

ARDISAM INC.

TEST REPORT

SCOPE OF WORK

EMISSIONS TESTING FOR MODEL CASTLE SERENITY 41278

REPORT NUMBER

104942704MID-001R3

TEST DATE(S)

02/16/22

ISSUE DATE

02/21/22

[REVISED DATE]

01/09/23

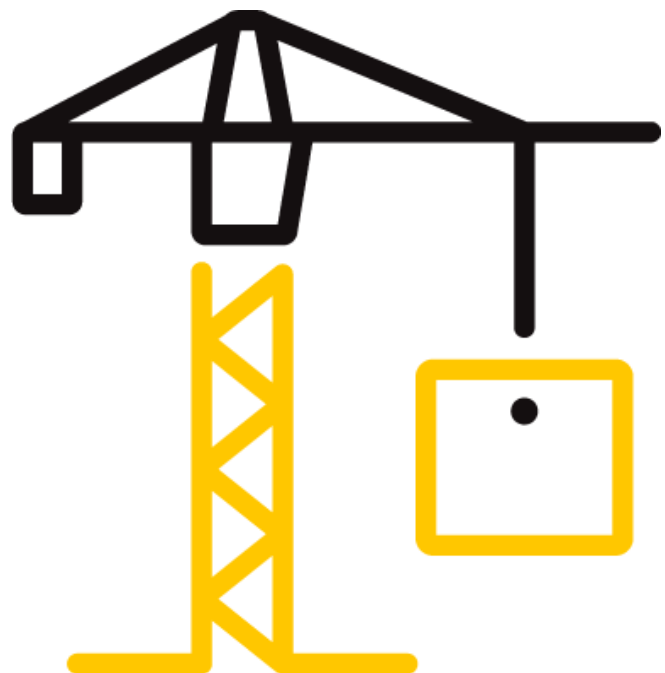
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DOCUMENT CONTROL NUMBER

GFT-OP-10c (05/10/17)

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Report No.: 104942704MID-001R3

Date: 01/09/23

REPORT ISSUED TO

ARDISAM INC

1690 Elm St

Cumberland, WI 54829

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Ardisam Inc. to perform testing in accordance with EPA 40 CFR Part 60 "Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces", ASTM E2515-2011(R2017) "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel", ASTM E2779-2010(R2017) "Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters," and CSA B415.1-10 (R2020) "Performance Testing of Solid-Fuel-Burning Heating Appliances" on their Model Castle Serenity 41278 Pellet Fuel Room Heater. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek test facility in Middleton, WI.

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

SECTION 2

SUMMARY OF TEST RESULTS

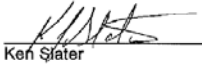

The appliance tests resulted in the following performance for test # 1:

Particulate Emissions: 1.00 g/hr

Carbon Monoxide Emissions: -1.7E-3 g/min

Heating Efficiency: 78.2 % (Higher Heating Value Basis)

For INTERTEK B&C:

COMPLETED BY:	Ken Slater	REVIEWED BY:	Brian Ziegler
TITLE:	Associate Engineer - Hearth	TITLE:	Technical Team Leader - Hearth
SIGNATURE:	 Ken Slater	SIGNATURE:	
DATE:	01/09/23	DATE:	01/09/23

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SECTION 3

TEST METHOD(S)

The specimen was evaluated in accordance with the following:

EPA 40 CFR Part 60-2015 - Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces

ASTM E2515-2011(R2017) Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel

ASTM E2779-2010(R2017) Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters

CSA B415.1-2010(R2020) - Performance Testing of Solid-Fuel-Burning Heating Appliances

EPA ALT-146-2022 Alternate Test Method for medium burn rate of pellet heaters

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 received at Intertek in Middleton, WI on 01/06/22 and was shipped via the client. The unit was assigned sample ID # MID2201060911-001. 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.

Prior to beginning the emissions tests, the unit was operated for a minimum of 48 hours at high-to-medium burn rates to break in the stove. This break-in period was conducted by Ardisam, Inc. staff and a copy of the data is included in the final report. The unit was found to be operating satisfactory during this break-in. The 48 plus hours of pre-burning were conducted from 12/30/21 through 01/02/22. The fuel used for the break-in process was wood pellets.

Following the pre-burn break-in process the unit was allowed to cool and ash and residue was removed from the firebox. The unit's chimney system and laboratory dilution tunnels were cleaned using standard wire brush chimney cleaning equipment.

On 02/16/22 the unit was set-up for testing.

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SECTION 5 EQUIPMENT

Equipment	INV Number	Calibration Due	MU
Timer	1212	4/5/22	0.7 sec
Timer	646	4/5/22	0.7 sec
Transducer	1406	7/07/22	0.00007 in/wc
Data Logger	986	4/12/22	0.06°F
Scale	1134	4/06/22	0.118 lbs
Flow Meter	1413	2/20/22	0.020 slpm
Flow Meter	1414	2/20/22	0.020 slpm
Flow Meter	1519	2/20/22	0.020 slpm
Balance	713	4/11/22	0.00007 g
Anamometer	1457	5/14/22	4 fpm
Hygrometer	1455	4/12/22	0.35 RH

SECTION 6 LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Ken Slater	Intertek B&C
Justin Buck	Intertek B&C
Seth Bailey	Ardisam Inc

SECTION 7 TEST PROCEDURE

On 02/16/22, the unit was tested for EPA emissions. For pellet stoves, the test was conducted in accordance with ASTM E2779-2010(R2017). The fuel used for the test run was premium-Grade Pellets (Marthwood).

The applicable EPA regulatory limits are:

Step 1 – 2015 – 4.5 grams per hour.

Step 2 – 2020 – 2.0 grams per hour.

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TEST SET-UP DESCRIPTION

A 3" horizontal flue is connected by a 90° elbow and adapters 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 a 2" inlet pipe located on the back of the heater, which is directed to the pellet burn pot. All gases exit through the 3" flue also located at the back of the heater. The exhaust gases are assisted by a combustion blower.

