Prendre note que n'importe quel tube (A) peut être remplacé sans retirer le coupe-feu (B) et que les tubes sont tous identiques.





GARANTIE À VIE LIMITÉE SBI

La garantie du fabricant ne s'applique qu'à l'acheteur au détail original et n'est pas transférable. La présente garantie ne couvre que les produits neufs qui n'ont pas été modifiés, altérés ou réparés depuis leur expédition de l'usine. Il faut fournir une preuve d'achat (facture datée), le nom du modèle et le numéro de série au détaillant lors d'une réclamation sous garantie.

La présente garantie ne s'applique que pour un usage résidentiel normal. Cette garantie devient invalide si l'appareil est utilisé pour brûler du matériel autre que du bois de chauffage (pour lequel l'appareil n'est pas certifié par l'EPA) et s'il n'est pas utilisé conformément aux instructions du manuel d'utilisation. Les dommages provenant d'une mauvaise utilisation, d'un usage abusif, d'une mauvaise installation, d'un manque d'entretien, d'une surchauffe, d'une négligence, d'un accident pendant le transport, d'une panne de courant, d'un manque de tirage, d'un retour de fumée ou d'une sous-évaluation de la surface de chauffage ne sont pas couverts par la présente garantie. La surface de chauffage recommandée pour un appareil est définie par le manufacturier comme sa capacité à conserver une température minimale acceptable dans l'espace désigné en cas de panne de courant.

La présente garantie ne couvre pas les égratignures, la corrosion, la déformation ou la décoloration. Tout défaut ou dommage provenant de l'utilisation de pièces non autorisées ou autres que des pièces originales, annule la garantie. Un technicien qualifié autorisé doit procéder à l'installation en conformité avec les instructions fournies avec le produit et avec les codes du bâtiment locaux et nationaux. Tout appel de service relié à une mauvaise installation n'est pas couvert par la présente garantie.

Le fabricant peut exiger que les produits défectueux lui soient retournés ou que des photos numériques lui soient fournies pour appuyer la réclamation. Les produits retournés doivent être expédiés port payé au fabricant pour étude. Les frais de transport pour le retour du produit à l'acheteur seront payés par le manufacturier. Tout travail de réparation couvert par la garantie et fait au domicile de l'acheteur par un technicien qualifié autorisé doit d'abord être approuvé par le fabricant. Tous les frais de pièces et main-d'œuvre couverts par la présente garantie sont limités au tableau ci-dessous.

Le fabricant peut, à sa discrétion, décider de réparer ou remplacer toute pièce ou unité après inspection et étude du défaut. Le fabricant peut, à sa discrétion, se décharger de toutes ses obligations en ce qui concerne la présente garantie en remboursant le prix de gros de toute pièce défectueuse garantie. Le fabricant ne peut, en aucun cas, être tenu responsable de tout dommage extraordinaire, indirect ou consécutif, quelle qu'en soit la nature, qui dépasserait le prix d'achat original du produit. Les pièces couvertes par une garantie à vie sont sujettes à une limite d'un seul remplacement sur la durée de vie utile du produit. Cette garantie s'applique aux produits achetés après le 1er mars 2019.

DESCRIPTION	**APPLICATION DE LA GARANTIE***	
	PIÈCES	**MAIN-D'OEUVRE**
Chambre à combustion (soudures seulement) et cadrage de porte en acier coulé (fonte).	À vie	5 ans
Verre céramique (bris thermique seulement**), placage (défaut de fabrication**) et échangeur de chaleur supérieur.	À vie	S.O.
Habillage, écran coupe-chaleur, tiroir à cendres, pattes en acier, piédestal, moulures décoratives (extrusions), coupe-feu en C-Cast**, coupe-feu en vermiculite**, tubes d'air secondaire**, déflecteurs et supports amovibles de la chambre à combustion en acier inoxydable.	7 ans	S.O.
Ensemble de poignée, moulures de vitre et mécanisme de contrôle d'air.	5 ans	3 ans
Pièces amovibles de la chambre à combustion en acier.	5 ans	S.O.
Ventilateur standard ou optionnel, capteurs thermiques, interrupteurs, rhéostats, câblage et électroniques.	2 ans	1 an
Peinture (écaillage**), joints d'étanchéité, isolants, laines céramiques, briques réfractaires et autres options.	1 an	S.O.
Toutes les pièces remplacées au titre de la garantie.	90 jours	S.O.

*Sous réserve des limitations ci-dessus. **Photos exigées. S.O. Sans Objet

Les frais de main-d'œuvre et de réparation portés au compte du fabricant sont basés sur une liste de taux prédéterminés et ne doivent pas dépasser le prix de gros de la pièce de rechange. Si votre appareil ou une pièce sont défectueux, communiquez immédiatement avec votre détaillant. Avant d'appeler, ayez en main les renseignements suivants pour le traitement de votre réclamation sous garantie :

- Votre nom, adresse et numéro de téléphone;
- La facture et le nom du détaillant;
- La configuration de l'installation;
- Le numéro de série et le nom du modèle tel qu'indiqué sur la plaque signalétique de l'appareil;
- La nature du défaut et tout renseignement important.

Avant d'expédier votre appareil ou une pièce défectueuse à notre usine, vous devez obtenir un numéro d'autorisation de votre détaillant. Toute marchandise expédiée sans autorisation sera automatiquement refusée et retournée à l'expéditeur.

Fabricant de poêles International inc.
250, rue de Copenhague,
St-Augustin-de-Desmaures (Québec) Canada
G3A 2H3
418-908-8002

Installation and Operation Manual

3.3 SERIES

Austral III	Escape 1900	Solution 3.3
Myriad III	Black Stag II	Gateway 3300
Legend III	Osburn 3300	

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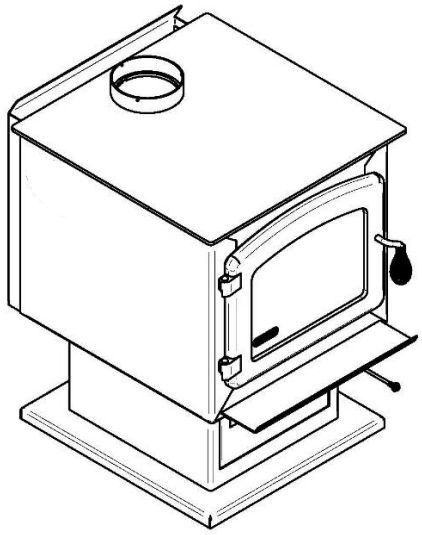

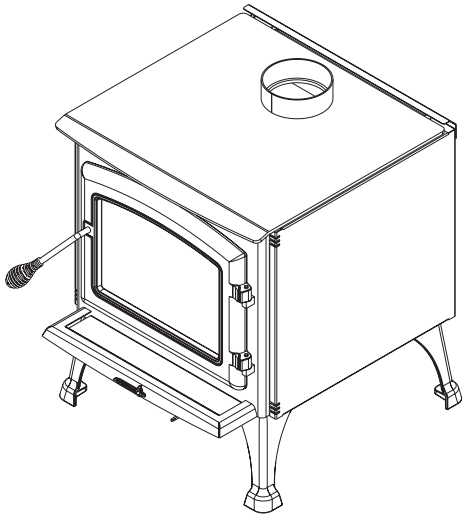

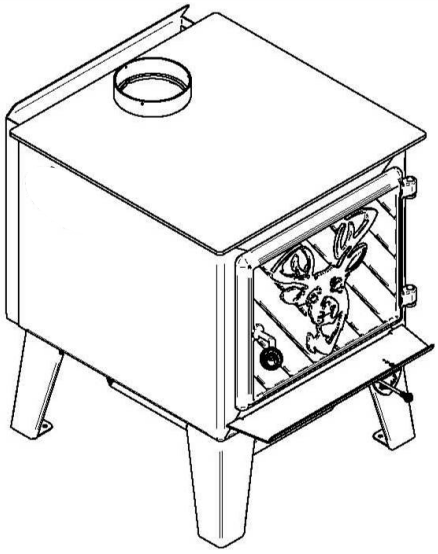

US Environmental Protection Agency
phase II certified wood stove compliant
with 2020 cord wood standard

EPA ≤2.5 g/h

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN LOCAL AREA.

READ THIS ENTIRE MANUAL BEFORE INSTALLATION AND USE OF THIS WOOD STOVE. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH.

READ AND KEEP THIS MANUAL FOR REFERENCE

2019-08-26

Printed in Canada

CERTIFICATION_A

THANK YOU FOR CHOOSING THIS WOOD STOVE.

If this stove is not installed properly, combustible materials near it may overheat and catch fire.

To reduce the risk of fire, follow the installation instructions in this manual.

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.

The following pages provide general advice on wood heating, detailed instructions for safe and effective installation, and guidance on how to get the best performance from this stove.

It is highly recommended that this wood burning hearth product be installed and serviced by professionals who are certified by a «Qualified Agency» such as NFI (National Fireplace Institute®) or CSIA (Chimney Safety Institute of America) in the United States and in Canada by WETT (Wood Energy Technology Transfer) or in Quebec by APC (Association des Professionnels du Chauffage).

Contact local building or fire officials about restrictions and installation inspection requirements in your local area.

A building permit might be required for the installation of this stove and the chimney that it is connected to. It is also highly recommended to inform your home insurance company.

Please read this entire manual before installing and using this stove.

A primary alternative heat source should be available in the home. This heating unit may serve as a supplementary heat source. The manufacturer cannot be responsible for additional heating costs associated with the use of an alternative heat source.

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PART A - OPERATION AND MAINTENANCE

1. Safety Information

- **HOT WHILE IN OPERATION, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. GLOVES MAY BE NEEDED FOR THE STOVE OPERATION.**

- Using a stove with cracked or broken components, such as glass, firebricks or baffle may produce an unsafe condition and may damage the stove.

- Open the air control fully before opening the loading door.

- **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 STOVE. KEEP ALL SUCH LIQUIDS OR AEROSOLS WELL AWAY FROM THE STOVE WHILE IT IS IN USE.**

- Do not store fuel within heater minimum installation clearances.

- Burn only seasoned natural firewood.

- This appliance should always be maintained and operated in accordance with these instructions.

- Do not elevate the fire by using a grate.

- Do not use makeshift materials or make any compromises when installing this appliance.

- This wood heater needs periodic inspection and repairs for the proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual.

- A smoke detector, a carbon monoxide detector and a fire extinguisher should be installed in the house. Location of detectors should be chosen wisely to avoid false alarm when reloading the appliance. The location of the fire extinguisher should be known by all family members.

This product can expose you to chemicals including carbon monoxide, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65warnings.ca.gov/

2. General Information

2.1 Performances

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

Model	Austral III, Myriad III, Legend III, Escape 1900, Black Stag II, Osburn 3300, Solution 3.3, Gateway 3300	
Fuel Type	Dry Cordwood	
Combustion Technology	Non-Catalytic	
Nominal firebox volume	3.4 ft^3 (0.096 m^3)	
Maximum heat output (dry cordwood)[1]	90,000 BTU/h (26.4 kW)	
Overall heat output rate (min. to max.)[2] [2]	15,841 BTU/h to 57,041 BTU/h (4.64 kW to 16.72 kW)	
Average overall efficiency[3] Dry cordwood	71.1 % (HHV)[3]	76.6 % (LHV)[4]
Optimum efficiency[5]	78 %	
Average particulate emissions rate[6]	0.95 g/h (EPA / CSA B415.1-10)[7]	
Average CO[8]	61.3 g/h	

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[1] 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%.
[2] As measured per CSA B415.1-10 stack loss method.
[3] Higher Heating Value of the fuel.
[4] Lower Heating Value of the fuel.
[5] Optimum overall efficiency at a specific burn rate (LHV).
[6] This appliance is officially tested and certified by an independent agency.
[7] Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii) and ASTM E3053-17
[8] Carbon monoxide.

2.2 Specifications

Maximum log length[9]	20 in (508 mm) north-south
Flue outlet diameter	6 in (150 mm)
Recommended connector pipe diameter	6 in (150 mm)
Type of chimney	ULC S629, UL 103 HT (2100 °F)
Baffle material	C-Cast or Vermiculite
Type of door	Simple, glass with cast iron frame
Type of glass	Ceramic glass
Blower	Included or Optional (up to 100 CFM)
Particulate emission standard[10]	EPA / CSA B415.1-10

2.3 Materials

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

The **paint** coating on the stove 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 **baffle** is made of aluminosilicate fibre material that is compressed with a binder to form arigid board. It can withstand temperatures above 2,000 °F. It is not considered hazardous waste. Disposal at a waste management center is recommended.

The firebrick is mainly composed of silicon dioxide, also known as silica, a product processedfrom a mined mineral. It is most commonly found in nature in the form of sand and clay. Disposal at a waste management center is recommended.

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 waste management center is recommended.

The door **glass** is a 5/32" (4 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 regular household products. Disposal at a waste management center is recommended.

[9] North-south: ends of the logs visible, East-west: sides of the logs visible.

[10] Tested and certified in compliance with CFR 40 part 60, subpart AAA, section 60.534(a)(1(ii) and ASTM E3053-17.

2.4 Zone Heating

This stove 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, a 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 stove. Whole house zone heating works best when the stove is 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.

Locating the stove in this area will give the maximum benefit of the heat it produces and will achieve the highest possible heating efficiency and comfort. The space where the most time is spent will be warmest, while bedrooms and basement (if there is one) will stay cooler. In this way, less wood is burnt than with other forms of heating.

Although the stove may be able to heat the main living areas of the house to an adequate temperature, it is strongly recommended to also have a conventional oil, gas or electric heating system to provide backup heating.

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

2.5 Emissions and Efficiency

The low smoke emissions produced by the special features inside this stove firebox mean that the household will release up to 90% less smoke into the outside environment than if an older conventional stove was used. 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, this stove releases all the heat energy from the wood instead of wasting it as smoke up the chimney. Also, the features inside the firebox allow control of the air supply meaning controlling the heat output, while maintaining clean and efficient flaming combustion, which boosts the efficient delivery of heat to the home.

The emission control and advanced combustion features of this stove can only work properly if the fuel used is in the correct moisture content range of 15% to 20%. Refer to the following section of suggestions on preparing fuelwood and judging its moisture.

3. Fuel

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

DO NOT BURN:

- **GARBAGE;**
- **LAWN CLIPPINGS OR YARD WASTE;**
- **MATERIALS CONTAINING RUBBER, INCLUDING TIRES;**
- **MATERIALS CONTAINING PLASTIC;**
- **WASTE PETROLEUM PRODUCTS, PAINTS OR PAINT THINNERS, OR ASPHALT PRODUCTS;**
- **MATERIALS CONTAINING ASBESTOS;**
- **CONSTRUCTION OR DEMOLITION DEBRIS;**
- **RAILROAD TIES OR PRESSURE-TREATED WOOD;**
- **MANURE OR ANIMAL REMAINS;**
- **SALT WATER DRIFTWOOD OR OTHER PREVIOUSLY SALT WATER SATURATED MATERIALS;**
- **UNSEASONED WOOD; OR**
- **PAPER PRODUCTS, CARDBOARD, PLYWOOD, OR PARTICLE BOARD. THE PROHIBITION AGAINST BURNING THESE MATERIALS DOES NOT PROHIBIT THE USE OF FIRE STARTERS MADE FROM PAPER, CARDBOARD, SAW DUST, WAX AND SIMILAR SUBSTANCES FOR THE PURPOSE OF STARTING A FIRE IN AN AFFECTED WOOD HEATER.**

BURNING THESE MATERIALS MAY RESULT IN THE RELEASE OF TOXIC FUMES OR RENDER THE HEATER INEFFECTIVE AND CAUSE SMOKE.

3.1 Tree Species

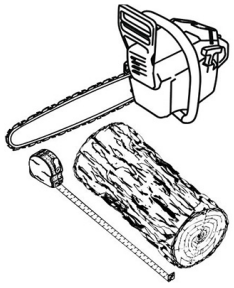
The tree species the firewood is produced from is less important than its moisture content. The main difference in firewood from various tree species is the density of the wood. Hardwoods are denser than softwoods. Homeowners with access to both hardwood and softwood use both types for different purposes.

Softer woods make good fuel for 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. 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.

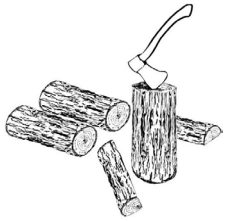
3.2 Log Length

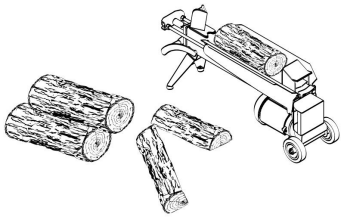
Logs should be cut at least 1" (25 mm) shorter than the firebox so they fit in easily. Pieces that are even slightly too long makes loading the stove very difficult. The most common standard length of firewood is 16" (400 mm).



3.3 Piece Size

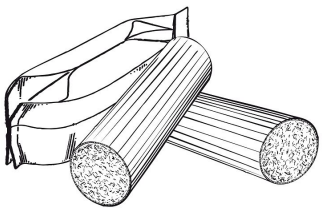
Firewood dries more quickly when it is split. Large unsplit rounds can take years to dry enough to burn. Even when dried, unsplit logs are difficult to ignite because they don't have the sharp edges where the flames first catch.





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.

3.4 Compressed Wood Logs



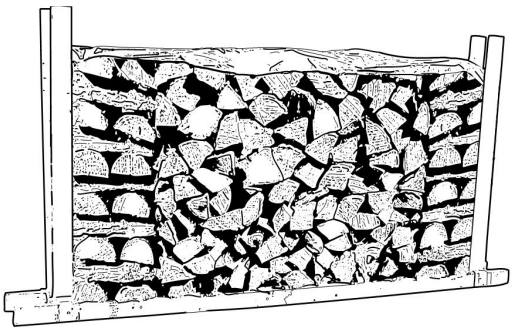
Compressed wood logs made of 100% compressed sawdust can be burned with caution in the number of these logs burned at once. Do not burn compressed logs made of wax impregnated sawdust or logs with any chemical additives. Follow the manufacturer's instructions and warnings.

3.5 Drying Time

Firewood that is not dry enough to burn is the cause of most complaints about wood burning appliances. Continually burning green or unseasoned wood produces more creosote and involves lack of heat and dirty glass door.

Firewood with a moisture content between 15% and 20% will allow the stove to produce its highest possible efficiency.

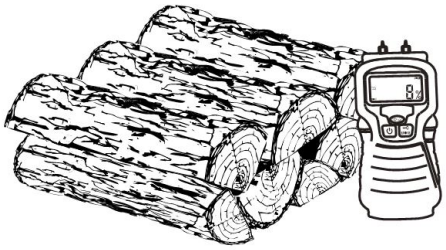
Here are some facts to consider in estimating drying time:



- 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 a damp climate;
- Drying happens faster in warm summer weather than in winter weather;
- Split pieces dry more quickly than unsplit rounds;
- Softwoods like pine, spruce, poplar, and aspen take less time to dry than hardwoods. They can be dry enough to burn after being stacked to air dry only for 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 outside in a location exposed to sun and wind; it takes much longer to dry when stacked in a wood shed;
- Firewood with a moisture content of 15% to 20% will allow the stove to reach its highest efficiency.

Firewood is dry enough to burn when:

- Cracks form at the end of logs;
- The wood turns from white or cream colored to grey or yellow;
- Two pieces of wood struck together sounds hollow;
- The face of a fresh cut feels warm and dry;
- The moisture content read by a moisture meter is between 15% to 20%.



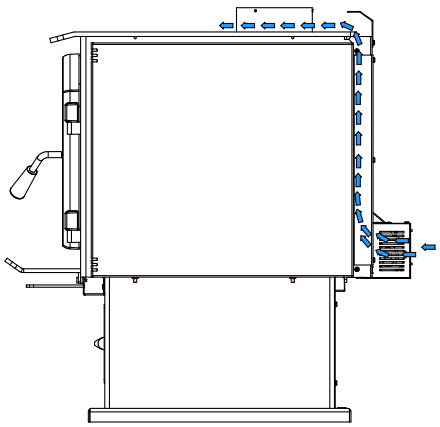
4. Operating the Stove

This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

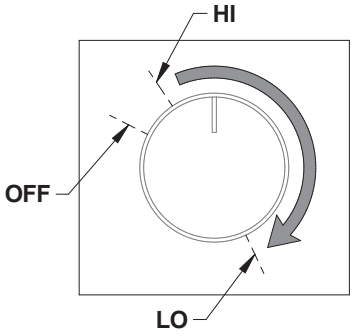
4.1 Blower Operation

A blower is included with this stove. The blower can be found in the combustion chamber of the stove and must be installed on the back of the stove. See «Appendix 1: Blower Installation». The blower is used to increase the airflow through the heat exchanger and improve hot air circulation in the room.

When used regularly, the blower can provide a small increase in efficiency, up to 2%. However, the use of a blower should not be used as a way to gain more output from a stove that is undersized for the space it is intended to heat.



Ensure the blower cord is not in contact with any surface of the stove to prevent electrical shock or fire damage. Do not run cord underneath the stove.



The blower has a variable speed control that can be adjusted in three different positions; either from high (HI) to low (LO) or closed (OFF). Allow the stove to reach operating temperature (approximately one hour) before turning on the blower, since increased airflow from the blower will remove heat and affect the start up combustion efficiency.

A heat sensor is also included. The heat sensor can be found in the combustion chamber of the stove must also be installed at the back of the stove. When the blower is on (position between HI and LO), the heat sensor will make the blower start automatically when the stove is hot enough and will stop it when the stove has cooled down. Therefore, the blower speed control can be left at the desired setting.

5. Burning Wood Efficiently

5.1 First Use

Two things happen when burning the first few fires; the paint cures and the internal components are conditioned. As the paint cures, some of the chemicals vaporize. The vapors are not poisonous, but they smell bad. Fresh paint fumes can also trigger false alarms in smoke detectors. When lighting the heater for the first few times, it may be wise to open doors and windows to ventilate the house.

Burn two or three small fires to begin the curing and conditioning process. Then build bigger and hotter fires until there is no longer paint smell from the stove. As hotter and hotter fires are burned, more of the painted surfaces reach the curing temperature of the paint. The smell of curing paint does not disappear until one or two very hot fires have been burned.

5.2 Lighting Fires

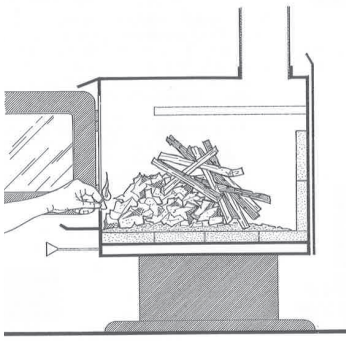
Each person heating with wood develops its own favorite way to light fires. Regardless of the method chosen, the goal should be to have a hot fire burning, quickly. A fire that ignites fast produces less smoke and deposits less creosote in the chimney.

Never use gasoline, gasoline-type lantern fuel (naphtha), fuel oil, motor oil, kerosene, charcoal lighter fluid, or similar liquids or aerosols to start or 'freshen up' a fire in this wood stove. Keep all such liquids well away from the stove while it is in use.

Here are three popular and effective ways to ignite wood fires.

5.2.1 Conventional Method

The conventional method to build a wood fire is to crumple 5 to 10 sheets of newspaper and place them in the firebox and hold them in place with ten pieces of kindling wood. The kindling should be placed on and behind the newspaper. Then add two or three small pieces of firewood. Open the air intake control completely and ignite the newspaper. Leave the door slightly ajar. Once the fire has ignited, the door can be closed with the air control still fully open. When the kindling is almost completely burned, standard firewood pieces can be added.



Do not leave the heater unattended when the door is slightly open. Always close and latch the door after the fire ignites.

5.2.2 The Top Down Method

This method is the opposite of the conventional method and only works properly if well-seasoned wood is used. Place three or four small, split, dry logs in the firebox. Arrange the kindling wood on the logs in two layers at right angles and place a dozen finely split kindling on the second row. It is possible to use ragged paper but it may not hold in place since it tends to roll while it is burning. The best is to wrap a sheet on itself, grab the ends of the roll and make a knot. Use four or five sheets of paper tied together and put them on top and around the kindling. Open the air intake control completely, ignite the paper and close the door.

The top down fire method has two advantages over the traditional method: first, the fire does not collapse on itself, and it is not necessary to add wood gradually since the combustion chamber is full before the fire is lit.

5.2.3 Two Parallel Logs Method

Two spit logs are placed in the firebox with a few sheets of twisted newspapers in between the logs. Fine kindling is added across the two logs and some larger kindling across those, log cabin style. Newspaper is lit.

5.2.4 Using Fire Starters

Commercial fire starters can be used instead of a newspaper. Some of these starters are made of sawdust and wax and others are made of specialized flammable solid chemicals. Always follow the package directions when using.

Gel starters can also be used, but only to light a fire, in a cold combustion chamber without hot embers inside.

5.3 Combustion Cycles

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

Wood heaters don't have a steady heat output. It is normal for the temperature to rise after a new load of wood is ignited and for its temperature to gradually decrease throughout the burning cycle. This increasing and decreasing temperature can be matched with the household routines. For example, the temperature in the area can be cooler when the household is active, and it can be warmer when it is inactive.

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.

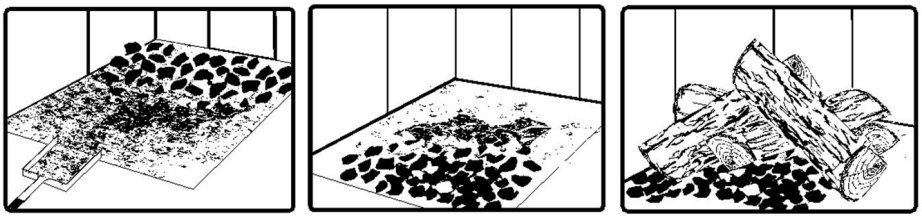
Trying to produce a steady heat output by placing a single log on the fire at regular intervals is not recommended. Always place at least three, and preferably more pieces on the fire at a time so that the heat radiated from one piece helps to ignite the pieces next to it. Each load of wood should provide several hours of heating. The size of each load may vary depending on the amount of heat required.

Burning in cycles means the loading door does not need to be opened while the wood is flaming. This is an advantage since it is preventing smoke leaking from the heater when the door is opened as a full fire is burning. This is especially true if the chimney is on the outside wall of the house.

If the door must be opened while the fire is flaming, fully open air control for a few minutes then open the door slowly.

5.4 Rekindling a Fire

When the temperature of the room is lower and all that remains is embers, it is time to reload. Most of the remaining embers will be at the back of the firebox. Remove excess ash from the front of the firebox and bring the embers forward before reloading. Place a new load of wood on, and at the back of the embers. Open the air control completely and close the door.



Raking the coals is useful for two reasons. First, it brings them near where most of the combustion air enters the firebox. This will ignite the new load quickly. Secondly, the charcoal will not be smothered by the new load of wood. When the embers are simply spread inside the combustion chamber, the new load smoulder for a long time before igniting.

Close the air control only when the firebox is full of bright turbulent flames, the wood is charred, and its edges are glowing.

The heater should not be left unattended during ignition and the fire should not burn at full intensity for more than a few minutes.

When lighting a new load, the appliance produces a heat surge. This heat surge is pleasant when the room temperature is cool but can be unpleasant when the room is already warm. Therefore, it is best to let each load of wood burn completely so that the room cools down before reloading.

5.5 Removing Ashes

Ash should be removed from the firebox every two to three days of full-time heating. Ash should not accumulate excessively in the firebox since it will affect the proper operation of the appliance.

The best time to remove ash is in the morning, after an overnight fire when the heater is relatively cold, but there is still a little chimney draft to draw the ash dust into the heater and prevent going out into the room.

Ashes should be placed in a tightly covered metal container. The container must be placed on a non-combustible floor or on the ground well away from all combustible materials. Ashes almost always contain live embers that can stay hot for days and which release carbon monoxide gas. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be kept in a closed metal container until they are completely cooled. No other waste should be placed in this container.

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

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5.6 Air Intake Control

Once the firewood, firebox and chimney are hot, air intake can be reduced to achieve a steady burn.

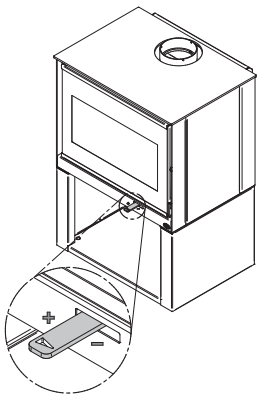


Figure 1: Air Intake Control

As the air intake is reduced, the burn rate decreases. This has the effect of distributing the thermal energy of the fuel over a longer period of time. In addition, the flow rate of exhaust through the appliance and flue pipe slows down, which increases the duration of the energy transfer of the exhaust gases. As the air intake is reduced, the flame slows down. If the flames diminish to the point of disappearing, the air intake has been reduced too early in the combustion cycle or the wood used is too wet. If the wood is dry and the air control is used properly, the flames should decrease, but remain bright and stable.

On the other hand, too much air can make the fire uncontrollable, creating very high temperatures in the unit as well as in the chimney and seriously damaging them. A reddish glow on the unit and on the chimney components indicates overheating. Excessive temperatures can cause a chimney fire.

5.7 Fire Types

Using the air intake control is not the only way to match the appliance heat output to the desired temperature in the house. A house will need far less heating in October than in January to maintain a comfortable temperature. Filling the firebox full in fall weather will overheat the space. Otherwise, the combustion rate will have to be reduced to a minimum and the fire will be smoky and inefficient.

Here are some suggestions for building fires suitable for different heating needs.

5.7.1 Flash Fire

To build a small fire that will produce a low heat output, use small pieces of firewood and load them crisscross in the firebox. The pieces should only be 3" (80 mm) to 4" (100 mm) in diameter. After raking the coals, lay two pieces parallel to each other diagonally in the firebox and lay two more across them in the other direction. Open the air control fully and only reduce the air after the wood is fully flaming. This kind of fire is good for mild weather and should provide enough heat for up to four hours. Small fires like this are a good time to use softer wood species and avoid overheating the house.

5.7.2 Long Lasting Fire

For a fire that will last up to eight hours but will not produce intense heat, use soft wood and place the logs compactly in the firebox. Before reducing the air intake, the load will have to burn at full heat for long enough for charring the surface of the logs. The flame must be bright before letting the fire burn by itself.

5.7.3 High Output Fires

When heating needs are high during cold weather, the fire should burn steadily and brightly. This is the time to use larger pieces of hardwood. Place the biggest pieces at the back of the firebox and place the rest of the pieces compactly. A densely built fire like this will produce the longest combustion this stove is capable of.

Special attention must be paid when building fires like this since if the air intake is reduced too quickly, the fire could smoulder. The wood must be flaming brightly before leaving the fire to burn.

5.7.4 Burn Cycle Time

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 burning time expected from this stove, including both phases, will vary depending on a number of things, such as:

- firebox size,
- the amount of wood loaded,
- the species of wood,
- the wood moisture content,
- the size of the space to be heated,
- the climate zone where the house is, and
- the time of the year.

The table below gives an approximate maximum burn cycle time, based on firebox volume.

Table 1 : Approximate Maximum Burn Cycle Time

FIREBOX VOLUME	MAXIMUM BURN CYCLE 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

A longer burning time is not necessarily an indication of efficient operation. It is preferable to build a smaller fire that will 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 stove to heat demand for space.

5.7.5 Logs Orientation

In a relatively square firebox, the wood can be loaded north-south (ends of the logs visible) or east-west (sides of the logs visible). North-south loads allow more wood to be loaded at the same time. On the other hand, they break into smaller pieces faster.

This kind of load is good for high output, long lasting fires for cold weather. East-west loads allow a limited amount of wood since too many logs could cause them to fall on the glass. Placed in a compact way, they take a long time before breaking down. They are excellent for low-intensity, long-lasting fires in relatively mild weather.

5.7.6 Carbon Monoxide

When unburned logs remain in the firebox and the flame disappears, go outside and look at the chimney exit. If there is visible smoke, it means that there is still combustible to burn but that the fire lacks air to burn properly. In this situation, the CO rate will increase so it is important to react. Open the door slightly and move the log with a poker. Turn it over and create a passage for the air below, making a trench with the coal bed. Add small pieces of wood to restart the combustion.

6. Maintenance

This heater will give many years of reliable service if used and maintained properly. Internal components of the firebox such as firebricks or refractory panels, baffle and air tubes will wear over time. Defective parts should always be replaced with original parts.

To avoid premature deterioration, follow the lighting and reloading procedures in section «5. Burning Wood Efficiently» and also avoid letting the heater run with the air intake fully open for entire burn cycles.

6.1 Cleaning and Painting

Painted and plated surfaces can be wiped down with a soft, damp cloth. If the paint is scratched or damaged, it is possible to repaint the heater with a heat-resistant paint. **Do not clean or paint the appliance when it is hot.** Before painting, the surface should be sanded lightly with sandpaper and then wiped off to remove dust. Apply two thin layers of paint.

6.2 Refractory Materials and Baffle

Periodically inspect the firebricks or the refractory panels and the baffle for damage. Replace anything that is damaged or broken.

Operation of the heater with a cracked or missing baffle may cause unsafe temperatures and hazardous conditions and will void the warranty.

6.3 Glass Door

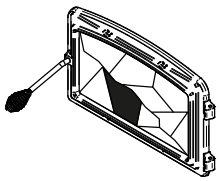
6.3.1 Cleaning

Under normal conditions, the door glass should stay relatively clear. If the firewood is dry enough and the operating instructions in this manual are followed, a whitish, dusty deposit will form on the inner surface of the glass after a week or so of use. This is normal and can be easily removed when the heater is cold by wiping with a damp cloth or paper towel and then drying.

When the stove runs at a low combustion rate, light brown stains may form, especially in the lower corners of the glass. This indicates that the fire has been smoky and some of the smoke has condensed on the glass. It also indicates incomplete combustion of the wood, which also means more smoke emissions and faster formation of creosote in the chimney.

The deposits that form on the glass are the best indication of the fuel quality and success in properly using the stove. These stains can be cleaned with a special wood stove glass cleaner. **Do not use abrasive products to clean the glass.**

The goal should be having a clear glass with no brown stains. If brown stains appear regularly on the glass, something about the fuel or the operating procedure needs to be changed. When brown streaks are coming from the edge of the glass, it is time to replace the gasket around the glass. The glass gasket should be self-adhesive. Always replace the gasket with a genuine one.



Do not clean the glass when the stove is hot.

Do not abuse the glass door by striking or slamming shut.

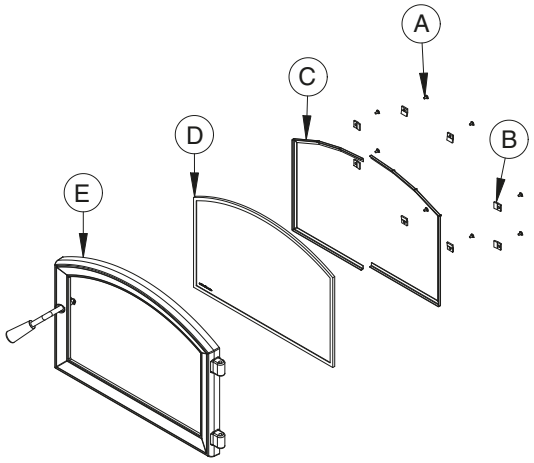
Do not use the stove if the glass is broken.

6.3.2 Replacement

The glass used is a ceramic glass, 5/32" (4 mm) thick, 18 ¾" x 12 ½" (476 mm x 248 mm), tested to reach temperatures up to 1400º F. If the glass breaks, it must be replaced with one having the same specification.

To remove or replace the glass **(D)**:

1. Remove the door **(E)** from its hinges and lay it on a soft, flat surface.
2. Remove the screws **(A)**, the glass retainers **(B)**, and the metal frames **(C)**.
3. Remove the glass **(D)**. If it is damaged install a new one in place. The replacement glass must have a gasket all around (see procedure below).
4. Reinstall the glass, being careful to centre the glass in the door and not to over-tightening the retaining screw.

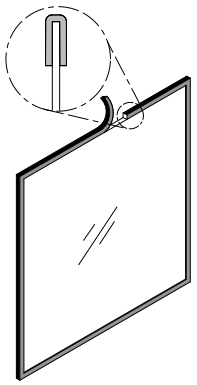


The two main causes of broken door glass are uneven placement in the door and over-tightening the retaining screws.

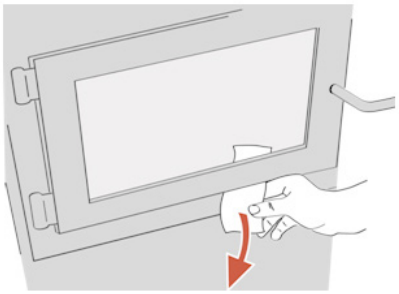
6.3.3 Gasket

The glass gasket is flat, adhesive-backed, woven fibreglass. The gasket must be centred on the edge of the glass.

1. Follow the steps of the previous section to remove the glass.
2. Remove the old gasket and clean the glass thoroughly.
3. Peel back a section of the paper covering the adhesive and place the gasket on a table with the adhesive side up.
4. Stick the end of the gasket to the middle of one edge, then press the edge of the glass down onto the gasket, taking care that it is perfectly centred on the gasket.
5. Peel off more of the backing and rotate the glass. The gasket must not be stretched during installation.
6. Cut the gasket to the required length. Pinch the gasket onto the glass in a U-shape, all around the glass.



6.4 Door



In order for the stove to burn at its best efficiency, the door must provide a perfect seal with the firebox. The tightness of the door seal can be verified by closing and latching the door on a strip of paper. The test must be performed all around the door. If the paper slips out easily anywhere, either adjust the door or replace the gasket.

6.4.1 Adjustment

The door seal may be improved with a simple latch mechanism adjustment:

1. Remove the split pin by pulling and turning it using pliers.
2. Turn the handle one counterclockwise turn to increase pressure.
3. Reinstall the split pin with a small hammer.

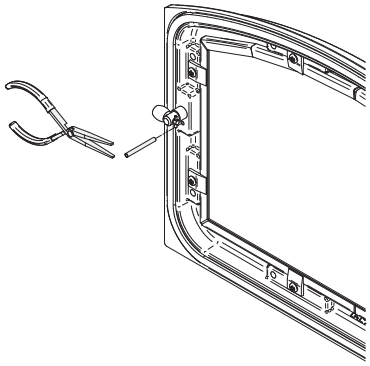


Figure 2: Removing the split pin

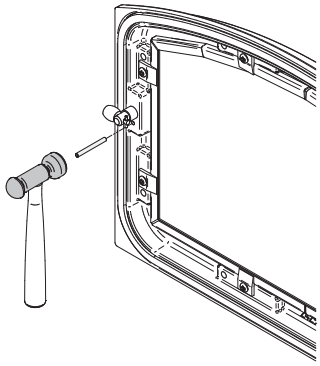
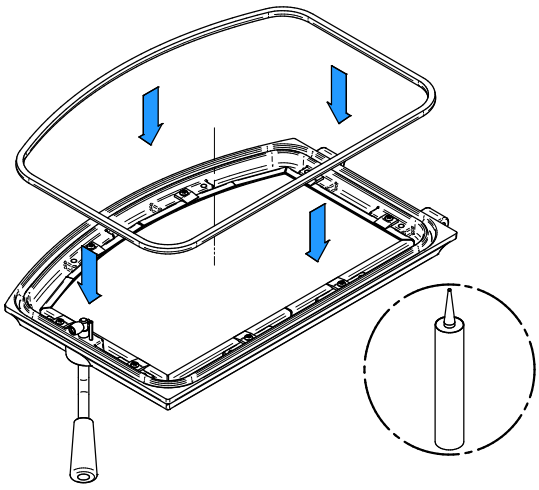


Figure 3: Installing the split pin

6.4.2 Gasket

It is important to replace the gasket with another having the same diameter and density to maintain a good seal.

1. Remove the door and place it face-down on something soft like a cushion of rags or a piece of carpet.
2. Remove the old gasket from the door. Use a screwdriver to scrape the old gasket adhesive from the door gasket groove.
3. Apply a bead of approximately 3/16" (5 mm) of high temperature silicone in the door gasket groove. Starting from the middle, hinges side, press the gasket into the groove. The gasket must not be stretched during installation.
4. Leave about ½" (10 mm) long of the gasket when cutting and press the end into the groove. Tuck any loose fibers under the gasket and into the silicone.
5. Close the door. Do not use the stove for 24 hours.



6.5 Exhaust System

Wood smoke can condense inside the chimney, forming an inflammable deposit called creosote. If creosote builds up in the system, it can ignite when a hot fire is burned in the stove. 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 the stove is operated properly, the exhaust from the chimney is mostly clear and creosote builds up more slowly.

«Creosote - Formation and Need to Removal

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cooler chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire.

The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if a creosote buildup has occurred.

If a significant layer of creosote has accumulated (⅛" [3 mm] or more) it should be removed to reduce the risk of a chimney fire.»

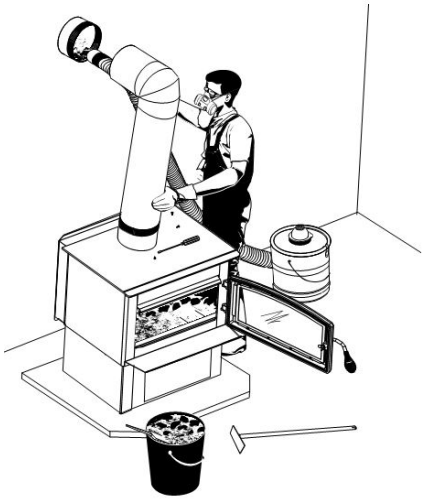
6.5.1 Cleaning Frequency

It is not possible to predict how much or how quickly creosote will form in the chimney. It is important, therefore, to check the build-up in the chimney monthly until the rate of creosote formation is determined. Even if creosote forms slowly in the system, the chimney should be cleaned and inspected at least once each year.

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. 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.

6.5.2 Sweeping the Chimney

Chimney sweeping can be a difficult and dangerous job. People with no chimney sweeping experience will often prefer to hire a professional chimney sweep to inspect and clean the system for the first time. After seeing the cleaning process, some will choose to do it themselves.



The chimney should be checked regularly for creosote build-up. Inspection and cleaning of the chimney can be facilitated by removing the baffle. See «Appendix 3: Air Tubes and Baffle Installation» for more details.

6.5.3 Chimney Fire

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

1. Close the stove door and the air intake control;
2. Alert the occupants of the house of the possible danger;
3. If you require assistance, alert the 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;

Do not use the appliance again until the stove and its chimney have been inspected by a qualified chimney sweep or a fire department inspector.

PART B - INSTALLATION

7. Safety Information and Standards

- The information given on the certification label affixed to the appliance always overrides the information published, in any other media (owner's manual, catalogues, flyers, magazines and web sites).
- Mixing of appliance components from different sources or modifying components may result in hazardous conditions. Where any such changes are planned, Stove Builder International Inc. should be contacted in advance.
- Any modification of the appliance that has not been approved in writing by the testing authority violates CSA B365 (Canada), and ANSI NFPA 211 (USA).
- **DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATION.**
- **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
- Connect this stove only to a listed factory-built chimney for use with solid fuel or to a lined masonry chimney conforming to national and local building codes.
- If required, a supply of combustion air shall be provided to the room.

7.1 Mobile Home

- May be installed in a mobile home. The installation requires a fresh air kit, sold separately.
- **WARNING : DO NOT INSTALL IN THE SLEEPING ROOM.**
- **THE STOVE MUST BE ATTACHED TO THE STRUCTURE OF THE MOBILE HOME.**
- **CAUTION : THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL, CEILING AND ROOF MUST BE MAINTAINED.**

7.2 Regulations Covering Stove Installation

When installed and operated as described in these instructions, this wood stove is suitable for use as a freestanding heater in residential installations.

In Canada, the CSA B365 Installation Code for Solid Fuel Burning Appliances and Equipment and the CSA C22.1 Canadian National Electrical Code are to be followed in the absence of local code requirements. In the USA, the ANSI NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances and the ANSI NFPA 70 National Electrical Code are to be followed in the absence of local code requirements.

This stove must be connected to a chimney complying with the requirements for Type HT chimneys in the Standard for Factory-Built Chimneys for Residential Type and Building Heating Appliances, UL 103 and ULC S629 or to a code-approved masonry chimney with a flue liner.

7.3 Location of the Certification Label

The information given on the certification label always overrides the information published in any other media (owner's manual, catalogues, flyers, magazines and web sites). It is important to refer to it in order to have a safe and compliant installation. Important information about the stove can also be found (model, serial number, etc.). The certification label is located on the back of the stove. It is recommended to note the stove serial number since it will be needed to precisely identify the version of the appliance in the event replacement parts or technical assistance is required.

8. The Venting System

The venting system, made of the chimney and the connecting pipe between the stove and the chimney, acts as the engine that drives the wood heating system. Even the best stove will not function safely and efficiently if it is not connected to a suitable chimney.

The heat in the flue gases that pass from the stove and chimney connector 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 stove and safely vents exhaust to outside. The heat in the flue gas can be seen as the fuel the chimney uses to create draft.

8.1 Suitable Chimneys

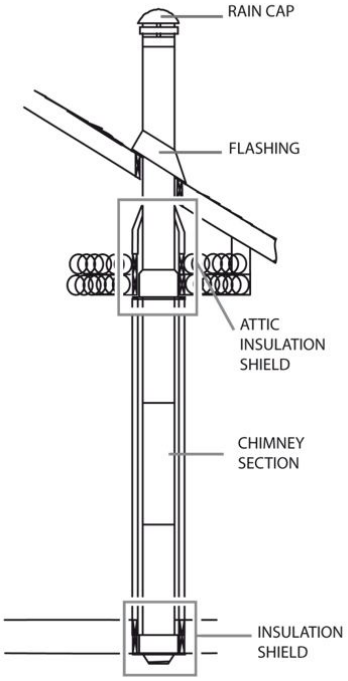
This stove will provide optimum efficiency and performance when connected to a 6" (150 mm) diameter chimney flue system. The connection to a chimney having a diameter of at least 5" (130 mm) (Canada only) or no more than 7" (180 mm) is permitted, if it allows the proper venting of combustion gases and that such application is verified and authorized by a qualified installer. Otherwise, the diameter of the flue should be 6" (150 mm). To be suitable, a factory-built metal chimney must comply with UL 103 HT (U.S.A.) or ULC S629 (Canada).

8.1.1 Factory-Built Metal Chimney

These are sometimes referred to as 'high temp' chimneys because they have the specific characteristics to withstand temperatures that can be created by wood burning stoves.

Factory-built chimneys are tested as a system with all the necessary components for installation. The instructions provided with the chimney by its manufacturer are the only reliable source of installation guidelines.

To be safe and effective, the chimney must be installed exactly in accordance with the manufacturer's instructions. Only components intended for the brand and model of chimney should be used. Never fabricate or substitute parts from other chimney brands. The chimney must be a type suitable for solid fuel.

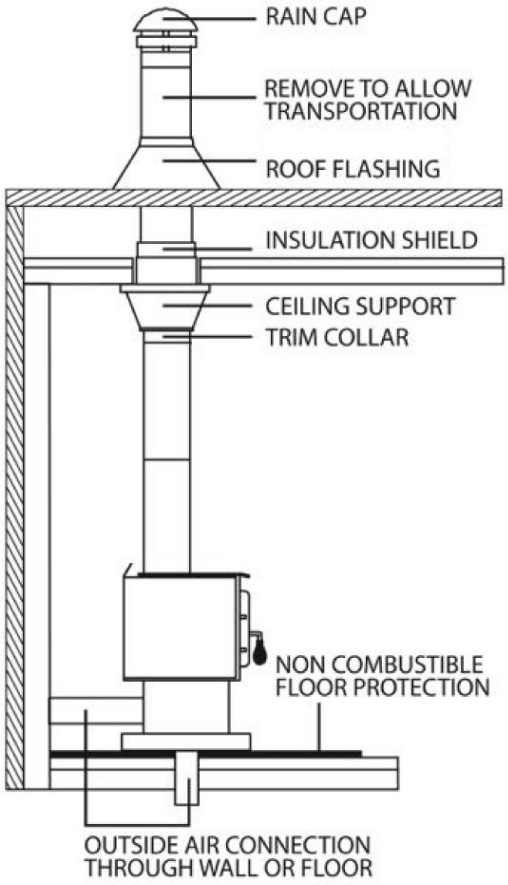


8.1.2 Factory-Built Metal Chimney in Mobile Home

For use in a mobile home, this stove is to be connected to a 6" (150 mm) double wall factory built chimney pipe conforming to ULC-S629 or UL 103 HT standards for 650°C Factory-built chimney.

The total length of the flue system should be at least 12' (3,6 m)including elbows, from the top of the stove.

To maintain an effective vapour barrier, insulation and waterproof at the chimney and outside flue pipe, a roof flashing must be installed and sealed with silicone adhesive.

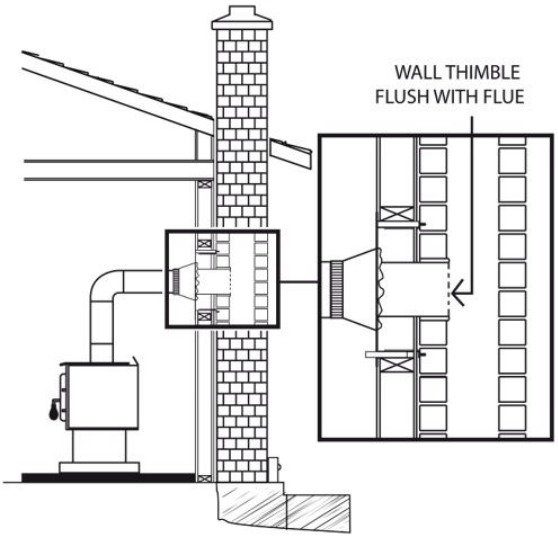


8.1.3 Masonry Chimney

The stove may also be connected to a masonry chimney, provided the chimney complies with the construction rules found in the building code enforced locally.

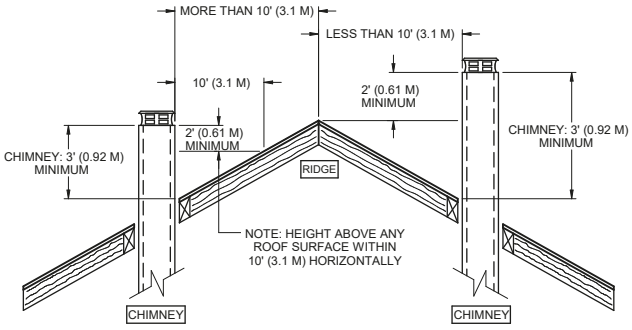
The chimney must have either a clay liner or a suitably listed stainless steel liner. If the masonry chimney has a square or rectangular liner that is larger in cross-sectional area than a round 6" (150 mm) flue, it should be relined with a suitably listed 6" (150 mm) stainless steel liner.

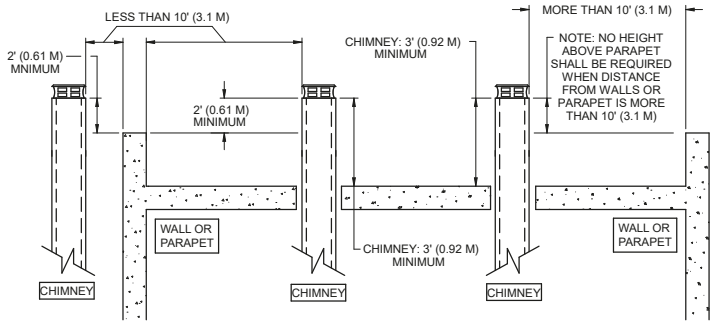
Do not downsize the flue to less than 6" (150 mm) unless the venting system is straight and exceeds 25' (7,6 m) in height. When passing through a combustible wall, the use of an insulated listed thimble is required.



8.2 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 3 ft. (1 m) above the highest point of contact with the roof, and at least 2 ft. (60 cm) higher than any roof line or obstacle within a horizontal distance of 10 ft. (3 m). The total system height, from the floor the appliance is mounted on to the top of the chimney, should never be less than 15 feet (4.6 m).





8.3 Chimney Location

The location of the chimney is crucial for the proper functioning of the appliance. The chimney should be installed within the house rather than up an outside wall and should rise straight up through the tallest part of the house. This installation benefits from being enclosed within the warm house environment, produce stronger draft, accumulate fewer creosote deposits and will be unaffected by cold temperatures or harsh winds.

Outside chimneys will lead to cold back drafting when there is no fire in the stove, slow kindling of new fires, and smoke roll-out when the door is open for loading.

On the other hand, excessive draft will make the fire uncontrollable, creating very high temperatures in the unit as well as in the chimney and seriously damaging them. A reddish glow on the unit and on the chimney components indicates overheating. Excessive temperatures can cause a chimney fire.

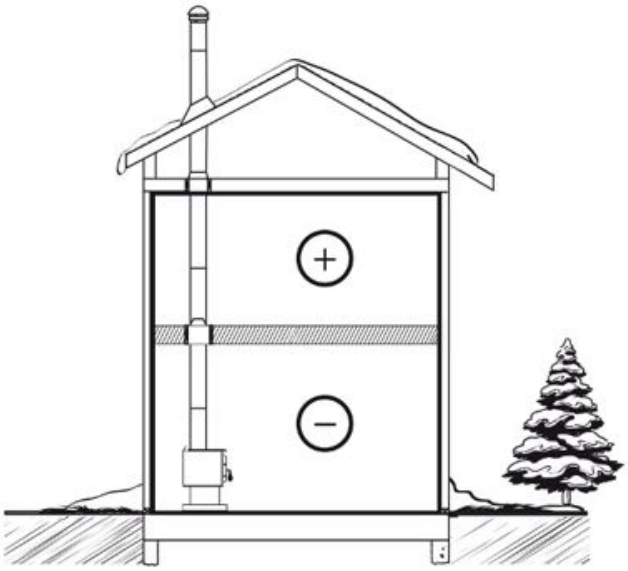


Figure 4: Good System Design

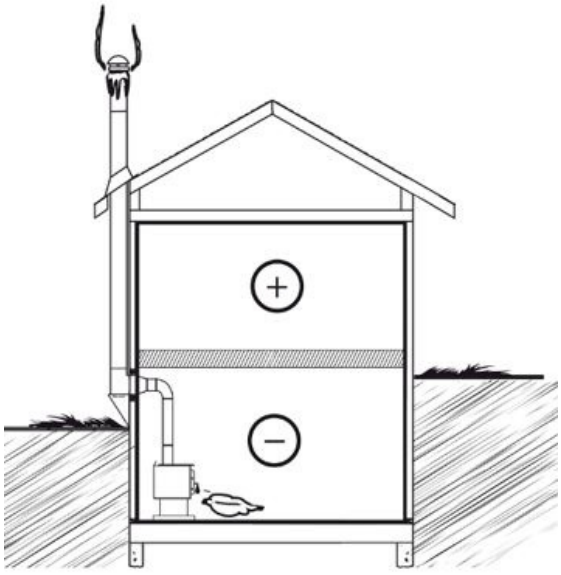


Figure 5: Inferior System Design

8.4 Supply of Combustion Air

8.4.1 Mobile Home

This stove is approved to be installed in a mobile home. It must therefore have a supply of combustion air from outdoors. The air intake must not draw air from the attic, from the basement, from a garage or any enclosed space. Air must be drawn from a ventilated crawl space under the floor or directly from outside.

Install a flexible or rigid, insulated pipe (HVAC type, must comply to ULC S110 and/or UL 181, Class 0 or Class 1) to the fresh air intake. The outside termination must have a weather protection cap with a wire mesh. Where a mobile home has been converted to a standard house by mounting it on a permanent basement foundation, the supply of outdoor air is not mandatory.

8.4.2 Conventional House

The safest and most reliable supply of combustion air for a wood stove 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. Almost all houses have enough natural leakage to provide the small amount of air needed by the stove. The only case in which the wood stove 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.

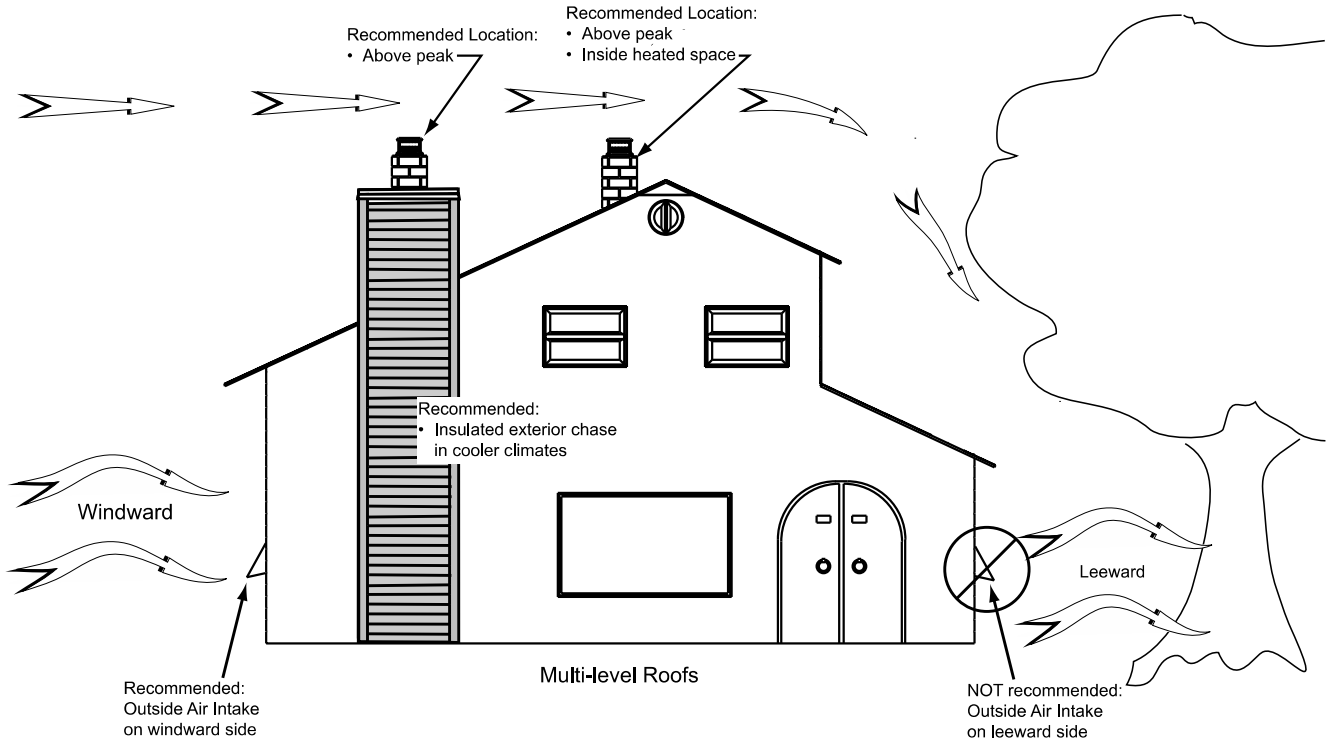


Figure 6: Air supply in conventional houses

If an air intake is installed through the wall of the house, its pressure can vary during windy weather. If smoke puffs from the stove, the air duct should be disconnected to determine if it is the cause of the problem. In some windy conditions, negative pressure near hood may draw hot exhaust gases from the stove to outdoors. Check the outdoor air duct for soot deposits when the full system is cleaned and inspected at least once each year.