TEST FUEL PROPERTIES

Wood pellets used for the testing were Marth premium grade hardwood pellets, with a majority of the wood species consisting of oak and maple. The pellets have PFI a measured heating value of 8160 Btu/hr (18974 kJ/kg) and a moisture content of 3.36% on a dry basis and 3.25% on a wet basis.

SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel at a 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 6 inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard Pitot tube located 60 inches from the beginning of the sampling section. The dry bulb thermocouple is located six inches downstream from the Pitot tube. Tunnel samplers are located 60 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. (See Figure 2.)

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FIGURE 1 – DILUTION TUNNEL

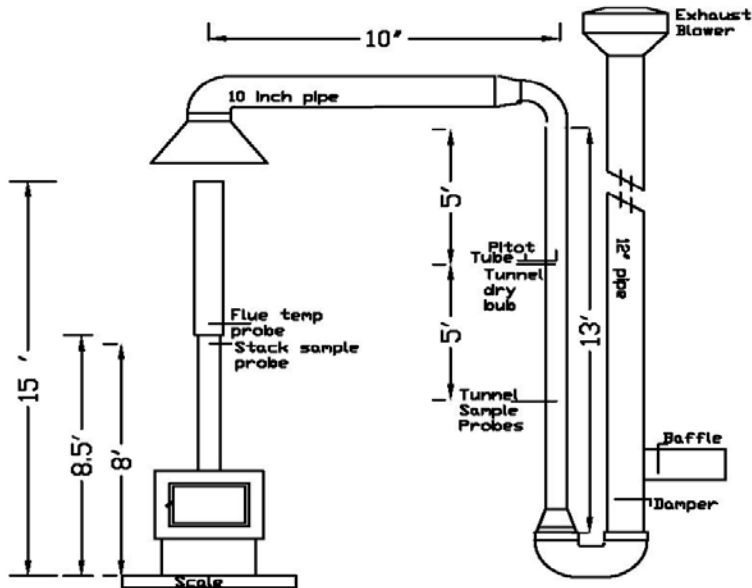
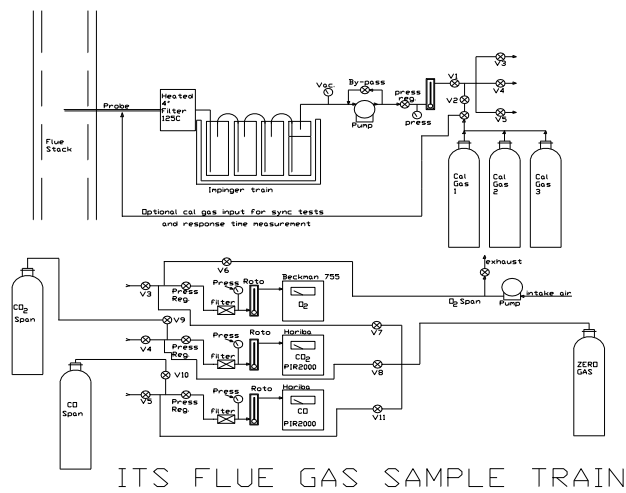


FIGURE 1

FIGURE 2 – STACK GAS SAMPLE TRAIN



ITS FLUE GAS SAMPLE TRAIN

FIGURE 2

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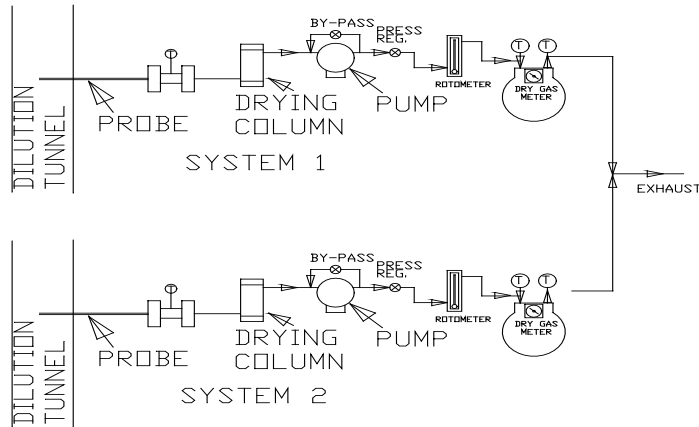


Figure 3

FIGURE 3 – DILUTION TUNNEL SAMPLE SYSTEMS

SAMPLING METHODS

PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515-2011(R2017). 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 the third filter set is prepared at one hour into the test run, the filter sets are changed in one of the two sample trains. The two filter sets used for this train are analysed individually to determine the first hour and total emissions rate.

INSTRUMENT CALIBRATION

DRY GAS METERS

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 D.

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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 ft³, the resolution is .1%, giving an accuracy higher than the ±2% required by the standard.

STACK SAMPLE ROTAMETER

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

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.

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

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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 E2515-17. The data and results are included in Appendix C.

DEVIATIONS FROM STANDARD METHOD:

None

SECTION 8

TEST CALCULATIONS

WEIGHT OF TEST FUEL BURNED (DRY) – ASTM E2779

$$M_{Bdb} = (M_{Swb} - M_{Ewb})(100/(100 + FM))$$

where:

FM = average fuel moisture of test fuel, % dry basis,

M_{Swb} = weight of test fuel in hopper at start of test run, wet basis, kg (lb),

M_{Ewb} = weight of test fuel in hopper at end of test run, wet basis, kg (lb), and

M_{Bdb} = weight of test fuel burned during test run, dry basis, kg (lb).

WEIGHT OF TEST FUEL BURNED PER TEST SEGMENT (DRY) – ASTM E2779

$$M_{BSidb} = (M_{SSiwb} - M_{ESiwb}) (100/(100 + FM))$$

where:

M_{SSiwb} = weight of test fuel in hopper at start of test run segment i , wet basis, kg (lb),

M_{ESiwb} = weight of test fuel in hopper at end of test run segment i , wet basis, kg (lb),

M_{BSidb} = weight of test fuel burned during test run segment i , dry basis, kg (lb), and

i = test run segments in accordance with 9.4, Table 1.