8.5 Chimney Connector

The chimney connector is the single or double wall pipe installed between the stove flue collar and the chimney breech.

Double wall chimney connectors are tested and certified. The rules concerning installation are found in the manufacturer's installation instructions.

Single wall pipe components are available from most hardware and building supply stores. These components are usually not tested to a particular standard and certified as compliant. Therefore, a list of rules found in solid fuel installation codes apply to the installation of single wall pipe.

8.5.1 Installation configuration

The best installation configuration is the one that rises straight up from the stove to the base of the chimney with no elbows. Straight assemblies are less likely to cause problems like smoke roll-out when the door is opened for loading. They are also more stable and easier to maintain than assemblies with elbows. Horizontal runs of flue pipe should be avoided where possible because they reduce chimney draft.

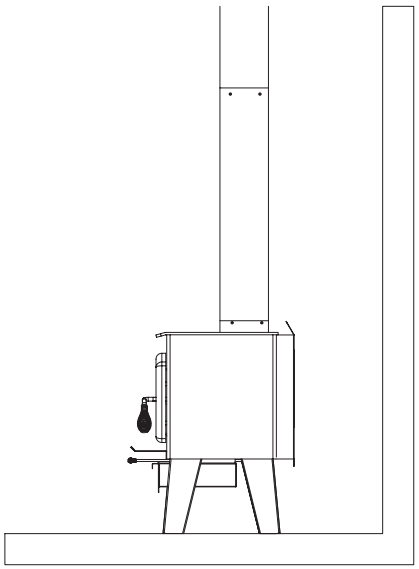


Figure 7: Best

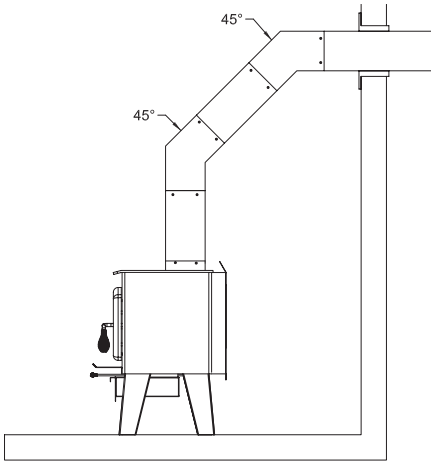


Figure 8: Acceptable

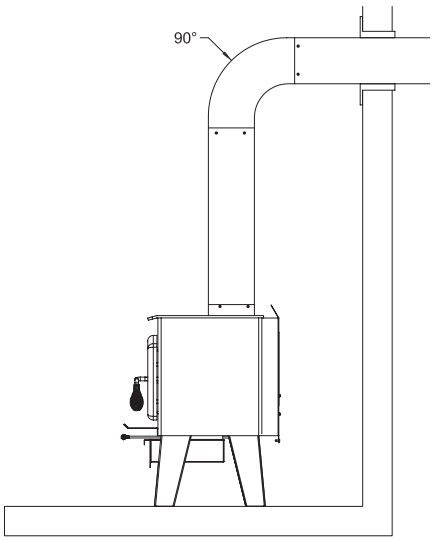


Figure 9: Avoid

8.5.2 Installation Rules

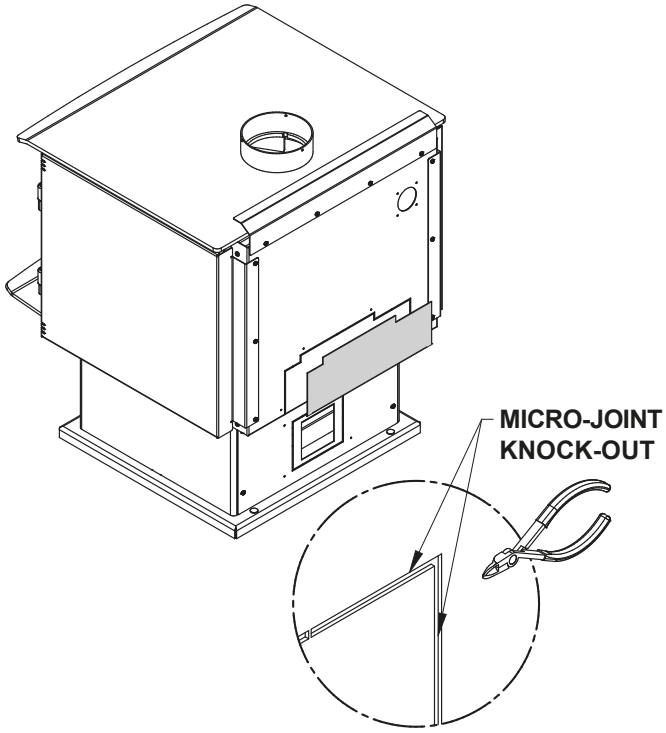
Failure to install the chimney connector properly can result in house fires. The rules below are based on those found in the CSA B365 installation code. Carefully follow these installation instruction rules, or those enforced by the local code.

- Maximum overall length of horizontal pipe: 10' (3 m) including elbows.
- Minimum clearance from combustible material: 18" (450 mm). The minimum clearance may be reduced by 50%, to 9" (225 mm) if proper heat shield is installed either on the pipe or on the combustible surface.

- The assembly should be as short and direct as possible between the stove and chimney. The use of two 45º elbows is preferable to a single 90º elbow.
- The minimum overall height of the chimney system, measured from the stove top to the exterior termination cap of the chimney should be at least 12’ (3.66 m). A chimney which is too short may lack the “tunnel effect” required to obtain a proper draft.
- Maximum number of 90º elbows: 2.
- Maximum unsupported horizontal length: 3’ (1 m).
- Galvanized flue pipes must not be used because the coatings vaporize at high temperatures and release dangerous gases. Use black painted flue pipes.
- Flue pipes must be at least 24 gauge in thickness.
- Flue pipe joints should overlap at least 1 ¼" (30 mm).
- Each joint in the assembly must be fastened with at least three screws.
- The installation must allow expansion: elbows in assemblies allow for expansion; straight assemblies should include an inspection wrap with one end unfastened, or a telescopic section.
- Minimum upward slope towards the chimney: ¼ in/ft. (20 mm/m).
- One end of the assembly must be securely fastened to the flue collar with 3 sheet metal screws and the other end securely fastened to the chimney.
- There must be provision for cleaning of the pipes, either through a clean out or by removal of the pipe assembly. Removal of the assembly should not require that the stove be moved.
- The male ends of the sections must be oriented towards the appliance so that ashes and condensation stay inside the pipe.
- A flue pipe must never pass through a combustible floor or ceiling or through an attic, roof space, closet or concealed space. Where passage through a wall or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.
- The chimney connector must be clean and in good condition.

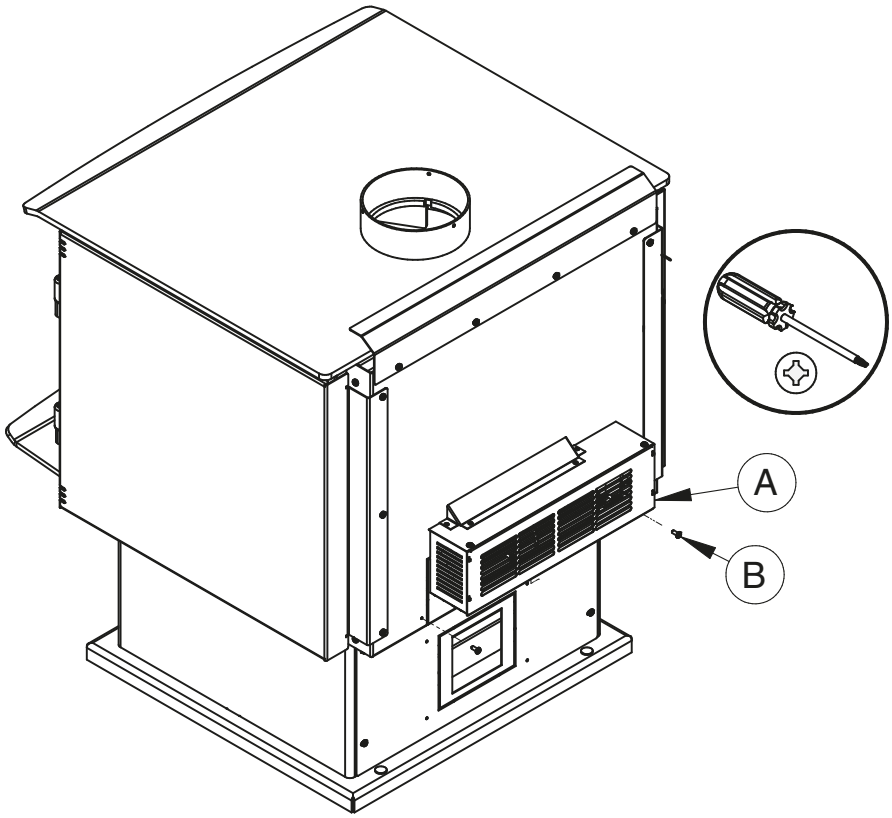
APPENDIX 1: BLOWER INSTALLATION

1. Remove the backplate by cutting the knockouts with pliers.



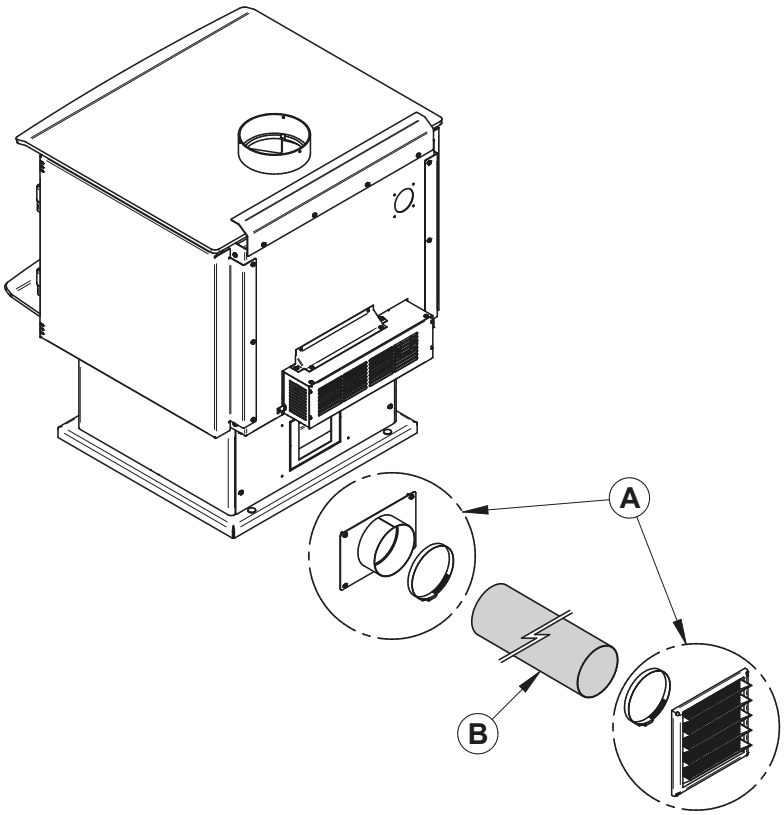
2. Screw the blower **(A)** in place using the screws **(B)** included in the installation manual.

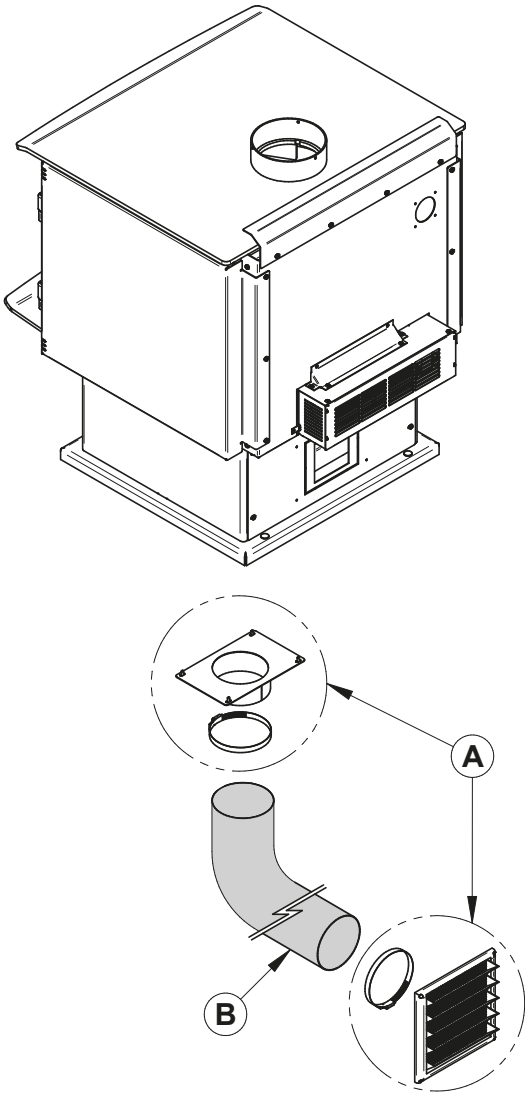
Ensure that the blower's power cord is not in contact with any surface of the stove to prevent electrical shock or fire damage. Do not run the power cord beneath the stove.



APPENDIX 2: OPTIONAL FRESH AIR INTAKE KIT INSTALLATION

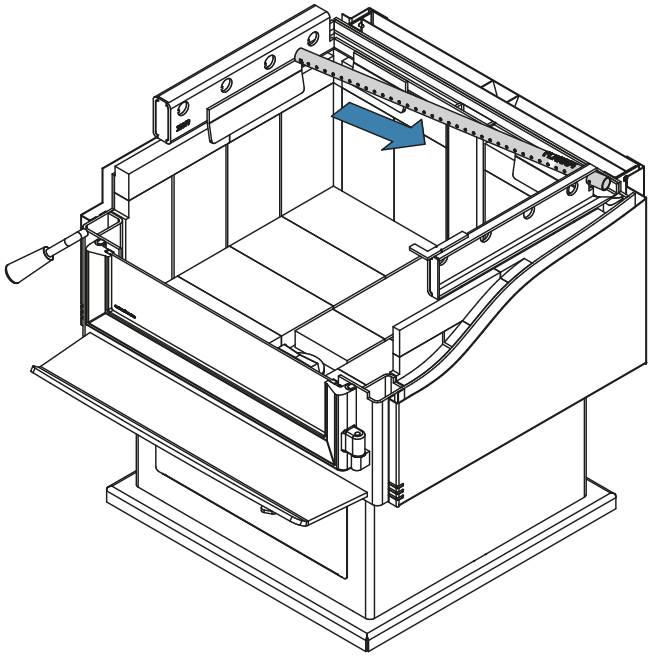
This mobile home approved stove requires the installation of a fresh air intake kit **(A)** and an insulated fresh air intake pipe (HVAC type, must meet ULC S110 or UL 181 class 0 or class 1) **(B)**, sold separately. Refer to air intake kit installation instructions for more details.



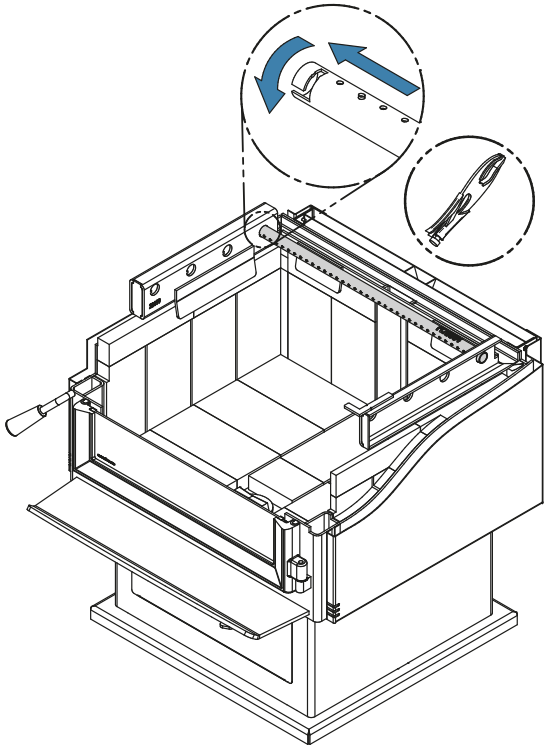


APPENDIX 3: AIR TUBES AND BAFFLE INSTALLATION

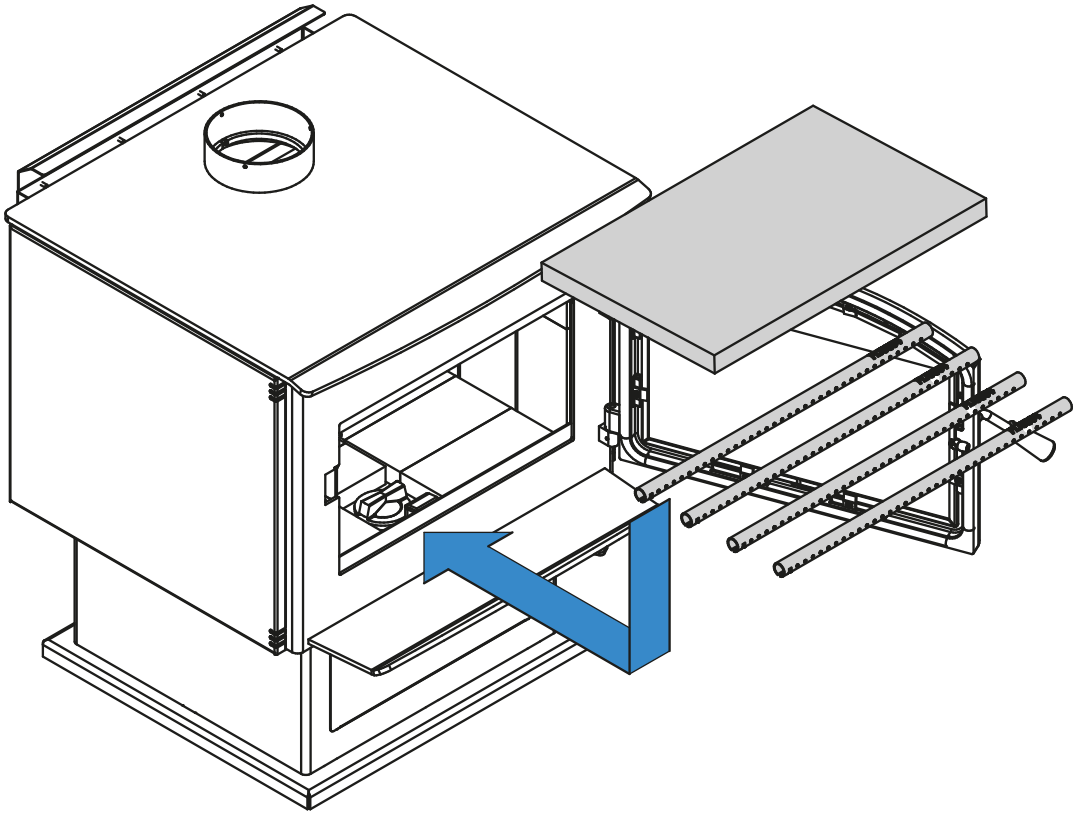
1. Starting with the rear tube, lean and insert the right end of the secondary air tube into the rear right channel hole. Then lift and insert the left end of the tube into the rear left channel.

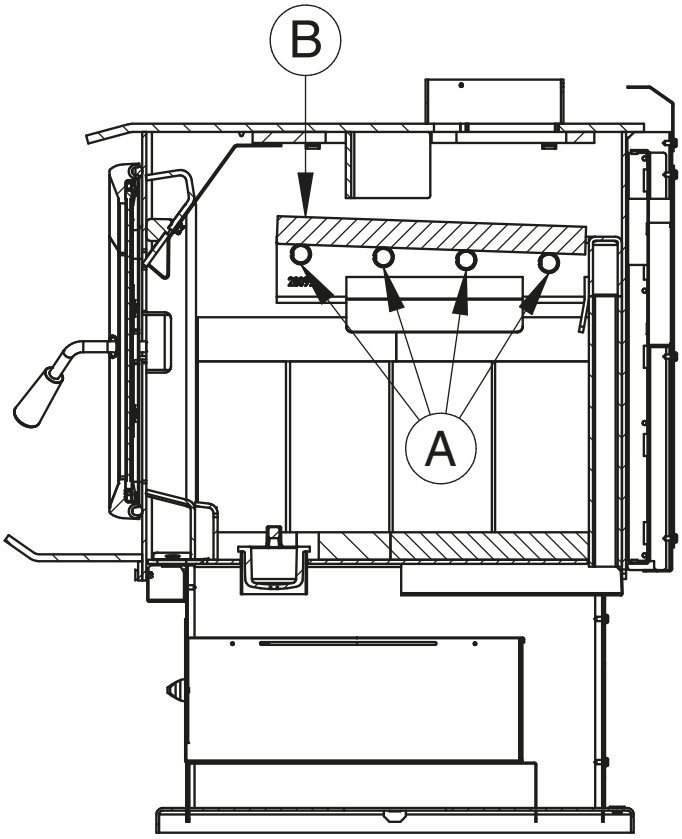


2. Align the notch in the left end of the tube with the key of the left air channel hole. Using a « Wise grip » hold the tube and lock it in place by turning the tube as shown. Make sure the notch reaches the end of the key way.
3. Put the baffle in place.
4. Repeat steps 1 and 2 for the three other tubes.
5. To remove the tubes use the above steps in reverse order.



Note that secondary air tubes **(A)** *can be replaced without removing the baffle board* **(B)** *and that all tubes are identical.*





SBI LIMITED LIFETIME WARRANTY

The warranty of the manufacturer extends only to the original retail purchaser and is not transferable. This warranty covers brand new products only, which have not been altered, modified nor repaired since shipment from the factory. Proof of purchase (dated bill of sale), model name and serial number must be supplied when making any warranty claim to the dealer.

This warranty applies to normal residential use only. This warranty is void if the unit is used to burn material other than cordwood (for which the unit is not certified by EPA) and void if not operated according to the owner's manual. Damages caused by misuse, abuse, improper installation, lack of maintenance, over firing, negligence or accident during transportation, power failures, downdrafts, venting problems or underestimated heating area are not covered by this warranty. 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.

This warranty does not cover any scratch, corrosion, distortion, or discoloration. Any defect or damage caused by the use of unauthorized or other than the original parts voids 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. 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. 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 uncommon, 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 lifetime coverage. This warranty applies to products purchased after March 1st 2019.

DESCRIPTION	**WARRANTY APPLICATION***	
	PARTS	**LABOUR**
Combustion chamber (welds only) and cast iron door frame.	Lifetime	5 years
Ceramic glass**, plating (manufacturing defect**) and convector air mate.	Lifetime	N/A
Surrounds, heat shields, ash drawer, steel legs, pedestal, trims (aluminum extrusions), C-Cast baffle**, vermiculite baffle**, secondary air tubes**, removable stainless steel combustion chamber, deflectors and supports.	7 years	N/A
Handle assembly, glass retainers and air control mechanism.	5 years	3 years
Removable carbon steel combustion chamber components.	5 years	N/A
Standard and optional blower, heat sensors, switches, rheostat, wiring and electronics.	2 years	1 year
Paint (peeling**), gaskets, insulation, ceramic fiber blankets, firebricks and other options.	1 year	N/A
All parts replaced under the warranty.	90 days	N/A

*Subject to limitations above. **Picture required.

Labour cost and repair work to the account of the manufacturer are based on a predetermined rate schedule and must not exceed the wholesale price of the replacement parts.

Shall your unit or a component be defective, contact immediately your dealer. To accelerate processing of your warranty claim, make sure to have on hand the following information when calling:

- Your name, address and telephone number;
- Bill of sale and dealer's name;
- Installation configuration;
- 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 an Authorization Number from your dealer. Any merchandise shipped to our plant without authorization will be refused automatically and returned to the sender.

Stove Builder International inc.
250, De Copenhague street,
St-Augustin-de-Desmaures (Québec), Canada
G3A 2H3
418-908-8002

POLYCONTROLS
INTEGRATION • CALIBRATION • INSTRUMENTATION

CLAS 2009-02

Conseil canadien des normes
Laboratoire accrédité
Portée d'accréditation 655

ISO/IEC 17025-2005

CERTIFICAT D'ÉTALONNAGE # 8719

Date d'étalonnage : 2018-10-26
Date d'émission du certificat : 2018-10-26

Stove Builder International
250, rue de Copenhague
Saint-Augustin-de-Desmaures, Québec, Canada
G3A 2H3

Étalonnage d'un
Débitmètre volumétrique American Meter Company DTM-200A S/N : 07J264834

CONFORMITÉ AU PROGRAMME DE QUALITÉ

Tous les étalonnages sont effectués conformément au manuel d'assurance qualité de Polycontrols qui est conforme à la norme ISO/IEC 17025 – 2005, à la norme ISO 9001 – 2015 ainsi qu'à tout autre exigences de qualité définies dans la description d'achat des clients.

TRAÇABILITÉ

La traçabilité des étalons de débit au National Institute of Standards and Technology, NIST, est maintenue par les laboratoires de Fluke Corporation de Phoenix, Arizona et est conforme aux normes ISO/IEC 17025, AINSI/NCSL Z540-1-1994, ISO-10012-1, MIL-STD 45662A.

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

APTITUDE EN MATIÈRE DE MESURE ET D'ÉTALONNAGE - CMC

Les références utilisées pour l'étalonnage de débit ont une incertitude de ±0.2% de la lecture pour les mesures entre 5 SCCM à 10 SLPM, ±0.3% de la lecture pour les mesures entre 10 SLPM à 30 SLPM, ±0.2% de la lecture pour les mesures entre 30 SLPM à 3000 SLPM, ±0.3% de la lecture pour les mesures supérieures à 3000 SLPM jusqu'à 6000 SLPM et ±0.5% pour les mesures inférieures à 5 SCCM jusqu'à concurrence de 1 SCCM, équivalent air ou azote. Les incertitudes exprimées sont élargies avec un facteur d'élargissement k = 2, et ce, pour un niveau de confiance d'environ 95 %, dans l'hypothèse d'une distribution normale incluant la résolution de l'instrument. Le rapport d'incertitude des essais (RIE) de cet étalonnage respecte un ratio de 4:1 à moins d'indication contraire.

SOMMAIRE DES CONDITIONS DE L'INSTRUMENT EN TEST

Conditions initiales	En bon état - vitre légèrement brisée à la réception
Travail Effectué	Étalonnage de l'instrument
	Lectures Initiales = Lectures finales, aucun ajustement
Résultats	Lectures finales dans les tolérances
Remarques	Fréquence d'étalonnage aux 12 mois

Métrologiste

Responsable du laboratoire

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ISO/IEC 17025-2005

Certificat d'étalonnage # 8719

Numéro de série:	07J264834	Station de mesure:	3
Date d'étalonnage:	2018-10-26	Procédure:	POS-CAL-005
Identification de l'instrument:	SBI-103		

Instrument de mesure de référence utilisé pour l'étalonnage final

Description	Modèle	# Série	Traçabilité	Date dû
DHI molbloc (30 slpm)	3E4-VCR-V-Q	2403	1500237464	2019-04-26
DHI molbox1	Molbox1	755	1500237197	2019-04-25
RTD Mist	M22	2208102	2018002234	2019-04-11
Module 44.5 PSI avec Baro 163671	Module 30	160659	2018002180	2019-04-12

Spécifications finales de l'appareil

Gaz	Air
Température d'opération	
Pression à l'entrée	
Pression à la sortie	
Température de référence	
Pression de référence	
Étendue d'échelle	0-200 ACFH
Signaux Entrée/Sortie	-
Alimentation	
Tolérance	±2 %F.S.