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AVERAGE BURN RATE FOR FULL TEST (DRY) – ASTM E2779

$$BR = 60 M_{Bdb}/\theta$$

where:

BR = average dry burn rate over the full integrated test run, kg/h (lb/h), and

 θ = total length of full integrated test run, min.**AVERAGE BURN RATE PER TEST SEGMENT (DRY) – ASTM E2779**

$$BR_{Si} = 60 M_{BSidb}/\theta_{Si}$$

where:

BR_{Si} = average dry burn rate over test run segment *i*, kg/h (lb/h), and θ_{Si} = total length of test run segment *i*, min.**AVERAGE EMISSION RATE FOR FULL TEST (g/hr) – ASTM E2779**

$$PM_R = 60(E_T/\theta)$$

where:

E_T = total particulate emissions for full integrated test run measured using Test Method **E2515**, g (lb), θ = total length of test run, min, andPM_R = average particulate emission rate over the full integrated test run, g/h.**AVERAGE EMISSION FACTOR FOR FULL TEST (g/kg dry) – ASTM E2779**

$$PM_F = E_T/M_{Bdb}$$

where:

PM_F = average particulate emission factor over the full integrated test run, g/dry kg of fuel burned.**AVERAGE EMISSIONS FOR FULL TEST (g/MJ or lb/MMBtu) – ASTM E2779**

$$PM_H = E_T/E_O$$

where:

E_O = average measured overall heat output over the full integrated test run from **Annex A1**, MJ (MMBTU), andPM_H = average particulate emissions in accordance with unit of average heat output over the full integrated test run, g/MJ (lb/MMBtu).

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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_{strav}/V_{scent}
- K_P = Pitot Tube Constant, $34.97 \frac{m}{sec} \left[\frac{\left(\frac{g}{g} \cdot mole\right)(mm\ Hg)}{(K)(mm\ water)} \right]^{\frac{1}{2}}$
- or
- = Pitot Tube Constant, $85.49 \frac{ft}{sec} \left[\frac{\left(\frac{lb}{lb} \cdot mole\right)(in\ Hg)}{(R)(in\ water)} \right]^{\frac{1}{2}}$
- 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

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

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

T_{si} = 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).

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} = $V_m - (L_p - L_a)u$

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).

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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.

TOTAL PARTICULATE WEIGHT – ASTM E2515

$$M_n = m_p + m_f + m_g$$

PARTICULATE CONCENTRATION – ASTM E2515

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

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

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

GENERAL FORMULA – ASTM E2515

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

Where:

$\delta Y / \delta x_i$ = Partial derivative of the combining formula with respect to individual measurement x_i ,

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,

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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

$$c_s = F_c / (Q_{sample} \times \theta) = 0.025 / (0.25 \times 180) = 0.0005555$$

$$\delta c_s / \delta F_c = 1 / Q_{sample} \cdot \theta = 1 / 0.25 \cdot 180 = 0.0222$$

$$\delta c_s / \delta Q_{sample} = -F_c / Q_{sample}^2 \cdot \theta = -0.025 / 0.25^2 \cdot 180 = -0.00222$$

$$\delta c_s / \delta \theta = -F_c / Q_{sample} \cdot \theta^2 = -0.025 / 0.25 \cdot 180^2 = -0.000003$$

$$MU_{c_s} = \sqrt{(0.00027 \cdot 0.0222)^2 + (0.0025 \cdot -0.00222)^2}$$

$$\sqrt{+ (0.1 \cdot -0.000003)^2} = 0.0000091g$$

Thus, c_s would be 0.555 mg/dscf \pm 0.0081 mg/dscf at 95% confidence level.

MU OF c_r

$$c_r = BG_c / (Q_{BG} \times \theta) = 0.002 / (0.15 \times 180) = 0.000074$$

$$\delta c_r / \delta BG_c = 1 / Q_{BG} \cdot \theta = 1 / 0.15 \cdot 180 = 0.03704$$

$$\delta c_r / \delta Q_{BG} = -BG_c / Q_{BG}^2 \cdot \theta = -0.002 / 0.15^2 \cdot 180 = -0.0004938$$

$$\delta c_r / \delta \theta = -BG_c / Q_{BG} \cdot \theta^2 = -0.002 / 0.15 \cdot 180^2 = -0.0000004$$

$$MU_{c_r} = \sqrt{(0.00027 \cdot 0.03704)^2 + (0.0015 \cdot -0.0004938)^2}$$

$$\sqrt{+ (0.1 \cdot -0.0000004)^2} = 0.00001g$$

Thus, c_r would be 0.074 mg/dscf \pm 0.01 mg/dscf at 95% confidence level.

E_T AND MU_{ET}

$$E_T = (c_s - c_r) Q_{std} \theta = (0.000555 - 0.000074) \times 150 \times 180 = 13.00g$$

$$\delta E_T / \delta c_s = Q_{std} \cdot \theta = 150 \cdot 180 = 27,000$$

$$\delta E_T / \delta c_r = Q_{std} \cdot \theta = 150 \cdot 180 = 27,000$$

$$\delta E_T / \delta Q_{std} = c_s \cdot \theta - c_r \cdot \theta = 0.000555 \cdot 180 - 0.000074 \cdot 180 = 0.08667$$

$$\delta E_T / \delta \theta = c_s \cdot Q_{std} - c_r \cdot Q_{std} = 0.000555 \cdot 180 - 0.000074 \cdot 180 = 0.07222$$

$$MU_{ET} = \sqrt{(27,000 \cdot 0.0000081)^2 + (27,000 \cdot 0.00001)^2 + (0.08667 \cdot 3)^2}$$

$$\sqrt{+ (0.07222 \cdot 0.1)^2} = 0.436$$

Thus the result in this example would be:

ET = 13.00g \pm 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:

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

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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

W = duct width, m

The air flow velocity shall be calculated as follows:

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

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:

$$\text{m/s}[\text{g/g mole (mm Hg)} / (\text{K})(\text{mm H}_2\text{O})]^{0.5}$$

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:

$$m = 3600VA\rho$$

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

ρ = density of air at standard temperature and pressure (use 1.204 kg/m³)

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23

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:

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

Where:

- E_t = 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:

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

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)

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23

SECTION 9**TEST SPECIMEN DESCRIPTION**

The model Castle Serenity Pellet 41278-Fuel Room Heater is constructed of carbon steel. The outer dimensions are 23-inches deep, 34-inches high, and 18.25-inches wide. The heat exchanger is located directly above the firebox with outlet air grille positioned directly above the fuel door. A galvanized steel fuel hopper located at the top back of the unit.

SECTION 10**TEST RESULTS****DESCRIPTION OF TEST RUNS:**

RUN #1 (02/16/22): The test for pellet heaters is a continuous test with three separate burn rates. At 8:04am the unit was started and operated for a minimum of 1 hour for the pretest operation. At 9:04am the unit was set to the maximum feed rate (level 5) with a burn rate of 2.05 kg/hr (wet), the scale was tared and a 25-lb weight was added to the scale to determine feed rate of the fuel, and the sampling system was started. At 10:04am the unit was set to $\leq 50\%$ feed rate (level 3) with a burn rate of 1.48 kg/hr (wet). At 12:04am, the heater was changed to the minimum feed rate (level 1) with a burn rate of 0.95 kg/hr (wet). At 3:04pm, testing was completed. The total burn time was 360 minutes.

Test run #1 has been found to be appropriate, with no anomalies, and the test run has been validated and is deemed compliant. No negative weight was found on the filters, as the filters and gaskets are weighed together to eliminate filter material transfer to gaskets. All weightings were handled properly, with no negative weight on gaskets or probes.

With the maximum burn rate at 2.05 kg/hr and the minimum burn rate at 0.95 kg/hr, this heater cannot achieve the required $\leq 50\%$ of the maximum burn rate at the medium burn setting. EPA ALT-146 issued on February 2, 2022, is being implemented to determine the required medium burn rate. The medium burn rate is determined by adding the maximum burn rate and the minimum burn rate and dividing by 2 $[(2.05 + 0.95)/2 = 1.50 \text{ kg/hr}]$. This heater was operated at a level 3 setting to achieve a burn rate of 1.48 kg/hr, which is less than the required 1.50 kg/hr and complies with this requirement.

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23

TABLE 1 – EMISSIONS

RUN#	TEST DATE	BURN RATES (kg/hr)(Wet)		PARTICULATE EMISSION RATE (g/hr)	1 st HOUR EMISSIONS (g)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (%HHV)
		H*	M*				
1	02/16/22	H*	2.05	1.00	0.917	-1.7E-3	78.2
		M*	1.48				
		L*	0.95				
		OA*	1.31				

*Notes: H= High burn rate, M= Medium burn rate, L= low burn rate, OA= overall burn rate.

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	71	68	23.1	28.73	21.2	25	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	360	22.11	220.32	529.56	43.88	43.37	3.20	3.40

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	1807.49	1828.84	5.78	6.22	3.62	0.055

TABLE 5 - GENERAL SUMMARY OF RESULTS

RUN #	BURN RATE (kg/hr)(Wet) (OVERALL)	RUN TIME (min)
1	1.31	360

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

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TABLE 6 - CSA B415.1 RESULTS RUN # 1

BURN RATE (kg/hr)(dry)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (% HHV)	HEAT OUTPUT (Btu/hr)
HIGH – 1.98	-2.0E-3	74.4	26,493
MEDIUM – 1.43	-1.6E-3	79.4	20,415
LOW – 0.92	-1.9E-3	77.2	12,807
OVERALL – 1.27	-1.7E-3	78.2	17,828

SECTION 11

CONCLUSION

This test demonstrates that the model Castle Serenity 41278 is an affected facility under the definition given in the regulation. The emission rate of 1.00 g/hr meets the EPA requirements for the Step 2 limits.

SECTION 12

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	02/21/22	N/A	Original Report Issue
1	6/28/22	17	Added ALT-146 information for medium burn rate.
2	11/9/22	2, 18, 19	Updated report to include CO emissions at two significant figures.
3	1/9/23	3	Added reference to EPA ALT-146.



Total Quality. Assured.

8431 Murphy Drive
Middleton, WI 53562

Telephone: 608-836-4400
Facsimile: 608-831-9279
www.intertek.com/building

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23

PHOTOS

Photo # 1 Test Pic

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23



Photo #2 Security Tape 1

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23



Photo #3 Security Tape 2

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23



Photo #4 Security Wrap

TEST REPORT FOR ARDISAM INC.

Report No.: 104942704MID-001R3

Date: 01/09/23



CERTIFICATE OF CONFORMITY

Emissions – Pellet Heater

EPA 40 CFR Part 60, Subpart AAA, ASTM E2515-2017, ASTM E2779-2017, CSA B415.1-2010, ALT-146

WHI22 – 223943002

Organization

Ardisam, Inc.

1737 Industrial Avenue
Cumberland, WI 54829
USA

Product: Castle Serenity 41278

Catalytic: No

Maximum Output: 26,493 Btu/hr

Weighted Average Emissions: 1.00 g/hr

Weighted Average Annual Delivered Efficiency (HHV): 78.2%

Test Fuel Type: Premium Wood Pellets

Weighted Average CO Emissions Rate (g/min): -1.7E-3

Conformance: Complies with 2020 particulate emissions standard

Test Report No.: 104942704MID-001R3

Certification Body: Intertek Testing Services NA, Inc.

Registered Address: 545 E. Algonquin Rd., Arlington Heights, IL 60005, USA

Initial Issue Date: 25-Mar-22

Date of Expiry: 28-Mar-27

Issue Status: 4

This is a certificate of conformity to confirm that the bearer has successfully completed the requirements of the Intertek certification scheme which include the testing of products and the initial assessment. The bearer is subject to continuing assessments of their compliance through surveillance and testing of products samples taken from production (as applicable to the scheme) and has been registered within the scheme for the products detailed. The validity of this certificate is contingent to the listing's status on the Intertek Directory of Building Products: bpdirectory.intertek.com.