Condition d'étalonnage

Gaz	Air
Température ambiante	21 °C
Pression ambiante	1017.99 mbar
Orientation	Horizontale
Élastomère	Viton
Valve	Viton

Lectures finales

Débit du test ACFH	Instrument en test ft³	Valeurs mesurées Pression PSIA	Température °C	Référence ft³	Référence calculée ft³	Erreur calculée ft³	Tolérance acceptable ft³	TUR
5.0526	0.8500	14.7758	21.56	0.8451	0.8418	0.0082	0.6665	>4
9.9963	1.6780	14.7774	21.51	1.6716	1.6646	0.0134	0.6661	>4
15.1919	2.5580	14.7782	21.47	2.5427	2.5316	0.0264	0.6666	>4
25.0425	4.2230	14.7815	21.41	4.1908	4.1707	0.0523	0.6662	>4
40.0833	6.7640	14.7872	21.40	6.7048	6.6700	0.0940	0.6656	>4

Bernard Poirier
Métrologiste

Signature

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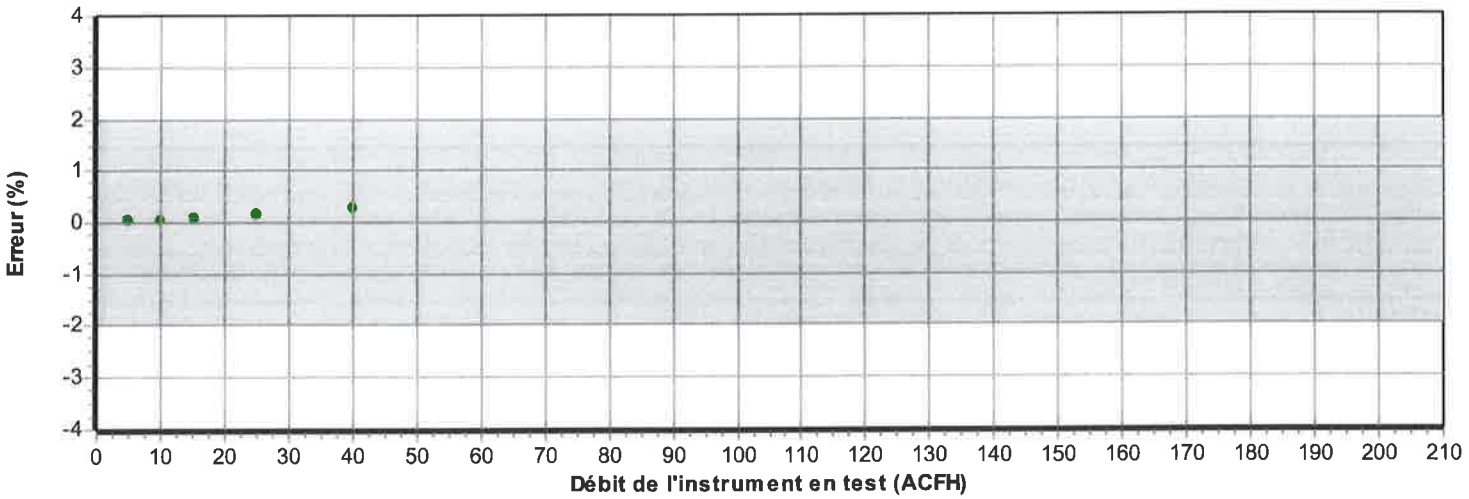
Certificat d'étalonnage # 8719

Numéro de série:	07J264834	Station de mesure:	3
Date d'étalonnage:	2018-10-26	Procédure:	POS-CAL-005
Identification de l'instrument:	SBI-103		

Résultats finaux



- La mesure (et son incertitude) se situe dans les tolérances
- La mesure (et son incertitude) se situe hors tolérance
- La mesure (et son incertitude) ne rencontre pas la marge de sécurité tel que spécifié dans le document G-8 de l'ILAC

Bernard Poirier
Métrologiste

Signature

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	American Meter Company
Model:	DTM-200A
Serial Number:	SBI-046 (90R054300)

Previous Calibration Comparision

Date	2018-10-10	Acceptable Deviation (5%)	Deviation
y Factor	1.013	0.05065	0.005
Acceptance	Acceptable		

Average Gas Meter y Factor

1.008

Calibration Date:	05-24-19
Calibrated by:	Claude Paré
Calibration Frequency:	6-month
Next Calibration Due:	11-22-19
Instrument Range:	1.000 cfm
Standard Temp.:	72.5 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.9 "Hg
Signature/Date:	2019-05-24

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.005
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	07J264834	
	Calib. Date	26-oct-18	
	Calib. Value	0.992	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	999.6	1005.1	1011.9
Final Reference Meter	1004.703	1011.464	1018.046
Initial DGM	780.23	785.675	792.365
Final DGM	785.266	791.923	798.369
Temp. Ref. Meter (°F), Tr	71.6	71.8	71.6
Temperature DGM (°F), Td	70.1	70.4	70.4
Time (Minutes)	43.0	39.0	31.0
Net Volume Ref. Meter, Vr	5.103	6.364	6.146
Net Volume DGM, Vd	5.036	6.248	6.004
Gas Meter y Factor =	**1.002**	**1.008**	**1.013**
Gas Meter y Factor Deviation (from avg.)	0.005	0.000	0.005
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.117116279

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

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	American Meter Company
Model:	DTM-200A
Serial Number:	SBI-047 (98Z332226)

Previous Calibration Comparision

Date	2018-10-10	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.012	0.0506	0.008
Acceptance	Acceptable		

Average Gas Meter y Factor	
1.004	

Calibration Date:	05-23-19
Calibrated by:	Claude Paré
Calibration Frequency:	6-month
Next Calibration Due:	11-21-19
Instrument Range:	1.000 cfm
Standard Temp.:	74.8 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	30 "Hg
Signature/Date:	2019-05-23

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.007
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	07J264834	
	Calib. Date	26-oct-18	
	Calib. Value	0.992	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	979.6	985.1	990.8
Final Reference Meter	984.685	990.234	995.808
Initial DGM	897.544	903.012	908.652
Final DGM	902.582	908.077	913.551
Temp. Ref. Meter (°F), Tr	74.6	75.0	75.0
Temperature DGM (°F), Td	73.7	73.5	73.5
Time (Minutes)	41.0	32.0	25.0
Net Volume Ref. Meter, Vr	5.085	5.134	5.008
Net Volume DGM, Vd	5.038	5.065	4.899
Gas Meter y Factor =	**1.000**	**1.003**	**1.011**
Gas Meter y Factor Deviation (from avg.)	0.005	0.002	0.007
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.122878049

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

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	Rockwell International
Model:	S-275
Serial Number:	9388
Asset No.	SBI-276

Average Gas Meter y Factor
1.000

Calibration Date:	05-27-19
Calibrated by:	Claude Paré
Calibration Frequency:	6-month
Next Calibration Due:	11-25-19
Instrument Range:	1.000 cfm
Standard Temp.:	71.5 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	30 "Hg
Signature/Date:	2019-05-27

Previous Calibration Comparision

Date	2019-04-09	Acceptable Deviation (5%)	Deviation
y Factor	0.995	0.04975	0.005
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.001
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	07J264834	
	Calib. Date	26-oct-18	
	Calib. Value	0.992	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	19.700	25.100	30.700
Final Reference Meter	24.753	30.169	35.877
Initial DGM	957.530	962.910	968.503
Final DGM	962.535	967.940	973.648
Temp. Ref. Meter (°F), Tr	71.5	71.9	72.3
Temperature DGM (°F), Td	71.5	72.2	72.9
Time (Minutes)	59.0	36.0	27.0
Net Volume Ref. Meter, Vr	5.053	5.069	5.177
Net Volume DGM, Vd	5.005	5.03	5.145
Gas Meter y Factor =	**1.002**	**1.000**	**0.999**
Gas Meter y Factor Deviation (from avg.)	0.001	0.000	0.001
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.084830508

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

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	American Meter Company
Model:	DTM-200A
Serial Number:	SBI-046 (90R054300)

Previous Calibration Comparision

Date	2019-05-24	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.008	0.0504	0.004
Acceptance	Acceptable		

Average Gas Meter y Factor	**1.012**

Current Calibration

Acceptable y Deviation	0.050
Maximum y Deviation	0.001
Acceptance	Acceptable

Calibration Date:	06-11-19		
Calibrated by:	Claude Paré		
Calibration Frequency:	Post test calibration		
Next Calibration Due:			
Instrument Range:	1.000	cfm	
Standard Temp.:	78.9	oF	
Standard Press.:	29.92	"Hg	
Barometric Press.:	29.7	"Hg	
Signature/Date:		2019-06-11	

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	07J264834	
	Calib. Date	26-oct-18	
	Calib. Value	0.992	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	59.100	64.400	69.900
Final Reference Meter	64.165	69.58	75.143
Initial DGM	339.981	345.157	350.541
Final DGM	344.928	350.225	355.673
Temp. Ref. Meter (°F), Tr	78.6	78.5	78.2
Temperature DGM (°F), Td	77.1	77.0	76.7
Time (Minutes)	33.0	34.0	34.0
Net Volume Ref. Meter, Vr	5.065	5.180	5.243
Net Volume DGM, Vd	4.947	5.068	5.132
Gas Meter y Factor =	**1.013**	**1.011**	**1.011**
Gas Meter y Factor Deviation (from avg.)	0.001	0.000	0.001
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.149909091

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

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	American Meter Company
Model:	DTM-200A
Serial Number:	SBI-047 (98Z332226)

Previous Calibration Comparision

Date	2019-05-23	Acceptable Deviation (5%)	Deviation
y Factor	1.004	0.0502	0.002
Acceptance	Acceptable		

Average Gas Meter y Factor
1.006

Calibration Date:	06-11-19
Calibrated by:	Claude Paré
Calibration Frequency:	Post test calibration
Next Calibration Due:	
Instrument Range:	1.000 cfm
Standard Temp.:	77 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.7 "Hg
Signature/Date:	2019-06-11

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	26-oct-18	
	Calib. Value	0.992	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	38.500	43.900	50.400
Final Reference Meter	43.673	50.113	56.562
Initial DGM	454.07	459.389	465.797
Final DGM	459.166	465.515	471.866
Temp. Ref. Meter (°F), Tr	75.5	76.4	77.0
Temperature DGM (°F), Td	76.2	76.1	76.1
Time (Minutes)	35.0	44.0	43.0
Net Volume Ref. Meter, Vr	5.173	6.213	6.162
Net Volume DGM, Vd	5.096	6.126	6.069
Gas Meter y Factor =	**1.008**	**1.006**	**1.006**
Gas Meter y Factor Deviation (from avg.)	0.002	0.001	0.001
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.1456

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

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer:	Rockwell International
Model:	S-275
Serial Number:	9388
Asset No.	SBI-276

Average Gas Meter y Factor
0.998

Calibration Date:	06-12-19
Calibrated by:	Claude Paré
Calibration Frequency:	Post test calibration
Next Calibration Due:	
Instrument Range:	1.000 cfm
Standard Temp.:	73 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	30.1 "Hg
Signature/Date:	2019-06-12

Previous Calibration Comparision

Date	2019-05-27	Acceptable	
		Deviation (5%)	Deviation
y Factor	1.000	0.05	0.002
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.002
Acceptance	Acceptable

Reference Standard *			
Standard	Model	Standard Test Meter	
Calibrator	S/N	07J264834	
	Calib. Date	26-oct-18	
	Calib. Value	0.992	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	82.700	89.600	96.900
Final Reference Meter	89.377	96.644	103.413
Initial DGM	20.085	26.933	34.168
Final DGM	26.713	33.918	40.645
Temp. Ref. Meter (°F), Tr	72.4	72.1	72.1
Temperature DGM (°F), Td	71.8	71.3	71.4
Time (Minutes)	38.0	40.0	37.0
Net Volume Ref. Meter, Vr	6.677	7.044	6.513
Net Volume DGM, Vd	6.6275	6.985	6.4775
Gas Meter y Factor =	**0.998**	**0.999**	**0.996**
Gas Meter y Factor Deviation (from avg.)	0.001	0.001	0.002
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.174407895

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

Unit break-in period

Total conditionning time (h)	52.13

Model tested: 3.3 Series

Identification number: Osburn 3300 - Proto - A1.1

Date	Burn cycle	Test run (#)	Duration (min)	Av. Flue (°F)	Av. Room (°F)	Av. Tunnel (°F)	Load type (-)	Fuel added (lbs)	Moisture (%)
2019-05-21	Preload	NA	170	606.4	76.3	128.0	Kindling & SUF	13.87	15
	Condition		-	-	-	-	High fire	27.87	19.2
	Load		541	334.7	75.5	98.0	Medium fire	33.29	19.3
2019-05-22	Preload	NA	169	571.8	76.0	130.3	Kindling & SUF	13.88	15.6
	Condition		12	479.3	82.1	128	High fire	27.98	20.3
	Load		661	287.8	81.0	96.7	Medium fire	33.38	21.2
2019-05-27	Preload	NA	156	618.7	76.0	132.5	Kindling & SUF	13.98	15.3
	Condition		18	462.5	77.4	117	High fire	27.99	21.0
	Load		581	308.3	77.0	95.4	Medium fire	32.78	20.0
2019-05-28	Preload	NA	167	575.1	78.1	128.0	Kindling & SUF	13.96	15.8
	Condition		12	443.5	80	117.4	High fire	28.00	21
	Load		641	292.5	78.8	95.3	Medium fire	33.28	20.3
	Preload	NA					Kindling & SUF		
	Condition						High fire		
	Load						Medium fire		
	Preload	NA					Kindling & SUF		
	Condition						High fire		
	Load						Medium fire		

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	25.30	0.2857	3.59	16.38	426.884	75.7946
1	24.78	0.2575	3.24	17.19	492.723	75.9509
2	24.28	0.3446	4.13	16.23	560.144	75.9389
3	23.88	0.4435	6.62	14.75	555.946	75.7274
4	23.72	0.5109	8.18	11.51	503.118	75.6568
5	23.57	0.5725	5.05	14.54	459.732	75.6126
6	23.41	0.5715	4.48	15.66	444.574	75.5895
7	23.27	0.5018	5.31	15.04	445.072	75.2458
8	23.08	0.4289	6.47	14.01	454.973	75.3293
9	22.87	0.3571	7.93	12.79	483.995	75.2175
10	22.62	0.2892	10.38	10.64	522.676	74.9491
11	22.40	0.2254	11.38	9.39	540.889	74.6995
12	22.18	0.1828	10.93	9.66	541.164	74.7163
13	21.97	0.1873	10.12	10.41	537.659	74.5501
14	21.75	0.2068	9.58	10.95	534.341	74.4917
15	21.49	0.2103	10.98	10.05	558.866	74.6211
16	21.21	0.1504	13.27	8.02	590.836	74.4477
17	20.89	0.1389	15.23	6.07	622.584	74.3732
18	20.58	0.185	16.3	4.81	640.068	74.2741
19	20.26	0.187	16.24	4.87	643.914	74.4943
20	19.97	0.1504	15.71	5.41	643.68	74.1973
21	19.68	0.1214	15.38	5.79	642.748	74.2449
22	19.38	0.1115	15.2	5.98	645.433	74.2951
23	19.09	0.1046	15.22	6.01	649.368	74.1447
24	18.82	0.0995	15.35	5.88	651.064	74.5037
25	18.52	0.1018	15.52	5.73	654.858	74.8327
26	18.21	0.1078	15.73	5.53	658.761	75.1511
27	17.94	0.1135	15.72	5.53	663.996	75.4129
28	17.61	0.1207	15.87	5.39	666.363	75.546
29	17.37	0.1287	15.91	5.3	668.957	75.9471
30	17.08	0.1332	15.94	5.27	669.757	75.9024
31	16.78	0.1392	15.98	5.2	670.286	76.2286
32	16.48	0.1484	16.02	5.14	672.144	76.7454
33	16.20	0.1523	15.98	5.14	672.477	77.2346
34	15.92	0.1589	15.94	5.16	671.834	77.6259
35	15.62	0.1656	15.78	5.28	672.105	77.202
36	15.34	0.1751	15.6	5.42	669.948	77.3736
37	15.08	0.187	15.37	5.58	670.102	77.1516
38	14.80	0.1951	15.12	5.82	669.391	77.8049
39	14.53	0.1846	15.01	5.96	667.022	78.1857
40	14.26	0.1748	14.96	6	666.032	78.4689

41	13.98	0.1634	15.02	5.95	664.556	78.6457
42	13.70	0.1518	15.23	5.75	667.34	78.8522
43	13.45	0.15	15.27	5.67	667.6	78.6604
44	13.15	0.1445	15.41	5.54	668.695	78.1974
45	12.88	0.1448	15.52	5.41	669.142	78.5778
46	12.61	0.1471	15.5	5.42	670.534	78.9561
47	12.35	0.1495	15.46	5.43	669.741	78.8243
48	12.07	0.151	15.38	5.46	670.263	78.5144
49	11.80	0.1512	15.33	5.53	669.783	78.3372
50	11.55	0.1509	15.33	5.5	670	78.6752
51	11.28	0.1479	15.28	5.54	667.975	78.7276
52	11.02	0.144	15.29	5.52	666.765	79.2089
53	10.77	0.1403	15.21	5.57	666.658	79.5063
54	10.50	0.1354	15.08	5.71	663.075	79.8334
55	10.25	0.1315	14.98	5.81	659.574	80.0014
56	10.01	0.1257	14.91	5.87	659.775	80.2162
57	9.76	0.1204	14.83	5.94	659.041	80.2544
58	9.52	0.1228	14.79	5.93	657.128	80.5033
59	9.25	0.1246	14.78	5.93	656.656	79.6404
60	9.01	0.1234	14.75	5.93	655.303	79.7648
61	8.78	0.121	14.69	5.99	654.146	80.1588
62	8.53	0.1162	14.71	5.96	652.958	79.735
63	8.30	0.116	14.69	5.94	652.933	80.3294
64	8.07	0.1131	14.64	5.95	651.549	79.8431
65	7.84	0.1118	14.54	6.03	649.627	80.0665
66	7.59	0.1092	14.47	6.07	648.044	80.3947
67	7.37	0.1071	14.39	6.13	645.807	79.5706
68	7.15	0.1054	14.29	6.19	643.188	80.1164
69	6.92	0.1039	14.12	6.32	639.602	80.3722
70	6.71	0.1015	13.93	6.5	638.657	79.9329
71	6.50	0.1015	13.74	6.67	631.672	80.0317
72	6.30	0.1009	13.51	6.87	627.992	79.2209
73	6.10	0.0996	13.28	7.08	622.338	79.7557
74	5.91	0.0992	13	7.33	617.864	80.2545
75	5.72	0.0979	12.8	7.5	614.415	80.0194
76	5.53	0.1015	12.71	7.59	610.98	80.2908
77	5.34	0.1096	12.71	7.55	610.657	80.4451
78	5.15	0.1073	12.71	7.52	608.821	80.667
79	4.99	0.1073	12.67	7.55	607.459	80.7947
80	4.78	0.1092	12.68	7.55	605.437	80.8688
81	4.60	0.1135	12.69	7.52	605.463	80.969
82	4.41	0.1101	12.66	7.55	603.84	80.7014
83	4.26	0.1065	12.61	7.58	601.162	80.7181

84	4.08	0.1026	12.45	7.71	601.38	80.6789
85	3.92	0.0957	12.33	7.78	597.335	80.8001
86	3.76	0.0865	12.04	7.98	591.962	80.7561
87	3.63	0.0803	11.62	8.28	586.29	80.9373
88	3.45	0.0773	11.27	8.49	580.437	80.881
89	3.32	0.0742	10.97	8.67	573.873	80.7269
90	3.22	0.0739	10.54	9.1	566.509	80.5115
91	3.09	0.0723	10.19	9.5	558.038	80.7013
92	2.97	0.0676	9.88	9.85	551.951	80.754
93	2.85	0.0639	9.6	10.18	546.796	80.7172
94	2.75	0.0618	9.45	10.36	543.308	80.5577
95	2.64	0.0578	9.43	10.42	540.033	80.7123
96	2.53	0.0593	9.36	10.47	534.796	80.7049
97	2.41	0.0576	9.36	10.48	532.041	80.5156
98	2.30	0.0584	9.39	10.44	529.821	80.6804
99	2.21	0.0609	9.36	10.47	526.172	80.6498
100	2.12	0.0571	9.35	10.48	523.849	80.6605
101	2.01	0.0554	9.34	10.5	520.976	80.2733
102	1.92	0.0551	9.29	10.56	518.588	80.34
103	1.82	0.0562	9.22	10.66	516.249	80.3637
104	1.72	0.0462	9.15	10.73	514.129	80.4704
105	1.66	0.0342	8.71	11.17	508.418	80.3637
106	1.57	0.0304	8.27	11.63	504.66	79.721
107	1.51	0.0332	7.96	12	499.954	80.0153
108	1.45	0.036	7.79	12.21	495.832	80.1768
109	1.39	0.0412	7.66	12.39	490.257	80.2533
110	1.31	0.045	7.6	12.48	486.442	80.2166
111	1.24	0.0492	7.54	12.57	482.857	80.1205
112	1.18	0.0493	7.54	12.61	478.421	79.118
113	1.12	0.0503	7.51	12.66	475.105	79.2806
114	1.06	0.0537	7.47	12.72	469.992	78.8995
115	0.98	0.0607	7.5	12.71	466.052	79.3877
116	0.94	0.066	7.53	12.68	464.469	79.4728
117	0.87	0.0709	7.6	12.62	461.465	79.5701
118	0.81	0.0732	7.62	12.59	459.154	79.393
119	0.75	0.0768	7.64	12.55	457.233	79.4219
120	0.70	0.0764	7.57	12.57	455.101	79.4717
121	0.64	0.0787	7.38	12.74	452.643	79.2096
122	0.57	0.0892	7.28	12.82	450.779	79.0375
123	0.53	0.1068	7.26	12.84	448.137	78.6726
124	0.47	0.1151	7.25	12.85	446.464	78.4399
125	0.42	0.1203	7.2	12.89	443.65	78.869
126	0.37	0.1201	7.08	12.99	441.345	78.6932

127	0.32	0.1242	6.94	13.11	438.296	78.857
128	0.27	0.1306	6.89	13.15	436.996	78.1126
129	0.21	0.1465	6.88	13.16	435.756	77.9809
130	0.16	0.1662	6.88	13.14	433.605	77.6735
131	0.12	0.1606	6.9	13.15	430.719	78.2615
132	0.08	0.1362	6.78	13.28	430.239	78.1781
133	0.02	0.122	6.51	13.62	428.6	78.1757
134	0.00	0.1179	6.24	13.96	427.042	78.1207

Stove Builder International Inc.

Manufacturer:	SBI
Model:	3.3 Series
Date:	06-03-19
Run:	1
Control #:	G103994967
Test Duration:	134
Output Category:	High

Technicians: _____

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Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	70.4%	75.9%
Combustion Efficiency	98.9%	98.9%
Heat Transfer Efficiency	71%	76.7%

Output Rate (kJ/h)	60,132	57,041	**(Btu/h)**
Burn Rate (kg/h)	4.29	9.46	**(lb/h)**
Input (kJ/h)	85,354	80,968	**(Btu/h)**

Test Load Weight (dry kg)	9.59	21.13	**dry lb**
MC wet (%)	16.5		
MC dry (%)	19.76		
Particulate (g)	0		
CO (g)	178		
Test Duration (h)	2.23		

Emissions	**Particulate**	**CO**
g/MJ Output	0.00	1.32
g/kg Dry Fuel	0.00	18.55
g/h	0.00	79.63
lb/MM Btu Output	0.00	3.08

Air/Fuel Ratio (A/F)	9.37

VERSION: **2.4** **2010-04-15**

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	33.48	0.23	4.73	15.07	440.5	79.8
1	33.39	0.17	3.65	16.43	390.4	79.5
2	33.29	0.18	3.32	16.51	368.5	79.2
3	32.95	0.20	2.23	17.83	442.6	79.3
4	32.42	0.28	2.38	18.02	628.5	79.5
5	32.09	0.45	3.98	16.77	616.7	79.6
6	31.76	0.53	9.44	12.28	634.2	79.3
7	31.42	0.56	13.51	7.40	664.4	78.7
8	31.10	0.66	15.14	5.38	666.4	78.9
9	30.83	0.75	15.97	4.39	639.6	78.5
10	30.57	0.71	15.98	4.26	618.3	79.2
11	30.31	0.49	15.31	5.07	608.9	79.6
12	30.06	0.36	14.86	5.85	605.1	80.1
13	29.79	0.30	14.71	6.15	604.2	80.2
14	29.55	0.27	14.65	6.29	604.6	80.6
15	29.29	0.25	14.69	6.30	604.5	80.5
16	29.03	0.23	14.70	6.31	605.7	80.4
17	28.79	0.22	14.71	6.29	589.7	80.5
18	28.58	0.26	14.48	6.52	570.1	80.4
19	28.41	0.20	13.72	7.30	550.7	80.3
20	28.25	0.14	12.47	8.51	534.9	80.2
21	28.08	0.11	11.34	9.68	522.4	80.4
22	27.89	0.09	10.66	10.41	512.2	80.6
23	27.75	0.09	10.27	10.79	503.6	80.8
24	27.60	0.09	10.01	11.03	496.0	81.0
25	27.44	0.09	9.84	11.19	488.4	80.4
26	27.27	0.09	9.72	11.29	483.5	80.1
27	27.13	0.09	9.64	11.37	480.1	79.7
28	26.98	0.10	9.59	11.43	476.9	79.5
29	26.82	0.10	9.60	11.42	474.4	79.5
30	26.67	0.10	9.62	11.41	471.9	79.3
31	26.51	0.10	9.59	11.40	468.7	78.9
32	26.34	0.11	9.54	11.46	466.4	78.7
33	26.18	0.12	9.52	11.46	464.4	78.6
34	26.03	0.11	9.54	11.47	463.0	79.0
35	25.86	0.11	9.55	11.45	461.3	79.0
36	25.72	0.11	9.60	11.41	460.4	78.7
37	25.55	0.10	9.63	11.40	460.9	78.5
38	25.40	0.10	9.70	11.35	458.9	78.0
39	25.26	0.10	9.75	11.31	458.3	77.6
40	25.11	0.09	9.86	11.23	457.7	77.7

41	24.95	0.09	9.96	11.14	458.7	77.6
42	24.79	0.09	10.02	11.10	458.2	77.6
43	24.62	0.09	10.10	10.99	460.4	77.9
44	24.47	0.09	10.14	10.95	461.3	77.9
45	24.30	0.09	10.25	10.85	462.6	78.2
46	24.15	0.09	10.36	10.73	463.9	78.0
47	23.98	0.09	10.45	10.64	465.2	77.9
48	23.82	0.10	10.53	10.56	467.0	77.8
49	23.63	0.0995	10.61	10.47	468.51	77.9299
50	23.46	0.1034	10.65	10.42	468.663	77.5781
51	23.30	0.1017	10.73	10.36	469.645	77.7007
52	23.13	0.1025	10.76	10.31	470.205	77.9053
53	22.98	0.1065	10.75	10.31	470.247	78.0197
54	22.79	0.1081	10.78	10.29	471.865	77.7979
55	22.64	0.1054	10.92	10.18	473.261	78.1351
56	22.48	0.1059	10.99	10.08	474.961	78.0515
57	22.30	0.105	11.13	9.95	477.471	78.1251
58	22.11	0.114	11.19	9.86	477.992	78.2865
59	21.95	0.117	11.24	9.82	478.825	78.2581
60	21.77	0.1121	11.32	9.75	480.791	78.2195
61	21.59	0.117	11.38	9.68	482.148	78.1492
62	21.42	0.1179	11.45	9.62	482.062	78.3578
63	21.24	0.117	11.47	9.63	482.96	78.2284
64	21.10	0.117	11.45	9.58	482.67	78.1043
65	20.91	0.112	11.4	9.66	483.148	78.2729
66	20.74	0.1054	11.41	9.66	482.41	78.2435
67	20.56	0.1092	11.43	9.63	481.572	78.4352
68	20.40	0.1089	11.44	9.63	481.338	78.4732
69	20.22	0.1023	11.46	9.6	480.867	78.4346
70	20.06	0.0971	11.46	9.59	480.76	78.6889
71	19.88	0.0917	11.44	9.59	477.916	78.5836
72	19.72	0.0878	11.42	9.63	478.751	78.4094
73	19.57	0.087	11.41	9.64	478.261	78.1918
74	19.39	0.0862	11.35	9.68	476.257	78.4571
75	19.22	0.0907	11.3	9.71	475.862	78.5938
76	19.06	0.0912	11.22	9.78	474.57	78.5364
77	18.90	0.0942	11.21	9.79	474.7	78.5397
78	18.75	0.097	11.23	9.77	474.179	78.7371
79	18.57	0.0946	11.22	9.76	473.336	78.5574
80	18.42	0.0968	11.22	9.75	471.605	78.3158
81	18.24	0.0881	11.18	9.77	470.953	78.5572
82	18.11	0.0845	11.1	9.87	470.285	78.5273
83	17.91	0.084	11.06	9.9	469.496	78.5784

84	17.79	0.0785	11.03	9.92	467.909	78.4485
85	17.64	0.0773	10.99	9.95	467.851	78.8561
86	17.48	0.0732	10.95	10.02	467.273	78.8083
87	17.33	0.0714	10.96	10.03	466.78	78.933
88	17.18	0.0695	10.97	10.02	465.509	79.1999
89	17.02	0.0693	10.99	10	465.128	78.645
90	16.86	0.0675	11.02	9.98	464.656	78.618
91	16.70	0.067	11.01	9.95	463.743	78.648
92	16.56	0.0682	11.01	9.94	463.518	78.6923
93	16.41	0.0667	11.03	9.92	463.246	78.8334
94	16.27	0.0675	11.02	9.91	462.959	78.6142
95	16.12	0.0671	11.06	9.88	462.982	78.6444
96	15.97	0.0657	11.07	9.84	462.682	78.8255
97	15.80	0.0657	11.06	9.83	462.695	78.9316
98	15.67	0.0667	11.1	9.8	461.89	78.9498
99	15.51	0.0635	11.14	9.77	461.503	78.8113
100	15.37	0.0632	11.19	9.72	461.753	78.8696
101	15.20	0.0664	11.24	9.65	463.291	78.6241
102	15.04	0.0725	11.33	9.55	464.187	78.8148
103	14.89	0.0806	11.43	9.45	466.032	78.7222
104	14.74	0.0964	11.52	9.34	466.942	79.0053
105	14.58	0.1301	11.56	9.24	469.097	78.6974
106	14.42	0.1729	11.6	9.12	469.645	78.3173
107	14.27	0.2118	11.58	9.04	471.409	78.5
108	14.11	0.2393	11.59	8.98	471.795	78.4864
109	13.96	0.2731	11.63	8.88	474.712	78.627
110	13.80	0.2782	11.65	8.86	477.27	78.5555
111	13.62	0.2956	11.78	8.73	478.92	78.8443
112	13.46	0.292	11.91	8.59	482.145	78.4383
113	13.31	0.285	12.04	8.47	483.039	78.4952
114	13.14	0.2728	12.13	8.39	483.797	78.984
115	12.96	0.2176	12.2	8.36	485.398	79.2138
116	12.79	0.2093	12.41	8.26	486.8	79.1984
117	12.61	0.2265	12.55	8.07	490.912	79.2953
118	12.45	0.2751	12.65	7.94	492.033	79.2223
119	12.28	0.2582	12.88	7.69	491.446	79.059
120	12.11	0.2289	13	7.55	488.638	79.2841
121	11.96	0.1851	12.85	7.69	484.893	79.6569
122	11.83	0.1515	12.51	8.04	481.11	79.085
123	11.68	0.1296	12.11	8.47	477.272	79.1297
124	11.54	0.1134	11.79	8.83	472.625	78.9652
125	11.41	0.1045	11.47	9.13	468.115	78.8899
126	11.28	0.099	11.16	9.45	464.176	79.0816

127	11.18	0.099	10.86	9.71	458.897	79.0369
128	11.08	0.0926	10.52	9.99	452.099	79.3229
129	10.99	0.0831	10.02	10.38	444.745	79.1732
130	10.91	0.0856	9.32	10.95	438.338	78.8234
131	10.83	0.0968	8.55	11.73	431.991	78.6479
132	10.70	0.1125	1.71	17.34	427.34	78.0675
133	10.62	0.1279	0.76	20.17	423.811	77.7293
134	10.54	0.1678	4.49	17.23	422.049	77.7588
135	10.47	0.1848	6.71	14	420.509	78.1061
136	10.34	0.1528	7.48	12.78	419.66	78.1905
137	10.29	0.1676	7.32	12.56	416.78	78.1445
138	10.17	0.1745	6.27	13.75	415.426	78.55
139	10.08	0.1779	6.34	13.82	412.198	78.4761
140	9.99	0.204	6.92	13.27	408.446	78.6233
141	9.91	0.2442	7.45	12.44	404.643	78.5971
142	9.85	0.2796	6.99	12.42	400.447	78.1877
143	9.78	0.2976	1.66	18.15	396.833	78.0949
144	9.70	0.3	6.57	13.09	393.77	78.0447
145	9.63	0.2925	6.76	12.78	389.698	78.1793
146	9.54	0.2873	6.79	12.77	386.793	78.5565
147	9.48	0.2854	6.77	12.8	384.607	78.759
148	9.43	0.2829	6.75	12.84	382.066	78.9207
149	9.38	0.284	6.71	12.91	379.555	78.9131
150	9.30	0.2815	6.73	12.93	377.67	78.6492
151	9.24	0.279	6.73	12.93	375.011	78.668
152	9.19	0.2815	6.77	12.92	373.367	78.9291
153	9.11	0.2764	6.81	12.88	371.029	78.3896
154	9.07	0.27	6.89	12.76	368.879	78.6962
155	8.99	0.2895	7.02	12.56	367.678	78.8718
156	8.93	0.2989	7.07	12.47	367.374	79.0382
157	8.87	0.3018	7.1	12.45	366.628	78.7538
158	8.80	0.2975	7.15	12.4	366.624	78.3137
159	8.75	0.2892	7.14	12.42	365.455	78.2677
160	8.67	0.2854	7.21	12.37	364.807	78.289
161	8.62	0.2804	7.22	12.36	364.824	78.6732
162	8.54	0.276	7.26	12.35	364.122	78.093
163	8.48	0.2754	7.2	12.43	363.284	78.1296
164	8.42	0.2732	7.19	12.47	362.733	78.3672
165	8.36	0.2734	7.19	12.5	361.075	78.5754
166	8.28	0.2679	7.13	12.57	360.601	78.5692
167	8.25	0.2684	7.09	12.6	359.974	78.2979
168	8.18	0.276	7.07	12.62	358.654	78.2786
169	8.12	0.2787	7.06	12.64	358.281	78.2811

170	8.06	0.286	7.01	12.7	357.459	77.9458
171	8.01	0.289	6.92	12.8	355.652	78.3864
172	7.96	0.2887	6.93	12.82	355.113	78.3676
173	7.89	0.2843	6.9	12.84	353.57	78.4934
174	7.84	0.2862	6.82	12.88	351.695	78.6156
175	7.79	0.3042	6.79	12.89	351.671	78.3873
176	7.75	0.316	6.83	12.87	350.123	78.6855
177	7.69	0.3096	6.78	12.92	349.494	78.5985
178	7.64	0.3089	6.82	12.88	348.588	78.6013
179	7.58	0.2989	6.72	12.97	347.752	78.7214
180	7.52	0.2943	6.79	12.87	347.221	78.9145
181	7.48	0.2907	6.6	13.07	346.402	78.9468
182	7.43	0.2671	6.45	13.21	346.492	78.1802
183	7.39	0.249	6.41	13.26	346.187	78.149
184	7.36	0.2432	6.32	13.35	344.218	77.6308
185	7.31	0.2475	6.13	13.5	341.843	77.8582
186	7.28	0.2678	5.95	13.64	338.069	77.9579
187	7.25	0.2928	5.94	13.65	336.383	77.8278
188	7.20	0.3067	5.93	13.67	334.48	77.6437
189	7.16	0.3134	5.98	13.64	332.994	77.8106
190	7.12	0.3143	6.01	13.61	331.257	77.5723
191	7.08	0.3125	6.03	13.6	330.557	77.75
192	7.03	0.3114	6.04	13.6	329.109	77.8111
193	7.00	0.3109	6.1	13.54	327.708	77.7248
194	6.96	0.3087	6.12	13.52	326.96	77.993
195	6.92	0.3067	6.15	13.5	326.137	78.0082
196	6.89	0.3037	6.18	13.5	325.702	77.9434
197	6.85	0.299	6.26	13.46	324.242	77.9684
198	6.80	0.2926	6.25	13.47	324.007	77.9224
199	6.77	0.2892	6.27	13.45	322.792	77.9381
200	6.74	0.2873	6.27	13.46	322.507	77.8971
201	6.70	0.2825	6.27	13.47	321.683	77.998
202	6.65	0.2796	6.29	13.47	321.967	78.0078
203	6.61	0.2756	6.31	13.46	321.522	77.5704
204	6.58	0.2779	6.33	13.45	320.908	77.6581
205	6.55	0.2815	6.31	13.47	320.11	77.7205
206	6.51	0.2854	6.32	13.48	319.842	77.6644
207	6.47	0.2876	6.32	13.49	319.438	77.6374
208	6.41	0.2848	6.26	13.54	319.995	77.5808
209	6.39	0.2892	6.24	13.57	319.374	77.5997
210	6.36	0.2945	6.23	13.59	318.406	77.9902
211	6.32	0.3009	6.23	13.58	317.105	77.8493
212	6.29	0.3093	6.23	13.57	317.071	77.7728

213	6.25	0.3143	6.18	13.59	316.376	77.913
214	6.20	0.3231	6.17	13.58	315.143	78.1373
215	6.16	0.3262	5.91	13.79	314.576	77.8031
216	6.14	0.3529	5.75	13.88	312.531	77.7964
217	6.13	0.4073	5.31	14.14	309.715	78.0458
218	6.10	0.5446	5.04	14.34	306.144	77.6862
219	6.05	0.645	5.01	14.37	303.164	77.2074
220	6.03	0.6773	4.98	14.46	300.635	77.3786
221	6.02	0.6768	5.03	14.46	298.81	77.3305
222	5.98	0.6629	5.08	14.41	296.482	77.4665
223	5.97	0.6475	5.11	14.39	294.926	77.5157
224	5.94	0.6256	5.15	14.38	293.817	77.7115
225	5.91	0.6104	5.19	14.36	292.436	77.912
226	5.90	0.575	4.89	14.71	291.658	77.8739
227	5.88	0.5423	4.7	14.84	289.323	77.8347
228	5.85	0.5557	4.63	14.88	287.999	77.6591
229	5.83	0.5771	4.59	14.95	285.885	78.0287
230	5.82	0.589	4.62	14.95	284.463	77.9645
231	5.78	0.5928	4.6	14.98	283.256	77.8301
232	5.76	0.5862	4.64	14.95	281.64	78.0224
233	5.74	0.5776	4.66	14.93	279.727	78.1468
234	5.72	0.569	4.65	14.95	279.064	78.2913
235	5.71	0.5595	4.68	14.93	277.976	78.2719
236	5.68	0.5554	4.7	14.92	277.233	78.1664
237	5.65	0.5495	4.69	14.94	275.879	78.2794
238	5.64	0.5429	4.72	14.91	273.926	78.1995
239	5.62	0.5379	4.69	14.96	273.519	78.0496
240	5.62	0.5318	4.72	14.94	273.373	78.0743
241	5.58	0.5267	4.71	14.95	272.22	78.0928
242	5.56	0.5225	4.71	14.96	270.746	78.2211
243	5.53	0.5176	4.71	14.96	270.108	78.2177
244	5.52	0.5162	4.73	14.94	269.917	78.1241
245	5.50	0.5156	4.72	14.95	269.019	77.8655
246	5.47	0.5132	4.71	14.97	268.637	77.906
247	5.45	0.5115	4.73	14.94	268.132	77.8541
248	5.44	0.5123	4.73	14.96	266.959	78.0058
249	5.42	0.5103	4.72	14.95	266.292	77.6771
250	5.39	0.5062	4.7	14.99	265.878	77.2456
251	5.36	0.5003	4.72	14.97	265.33	77.2504
252	5.36	0.4948	4.73	14.96	264.918	77.2944
253	5.33	0.4948	4.71	15	264.781	77.1077
254	5.32	0.494	4.75	14.94	263.909	77.3357
255	5.31	0.495	4.77	14.92	262.954	77.2738

256	5.27	0.4964	4.78	14.92	262.414	77.3389
257	5.25	0.4981	4.77	14.92	262.608	77.3408
258	5.23	0.5001	4.79	14.9	262.015	77.4532
259	5.22	0.5012	4.77	14.93	261.255	77.4692
260	5.20	0.5021	4.76	14.92	261.092	77.3005
261	5.18	0.5067	4.72	14.95	260.9	77.3753
262	5.15	0.5139	4.68	15	260.862	77.3902
263	5.13	0.5187	4.69	14.99	259.836	77.5727
264	5.13	0.5157	4.67	15.02	259.363	77.5948
265	5.11	0.5151	4.68	15.01	258.352	77.6739
266	5.09	0.5132	4.68	15	258.862	77.3123
267	5.07	0.5123	4.67	15.01	257.808	77.4517
268	5.03	0.5123	4.68	15	258.021	77.5416
269	5.02	0.5129	4.72	14.97	257.755	77.6018
270	5.00	0.5139	4.7	14.97	257.569	77.6136
271	4.98	0.5143	4.71	14.98	256.958	77.5908
272	4.97	0.5146	4.42	15.2	255.924	77.5061
273	4.95	0.5418	4.27	15.34	255.711	77.5214
274	4.93	0.5626	4.24	15.38	255.737	77.4945
275	4.92	0.5667	4.21	15.43	254.774	77.5055
276	4.90	0.5632	4.18	15.45	253.67	77.5858
277	4.89	0.5565	4.18	15.47	252.731	77.553
278	4.86	0.5512	4.17	15.47	252.242	77.464
279	4.85	0.5473	4.14	15.52	252.001	77.5016
280	4.84	0.5443	4.15	15.51	251.307	77.1871
281	4.83	0.5409	4.13	15.54	250.313	77.189
282	4.80	0.540206	4.12	15.56	249.933	77.2112
283	4.77	0.539511	4.12	15.55	249.203	77.0849
284	4.76	0.538817	4.1	15.58	249.016	77.2871
285	4.75	0.538123	4.11	15.57	248.399	77.3592
286	4.73	0.527428	4.09	15.6	247.988	77.234
287	4.71	0.526734	4.06	15.64	247.331	77.3597
288	4.70	0.52604	4.08	15.62	247.265	77.4283
289	4.69	0.525345	4.08	15.61	246.853	77.5208
290	4.66	0.524651	4.07	15.63	246.091	77.4366
291	4.64	0.523957	4.05	15.66	245.331	77.413
292	4.63	0.523262	4.06	15.64	245.62	77.4163
293	4.62	0.532568	4.06	15.65	244.913	77.3443
294	4.61	0.521874	4.07	15.65	244.612	77.1694
295	4.58	0.521179	4.05	15.67	243.981	77.1653
296	4.57	0.520485	4.07	15.64	243.424	77.217
297	4.55	0.519791	4.03	15.66	243.033	77.2212
298	4.53	0.519096	4.04	15.65	242.437	77.2369

299	4.51	0.518402	4.02	15.68	242.161	77.2164
300	4.51	0.517708	4.02	15.69	241.566	77.1366
301	4.49	0.507013	3.99	15.7	241.926	76.9578
302	4.47	0.516319	4.02	15.67	241.37	76.9985
303	4.45	0.515625	4.01	15.69	241.054	77.0077
304	4.42	0.51493	4.02	15.69	240.513	77.0965
305	4.42	0.504236	4	15.7	239.976	77.2336
306	4.39	0.503542	3.99	15.72	240.461	77.3198
307	4.39	0.502847	3.98	15.74	239.968	77.3568
308	4.39	0.512153	4.03	15.68	239.663	77.3012
309	4.36	0.501459	3.95	15.76	239.101	77.1678
310	4.33	0.500764	3.96	15.74	238.112	77.0696
311	4.32	0.50007	3.95	15.76	237.886	77.1311
312	4.30	0.499376	3.98	15.74	237.662	77.2168
313	4.29	0.508681	4	15.72	237.388	77.254
314	4.27	0.497987	4.01	15.71	237.217	77.1151
315	4.26	0.497293	3.99	15.72	237.196	77.1327
316	4.24	0.496598	3.99	15.73	237.169	77.0637
317	4.22	0.495904	4.01	15.71	236.541	77.1269
318	4.21	0.49521	4.01	15.71	236.053	77.193
319	4.19	0.504515	4.02	15.7	236.251	76.9964
320	4.16	0.503821	4.01	15.7	236.326	76.9918
321	4.16	0.503127	3.99	15.73	235.764	77.0371
322	4.14	0.512432	4.02	15.67	235.664	76.7139
323	4.11	0.501738	3.99	15.71	235.379	76.6008
324	4.10	0.501044	3.99	15.72	235.304	76.5222
325	4.08	0.500349	4.03	15.68	235.352	76.5477
326	4.06	0.499655	4.05	15.66	235.094	76.7831
327	4.05	0.488961	4.04	15.68	235.214	76.9561
328	4.03	0.498266	4.04	15.67	234.52	77.0245
329	4.02	0.4635	4.03	15.69	235.028	76.9313
330	3.99	0.4642	4.04	15.69	235.167	77.0229
331	3.99	0.464	4.02	15.7	234.708	77.0949
332	3.97	0.4648	4.03	15.69	234.734	77.0205
333	3.94	0.4654	4.04	15.68	233.905	76.8439
334	3.93	0.4645	4.03	15.69	234.409	76.0128
335	3.91	0.4654	4.03	15.7	234.006	76.0747
336	3.89	0.4635	3.98	15.74	233.3	76.0165
337	3.89	0.461	4	15.71	232.853	75.6295
338	3.87	0.4626	3.99	15.75	232.838	75.8149
339	3.85	0.4676	3.99	15.75	232.126	76.2973
340	3.84	0.4707	4	15.75	232.596	76.5155
341	3.83	0.4709	3.97	15.78	232.532	76.6025

342	3.80	0.4735	3.89	15.84	232.259	76.735
343	3.80	0.4754	3.85	15.88	231.432	76.8927
344	3.78	0.4764	3.84	15.89	231.359	76.9228
345	3.77	0.4768	3.82	15.9	231.391	77.063
346	3.75	0.4767	3.83	15.89	230.711	77.0904
347	3.73	0.4795	3.84	15.89	230.219	77.1299
348	3.72	0.4795	3.84	15.88	230.088	77.099
349	3.71	0.4804	3.83	15.9	230.225	76.9677
350	3.69	0.482	3.84	15.88	230.397	76.9122
351	3.68	0.4815	3.83	15.89	230.162	76.9673
352	3.65	0.4785	3.82	15.89	229.815	76.9461
353	3.65	0.4781	3.82	15.9	229.721	76.8537
354	3.65	0.4779	3.81	15.91	229.184	76.8946
355	3.62	0.4742	3.8	15.93	229.462	76.9294
356	3.60	0.4764	3.81	15.92	229.222	76.9726
357	3.58	0.477	3.82	15.91	229.332	76.9244
358	3.56	0.4785	3.81	15.92	228.966	77.0213
359	3.55	0.4795	3.84	15.88	228.678	76.8799
360	3.54	0.4806	3.81	15.92	228.802	76.9915
361	3.50	0.479	3.83	15.89	228.52	77.0352
362	3.50	0.4779	3.84	15.88	228.426	77.1457
363	3.47	0.4771	3.84	15.9	228.113	76.9535
364	3.47	0.4767	3.82	15.91	227.884	77.0428
365	3.47	0.4746	3.81	15.92	228.018	77.0068
366	3.44	0.4762	3.74	15.97	227.702	76.9528
367	3.44	0.4757	3.71	16.01	226.756	77.098
368	3.43	0.4732	3.71	16.02	226.584	77.1359
369	3.39	0.4746	3.69	16.05	226.327	77.1147
370	3.38	0.472	3.71	16.05	226.095	77.0548
371	3.37	0.4717	3.68	16.06	225.749	77.0156
372	3.36	0.4698	3.68	16.05	225.847	77.0181
373	3.34	0.4685	3.68	16.08	225.028	77.0353
374	3.32	0.4689	3.68	16.08	224.907	77.0592
375	3.31	0.4709	3.66	16.09	224.957	77.1057
376	3.29	0.4709	3.68	16.06	224.86	77.0961
377	3.29	0.4712	3.69	16.05	224.537	76.8456
378	3.26	0.4723	3.68	16.06	224.655	76.9229
379	3.25	0.4698	3.68	16.07	224.935	76.9182
380	3.24	0.4723	3.69	16.06	224.722	76.9655
381	3.24	0.4693	3.67	16.07	224.656	76.9943
382	3.21	0.4651	3.68	16.07	223.904	77.0179
383	3.19	0.461	3.68	16.06	223.975	77.0555
384	3.18	0.4601	3.66	16.11	224.052	77.0608

385	3.17	0.459	3.63	16.17	223.379	77.0423
386	3.15	0.461	3.61	16.18	223.193	76.848
387	3.14	0.4626	3.61	16.17	223.067	76.8052
388	3.13	0.4615	3.62	16.17	222.929	76.8405
389	3.12	0.4618	3.63	16.16	222.79	76.8025
390	3.09	0.4601	3.62	16.16	223.314	76.816
391	3.08	0.461	3.58	16.2	222.807	76.6496
392	3.07	0.4612	3.61	16.18	222.125	76.7106
393	3.04	0.4635	3.59	16.18	222.15	76.8387
394	3.04	0.4635	3.58	16.2	221.559	76.8238
395	3.04	0.4625	3.55	16.25	221.643	76.883
396	3.01	0.4635	3.56	16.23	221.682	76.935
397	3.00	0.4648	3.55	16.23	221.793	76.9822
398	2.98	0.4659	3.56	16.21	221.699	76.9606
399	2.97	0.4678	3.58	16.18	221.5	76.9701
400	2.95	0.4679	3.6	16.16	221.256	76.9433
401	2.93	0.4668	3.57	16.2	221.008	76.9848
402	2.91	0.4651	3.57	16.2	221.054	76.9722
403	2.90	0.4629	3.57	16.2	221.105	76.8983
404	2.89	0.461	3.56	16.21	220.64	76.8813
405	2.89	0.4596	3.53	16.26	220.729	76.6747
406	2.86	0.4571	3.54	16.24	220.894	76.6922
407	2.85	0.4576	3.54	16.23	220.555	76.7748
408	2.84	0.459	3.53	16.25	220.62	76.7926
409	2.81	0.4581	3.51	16.27	220.634	76.8385
410	2.81	0.4575	3.52	16.26	220.184	76.8523
411	2.79	0.4534	3.52	16.26	220.099	76.736
412	2.78	0.4523	3.5	16.29	220.102	76.7619
413	2.76	0.4523	3.48	16.32	219.993	76.784
414	2.75	0.4528	3.47	16.32	219.425	76.7722
415	2.73	0.4523	3.47	16.32	219.129	76.832
416	2.72	0.4514	3.46	16.33	218.828	76.8019
417	2.71	0.4535	3.48	16.3	218.73	76.8883
418	2.71	0.4548	3.47	16.32	217.838	76.8969
419	2.70	0.4542	3.49	16.29	217.765	76.8597
420	2.67	0.4532	3.48	16.31	218.309	76.8986
421	2.65	0.4537	3.46	16.33	218.479	76.8205
422	2.65	0.4537	3.47	16.32	218.133	76.7524
423	2.62	0.4523	3.46	16.33	218.036	76.7628
424	2.62	0.4532	3.47	16.33	217.92	76.816
425	2.59	0.4529	3.45	16.33	217.597	76.8866
426	2.59	0.4518	3.45	16.35	217.643	76.9335
427	2.58	0.4532	3.44	16.35	217.877	76.7031

428	2.56	0.4546	3.44	16.35	217.984	76.6524
429	2.54	0.4575	3.43	16.37	217.579	76.6228
430	2.52	0.4585	3.42	16.37	217.134	76.6531
431	2.51	0.4557	3.44	16.35	216.987	76.72
432	2.50	0.4562	3.42	16.38	216.635	76.6786
433	2.49	0.4526	3.41	16.38	216.322	76.7235
434	2.48	0.4523	3.39	16.4	216.772	76.7736
435	2.47	0.4553	3.39	16.39	216.329	76.696
436	2.45	0.4565	3.36	16.44	216.063	76.7462
437	2.43	0.4553	3.36	16.44	215.961	76.7784
438	2.41	0.4565	3.38	16.4	215.845	76.7551
439	2.39	0.4587	3.4	16.38	215.598	76.7293
440	2.39	0.4584	3.39	16.4	215.699	76.7415
441	2.36	0.4601	3.39	16.39	215.399	76.7979
442	2.36	0.462	3.4	16.38	214.792	76.7231
443	2.35	0.4601	3.38	16.39	215.007	76.7746
444	2.33	0.4589	3.39	16.38	215.16	76.7619
445	2.33	0.4525	3.39	16.38	214.913	76.6256
446	2.30	0.4475	3.37	16.43	215.012	76.6732
447	2.29	0.4414	3.36	16.44	214.776	76.6932
448	2.28	0.4407	3.3	16.52	214.818	76.7417
449	2.26	0.439	3.3	16.52	213.823	76.68
450	2.26	0.4376	3.29	16.52	214.14	76.736
451	2.24	0.4367	3.28	16.56	213.873	76.707
452	2.22	0.4367	3.28	16.52	213.67	76.7833
453	2.22	0.437	3.28	16.55	213.455	76.7409
454	2.19	0.4387	3.29	16.53	213.251	76.5493
455	2.19	0.4387	3.27	16.57	212.793	76.4498
456	2.18	0.439	3.27	16.56	213.013	76.4494
457	2.17	0.4371	3.25	16.56	212.225	76.3531
458	2.15	0.4376	3.21	16.61	212.579	76.3269
459	2.14	0.4371	3.21	16.61	212.299	76.3945
460	2.13	0.4381	3.21	16.6	212.264	76.4812
461	2.12	0.4428	3.21	16.59	211.503	76.5833
462	2.10	0.4728	3.19	16.62	211.479	76.6257
463	2.09	0.4832	3.2	16.62	211.223	76.6213
464	2.08	0.4843	3.18	16.61	211.317	76.6764
465	2.07	0.4785	3.15	16.58	211.483	76.68
466	2.05	0.4739	3.14	16.59	211.206	76.7159
467	2.03	0.4704	3.14	16.6	211.289	76.7447
468	2.02	0.4671	3.11	16.64	211.053	76.6846
469	2.02	0.4659	3.08	16.68	211.469	76.63
470	1.99	0.4678	3.07	16.69	210.962	76.6963

471	1.98	0.4696	3.07	16.72	210.996	76.6245
472	1.97	0.4735	3.04	16.73	210.886	76.5922
473	1.96	0.4742	3.04	16.72	210.264	76.6225
474	1.95	0.476	3.03	16.73	210.195	76.648
475	1.92	0.4815	3.03	16.73	209.741	76.6984
476	1.91	0.4878	3.01	16.77	209.747	76.7091
477	1.92	0.4893	3.01	16.75	209.811	76.6867
478	1.89	0.4932	3	16.75	209.254	76.6377
479	1.89	0.4982	3	16.73	209.008	76.6576
480	1.87	0.5009	2.99	16.74	208.83	76.6599
481	1.87	0.5054	2.99	16.73	208.771	76.6727
482	1.84	0.5121	2.98	16.75	208.713	76.6112
483	1.84	0.5156	2.98	16.76	208.075	76.5839
484	1.83	0.5203	2.98	16.73	207.937	76.3821
485	1.81	0.5259	2.98	16.75	207.605	76.4473
486	1.80	0.5268	2.96	16.78	207.291	76.504
487	1.79	0.5296	2.96	16.76	207.298	76.5026
488	1.76	0.5314	2.97	16.74	207.203	76.4217
489	1.76	0.532	2.95	16.77	206.915	76.3772
490	1.77	0.5307	2.97	16.75	206.286	76.3859
491	1.74	0.5307	2.96	16.77	206.139	76.4091
492	1.72	0.5317	2.97	16.76	206.392	76.4219
493	1.72	0.5337	2.95	16.77	205.922	76.4949
494	1.70	0.5356	2.97	16.74	205.503	76.4979
495	1.69	0.5346	2.97	16.73	205.192	76.3943
496	1.68	0.537	2.98	16.73	205.257	76.4456
497	1.66	0.5404	2.98	16.73	204.938	76.4604
498	1.65	0.5395	2.95	16.77	204.942	76.4617
499	1.64	0.5385	2.97	16.73	204.912	76.4687
500	1.63	0.5382	2.97	16.74	204.432	76.393
501	1.61	0.5378	2.97	16.73	203.848	76.3785
502	1.60	0.54	2.96	16.75	203.911	76.3624
503	1.58	0.541	2.96	16.74	204.107	76.3403
504	1.57	0.5421	2.93	16.78	203.954	76.2288
505	1.57	0.5437	2.95	16.74	203.52	76.2868
506	1.55	0.5448	2.95	16.76	203.494	76.3484
507	1.53	0.5454	2.93	16.76	203.465	76.316
508	1.53	0.5465	2.93	16.77	203.079	76.3011
509	1.51	0.5439	2.94	16.75	203.117	76.3278
510	1.50	0.5456	2.93	16.77	202.8	76.2946
511	1.48	0.547	2.96	16.73	202.211	76.3239
512	1.47	0.5482	2.92	16.78	202.706	76.2982
513	1.45	0.5498	2.92	16.77	202.961	76.2555

514	1.44	0.5503	2.94	16.75	202.294	76.2437
515	1.42	0.5512	2.91	16.79	202.267	76.0827
516	1.40	0.5521	2.93	16.76	201.788	76.1184
517	1.42	0.5517	2.9	16.8	201.918	76.1422
518	1.39	0.5528	2.9	16.79	201.785	76.2171
519	1.39	0.5546	2.9	16.81	201.656	76.321
520	1.37	0.5542	2.92	16.77	201.54	76.3503
521	1.36	0.5562	2.9	16.79	201.667	76.3516
522	1.34	0.5571	2.91	16.77	201.812	76.2752
523	1.33	0.5576	2.88	16.81	200.964	76.3136
524	1.32	0.5576	2.87	16.82	201.338	76.2808
525	1.30	0.5557	2.89	16.8	200.543	76.269
526	1.30	0.5526	2.86	16.83	200.664	76.1688
527	1.28	0.5576	2.87	16.82	200.37	76.103
528	1.27	0.5642	2.84	16.85	199.899	76.1257
529	1.26	0.5693	2.85	16.84	200.261	76.0218
530	1.23	0.5734	2.86	16.81	200.061	75.9801
531	1.24	0.5751	2.86	16.8	199.924	75.9712
532	1.22	0.5775	2.85	16.8	199.743	75.9089
533	1.21	0.5771	2.85	16.81	199.964	75.9085
534	1.19	0.5776	2.85	16.83	199.745	75.9403
535	1.18	0.579	2.85	16.83	199.706	75.8987
536	1.16	0.5825	2.86	16.81	199.547	75.8722
537	1.15	0.5829	2.86	16.82	199.581	75.934
538	1.14	0.584	2.87	16.79	199.6	75.7765
539	1.12	0.582	2.88	16.78	199.658	75.8738
540	1.11	0.5814	2.88	16.78	199.674	75.9427
541	1.10	0.582	2.87	16.79	198.99	75.8076
542	1.09	0.581	2.86	16.82	199.111	75.7289
543	1.07	0.5829	2.86	16.81	199.103	75.8551
544	1.06	0.5815	2.87	16.8	198.977	75.9284
545	1.04	0.5804	2.87	16.8	199.437	75.7235
546	1.03	0.5801	2.88	16.79	198.604	75.6915
547	1.00	0.58	2.87	16.8	198.743	75.7023
548	0.99	0.5795	2.87	16.81	198.766	75.587
549	0.99	0.5782	2.87	16.81	198.676	75.5379
550	0.98	0.5776	2.86	16.83	198.603	75.6123
551	0.96	0.5762	2.86	16.83	198.915	75.59
552	0.94	0.5757	2.86	16.83	198.847	75.696
553	0.94	0.5776	2.84	16.84	199.053	75.6704
554	0.92	0.576	2.84	16.85	198.275	75.7726
555	0.90	0.5757	2.85	16.84	198.462	75.7721
556	0.89	0.5737	2.84	16.84	198.238	75.8133