Jean-Philippe Kayl
Vice President – Global
Certification



09-Jan-23

Name

Signature

Date

The certificate and schedule are held in force by regular annual surveillance visits by Intertek Testing Services NA, Inc. and the reader or user should contact Intertek to validate its status. This certificate remains the property of Intertek Testing Services NA, Inc. and must be returned to them on demand. This Certificate is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this certificate. Only the Client is authorized to permit copying or distribution of this certificate and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Certificate of Conformity WHI22-223943002

Appendix A

Certificate of Conformity #:		Certificate of Conformity Issue Date:	
WHI22-223943002		March 25, 2022	
REVISION #	REVISION DATE	REPORT PAGES	REVISION
0	March 25, 2022	N/A	Original Report Issue
1	June 28, 2022	N/A	Added ALT-146 for medium burn rate.
2	November 9, 2022	N/A	Updated CoC to include CO emissions at two significant figures.
3	January 9, 2023	N/A	Test report updated to reference ALT-146

Revised Report #:		Report Issue Date:	
104942704MID-001MID		February 21, 2022	
REVISION #	REVISION DATE	REPORT PAGES	REVISION
0	NA	N/A	Original Report Issue
1	June 28, 2022	17	Added ALT-146 information for medium burn rate.
2	November 9, 2022	2, 18, 19	Updated report to include CO emissions at two significant figures.
3	January 9, 2023	3	Added reference to EPA ALT-146.

The certificate and schedule are held in force by regular annual surveillance visits by Intertek Testing Services NA, Inc. and the reader or user should contact Intertek to validate its status. This certificate remains the property of Intertek Testing Services NA, Inc. and must be returned to them on demand. This Certificate is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this certificate. Only the Client is authorized to permit copying or distribution of this certificate and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.



RESIDENTIAL WOOD HEATER 30-DAY NOTIFICATION

INSTRUCTIONS

The manufacturer of an affected wood/pellet heater/central heater model line must notify the U.S. Environmental Protection Agency (EPA) of the date that certification testing is scheduled to begin. The EPA at least 30 days before the start of testing.

This notification must be signed by a responsible representative of the manufacturer or an authorized representative. Once completed, this notification must be submitted to WoodHeaterReports@epa.gov.

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. (40 CFR Part 60, Subpart AAA)

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"). (40 CFR Part 60, Subpart QQQQ)

Disclaimer: The statutory provisions and the EPA regulations described in this document contain legally binding requirements. This document is not a substitute for those provisions or regulations, nor is it a regulation itself. In the event of a discrepancy, please refer to Part 60 Subparts AAA AND QQQQ, Sections 60.537, and 60.5479. If you have additional questions, please contact Rafael Sanchez at 202-564-7028, Residential Wood Heater Compliance Program Lead, or via email at sanchez.rafael@epa.gov.

MANUFACTURER INFORMATION

Manufacturer's Name:
Ardisam Inc.

Manufacturer's Physical Address:
1730 Industrial Ave
Cumberland, WI 54829

Manufacturer's Mailing Address (if different from physical address):
PO Box 666
Cumberland, WI 54829

Name and Title of Manufacturer's Responsible/Authorized Representative Submitting this Application:
Seth Bailey - Regulatory Compliance Manager

Manufacturer's Contact E-mail:
seth.bailey@ardisam.com

Manufacturer's Phone Number: 800-345-6007

Manufacturer's Website Address:
ardisam.com

Manufacturer's Website Address where the test report and owner's manual will be posted, if known:
castlestoves.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": Castle Serenity

Model Number(s) (as appearing on the certification test report, if applicable): 41278

Heater Type Check one):	<input type="checkbox"/> Adjustable Burn Rate Wood Heater	<input checked="" type="checkbox"/> Pellet Stove	<input type="checkbox"/> Single Burn Rate Heater	<input type="checkbox"/> Hydronic Heater	<input type="checkbox"/> Forced Air Furnace
Hydronic Heater Type (Check one):	<input type="checkbox"/> Full Storage	<input type="checkbox"/> Partial Storage	<input type="checkbox"/> No External Storage	<input type="checkbox"/> Indoor	<input type="checkbox"/> Outdoor
Forced-Air Furnace Type (Check one):	<input type="checkbox"/> Small (less than 65,000 BTU/hr heat output)		<input type="checkbox"/> Large (greater than 65,000 BTU/hr heat output)		
Fuel Tested (Check one):	<input type="checkbox"/> Crib	<input checked="" type="checkbox"/> Pellet	<input type="checkbox"/> Cordwood	<input type="checkbox"/> Wood Chips	<input type="checkbox"/> Other:
Certification Step:	<input type="checkbox"/> 2015	<input checked="" type="checkbox"/> 2020 (ALL HEATERS)		Equipped with a catalytic combustor? <input type="checkbox"/> Yes <input type="checkbox"/> No	

EPA-APPROVED TEST LABORATORY

Name of EPA-Approved Test Laboratory:
Intertek

Name(s) of Person(s) Authorized and/or Responsible for Conducting Certification Test:

Brian Ziegler – Technical Team Leader - Hearth

Phone: 608-824-7425	E-mail: brian.ziegler@intertek.com	Website: intertek.com
City: Middleton	State: WI	ZIP Code: 53562

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:

Jean-Phillippe Kayl - Vice President – Global Certification

Phone: 630-481-3114	E-mail: jp.kayl@intertek.com	Website: intertek.com
City: Arlington Heights	State: IL	ZIP Code: 60005

COMPLIANCE TEST INFORMATION

Test Method(s): ASTM E2515-17

Date(s) of Proposed Test: February 16, 2022

Testing Location (Name and Address):

Intertek
8431 Murphy Drive
Middleton, WI 53562

Technician's Contact Name:
Ken Slater

Title:
Associate Engineer

Phone Number:
608-824-7423

Email Address:
kenneth.slater@intertek.com

Seth Bailey - Regulatory Compliance Manager

Print Name and Title of Authorized Official



Signature

January 14, 2022

Date

Telephone Number: 800-345-6007

Email Address: seth.bailey@ardisam.com

Remarks: As a point of clarity, "Castle" is the brand name, "Serenity" is the model name, and "41278" is the model number.

v1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. John Steinert
Vice President
PFS TECO
11785 SE Hwy 212
Suite 305
Clackamas, OR 97015

02/04/2022

Dear Mr. Steinert,

I am writing you in response to your correspondence dated February 3, 2022, in which you request the use of an alternative testing procedure to demonstrate compliance with 40 CFR part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters (Subpart AAA). The Office of Air Quality Planning and Standards, as the delegated authority, must make the determination on any major alternatives to test methods and procedures required under 40 CFR parts 59, 60, 61, 63, and 65. Your proposed alternative test method and our approval decisions are discussed below.