557	0.89	0.5739	2.83	16.84	197.672	75.9066
558	0.88	0.5753	2.84	16.85	197.868	75.9426
559	0.85	0.5753	2.83	16.85	197.765	75.895
560	0.84	0.5765	2.84	16.84	197.885	75.867
561	0.83	0.5776	2.84	16.85	197.79	75.9332
562	0.82	0.5757	2.84	16.84	197.807	75.8092
563	0.81	0.5757	2.84	16.83	197.085	75.8178
564	0.80	0.5737	2.84	16.84	197.331	75.7996
565	0.79	0.5707	2.83	16.85	197.286	75.7455
566	0.76	0.5709	2.83	16.83	197.602	75.7228
567	0.75	0.5728	2.83	16.84	197.819	75.6142
568	0.75	0.57	2.81	16.87	197.49	75.5172
569	0.72	0.5684	2.84	16.86	197.025	75.5694
570	0.71	0.5664	2.85	16.84	196.69	75.5232
571	0.70	0.5659	2.83	16.87	196.843	75.5711
572	0.70	0.565	2.83	16.86	196.866	75.5811
573	0.68	0.5629	2.83	16.87	196.749	75.5774
574	0.66	0.5615	2.82	16.88	196.612	75.5191
575	0.64	0.5626	2.81	16.88	196.861	75.6317
576	0.63	0.561	2.8	16.9	196.551	75.6622
577	0.62	0.5598	2.79	16.9	196.438	75.6323
578	0.61	0.5585	2.81	16.9	195.952	75.717
579	0.60	0.5581	2.8	16.91	195.646	75.802
580	0.59	0.5556	2.81	16.92	195.736	75.8573
581	0.58	0.5562	2.8	16.92	196.008	75.7565
582	0.57	0.5562	2.79	16.93	195.792	75.7749
583	0.55	0.5546	2.79	16.93	195.57	75.7645
584	0.54	0.5528	2.79	16.91	195.586	75.7225
585	0.54	0.5539	2.79	16.9	195.253	75.6993
586	0.51	0.5537	2.78	16.93	195.486	75.5889
587	0.51	0.5514	2.77	16.94	195.679	75.4946
588	0.49	0.5518	2.78	16.93	195.219	75.576
589	0.47	0.5518	2.76	16.96	194.818	75.587
590	0.47	0.5459	2.76	16.96	194.598	75.6739
591	0.45	0.5445	2.77	16.95	194.655	75.6424
592	0.44	0.5431	2.76	16.96	194.672	75.5736
593	0.44	0.5389	2.64	17.09	194.281	75.4676
594	0.42	0.5346	2.56	17.19	194.014	75.4788
595	0.41	0.5307	2.57	17.17	193.571	75.5614
596	0.40	0.5268	2.55	17.18	193.554	75.5451
597	0.39	0.5234	2.53	17.21	192.914	75.476
598	0.39	0.5195	2.51	17.22	192.501	75.5238
599	0.36	0.5162	2.49	17.26	192.073	75.4212

600	0.35	0.5129	2.5	17.24	191.578	75.4383
601	0.34	0.5103	2.48	17.27	191.327	75.3764
602	0.33	0.5062	2.48	17.28	191.078	75.3472
603	0.32	0.5031	2.48	17.28	190.763	75.3536
604	0.31	0.5039	2.47	17.29	190.353	75.4303
605	0.30	0.5014	2.47	17.3	190.133	75.4008
606	0.28	0.5014	2.47	17.31	189.945	75.4793
607	0.28	0.5004	2.47	17.29	189.663	75.4721
608	0.27	0.499	2.47	17.29	189.345	75.5016
609	0.26	0.4984	2.47	17.29	188.984	75.401
610	0.25	0.496	2.48	17.29	188.992	75.347
611	0.24	0.494	2.48	17.3	188.653	75.4524
612	0.23	0.4951	2.49	17.29	188.63	75.4214
613	0.22	0.4957	2.47	17.31	188.356	75.2426
614	0.21	0.4946	2.48	17.29	188.488	75.117
615	0.20	0.5014	2.47	17.31	188.126	75.1578
616	0.17	0.5076	2.47	17.31	187.735	75.1507
617	0.18	0.5092	2.48	17.31	187.58	75.2423
618	0.15	0.5067	2.47	17.3	187.694	75.1372
619	0.14	0.504	2.48	17.28	188.128	75.1302
620	0.14	0.5014	2.45	17.31	188.191	75.0874
621	0.13	0.4551	2.44	17.33	188.156	75.1006
622	0.11	0.6021	2.44	17.32	187.838	75.087
623	0.11	0.8029	2.43	17.33	187.766	75.1009
624	0.07	0.8439	1.62	18.05	205.429	74.9503
625	0.03	0.8359	2.68	17.24	202.465	74.9589
626	0.02	0.8043	3.51	15.73	199.369	75.0093
627	0.02	0.7768	3.44	15.8	198.322	75.0184
628	0.01	0.7568	3.36	15.96	198.233	75.1053
629	0.01	0.7428	3.36	16	199.408	75.1678
630	0.00	0.7307	3.34	16.02	199.53	75.1917

Stove Builder International Inc.

Manufacturer:	SBI
Model:	3.3 Series
Date:	06-04-19
Run:	2
Control #:	G103994967
Test Duration:	630
Output Category:	Low

Technicians: _____

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Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	70.0%	75.4%
Combustion Efficiency	96.6%	96.6%
Heat Transfer Efficiency	72%	78.0%

Output Rate (kJ/h)	16,699	15,841	**(Btu/h)**
Burn Rate (kg/h)	1.20	2.64	**(lb/h)**
Input (kJ/h)	23,854	22,628	**(Btu/h)**

Test Load Weight (dry kg)	12.59	27.76	**dry lb**
MC wet (%)	17.1		
MC dry (%)	20.63		
Particulate (g)	4.105		
CO (g)	672		
Test Duration (h)	10.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.02	3.83
g/kg Dry Fuel	0.33	53.34
g/h	0.39	63.98
lb/MM Btu Output	0.05	8.90

Air/Fuel Ratio (A/F)	16.90

VERSION: **2.4** **2010-04-15**

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	33.46	0.15	3.69	16.10	482.4	80.4
1	33.34	0.12	1.91	18.66	423.0	79.3
2	33.23	0.14	3.61	16.99	453.9	79.1
3	32.84	0.18	11.02	11.37	575.4	79.5
4	32.40	0.20	15.97	4.39	628.7	79.6
5	32.04	0.47	15.52	4.82	643.5	79.5
6	31.78	0.86	15.09	5.46	620.7	79.3
7	31.49	0.80	15.32	5.27	619.9	79.2
8	31.20	0.79	14.97	5.67	620.1	79.0
9	30.97	0.81	14.50	6.33	603.5	78.9
10	30.71	0.72	14.61	6.23	597.7	78.8
11	30.47	0.61	14.55	6.39	597.1	78.9
12	30.22	0.56	14.46	6.57	594.5	78.9
13	29.96	0.48	14.32	6.64	590.0	78.8
14	29.73	0.42	14.01	6.96	590.1	79.0
15	29.50	0.42	14.03	7.09	587.4	79.0
16	29.31	0.40	14.07	7.13	583.3	79.0
17	29.06	0.31	13.99	7.13	583.0	79.0
18	28.84	0.27	13.96	7.18	580.2	78.8
19	28.62	0.26	14.01	7.18	580.4	79.1
20	28.40	0.26	13.93	7.26	580.0	79.3
21	28.17	0.23	13.95	7.23	579.7	79.8
22	27.96	0.23	13.84	7.34	579.5	79.4
23	27.75	0.22	13.79	7.39	577.0	79.5
24	27.52	0.21	13.81	7.36	577.0	79.2
25	27.31	0.21	13.62	7.44	576.0	79.4
26	27.09	0.23	13.79	7.29	579.2	79.3
27	26.87	0.26	13.77	7.28	577.9	79.6
28	26.65	0.28	13.90	7.19	578.4	79.8
29	26.42	0.29	14.06	7.03	578.0	79.6
30	26.22	0.28	14.06	7.02	579.7	79.6
31	26.01	0.27	14.19	6.90	579.7	79.9
32	25.80	0.26	14.30	6.85	580.8	80.4
33	25.58	0.25	14.26	6.89	580.0	80.7
34	25.35	0.23	14.30	6.93	578.9	81.2
35	25.15	0.21	14.32	6.90	577.8	81.5
36	24.93	0.18	14.16	7.02	576.8	81.7
37	24.74	0.17	14.14	7.09	576.5	81.2
38	24.49	0.17	13.93	7.27	577.5	80.1
39	24.28	0.16	13.95	7.25	574.8	81.1
40	24.08	0.15	13.86	7.29	572.7	81.4

41	23.88	0.14	13.92	7.21	572.2	80.7
42	23.64	0.16	14.03	7.09	573.6	80.9
43	23.46	0.16	13.96	7.11	573.1	80.8
44	23.23	0.17	13.78	7.17	574.1	81.5
45	23.03	0.19	13.76	7.27	574.2	81.4
46	22.81	0.24	13.56	7.47	572.6	81.5
47	22.61	0.24	13.49	7.58	571.3	81.5
48	22.38	0.24	13.41	7.64	570.0	81.9
49	22.22	0.2085	13.35	7.78	568.53	81.9007
50	22.01	0.189	13.27	7.81	567.773	82.0675
51	21.81	0.1696	13.17	7.89	565.748	81.9204
52	21.60	0.1703	13.06	7.99	563.84	82.2614
53	21.42	0.1693	12.96	8.12	560.903	81.5832
54	21.24	0.1584	12.85	8.26	558.476	81.7755
55	21.05	0.1414	12.87	8.25	555.377	81.4959
56	20.86	0.1237	12.83	8.31	554.315	81.4452
57	20.66	0.1095	12.85	8.27	552.947	80.7853
58	20.48	0.1025	12.81	8.32	551.482	81.3458
59	20.28	0.095	12.66	8.48	549.634	81.0779
60	20.10	0.0785	12.51	8.64	547.04	81.1853
61	19.93	0.065	12.42	8.72	543.216	81.4466
62	19.74	0.0567	12.27	8.88	540.946	81.6275
63	19.57	0.0529	12.15	8.99	537.498	81.3086
64	19.40	0.0503	11.99	9.14	534.781	82.0909
65	19.23	0.0473	11.9	9.21	532.347	82.5389
66	19.07	0.0439	11.78	9.34	530.116	81.3179
67	18.89	0.0431	11.63	9.46	527.668	80.713
68	18.73	0.0415	11.51	9.59	525.05	81.6799
69	18.59	0.0403	11.45	9.64	522.77	81.082
70	18.42	0.0403	11.46	9.63	521.446	80.8213
71	18.27	0.0423	11.45	9.62	519.14	81.3029
72	18.10	0.044	11.33	9.75	517.184	80.6286
73	17.96	0.0457	11.26	9.79	517.668	81.1142
74	17.79	0.0481	11.23	9.81	515.775	81.0107
75	17.63	0.0525	11.19	9.84	514.276	81.3566
76	17.48	0.0562	11.21	9.81	513.412	81.7435
77	17.33	0.0567	11.32	9.71	513.388	81.5521
78	17.19	0.056	11.37	9.66	512.992	81.0426
79	17.04	0.0567	11.39	9.64	512.439	81.7929
80	16.88	0.0571	11.42	9.6	511.876	81.9075
81	16.72	0.0542	11.5	9.5	512.833	82.1564
82	16.58	0.0553	11.5	9.5	514.224	81.8914
83	16.43	0.0571	11.55	9.44	512.787	82.3073

84	16.28	0.0582	11.47	9.52	513.063	82.3691
85	16.15	0.0565	11.49	9.46	513.617	81.9914
86	15.99	0.0565	11.43	9.51	512.698	82.0126
87	15.85	0.0592	11.32	9.62	512.405	81.8302
88	15.69	0.0582	11.24	9.64	511.807	81.3282
89	15.53	0.0576	10.87	9.95	507.722	81.7027
90	15.42	0.0571	10.56	10.26	504.405	82.2156
91	15.28	0.0539	10.28	10.49	500.801	82.3444
92	15.16	0.0537	9.82	10.93	495.565	81.2659
93	15.03	0.0493	9.67	11.09	487.87	81.0019
94	14.94	0.0453	9.58	11.19	483.549	80.9167
95	14.82	0.0426	9.43	11.35	479.706	80.7864
96	14.68	0.0418	9.37	11.41	475.901	81.0259
97	14.59	0.0423	9.25	11.54	474.016	80.7527
98	14.46	0.0429	9.18	11.6	469.07	81.178
99	14.37	0.0432	9.09	11.7	469	80.852
100	14.25	0.0443	9.05	11.74	465.994	80.738
101	14.14	0.0468	9.08	11.7	463.985	80.7738
102	14.01	0.0503	8.99	11.81	463.043	80.7865
103	13.91	0.0531	9.12	11.66	460.847	80.6289
104	13.80	0.056	9.05	11.76	459.825	80.572
105	13.70	0.0571	8.98	11.83	459.003	80.6359
106	13.60	0.0571	9.04	11.74	458.091	80.5796
107	13.49	0.0567	9.1	11.71	458.001	81.0961
108	13.39	0.0542	9.14	11.69	457.644	81.0202
109	13.26	0.0534	9.27	11.53	456.697	81.7143
110	13.15	0.049	9.1	11.65	457.393	82.4176
111	13.03	0.0475	9.31	11.47	456.215	82.7872
112	12.91	0.0518	9.17	11.5	456.97	83.1958
113	12.83	0.0487	9.05	11.66	454.994	83.3088
114	12.71	0.0587	8.9	11.76	454.482	83.805
115	12.62	0.0512	8.59	12.08	452.263	84.0638
116	12.51	0.0545	8.69	11.93	451.122	84.2842
117	12.42	0.0571	8.33	12.27	450.776	84.335
118	12.32	0.0614	8.3	12.25	448.219	84.7344
119	12.24	0.0789	8.32	12.23	447.231	84.4534
120	12.13	0.0943	8.16	12.34	444.566	84.7741
121	12.05	0.0973	7.81	12.62	442.321	85.0673
122	11.97	0.1031	7.73	12.76	437.029	84.9193
123	11.89	0.1221	7.63	12.8	436.321	85.3845
124	11.79	0.1278	7.41	12.91	433.778	85.272
125	11.70	0.1393	7.38	12.95	431.098	85.0343
126	11.62	0.1703	7.33	13.03	428.201	85.6432

127	11.53	0.1804	7.29	13.09	426.7	85.5793
128	11.47	0.1848	7.23	13.11	425.047	85.3558
129	11.37	0.1898	7.27	13.08	423.203	85.4528
130	11.28	0.2035	7.23	13.1	421.089	85.3504
131	11.20	0.2101	7.19	13.12	418.74	85.5051
132	11.13	0.2315	7.22	13.12	418.255	85.3524
133	11.06	0.227	7.21	13.1	417.807	85.3594
134	10.96	0.2251	7.14	13.14	417.382	85.3495
135	10.89	0.225	7.11	13.17	416.944	85.4717
136	10.82	0.242	7.13	13.16	415.284	85.591
137	10.74	0.2468	7.09	13.2	414.127	85.6039
138	10.66	0.2451	7.17	13.12	413.443	85.1807
139	10.60	0.2485	7.17	13.14	413.939	85.0561
140	10.51	0.2312	7.12	13.16	412.978	85.1648
141	10.42	0.2304	7.14	13.12	412.273	85.3825
142	10.35	0.2457	7.18	13.08	411.741	85.288
143	10.24	0.2373	7.2	13	411.234	85.2234
144	10.20	0.2326	7.02	13.1	409.231	85.5353
145	10.12	0.2653	7	13.13	408.124	85.7654
146	10.03	0.2804	6.94	13.19	407.498	85.1673
147	9.96	0.2968	6.94	13.23	407.143	85.4325
148	9.88	0.3054	6.93	13.21	406.589	85.3257
149	9.79	0.2957	7.08	13.11	406.075	85.2984
150	9.72	0.2951	7.1	13.12	406.226	84.8967
151	9.65	0.2779	7.15	13.07	406.338	85.0251
152	9.56	0.2656	7.16	13.01	405.459	85.0916
153	9.48	0.2585	7.19	13.02	404.217	85.1263
154	9.41	0.2612	7.24	12.96	405.468	84.9554
155	9.33	0.2482	7.19	13.03	405.323	85.0332
156	9.26	0.2425	7.18	12.98	405.159	85.2161
157	9.17	0.2407	7.16	13.02	404.287	85.3142
158	9.11	0.2439	7.12	13.04	403.862	85.7472
159	9.04	0.2571	7.11	13.03	403.252	85.7618
160	8.96	0.2673	7.11	13.06	400.996	85.7631
161	8.89	0.2728	7.19	12.96	401.921	85.565
162	8.81	0.2714	7.15	12.99	402.142	85.6672
163	8.74	0.2696	7.14	12.97	402.496	85.7508
164	8.66	0.2701	7.15	12.95	401.616	85.35
165	8.60	0.2776	7.17	12.89	401.9	85.348
166	8.53	0.2879	7.15	12.95	401.623	85.4922
167	8.46	0.2846	6.87	13.15	400.458	85.6101
168	8.38	0.2881	6.52	13.44	396.735	85.4196
169	8.32	0.3112	6.48	13.48	393.048	85.6846

170	8.26	0.3387	6.54	13.43	390.039	85.3166
171	8.19	0.346	6.54	13.42	388.298	85.4204
172	8.13	0.342	6.62	13.37	386.5	85.2999
173	8.05	0.3353	6.59	13.41	386.423	85.3156
174	8.01	0.3301	6.63	13.39	386.11	85.3288
175	7.95	0.3281	6.65	13.36	384.246	85.4512
176	7.87	0.3242	6.64	13.39	384.625	85.4458
177	7.81	0.3221	6.65	13.38	383.005	85.3683
178	7.75	0.3214	6.64	13.34	383.014	85.3968
179	7.69	0.3232	6.63	13.34	382.404	85.4583
180	7.62	0.3259	6.65	13.31	382.388	85.6262
181	7.56	0.3317	6.65	13.3	382.797	85.6938
182	7.50	0.3385	6.67	13.3	381.643	85.1378
183	7.42	0.3373	6.71	13.26	381.411	85.0655
184	7.35	0.3351	6.7	13.28	381.349	85.3328
185	7.29	0.3321	6.75	13.21	381.883	85.0045
186	7.23	0.3275	6.78	13.19	382	85.348
187	7.18	0.3184	6.82	13.15	382.4	85.2351
188	7.11	0.3135	6.87	13.1	382.483	85.3361
189	7.03	0.3053	6.83	13.1	383.19	85.5232
190	6.97	0.3009	6.87	13.06	383.645	85.4736
191	6.89	0.312	6.85	13.05	384.666	85.5884
192	6.82	0.316	6.94	12.97	384.377	85.7832
193	6.75	0.3273	6.96	12.94	383.66	85.6758
194	6.68	0.3251	7.03	12.87	384.453	85.587
195	6.63	0.3235	7.08	12.85	384.358	85.6714
196	6.54	0.319	7.2	12.75	384.435	85.7135
197	6.47	0.3082	7.19	12.72	386.236	85.6887
198	6.41	0.2998	7.21	12.63	385.728	85.5652
199	6.33	0.31	7.35	12.47	387.234	85.7954
200	6.27	0.3223	7.59	12.23	389.364	85.8876
201	6.18	0.3089	7.72	12.04	391.297	85.7719
202	6.11	0.2821	7.92	11.74	392.071	85.6246
203	6.05	0.269	7.81	11.82	393.185	85.6407
204	5.99	0.2521	7.56	12.05	392.43	85.5793
205	5.91	0.2217	7.47	12.1	392.372	85.829
206	5.84	0.201	7.46	12.08	391.527	85.8326
207	5.79	0.192	7.33	12.23	391.362	85.8943
208	5.72	0.1834	7.2	12.37	390.892	85.9301
209	5.67	0.1876	7.47	12.06	390.145	85.8082
210	5.60	0.199	7.61	11.63	390.126	85.8909
211	5.55	0.2064	7.61	11.51	391.457	85.7406
212	5.48	0.219	7.68	11.45	393.627	85.9652

213	5.42	0.2162	7.72	11.51	394.135	85.9815
214	5.36	0.1892	7.67	11.61	395.392	86.1504
215	5.31	0.1607	7.63	11.72	393.908	86.0593
216	5.26	0.1442	7.63	11.81	393.346	85.9395
217	5.22	0.1346	7.63	11.91	391.855	85.6255
218	5.16	0.1203	7.57	12.06	390.744	84.4807
219	5.11	0.1045	7.54	12.15	389.523	84.4391
220	5.07	0.1006	7.51	12.23	387.497	84.2703
221	5.04	0.0996	7.47	12.3	385.79	83.9201
222	5.00	0.1034	7.47	12.37	383.328	83.8559
223	4.93	0.1101	7.46	12.36	380.931	84.4333
224	4.90	0.1148	7.51	12.3	379.139	84.6269
225	4.84	0.1196	7.5	12.35	378.433	84.7245
226	4.80	0.1243	7.56	12.28	377.232	85.0995
227	4.75	0.1237	7.55	12.3	376.175	85.0919
228	4.71	0.127	7.62	12.26	375.624	85.4625
229	4.67	0.1279	7.57	12.3	373.96	85.3376
230	4.63	0.1267	7.49	12.36	374.318	85.5855
231	4.59	0.1246	7.38	12.42	374.062	85.5683
232	4.56	0.129	7.17	12.58	372.291	85.6691
233	4.52	0.1356	6.97	12.75	370.942	85.9226
234	4.49	0.1625	6.89	12.8	369.48	86.0006
235	4.46	0.1925	6.75	12.91	366.963	86.0911
236	4.43	0.2235	6.65	13	366.241	86.113
237	4.40	0.2618	6.63	13.04	364.811	86.2321
238	4.37	0.2959	6.59	13.09	363.77	86.1823
239	4.33	0.3082	6.6	13.11	362.083	86.2988
240	4.30	0.3214	6.59	13.12	362.29	86.426
241	4.27	0.3282	6.58	13.14	362.531	86.4254
242	4.24	0.3276	6.6	13.14	360.787	86.5264
243	4.20	0.3303	6.17	13.49	359.766	86.403
244	4.17	0.3279	5.87	13.77	356.882	86.2245
245	4.14	0.3634	5.82	13.81	352.749	86.5414
246	4.11	0.3968	5.8	13.85	350.162	86.6412
247	4.09	0.4165	5.81	13.84	347.383	86.5493
248	4.07	0.4289	5.79	13.9	345.136	86.7891
249	4.05	0.4393	5.78	13.91	343.748	86.2749
250	4.02	0.4384	5.8	13.9	343.248	86.9778
251	3.99	0.4392	5.74	13.97	340.988	87.0005
252	3.97	0.4317	5.75	13.97	339.296	86.5782
253	3.94	0.4275	5.74	13.96	337.671	86.651
254	3.92	0.4275	5.58	14.12	337.413	86.479
255	3.90	0.4359	5.59	14.11	336.073	86.4607

256	3.87	0.4412	5.6	14.11	335.206	86.2451
257	3.84	0.4418	5.58	14.14	333.557	86.7602
258	3.82	0.4398	5.43	14.27	332.718	86.4506
259	3.79	0.439	5.39	14.31	330.572	86.3942
260	3.77	0.441	5.4	14.31	328.712	86.4315
261	3.74	0.4392	5.41	14.29	328.966	86.5338
262	3.70	0.4367	5.39	14.33	327.564	86.4797
263	3.69	0.4343	5.41	14.31	325.972	86.6063
264	3.67	0.4328	5.41	14.32	325.541	86.6832
265	3.66	0.4304	5.29	14.41	324.34	86.8442
266	3.62	0.4345	5.31	14.37	323.503	86.672
267	3.60	0.4525	5.28	14.41	322.929	86.6031
268	3.57	0.4612	5.26	14.41	322.141	86.4677
269	3.55	0.4654	5.26	14.43	321.722	86.472
270	3.54	0.4685	5.27	14.41	320.935	86.6256
271	3.51	0.469	5.25	14.45	320.31	86.5592
272	3.48	0.466	5.24	14.46	319.507	86.4143
273	3.46	0.4653	5.25	14.46	318.199	86.782
274	3.43	0.4642	5.25	14.46	317.396	86.8241
275	3.41	0.4617	5.23	14.5	315.857	86.6141
276	3.39	0.4562	5.16	14.57	315.624	86.3577
277	3.36	0.4501	5.08	14.66	315.249	86.3642
278	3.34	0.4467	5.1	14.63	314.48	86.0738
279	3.32	0.4482	5.11	14.62	313.346	86.3479
280	3.29	0.4521	5.07	14.66	312.963	86.3954
281	3.28	0.4542	5.08	14.65	312.552	86.4059
282	3.26	0.4532	5.08	14.65	312.021	86.5664
283	3.23	0.4521	5.1	14.63	311.469	86.2527
284	3.22	0.455	5.07	14.66	310.49	86.2499
285	3.18	0.4557	5.09	14.64	310.229	86.0376
286	3.18	0.4535	5.08	14.67	308.655	86.0761
287	3.15	0.4492	5.04	14.71	308.316	86.1305
288	3.12	0.4467	5.05	14.7	308.39	86.2774
289	3.10	0.4468	5.05	14.74	307.926	86.034
290	3.08	0.4453	5.03	14.73	307.587	86.0783
291	3.06	0.4453	5.03	14.73	307.436	86.0607
292	3.04	0.4453	5.05	14.72	307.267	86.1465
293	3.01	0.4453	5.06	14.7	306.64	86.1654
294	2.99	0.4448	5.04	14.74	306.31	86.1498
295	2.97	0.4423	5.02	14.77	306.161	86.1537
296	2.94	0.4382	5.01	14.79	305.712	86.0135
297	2.92	0.4317	5.01	14.79	305.606	85.795
298	2.90	0.4293	4.88	14.87	305.098	85.8636

299	2.87	0.4267	4.48	15.36	303.69	85.7836
300	2.86	0.4132	4.47	15.38	302.544	86.1073
301	2.85	0.3985	4.45	15.39	301.246	86.0644
302	2.82	0.3873	4.43	15.41	300.33	85.8545
303	2.81	0.3837	4.44	15.41	299.92	86.1595
304	2.79	0.3823	4.45	15.39	298.687	85.9445
305	2.78	0.3809	4.46	15.38	297.868	86.0863
306	2.75	0.3823	4.42	15.45	296.773	85.7566
307	2.73	0.381	4.4	15.46	296.506	86.0653
308	2.72	0.3795	4.31	15.54	295.21	86.0661
309	2.70	0.3779	4.24	15.6	294.32	86.2484
310	2.69	0.3835	4.21	15.63	292.89	86.0003
311	2.67	0.3887	4.2	15.65	292.636	85.8658
312	2.66	0.3907	4.17	15.67	291.7	85.8781
313	2.63	0.3918	4.18	15.65	290.815	85.4847
314	2.62	0.3918	4.12	15.71	290.168	85.2681
315	2.61	0.3935	3.95	15.89	288.933	85.2099
316	2.57	0.3882	3.97	15.88	287.15	85.5358
317	2.57	0.3837	3.97	15.87	286.21	85.1954
318	2.55	0.3829	3.95	15.91	285.052	85.3021
319	2.54	0.3803	3.95	15.9	284.478	85.2968
320	2.52	0.3778	3.95	15.9	283.208	85.444
321	2.50	0.3767	3.94	15.92	282.527	85.3179
322	2.47	0.3757	3.91	15.96	282.025	85.2875
323	2.46	0.3756	3.92	15.97	280.807	85.3984
324	2.45	0.3753	3.91	15.98	279.837	85.4177
325	2.43	0.3748	3.88	16.01	279.355	85.113
326	2.40	0.3718	3.87	16.06	278.6	85.3706
327	2.40	0.3707	3.88	16	277.75	85.6447
328	2.38	0.3706	3.87	16.02	276.759	85.4806
329	2.36	0.3703	3.85	16.02	275.911	85.3556
330	2.35	0.3707	3.85	16.03	276.203	85.1737
331	2.33	0.3698	3.85	16.03	275.196	85.2247
332	2.31	0.3703	3.87	16	274.985	85.4191
333	2.29	0.3703	3.84	16.02	274.337	85.267
334	2.27	0.3693	3.84	16.02	273.234	85.4135
335	2.25	0.3704	3.86	16.02	272.737	85.36
336	2.24	0.3712	3.82	16.07	272.144	85.1574
337	2.24	0.372	3.84	16.03	272.127	85.057
338	2.21	0.3725	3.85	16.02	271.278	85.1974
339	2.19	0.3725	3.83	16.06	271.331	85.2455
340	2.18	0.3731	3.86	16.01	271.389	85.3145
341	2.16	0.3714	3.87	15.98	270.078	85.2538

342	2.15	0.3739	3.85	16.05	269.471	85.2659
343	2.13	0.376	3.86	16.03	269.648	85.2241
344	2.12	0.3768	3.83	16.05	268.936	85.1197
345	2.09	0.3748	3.86	16.02	268.269	85.2609
346	2.08	0.3726	3.83	16.06	267.68	85.1322
347	2.07	0.3726	3.85	16.02	267.584	85.0579
348	2.05	0.3728	3.83	16.05	266.552	85.0934
349	2.03	0.3725	3.82	16.07	266.901	84.8137
350	2.02	0.3714	3.82	16.05	266.963	84.9617
351	2.00	0.3718	3.84	16.04	267.091	85.0577
352	1.98	0.3726	3.8	16.13	266.703	85.0311
353	1.97	0.3732	3.79	16.12	265.48	84.9392
354	1.96	0.3731	3.8	16.11	265.38	85.1163
355	1.94	0.3728	3.75	16.13	264.883	85.0827
356	1.92	0.3726	3.75	16.14	263.901	84.906
357	1.90	0.3732	3.75	16.14	263.955	84.8535
358	1.89	0.3734	3.66	16.25	263.231	85.0812
359	1.87	0.3739	3.63	16.25	262.304	85.0987
360	1.85	0.3778	3.64	16.24	262.446	84.9279
361	1.84	0.3782	3.63	16.26	261.936	84.9935
362	1.83	0.3779	3.6	16.29	260.517	84.8949
363	1.81	0.3751	3.6	16.3	260.216	84.5378
364	1.79	0.3718	3.57	16.32	259.583	84.7185
365	1.78	0.3698	3.57	16.32	259.395	84.8653
366	1.77	0.3693	3.58	16.3	259.119	84.8262
367	1.75	0.3684	3.59	16.29	258.691	85.0147
368	1.74	0.3682	3.58	16.31	258.036	85.1017
369	1.72	0.3668	3.57	16.33	257.548	84.7843
370	1.70	0.366	3.55	16.34	257.428	84.4754
371	1.69	0.3659	3.38	16.51	256.821	84.6476
372	1.68	0.3656	3.28	16.61	255.932	84.4652
373	1.66	0.3681	3.29	16.6	255.091	84.638
374	1.65	0.3695	3.29	16.61	253.994	84.4822
375	1.63	0.3698	3.28	16.61	252.951	84.4819
376	1.62	0.3687	3.28	16.62	252.454	84.5237
377	1.60	0.3678	3.25	16.66	252.367	84.4071
378	1.59	0.3667	3.25	16.64	251.741	84.604
379	1.58	0.3668	3.25	16.66	251.066	84.4684
380	1.56	0.3653	3.24	16.66	250.393	84.5701
381	1.55	0.3643	3.23	16.67	249.671	84.6191
382	1.54	0.3643	3.24	16.65	248.887	84.6554
383	1.52	0.3639	3.25	16.65	248.375	84.6075
384	1.50	0.3642	3.25	16.65	247.391	84.664

385	1.49	0.3632	3.26	16.63	247.759	84.6999
386	1.48	0.3634	3.23	16.67	247.499	84.8179
387	1.47	0.3629	3.26	16.63	246.934	84.5506
388	1.46	0.3639	3.27	16.62	246.413	84.7122
389	1.44	0.3653	3.27	16.63	246.203	84.4882
390	1.43	0.365	3.26	16.66	245.702	84.555
391	1.41	0.3653	3.27	16.63	244.984	84.6609
392	1.40	0.3657	3.28	16.62	245.148	84.536
393	1.39	0.3667	3.26	16.64	245.374	84.6528
394	1.38	0.3654	3.25	16.65	245.46	84.4437
395	1.37	0.3653	3.27	16.62	245.044	84.4227
396	1.35	0.3654	3.26	16.63	244.497	84.4024
397	1.32	0.3653	3.26	16.63	243.931	84.4742
398	1.31	0.3642	3.22	16.63	242.895	84.4662
399	1.30	0.3734	3.18	16.67	242.761	84.4589
400	1.28	0.3871	3.19	16.67	242.777	84.5312
401	1.29	0.3942	3.21	16.63	242.098	84.4978
402	1.26	0.3998	3.18	16.67	241.976	84.6808
403	1.24	0.4017	3.2	16.65	241.602	84.6085
404	1.24	0.4015	3.19	16.67	241.032	84.5449
405	1.21	0.4	3.18	16.69	241.302	84.4619
406	1.22	0.3992	3.19	16.68	240.995	84.5018
407	1.19	0.3973	3.17	16.7	240.712	84.5995
408	1.18	0.3967	3.18	16.68	240.473	84.6633
409	1.17	0.3962	3.18	16.68	240.502	84.5787
410	1.16	0.396	3.18	16.67	239.955	84.6785
411	1.15	0.3971	3.18	16.68	239.761	84.6144
412	1.13	0.3985	3.17	16.7	239.23	84.4801
413	1.12	0.3979	3.17	16.7	239.352	84.5577
414	1.10	0.3987	3.19	16.69	239.24	84.622
415	1.08	0.4	3.17	16.7	238.652	84.5893
416	1.07	0.399	3.16	16.7	238.629	84.523
417	1.05	0.4	3.19	16.71	238.761	84.568
418	1.04	0.4	3.17	16.69	238.567	84.4567
419	1.02	0.4	3.18	16.67	238.238	84.5196
420	1.02	0.3998	3.17	16.68	238.621	84.5105
421	0.99	0.4	3.17	16.7	237.51	84.3774
422	0.98	0.397	3.14	16.73	237.505	84.5838
423	0.97	0.396	3.14	16.71	237.491	84.5194
424	0.96	0.3967	3.15	16.7	237.48	84.5231
425	0.94	0.3951	3.14	16.71	236.879	84.4942
426	0.94	0.3946	3.16	16.7	237.115	84.4396
427	0.92	0.395	3.14	16.72	236.916	84.427

428	0.90	0.3953	3.14	16.72	236.58	84.5097
429	0.89	0.3951	3.13	16.73	236.745	84.5753
430	0.87	0.3943	3.13	16.75	236.166	84.3836
431	0.86	0.3937	3.13	16.73	236.497	84.4092
432	0.84	0.3934	3.12	16.76	235.637	84.3237
433	0.84	0.3915	3.11	16.76	235.625	84.2094
434	0.82	0.3889	3.12	16.75	235.326	84.119
435	0.81	0.3873	3.13	16.74	235.266	84.3465
436	0.79	0.387	3.12	16.75	235.349	84.3163
437	0.80	0.3854	3.11	16.76	235.124	84.3286
438	0.77	0.3854	3.11	16.77	234.961	84.0213
439	0.76	0.3856	3.11	16.79	234.694	84.0234
440	0.75	0.3854	3.11	16.79	234.638	84.1116
441	0.72	0.3845	3.11	16.76	234.395	84.209
442	0.72	0.3851	3.1	16.79	234.369	84.1095
443	0.69	0.3845	3.09	16.79	233.953	84.245
444	0.69	0.3834	3.1	16.77	234.024	84.3054
445	0.69	0.3895	3.12	16.73	233.983	84.1636
446	0.66	0.4023	3.13	16.73	233.565	84.1664
447	0.66	0.4073	3.12	16.76	234.031	84.3355
448	0.63	0.4068	3.11	16.77	234.595	84.1835
449	0.63	0.4046	3.1	16.8	233.997	84.1755
450	0.61	0.4018	3.11	16.76	234.268	84.1872
451	0.60	0.3992	3.11	16.76	234.023	84.0707
452	0.60	0.397	3.11	16.76	234.143	84.1275
453	0.57	0.3948	3.11	16.76	233.44	84.0402
454	0.56	0.3931	3.11	16.78	233.883	84.0253
455	0.54	0.3906	3.1	16.79	233.716	83.976
456	0.52	0.3895	3.09	16.8	233.548	84.0424
457	0.51	0.3879	3.1	16.79	233.204	84.0322
458	0.49	0.387	3.08	16.81	233.312	84.11
459	0.49	0.387	3.07	16.84	233.41	84.0641
460	0.47	0.3848	3.03	16.87	233.299	83.9675
461	0.45	0.3834	3.05	16.85	232.931	84.0771
462	0.45	0.384	3.02	16.87	232.69	83.9745
463	0.43	0.3825	3.03	16.87	232.444	84.0337
464	0.41	0.3792	3.01	16.9	232.674	84.0072
465	0.41	0.3765	3	16.91	232.406	84.0549
466	0.39	0.3742	3	16.91	232.093	84.081
467	0.38	0.3728	2.98	16.92	231.641	84.1338
468	0.37	0.371	2.96	16.95	231.284	84.1907
469	0.36	0.3681	2.94	16.98	231.644	84.1006
470	0.34	0.3657	2.93	16.99	231.488	84.051

471	0.34	0.3637	2.92	17.02	230.849	84.1237
472	0.32	0.3626	2.91	17.02	230.436	84.1309
473	0.31	0.3609	2.88	17.03	230.423	84.2127
474	0.30	0.3654	2.87	17.06	230.519	84.0795
475	0.29	0.3696	2.85	17.07	230.071	84.1477
476	0.27	0.369	2.85	17.09	229.832	84.1819
477	0.26	0.3681	2.84	17.09	229.595	84.0753
478	0.24	0.3676	2.84	17.09	229.356	84.0773
479	0.23	0.3664	2.84	17.09	228.839	84.2192
480	0.23	0.3656	2.83	17.1	228.408	84.0391
481	0.21	0.3642	2.82	17.1	228.679	84.0135
482	0.20	0.3631	2.8	17.14	228.714	83.935
483	0.19	0.3626	2.8	17.12	228.203	84.1477
484	0.17	0.3639	2.81	17.13	227.747	84.0047
485	0.16	0.3632	2.78	17.16	227.854	84.0188
486	0.15	0.3626	2.79	17.13	227.352	83.937
487	0.14	0.3612	2.77	17.17	227.044	84.0619
488	0.13	0.3609	2.77	17.16	227.154	83.9764
489	0.11	0.36	2.76	17.18	226.759	83.9823
490	0.10	0.3584	2.76	17.18	226.585	83.8841
491	0.08	0.3585	2.76	17.18	226.244	83.8894
492	0.08	0.357	2.75	17.19	225.797	83.9877
493	0.06	0.3575	2.73	17.21	225.513	83.9326
494	0.05	0.3559	2.73	17.22	225.51	83.8364
495	0.04	0.3546	2.73	17.21	224.962	83.9569
496	0.03	0.3529	2.71	17.24	224.765	83.8976
497	0.02	0.3507	2.71	17.23	224.603	83.9402
498	0.01	0.3525	2.71	17.23	224.14	83.8554
499	0.00	0.3534	2.71	17.24	224.303	83.8066
500	-0.02	0.354	2.7	17.25	224.325	83.8104
501	-0.03	0.3529	2.69	17.26	224.277	83.9236
502	-0.04	0.3525	2.68	17.28	223.235	83.8987
503	-0.04	0.3509	2.68	17.28	222.572	83.9605
504	-0.06	0.349	2.66	17.31	222.641	83.8924
505	-0.08	0.347	2.65	17.31	222.156	83.9472
506	-0.08	0.346	2.66	17.3	221.886	83.9242
507	-0.09	0.346	2.65	17.31	222.109	83.8516
508	-0.11	0.3446	2.65	17.32	221.937	83.9591
509	-0.10	0.3434	2.65	17.32	221.428	83.93
510	-0.12	0.345	2.65	17.31	221.647	83.8245

Stove Builder International Inc.

Manufacturer:	SBI
Model:	3.3 Series
Date:	06-06-19
Run:	4
Control #:	G103994967
Test Duration:	510
Output Category:	Medium

Technicians: _____

_____

_____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.5%	78.1%
Combustion Efficiency	97.7%	97.7%
Heat Transfer Efficiency	74%	79.9%

Output Rate (kJ/h)	21,480	20,376	**(Btu/h)**
Burn Rate (kg/h)	1.49	3.28	**(lb/h)**
Input (kJ/h)	29,621	28,099	**(Btu/h)**

Test Load Weight (dry kg)	12.66	27.90	**dry lb**
MC wet (%)	16.6		
MC dry (%)	19.90		
Particulate (g)	4.695		
CO (g)	421		
Test Duration (h)	8.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.03	2.31
g/kg Dry Fuel	0.37	33.25
g/h	0.55	49.52
lb/MM Btu Output	0.06	5.36

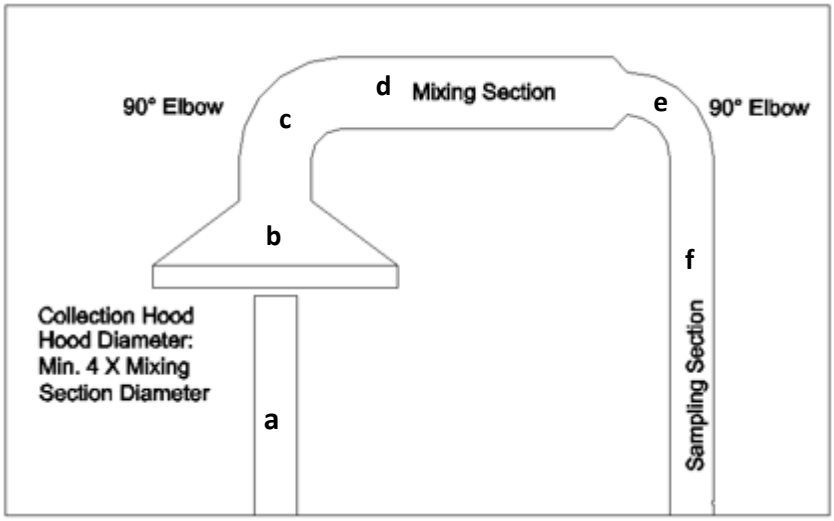
Air/Fuel Ratio (A/F)	15.03

VERSION: **2.4** **2010-04-15**

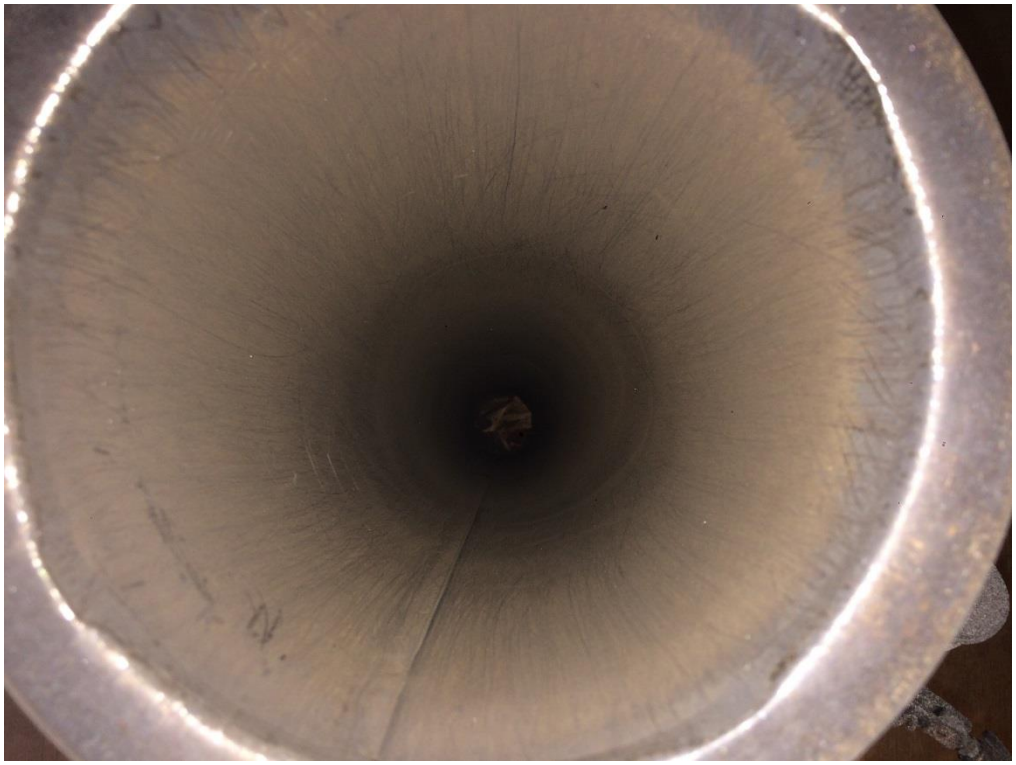
Appendix H

Tunnel cleaning and test load photograph

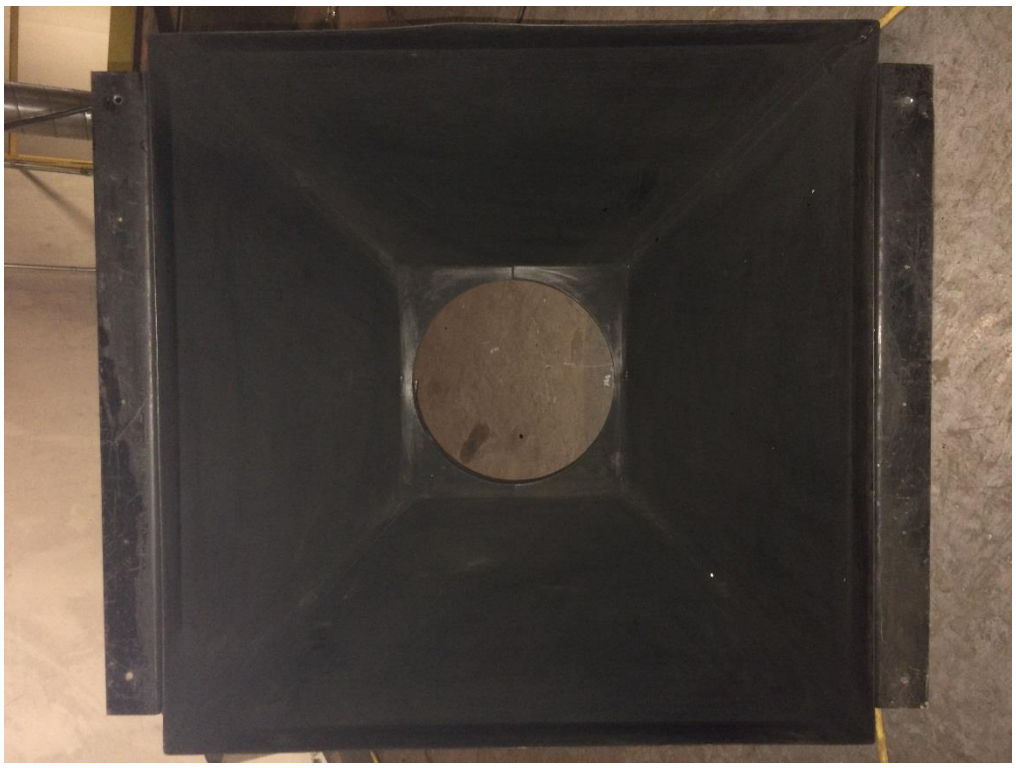
1. Tunnel cleaning pictures



a. Picture of the chimney

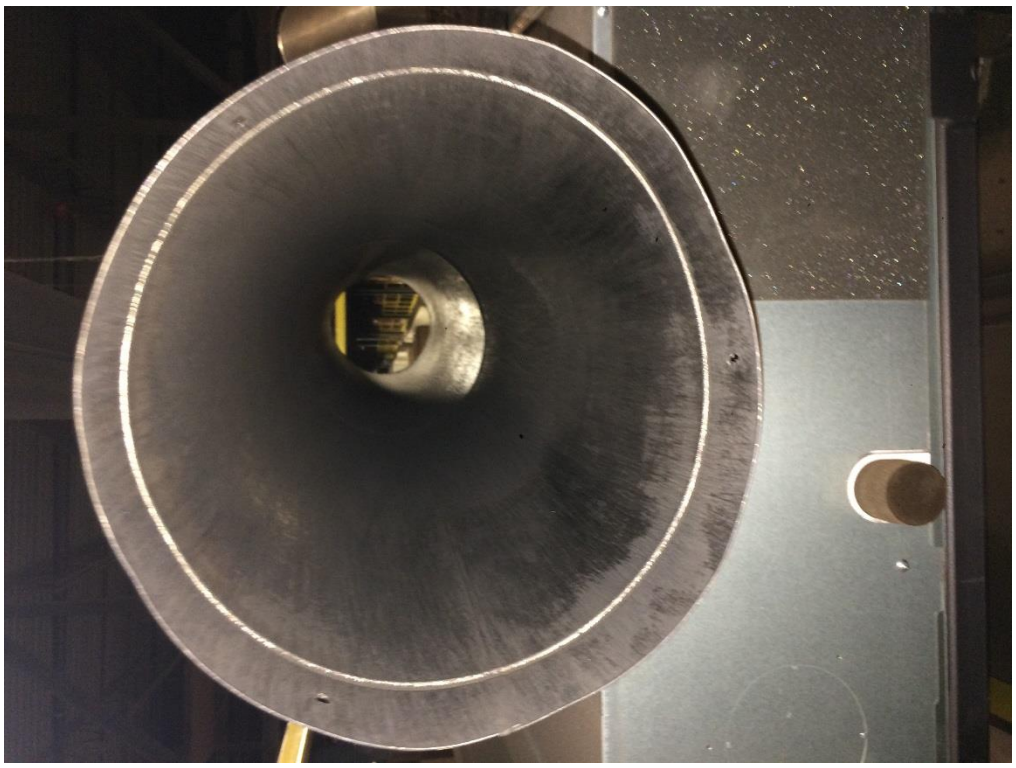


b. Picture of the collecting hood



c. Picture of the first elbow

d. Picture of the mixing section



e. Picture of the second elbow

f. Picture of the sampling section

2. Identification pictures (Ex : Model name – Proto – A1.2)

a. Front view

b. Rear view

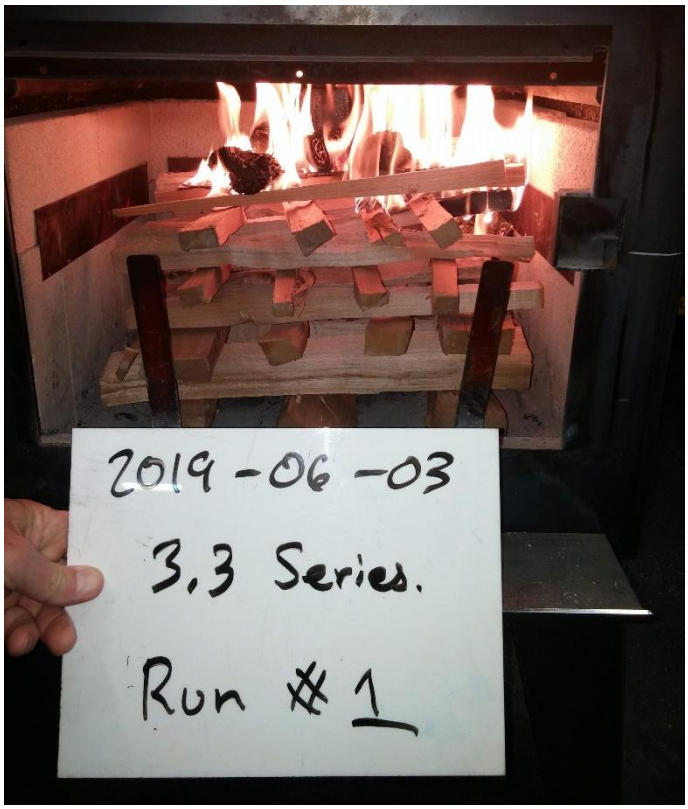
c. Iso view

3. Test run pictures

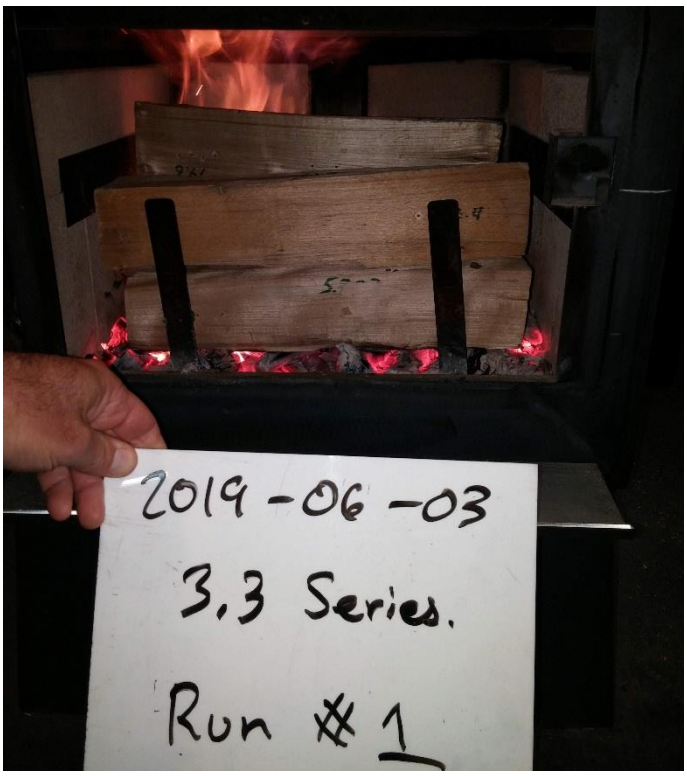
a. Run #1

i. Picture of the load with all dimensions

ii. Picture of kindling and start-up fuel after ignition

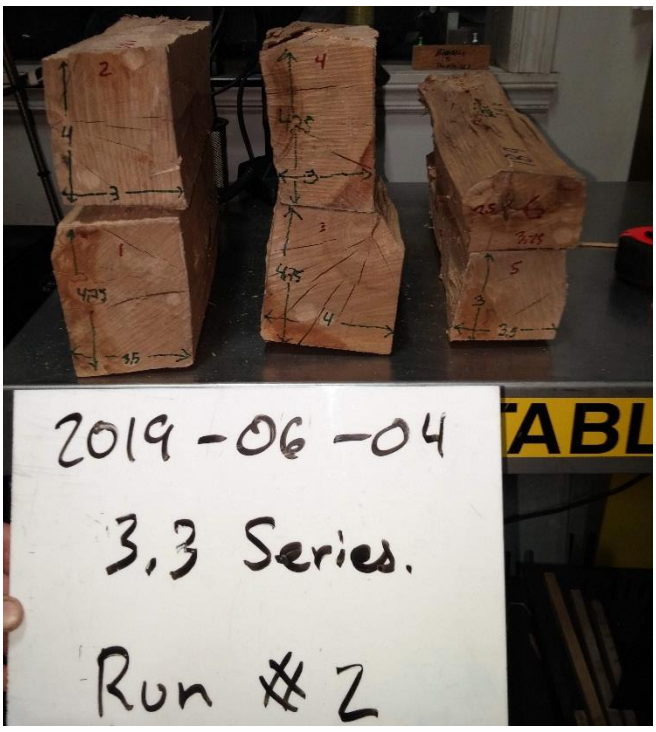


iii. Picture of the high fire load inside of the combustion chamber

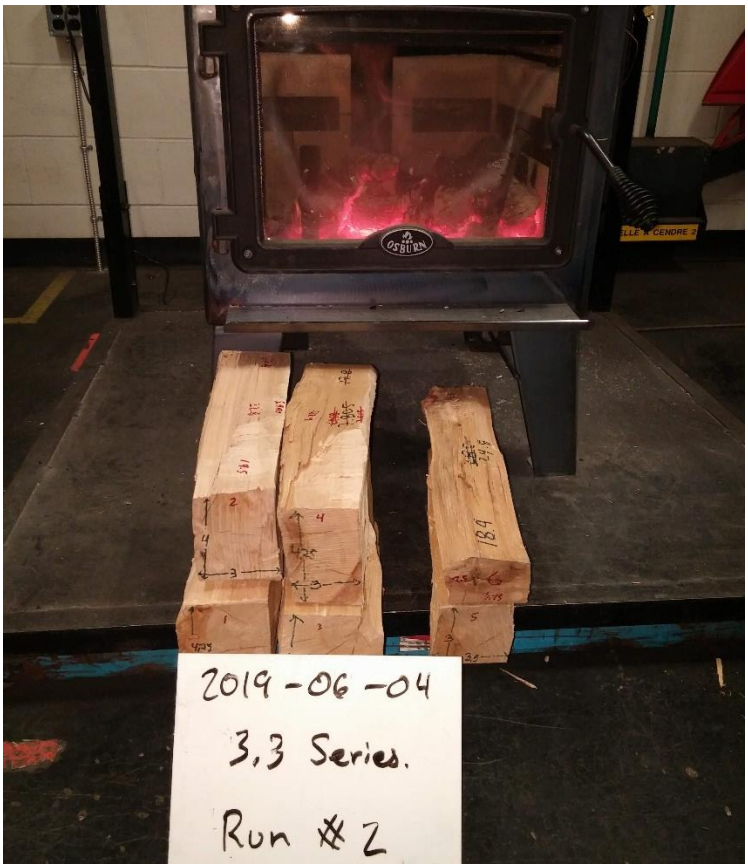


b. Run #2

i. Picture of the load with all dimensions

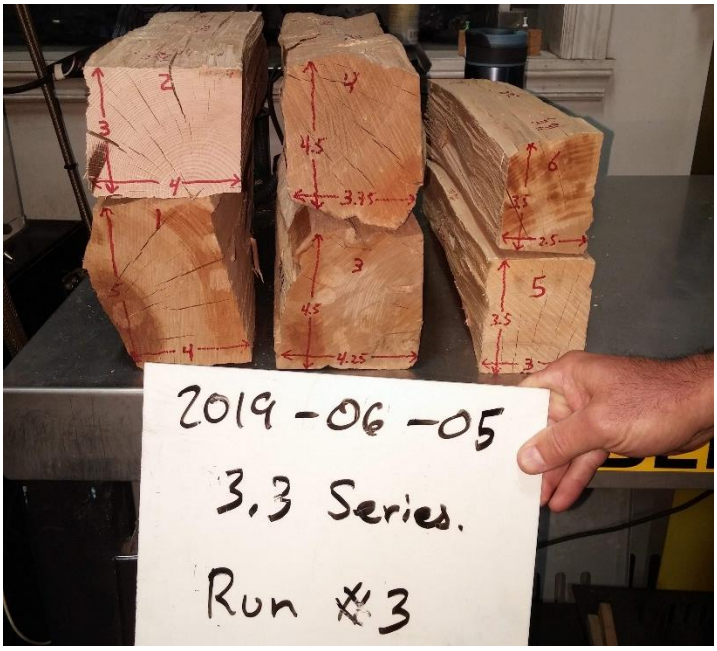


ii. Picture before loading

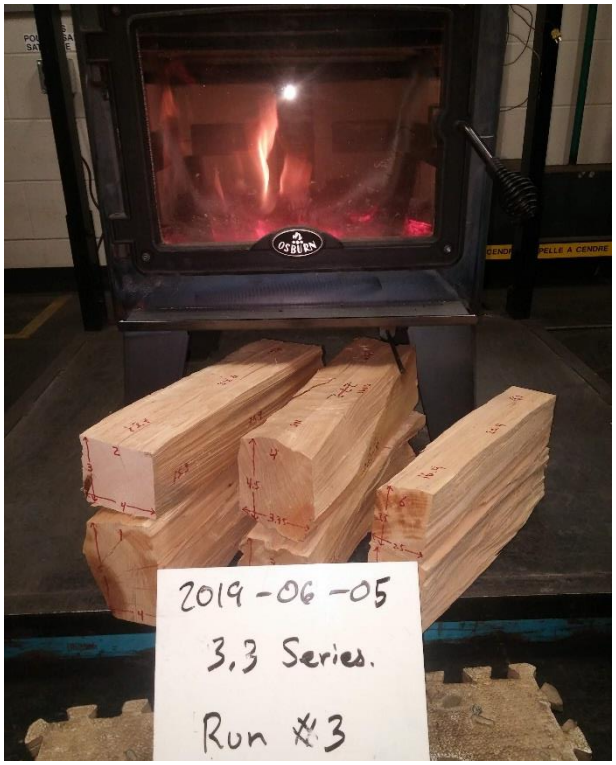


c. Run #3

i. Picture of the load with all dimensions

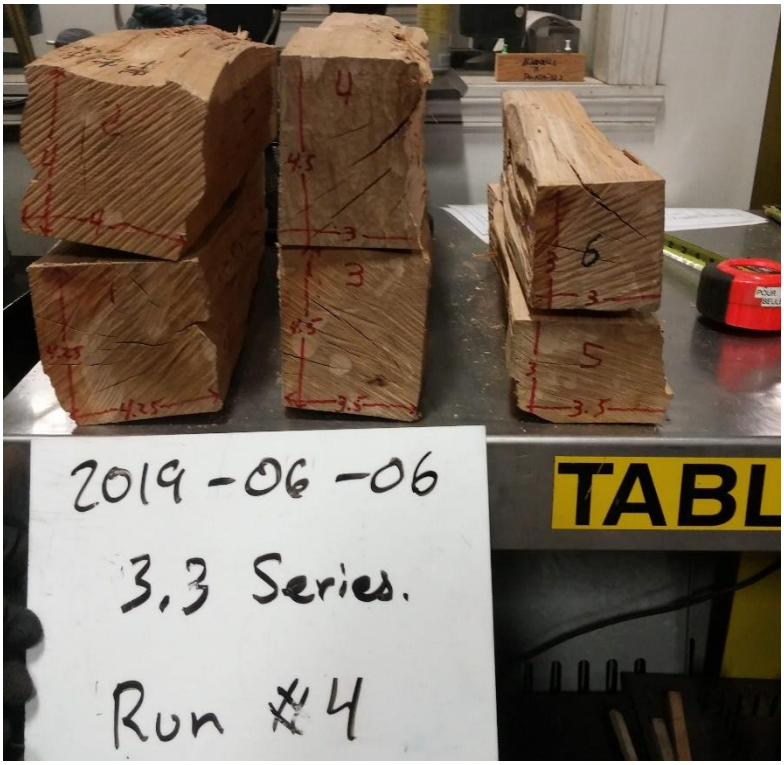


ii. Picture before loading



d. Run #4

i. Picture of the load with all dimensions



i. Picture before loading

4. Picture of the sealed unit

a. Front view

b. Rear View

c. Iso view

Signature : _____

Date : _____

SBI Fabricant de poêles international inc.
Stove Builder International Inc.