According to the information provided, you seek an alternative test method for use when conducting testing on the United States Stove Company, Model KP5517 pellet heater. Currently, as required by section 60.534(a)(1)(i) of Subpart AAA, a manufacturer has the option to test their appliance in accordance with 40 CFR part 60, Appendix B, Method 28R for a crib fuel appliance or ASTM E2779-10 “Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters” (ASTM E2779-10) for a pellet fuel appliance. This request seeks an alternative to section 9.4.1.2 of ASTM E2779-10 which specifies test conditions for pellet heaters including the determination of the Medium Burn Rate Category and states that the medium burn rate must be $\leq 50\%$ of the maximum burn rate.

In your request, you state that the specification for determining the medium burn rate found in ASTM E2779-10 is incorrect, and the Medium Burn Rate Category should be defined as less than 50% of the midpoint point (this is defined in the attached Memo as 50% of the span between the Maximum Burn Rate and the Low Burn Rate) between the high and low burn rates. Furthermore, your request includes a memorandum dated February 2, 2022, titled “Appropriate Calculation of Medium Burn Rate Category in ASTM E-2779 Testing” (attached) which was sent to the EPA’s Office of Enforcement and Compliance Assurance. This memorandum states that an error had been uncovered in determining the appropriate Medium Burn Rate Category in ASTM E2779-10 for compliance pursuant to Subpart AAA. Specifically, section 9.4.1.2 of ASTM E2779-10 states that “the pellet heater shall be operated with the control or controls set in

the position(s) as needed to achieve a burn rate that is $\leq 50\%$ of the maximum burn rate.” Table 1 of ASTM E2779-10 also notes that the Medium Burn Rate Category test must be $\leq 50\%$ of the maximum burn rate. The memorandum states that this is incorrect as it assumes that zero is the other bound for determining half of the maximum burn rate, and that the correct approach in determining the Medium Burn Rate Category should be at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value).

We have reviewed your request and agree that the Medium Burn Rate Category should be defined as less than 50% of the span between the high and low burn rates. Meaning that the Medium Burn Rate Category should be at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value).

Based on the information provided and with the caveats set forth below, we are approving your request for an alternative methodology used when calculating the Medium Burn Rate Category to conduct certification testing as required by Subpart AAA, section 60.534(a)(1)(i) on pellet heaters. This approval is based on the understanding that the Medium Burn Rate Category is defined as less than 50% of the span between the high and low burn rates. Additionally, this approval is based on the understanding that the lowest heat output (Btu/hr) setting available to the user, and corresponds to the lowest burn rate to be evaluated during certification testing; this is consistent with Subpart AAA, section 60.534(a)(1), which states: “The burn rate for the low burn 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.”

With this Alternate Test Method, the following changes to ASTM E2779-10 must be followed for certification testing:

1. Medium Burn Rate Category burn rate is defined as:

Nomenclature:

Max = Maximum burn rate (kg/h)

Min = Minimum burn rate (kg/h)

$$\frac{Max+Min}{2} \quad \text{Eq.1}$$

All other requirements of ASTM E-2779-10 must be followed during the testing, and all requirements of 40 CFR part 60, Subpart AAA must be satisfied as described in your test report. A copy of this letter must be included in each certification test report where this alternative test method is utilized.

Because this alternative method may be of use to others, we feel that it is reasonable that this approval be broadly applicable to all pellet heaters tested in accordance with ASTM E2779-10 “Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters” and subject to the requirements of §60.534(a)(1)(i) of Subpart AAA. For this reason, we will post this

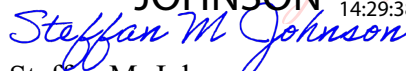
letter as ALT-146 on our website at <https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods> for use by other interested parties. This alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different pellet heater certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Angelina Brashear of my staff at 919-541-4746 or brashear.angelina@epa.gov.

Sincerely,

STEFFAN
JOHNSON

Digitally signed by
STEFFAN JOHNSON
Date: 2022.02.04
14:29:38 -05'00'



Steffan M. Johnson
Group Leader
Measurement Technology Group

cc: Angelina Brashear – EPA/OAQPS/AQAD
Chuck French – EPA/OAQPS/SPPD
Rafael Sanchez – EPA/OECA
Robert Scinta – EPA/OECA
Michael Toney – EPA/OAQPS/AQAD
Nathan Topham – EPA/OAQPS/SPPD
John Voorhees – United States Stove Company
Chet Wayland – EPA/OAQPS/AQAD



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

02/02/2022

SUBJECT: Appropriate calculation of Medium Burn Rate Category in ASTM E-2779 Testing

FROM: Steffan Johnson
Group Leader
Measurement Technology Group
Air Quality Assessment Division

**STEFFAN
JOHNSON** Digitally signed by
STEFFAN JOHNSON
Date: 2022.02.02
08:28:07 -05'00'

TO: Robert Scinta, P.E.
Chief, Air Branch
Monitoring, Assistance, and Media Programs Division
Office of Compliance, Office of Enforcement and Compliance Assurance

During a recent review of pellet heater compliance test reports, the Measurement Technology Group has uncovered an error in determining the appropriate Medium Burn Rate Category when using ASTM E-2779 for compliance pursuant to 40 CFR 60, subpart AAA. Specifically, the method requirements in section 9.4.1.2 and Table 1 of that test method incorrectly require that the Medium Burn Rate Category must fall below 50% of the maximum burn rate. This is not correct as this requirement assumes then that zero is the other bound for determining half of the maximum.