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

June 21st, 2019

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: EPA Administrator

Subject: Compliance Statements and Acknowledgements

Dear Administrator,
As stated in the application for certificate of compliance, Stove Builder International Inc (SBI) states and acknowledges the 13 items below.

1. SBI provided all engineering drawing (including specifications for each component listed in paragraphs (k)(2), (3) and (4) of 60.533(b) and 60.5475(b) available in Intertek Test Report 103994967-MTL001 at Appendix D. Tolerances are identified on all part draft and cannot reasonably be anticipated to cause wood heater in the model line to exceed the applicable emission limits. The user's manual shows how to replace and inspect emission-critical part such as the secondary tubes.
2. SBI confirm that the firebox or any firebox component (including the materials listed in paragraph (k)(3) of 60.533(b) and 60.5475(b) will be composed of material similar from the material used for the firebox or firebox component in the wood heater on which certification testing was performed. Individual brick size and color may vary but the specification of the material remains the same. The inner firebox brick coverage remains also always the same. If other differences occur over time, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency will be communicate with Residential Wood Heater Compliance Program Lead.
3. SBI will provide to Residential Wood Heater Compliance Program Lead the Confidential Business Information (CBI) report including all test data and drawings by e-mail to Sanchez.Rafael@epa.gov.
4. SBI provided all documentation that proves that the certification tests were valid. Raw data sheets, laboratory technician notes, calculations and test results were provided to Residential Wood Heater Compliance Program Lead in the appendix of Intertek Test Report 103994967-MTL001. SBI confirms that the burn rate for the low burn rate category is no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer.
5. SBI provided in Appendix D of Intertek Test Report 103994967-MTL001 a copy of the warranty that stated: "This warranty is void if the unit is used to burn materials other than cordwood (for which the unit is not certified by the EPA) and void if not operated according to the owner's manual. 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, venting problems or under-estimated heating area are not covered by this warranty. 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."

6. SBI, with the help of the certification laboratory, Intertek, built a Quality Assurance Program. A quality control is performed for each unit produced and 4 times a year, Intertek audits our production line to make sure that the models in production comply with the certification unit.
7. SBI confirms that the certification model was sealed by Intertek as per picture of Appendix H. Permanent straps holds the unit on a wooden palette and prevent the door from opening. Intertek logo is painted over the unit and the strap as a protection. The sealed unit will be store at SBI laboratory as long as the unit is in production, but a least for 5 years after certification test.
8. SBI states that the units produce under this certificate will be:
    a. Similar in all material respects that would affect emissions as defined in § 60.531 to the wood heater submitted for certification testing, and labeled as prescribed in § 60.536 and 60.5478.
    b. Accompanied by an owner's manual that meets the requirements in § 60.536 and 60.5478. A copy of the owner's manual was submitted to the Administrator and will be available to the public on the manufacturer's web site at production launch.
9. SBI has entered into contracts with an approved laboratory and third-party certifier which is Intertek. Intertek Montreal is the approved laboratory and the third-party certifier is the Middleton chapter of Intertek.
10. SBI allows the approved laboratory and approved third-party certifier to submit information to Residential Wood Heater Compliance Program Lead on behalf of SBI, including any claimed to be CBI.
11. SBI will place a copy of the certification test report, summary and all non-CBI on the manufacturer's web site available to the public within 30 days after the Administrator issues a certificate of compliance.
12. SBI acknowledges that the certificate of compliance cannot be transferred to another manufacturer or model line without written approval by the Administrator.
13. SBI acknowledges that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

Print name and title : Guillaume Thibodeau-Fortin, Eng. Date : 2019/07/03

Signature of responsible representative of the manufacturer certifying the accuracy of the above statements:

The authorized or responsible party whose signature is above is certifying that the manufacturer has complied with and will continue to comply with all requirements of the 2015 CAA Standards for compliance certification and that the manufacturer remains responsible for compliance regardless of any error by the test laboratory or third-party certifier.

Guillaume Thibodeau-Fortin

De: Guillaume Thibodeau-Fortin
Envoyé: 13 mai 2019 15:31
À: 'WoodHeaterReports'
Cc: 'Rafael Sanchez'
Objet: RE: 30-days notification

Hi,
This is to notify that the certification runs planned May 23rd, 2019 need to be postponed to June 3rd, 2019 due to too high moisture content in the test cord wood. Two additional weeks would probably be a enough for air drying.

Thanks,

Guillaume Thibodeau-Fortin, Ing./Eng.
Ingénieur mécanique
Mechanical Engineer
| T : 418-878-3040 ext.5224 |

De : Guillaume Thibodeau-Fortin
Envoyé : 17 avril 2019 16:42
À : WoodHeaterReports <WoodHeaterReports@epa.gov>
Cc : 'Rafael Sanchez' <sanchez.rafael@epa.gov>
Objet : 30-days notification

Hi,
This is to notify that SBI is planning to certify a wood stove on May 23rd, 2019.

Have a good day,

Guillaume Thibodeau-Fortin, Ing./Eng.
Ingénieur mécanique
Mechanical Engineer
| T : 418-878-3040 ext.5224 |

United States Environmental Protection Agency

OMB Control No. 2060-0161
Approval expires 03/31/2019

OMB Control No. 2060-0693
Approval expires 03/31/2019

EPA Form 6400-05

Office of Enforcement and Compliance Assurance

30-DAY NOTIFICATION

2015 CLEAN AIR ACT (CAA) STANDARDS OF PERFORMANCE FOR NEW RESIDENTIAL WOOD HEATERS, NEW RESIDENTIAL HYDRONIC HEATERS AND FORCED-AIR FURNACES 40 CFR PART 60 SUBPARTS AAA AND QQQQ

The public reporting and recordkeeping burden for this collection of information is estimated to average 2 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Regulatory Support Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

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Instructions: The manufacturer of an affected wood/pellet heater/central heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov. This notice must be received by the EPA at least 30 days before the start of testing.

GENERAL INFORMATION						
Manufacturer's Name: Stove Builder International						
Heater Type Check one):	☒Adjustable Burn Rate Wood Heater	☐Pellet Stove	☐Single Burn Rate Heater	☐Hydronic Heater	☐Forced Air Furnace	☐Other:
Hydronic Heater Type (Check one):	☐Full Storage	☐Partial Storage	☐Indoor	☐Outdoor	☐Other:	
Forced-Air Furnace Type (Check one):	☐Small (less than 65,000 BTU/hr heat output)		☐Large (greater than 65,000 BTU/hr heat output)			
Fuel Tested (Check one):	☐Crib	☐Pellet	☒Cordwood	☐Wood Chips	☐Other:	
Model Name(s) (as will appear on test report): 3.1 Series						
Model Number(s) (as will appear on test report): These are preliminary names subject to change. Official names will be on Test Report : Austral III, Blackstag II, Legend III, Myriad III, Escape 1900, Solution 3.1, Osburn 3300						
Equipped with a catalytic combustor? ☐Yes ☒No						

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Environmental Protection
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Mailing Address: Same as street address		
Street Address: 250 rue de Copenhague		
City: Saint-Augustin-de-Desmaures	**State: Québec**	**ZIP Code: G3A 2H3**
Phone:1-418-878-3040 x5224	**Fax: 1-418-878-3001**	**Web Site:** www.sbi-international.com
Address of Manufacturer: **Same as above.**		
City:	**State**	**ZIP Code:**
EPA APPROVED TEST LABORATORY		
Name and Title of Authorized Representative: Claude Pelland, Project Engineer		
Company: Intertek		
Phone: 1-514-631-3100 x277	**E-mail:** **claude.pelland@intertek.com**	**Fax: 1-514-631-1133**

United States
Environmental Protection
Agency

OMB Control No. 2060-0161
Approval expires 03/31/2019

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City: Lachine	**State: Québec**	**ZIP Code: H8T 3J1**
EPA APPROVED THIRD-PARTY CERTIFIER		
Name and Title of Authorized Representative: Brian Ziegler		
Company: Intertek		
Phone: 608-824-7425	**E-mail:** brian.ziegler@intertek.com	**Fax:**
City: Middleton	**State: WI**	**ZIP Code: 53562**
COMPLIANCE TEST INFORMATION		
Test Method(s): ASTM E3053-17 as per letter the Broadly Applicable Alternative Test Method from EPA of 2/28/2018 (Alt-125)		
Date(s) of Proposed Test: May 23rd, 2019		

United States
Environmental Protection
Agency

OMB Control No. 2060-0161
Approval expires 03/31/2019

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Instructions: The manufacturer of an affected wood/pellet heater/central heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov. This notice must be received by the EPA at least 30 days before the start of testing.

Testing Location (Name and Address): Stove Builder International Laboratory **250 rue de Copenhague, Saint-Augustin-de-Desmaures,** **Québec, Canada, G3A 2H3**	
Contact Name: Guillaume Thibodeau-Fortin	**Title: Engineer**
Phone Number: 1-418-878-3040 x5224	**Email Address:** gthibodeaufortin@sbi-international.com

United States
Environmental Protection
Agency

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Instructions: The manufacturer of an affected wood/pellet heater/central heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov. This notice must be received by the EPA at least 30 days before the start of testing.

Guillaume Thibodeau-Fortin
Print Name and Title of Authorized Official


Signature

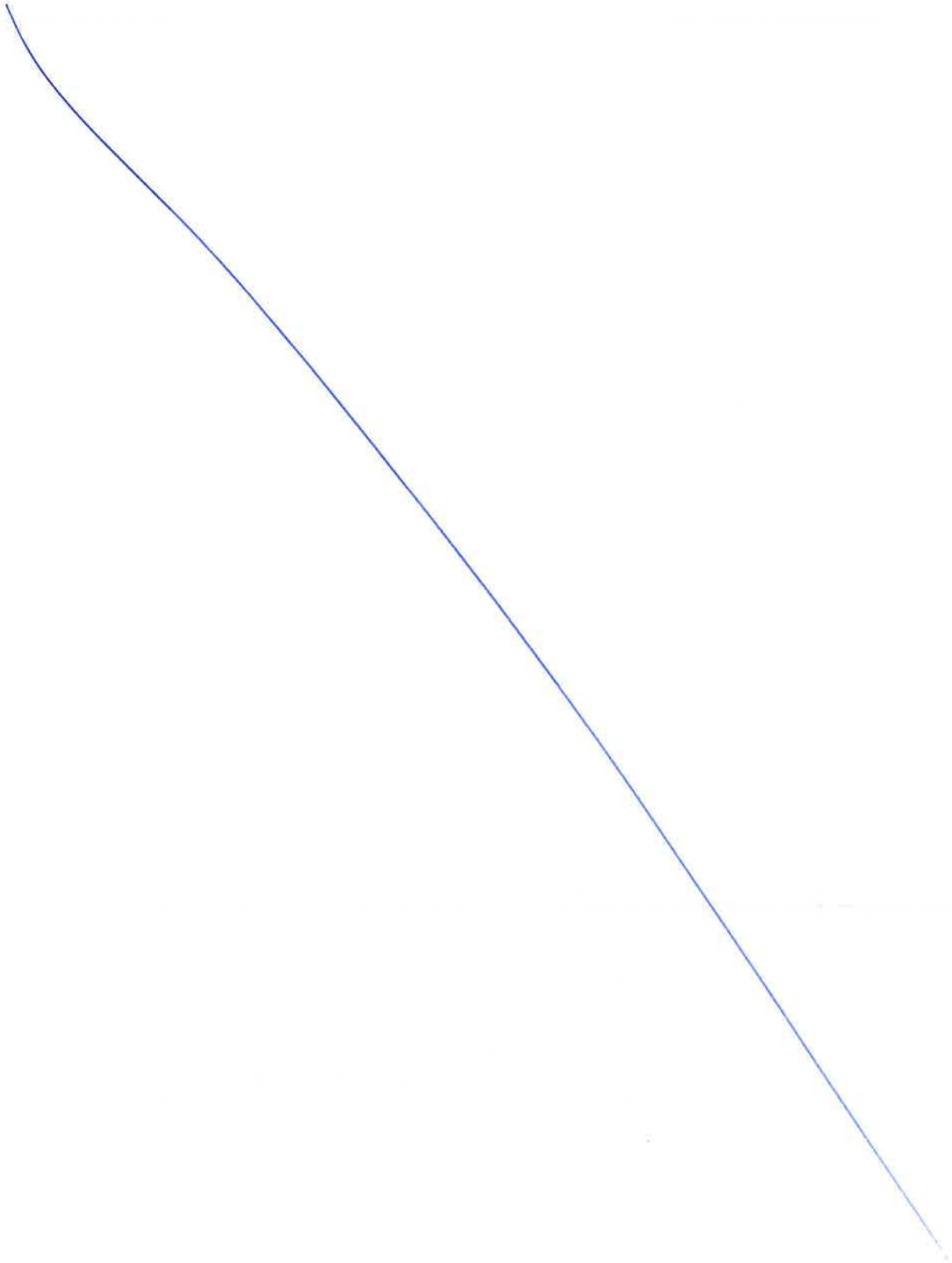
2019 April 17th
Date

Telephone Number: 418-878-3040 x 5224

Email Address: gthibodeaufortin@sbi-international.com

Remarks:

v1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

FEB 2 8 2018

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Justin White
Hearthstone QHPP, Inc.
#17 Stafford Ave.
Morrisville, VT 05661

Dear Mr. White,

I am writing in response to your letter dated January 12, 2018, regarding wood heaters manufactured by Hearthstone QHPP, Inc. (Hearthstone). This response, dated February 28, 2018, supercedes our previous response (dated February 26, 2018) to correct an inaccuracy regarding required changes to ASTM E3053-17.

You are requesting to use an alternative test method, using cord wood, as referenced in section 60.532(c) of 40 CFR part 60, Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA) to meet the 2020 cord wood alternative compliance option. The 2020 cord wood alternative compliance option states that each affected wood heater manufactured or sold at retail for use in the United States on or after May 15, 2020, must not discharge into the atmosphere any gases that contain particulate matter in excess of 2.5 g/hr. Compliance must be determined by a cord wood test method approved by the Administrator along with the procedures in 40 CFR 60.534. You have requested approval to use the procedures and specifications found in ASTM Method E3053-17, a cord wood test method titled, "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel," in conjunction with ASTM E2515-11 and Canadian Standards Administration (CSA) Method CSA-B415.1-10, which are specified in 40 CFR 60.534.

We understand that Hearthstone is also requesting that the alternative method proposed above be approved to apply broadly to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA, from the approval date of this request until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, providing all requirements of section 60.533 of Subpart AAA are met.

With the caveats set forth below, we approve your alternative test method request for certifying wood heaters using ASTM E3053-17 in conjunction with section 60.534 of Subpart AAA to meet the 2020 cord wood compliance option until such time that Subpart AAA is revised or replaced to require a different cord wood certification method. We also approve application of this alternative method to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA.

As required in Subpart AAA, section 60.354(d), you or your approved test laboratory 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. Also, as required by Subpart AAA, section 60.534(e), you must have your approved laboratory measure the efficiency, heat output, and carbon monoxide emissions of the tested wood heater using CSA-B415.1-10. For measurement of particulate matter emission concentrations, ASTM 2515-11 must be used.

The following change to ASTM E3053-17 must be followed:

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

The following changes to ASTM E2515-11 must be followed:

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

2. Filters must be weighed in pairs to reduce weighing error propagation; see ASTM 2515-11, Section 10.2.1 Analytical Procedure.

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

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

A copy of this letter must be included in each certification test report where this alternative test method is utilized.

It is reasonable that this alternative test method approval be broadly applicable to all wood heaters subject to the requirements of 40 CFR part 60, Subpart AAA. For this reason, we will post this letter as ALT-125 on our website at *http://www3.epa.gov/ttn/emc/approalt.html* for use by other interested parties. As noted earlier in this letter, this alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Michael Toney of my staff at 919-541-5247 or toney.mike@epa.gov.

Sincerely,

Steffan M. Johnson, Group Leader
Measurement Technology Group

cc: Amanda Aldridge, EPA/OAQPS/OID
Adam Baumgart-Getz, EPA/OAQPS/OID
Rafael Sanchez, EPA/OECA
Michael Toney, EPA/OAQPS/AQAD

United States
Environmental Protection
Agency

OMB Control No. 2060-0161
Approval expires 3/31/2019

OMB Control No. 2060-0693
Approval expires 3/31/2019

EPA Form 6400-03

RESIDENTIAL WOOD HEATER CERTIFICATE OF COMPLIANCE APPLICATION

INSTRUCTIONS

Pursuant to the 2015 Clean Air Act Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces, 40 CFR Part 60 Subparts AAA and QQQQ (2015 Wood Heater Rule), any manufacturer of an affected residential wood heater must apply to the EPA for a certificate of compliance for each model line. Without applying for and obtaining a certificate of compliance, a manufacturer may not manufacture, advertise for sale, offer for sale, or sell affected residential wood heaters in the United States.

Under Subpart AAA, affected residential wood-burning room heaters currently include, but are not limited to, adjustable burn rate stoves, catalytic adjustable burn rate stoves; hybrid adjustable burn rate stoves; single burn rate stoves; and pellet stoves.

Under Subpart QQQQ, affected residential wood-burning central heaters currently include, but are not limited to, indoor hydronic heaters ("wood boilers"); outdoor hydronic heaters ("outdoor wood boilers"); and forced-air furnaces ("warm air furnaces").

By completing and submitting this application to EPA, you will satisfy the requirement to apply for a certificate of compliance. To submit a complete application, this application must include the following:

(1) Certification test report prepared by an EPA-approved test laboratory
(2) Certification of conformity by an EPA-approved third party certifier
(3) Quality assurance plan
(4) All required supporting documentation and manufacturer statements pursuant to the 2015 Wood Heater Rule (Sections 60.533 or 60.5475)

This application must be signed by a responsible representative of the manufacturer or an authorized representative. Once completed with all required information/documentation included, this application must be submitted to WoodHeaterReports@epa.gov.

The public reporting and recordkeeping burden for this collection of information is estimated to average 8 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Regulatory Support Division, U.S. Environmental Protection Agency (EPA) (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed application to this address.

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564-7028, Residential Wood Heater Compliance Program Lead, or via email at sanchez.rafael@epa.gov.

MANUFACTURER INFORMATION

Manufacturer's Name: Stove Builder International

Manufacturer's Physical Address:
250 rue de Copenhague
Saint-Augustin-de-Desmaures,
Canada, G3A 2H3

Manufacturer's Mailing Address (if different from physical address):

Name and Title of Manufacturer's Responsible/Authorized Representative Submitting this Application:
Guillaume Thibodeau-Fortin

Manufacturer's Contact E-mail: gthibodeaufortin@sbi-international.com

Manufacturer's Phone Number: 1-418-878-3040 x5224

Manufacturer's Website Address:
www.sbi-international.com

Manufacturer's Website Address where the test report and owner's manual will be posted, if known:
www.drolet.com

AFFECTED WOOD HEATER MODEL INFORMATION

Model Name(s) (as appearing on the certification test report). Please note: the model name and design number must clearly distinguish one model from another. The name and design number cannot include the EPA symbol or logo or name or derivatives such as "EPA": 3.3 Series

Model Number(s) (as appearing on the certification test report): Osburn 3300, Austral III, Black Stag II, Escape 1900, Gateway 3300, Legend III, Myriad III, Solution 3.3

Heater Type Check one):	☒Adjustable Burn Rate Wood Stover		☐Pellet Stove	☐Single Burn Rate Wood Stove	☐Hydronic Heater	☐Forced-Air Furnace (FAF)
Hydronic Heater Type (Check one):	☐Full Storage		☐Partial Storage	☐Indoor	☐Outdoor	
Forced-Air Furnace Type (Check one):	☐Small (less than 65,000 BTU/hr heat output)			☐Large (greater than 65,000 BTU/hr heat output)		
Fuel Tested (Check one):	☐Crib		☐Pellet	☒Cordwood	☐Wood Chips	☐Other:
Certification Step:	☐2015	☐2016 (FAFs only)	☐2017 (FAFs only)	☒2020 (ALL HEATERS)		

Was this heater tested using an EPA-approved Alternative Test Method (ATM)? ☒Yes ☐No

If yes, provide date of EPA approval and attach copy of EPA approved ATM letter):
2/28/2018

If not, what Test Method(s) did the test laboratory use for the certification test? (List all applicable test methods):

Heater equipped with a catalytic combustor? ☐Yes ☒No

Date of submission of 30-Day Notice to the EPA:4/17/2019

What was the proposed date(s) of testing? 05/23/2019

What was the actual date(s) of testing? 06/03/2019

Was the compliance test postponed or suspended? ☒Y ☐N If yes, date of EPA notification of postponement or suspension: 05/13/2019

Explain reason for postponing or suspending the certification test:
"This is to notify that the certification runs planned May 23rd, 2019 need to be postponed to June 3rd, 2019 due to too high moisture content in the test cord wood. Two additional weeks would probably be a enough for air drying."

EPA-APPROVED TEST LABORATORY

Name of EPA-Approved Test Laboratory: Intertek

Name(s) of Person(s) Authorized and/or Responsible for Conducting Certification Test: Claude Pelland, Eng.

Position/Title: Project Engineer

Address: 1829, 32nd avenue

City: Lachine	**State: Québec**	**ZIP Code: H8T 3J1**
Phone: 1-514-631-3100 x277	**Email: claude.pellant@intertek.com**	

EPA-APPROVED THIRD PARTY CERTIFIER

Name of EPA-Approved Third-Party Certifier: Intertek

Name(s) of Person(s) Authorized and/or Responsible for Reviewing Test Report and/or Issuing Certification of Conformity: Brian Ziegler

Position/Title: Technical Team Leader

Address: 8431 Murphy Drive

City: Middleton	**State: WI**	**ZIP Code: 53562**
Phone: 608-824-7425	**Email: brian.ziegler@intertek.com**	

REQUIRED SUPPORTING DOCUMENTATION/MANUFACTURER STATEMENTS

NOTE: TO COMPLETE THIS APPLICATION, ALL REQUIRED DOCUMENTATION AND MANUFACTURER STATEMENTS MUST ACCOMPANY THIS APPLICATION.

1. Engineering Drawings

Engineering drawings and specifications of components that may affect emissions (including specifications for each component listed in paragraphs (k)(2), (3) and (4) of 60.533(b) and 60.5475(b). Manufacturers may use assembly or design drawings that have been prepared for other purposes, but must designate on the drawings the dimensions of each component listed in paragraph (k) of this section. Manufacturers must identify tolerances of components listed in paragraph (k)(2) of 60.533(b) and 60.5475(b) that are different from those specified in that paragraph, and show that such tolerances cannot reasonably be anticipated to cause wood heaters in the model line to exceed the applicable emission limits. The drawings must identify how the emission-critical parts, such as air tubes and catalyst, can be readily inspected and replaced.

2. Firebox Statement Requirement

A statement whether the firebox or any firebox component (including the materials listed in paragraph (k)(3) of 60.533(b) and 60.5475(b) will be composed of material different from the material used for the firebox or firebox component in the wood heater on which certification testing was performed, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency.

3. Confidential Business Information

Clear identification of any claimed confidential business information (CBI). Submit such information under separate cover to the EPA CBI Office; Attn: Residential Wood Heater Compliance Program Lead, 1200 Pennsylvania Ave., NW, Room 7149-D, MS:2227A, Washington, DC 20460. **Note that all emissions data, including all information necessary to determine emission rates in the format of the standard, cannot be claimed as CBI.**

4. All Documentation Pertaining to a Valid Certification Test

All documentation pertaining to a valid certification test including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why. The burn rate for the low burn rate category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer. The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs. Submit the test report and all associated required information, according to the procedures for electronic reporting specified in § 60.537(f) and 60.5475(f).

5. Warranties

A copy of the warranties for the model line, which must include a statement that the warranties are void if the unit is used to burn materials for which the unit is not certified by the EPA and void if not operated according to the owner's manual.

6. Quality Assurance Program Statement

A statement that the manufacturer will conduct a quality assurance program for the model line that satisfies the requirements of § 60.533(m).

7. Laboratory Sealing of Unit

A statement describing how the tested unit was sealed by the laboratory after the completion of certification testing and asserting that such unit will be stored by the manufacturer in the sealed state until 5 years after the certification test.

8. Statements that the Wood Heaters Manufactured under this Certificate will be:

(i) Similar in all material respects that would affect emissions as defined in § 60.531 to the wood heater submitted for certification testing, and

(ii) Labeled as prescribed in § 60.536 and 60.5478, and

(iii) Accompanied by an owner's manual that meets the requirements in § 60.536 and 60.5478. In addition, a copy of the owner's manual must be submitted to the EPA and be available to the public on the manufacturer's web site.

9. Third Party Certification Statement

A statement that the manufacturer has entered into contracts with an approved laboratory and an approved third-party certifier that satisfy the requirements of § 60.533(f).

10. Approved Laboratory/Third Party Statement

A statement that the approved laboratory and approved third-party certifier are allowed to submit information on behalf of the manufacturer, including any claimed to be CBI.

11. Manufacturer's Website Certification Test Reports Availability Statement

A statement that the manufacturer will place a copy of the certification test report and summary on the manufacturer's web site available to the public within 30 days after the EPA issues a certificate of compliance.

12. Transferability Acknowledgement Statement

A statement of acknowledgment that the certificate of compliance cannot be transferred to another manufacturer or model line without written approval by the EPA.

13. Statement about Selling Wood Heaters without an EPA Certificate

A statement acknowledging that it is unlawful to sell, distribute or offer to sell or distribute an affected wood heater without a valid certificate of compliance.

PLEASE ACKNOWLEDGE THAT ALL REQUIRED SUPPORTING DOCUMENTATION AND MANUFACTURER STATEMENTS ACCOMPANY THIS APPLICATION.

Initials GTF

SIGNATURE OF RESPONSIBLE OFFICER OR AUTHORIZED REPRESENTATIVE OF THE MANUFACTURER CERTIFYING THE ACCURACY AND COMPLETENESS OF THIS APPLICATION:

Signature: Ing.

Print Name: Guillaume Thibodeau-Fortin Ing.

Title: Engineer

Date: June 21st 2019.

The responsible officer or authorized representative of the manufacturer whose signature is above is certifying that the manufacturer has complied with all requirements of the 2015 Wood Heater Rule for compliance certification and will continue to do so. The manufacturer remains responsible for compliance regardless of any error by the EPA-approved test laboratory or third-party certifier.