9.4.1.2 *Medium Burn Rate Category*—For burn rates in the medium segment, except as allowed in 9.4.1.4 or 9.4.1.5, the pellet heater shall be operated with the control or controls set in the position(s) as needed to achieve a burn rate that is $\leq 50\%$ of the maximum burn rate.

TABLE 1

Burn Rate Segment	Maximum	Medium	Minimum
Description	Maximum achievable	$\leq 50\%$ of Maximum	Minimum achievable
Time at Burn Rate	60 +5 / - 0 minutes	120 +5 / - 0 minutes	180 +5 / - 0 minutes

The correct application of this requirement would be to determine the Medium Burn Rate Category at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value). Ergo, the correct calculation for finding that midpoint of 50% is defined as $\frac{Max+M}{2}$.

For example, if the Maximum Burn rate of an appliance is 1.79 kg/hr and the minimum is 1.23 kg/hr, the method would currently place the 50% requirement at 0.895 kg/hr. This is unachievable on this appliance and presents an impossible compliance requirement. Applying the equation laid out above the value of 1.51 is derived and, therefore, presents an appropriate and likely attainable emissions test requirement for the Medium Burn Rate Category.

During your reviews of such emissions tests, as reported to OECA and intended for compliance certification purposes, MTG recommends applying the above procedure in order to ascertain if a Medium Burn Rate was appropriately established during a compliance test.

CC:

Sarah Ayres - OECA

Angelina Brashear – OAQPS

Alice Edwards – Alaska DEC

Chuck French – OAQPS

Robert Lischinsky - OECA

Theresa Lowe - OAQPS

Rafael Sanchez – OECA

Robert Scinta - OECA

Mike Toney – OAQPS

Nathan Topham - OAQPS

Chet Wayland – OAQPS

INTRODUCTION

This document provides a systematic guide for the technician conducting tests to EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with ASTM E2779 and ASTM E2515. This guide cannot cover every possible contingency that may develop during a particular test program. Many questions that may arise can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail check with the laboratory manager and be sure you understand the procedures involved.

The primary measurements to be obtained are particulate emission data and efficiency data. The technician's duties include the following steps. It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

I. APPLIANCE INSPECTION AND SET-UP

- A. Incoming Inspection
- B. Unit Set-Up

II. SAMPLING SYSTEMS - SET-UP

- A. Gas Analysis
- B. Dilution Tunnel

III. TEST CONDUCT

- A. Pre-Test Fuel Load
- B. Test Fuel Load
- C. Unit Start - up
- D. Test Run

IV. POST TEST PROCEDURE

- A. Leak Checks
- B. Particulate Sample Recovery

The technician running this test must be familiar with the following documents that are to be kept in the laboratory at all times.

1. ASTM E2779
2. ASTM E2515

INTERTEK/WARNOCK HERSEY
SFBA EMISSIONS AND EFFICIENCY TESTING LABORATORY
OPERATING PROCEDURES

pg. 2 of 8

I. APPLIANCE INSPECTION AND SET-UP

A. Incoming Inspection

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications, etc. Note any discrepancies or missing parts.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irreparable, a new unit will need to be obtained.
3. Mark unit with manufacturer's name, model number, work order number, and date received.
4. If unit is safety listed, note label data including listing agency and serial number.

B. Unit Set-Up

1. All units must be operated by the manufacturer or Intertek for a break-in period of 50 hours at a medium burn rate. NOTE: Inserts are tested as if they are freestanding stoves.
2. Once break-in is completed, allow unit to cool then clean unit thoroughly.
3. Prior to placing unit on scale, the scale must be turned on and allowed to warm up for 1-hour minimum.
4. Place unit on scale and align so chimney will be centered in hood. Record the weight of the unit and all accessories. (Do not weigh with chimney attached.)
5. Chimney and connector should be cleaned with a wire brush prior to mounting. Attach chimney and connector then seal all joints. Be sure the single wall stove pipe terminates and insulated pipe starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
6. Plug thermocouples into data acquisition system jacks and verify that all instrumentation is working properly.
7. Dilution tunnel must be cleaned prior to each certification test series, and at anytime a higher burn rate follows a lower burn rate.

II. SAMPLING SYSTEMS SET-UP

A. Gas Analysis

1. All instruments should be turned on and allowed to warm up for 1-hour minimum.

2. Prior to calibrating, make sure that the outlet pressure on each calibration gas bottle reads 10 PSI. Adjust flow meters at each gas analyzer to required flow.

The gas analyzer (CO₂, CO, O₂) is zeroed on nitrogen. The O₂, CO₂ and CO analyzer is spanned with a certified span gas mixture.

Calibrate analyzers as follows:

- a. With calibration switch at "SPAN", adjust all span controls to values specified on span gas label.
- b. Switch to "ZERO" and adjust zero controls to provide 0.00 readout on all analyzers.
- c. Repeat a. and b. until no further adjustment is required.
- d. Record these values on the appropriate data sheet.
- e. Switch to "CAL." and record all analyzer values.

3. Response time synchronization check.

- a. With switch at "SAMPLE" and no fire in unit, allow readings to stabilize (O₂ analyzer should read 20.93, CO and CO₂ should read 0.00).
- b. Switch to "CAL" setting and start the stopwatch. Note the time required for each unit to reach the calibration gas bottle value. If all three analyzers reach this value within 5 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by either internal instrument setting or adjustment of sample line length.
- c. Use EPA Method 5H 6.7-6.9 procedures to check calibration of instruments.

4. Sample clean-up train.

- a. Load a new filter in 4-inch glass filter holder.
- b. Load four Impingers as follows:
 - #1: 100 ml. distilled water
 - #2: 100 ml. distilled water
 - #3: Empty
 - #4: 200-300 grams Drierite.
- c. Place Impingers in container and connect with greased "U TUBES". (Grease carefully on bottom half of ball joint so that grease will not get into tubes.)
- d. Connect filter to impinger #1 and sample line to impinger #4.
- e. Connect stack probe to filter.
- f. Leak check system as follows:

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- 1) Plug probe.
- 2) Turn on sample system and increase flow rate slowly.
- 3) Set vacuum-adjust valve to obtain a vacuum of 10 inches mercury.
- 4) If sapphire float in rotometer does not stabilize below 10 on scale, system must be resealed.
- 5) Repeat leak-check procedure until satisfactory results are obtained.
- 6) Unplug probe slowly, then decrease flow rate slowly before shutting off system.

g. Just prior to starting test, fill impinger container with ice.

B. Dilution Tunnel Sample Train Set-Up:

1. Filters and holders.
 - a. Clean probes and filter holder front housings carefully and desiccate to a constant weight prior to use.
 - b. Filters and filter probe combinations should be numbered and labeled prior to use.
 - c. Weigh desiccated filters and probe filter units on analytical balance. Record the weights on the appropriate form. Note that the probe and front half of the front filter holder is to be weighed as a unit.
 - d. Carefully assemble the filter holder units and connect to sampling systems.
 - e. System #1 (Filter set #1) will have one filter set and System #2 (Filter set #2 and #3) will have two filter sets. Filter set #2 will be changed 1-hour into the test.
 - e. Change desiccate columns with dry absorbent before each test series.
2. Leak checking.
 - a. Each sample system is to be checked for leakage prior to inserting probes in tunnel.
 - b. Plug probes and start the samplers. Adjust pump bypass valve to produce a vacuum reading of 10 inches mercury. NOTE: During test, highest vacuum recorded is required for posttest leak check.
 - c. Allow vacuum indication to stabilize at 10" mercury, record dry gas meter readings, (DGM₁, DGM₂). At a convenient DGM value start stopwatch. Time for 1 minute then stop vacuum pumps. Record dry gas meter readings again, (DGM₃, DGM₄). NOTE: If rotometer ball is floating above the 5-mm mark, system is leaking too much and all seals should be checked.

- d. Calculate leakage rate as follows.

System 1: $DGM3 - DGM_1 = CFM_1$

System 2: $DGM4 - DGM_2 = CFM_2$

If CFM_1 or CFM_2 is greater than 0.02 cfm, or ${}_1S$ greater than $0.04 \times$ Sample Rate, leakage is unacceptable and system must be resealed. For most tests the sample rate will be 0.25 cfm, thus leakage rates in excess of $0.04 \times 0.25 = 0.010$ cfm are not acceptable.

- e. To prevent contamination, do not insert probes in tunnel until the start of the test run.

III. TEST CONDUCT

A. Pre-Test Fuel Load

1. Fill hopper with pellets, tare the scale, and place a 25lb weight on the scale to measure fuel consumed.

B. Test Fuel Load

1. Determine moisture content of pellets per ASTM E871 by weighing pellets before and after oven drying.
2. Verify and document the pellet manufacturer and grade of pellets used for test.
3. Confirm enough pellets are in the hopper to complete the test, add if necessary. Tare scale and place a 25lb weight on the scale to measure fuel consumed.

C. Unit Start-Up

1. With all doors and air controls closed, zero draft Magnehelic using screw located at bottom of meter.
2. Before lighting a fire turn on dilution tunnel and set flow rate to 140 scfm (approximately 715 fpm) if burn rate is to be less than 3 kg/hr. For higher burn rates set flow for a 150:1 air fuel ratio (see chart for approximate values).
3. Check draft imposed on cold stove. All inlets must be closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005 inches water column.
4. With hot wire anemometer check for ambient airflow around unit (must be less than 50 ft/min).

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5. Tare scale and start fire by turning the unit on per manufacturer's instructions. (Make sure stack sample probe is on the unit.)
6. Once fuel is burning well, operate at high fire for sufficient time to get the fuel burning well. Then adjust settings to intended test run levels.
7. Perform the dilution tunnel traverse as prescribed in ASTM E2515, Section 9.3.2 (Pitot tube should be carefully cleaned prior to each test.)
8. Pretest must burn for a minimum of 1 hour. Record room and flue temperatures.

D. Test Run

1. Stack gas analyzers should be on and in the sample mode.
2. When the 1-hour pre-burn is complete, the test is to be started.
 - a. Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
 - b. Check tunnel Pitot tube for proper position.
 - c. Confirm heater is set to the maximum burn rate.
 - d. Record initial readings.
 - e. Turn on probe sample systems and start timing test.
 - f. Tare platform scale and add 25lb weight.
 - g. Every 10 minutes record the following:
 - 1) Dry gas meter readings.
 - 2) Weight remaining.
 - 3) All thermocouple temperatures.
 - 4) Tunnel Pitot tube reading.
 - 5) Draft reading.
 - 6) Rotometer readings.
 - h. Filter temperatures shall not exceed 90°F anytime during the test. If the filters are approaching 90°F turn on cooling pump. Filters must be kept above the dilution tunnel wet bulb temperature in order to prevent condensation.
 - i. Regularly check impinger train for ice level during test.
 - j. At 1-hour, Filter set #2 is to be removed from the dilution tunnel and Filter set #3 is added. The heater is changed from the high burn setting to the ≤50% of maximum burn rate setting and operated for 2-hours.
 - k. At the 3-hour point, the heater is changed to the lowest burn rate setting.
 - l. At the 6-hour point, shut off sample trains and record last reading.
 - m. Record final dry gas meter values.
 - n. Shut down heater per manufacturer's instructions.

IV. POST TEST PROCEDURES

A. Leak Checks

1. Dilution Tunnel
 - a. Remove sample probes from tunnel and plug with rubber stopper.
 - b. Turn on sample system and set vacuum to 10" mercury or to the highest value reached during the test.
 - c. At a convenient value start stopwatch and record the DGM starting value.
 - d. After 1 minute stop sample system and record ending DGM value.
 - e. Calculate leakage rate per pre-test description (see II.B.2.c.).

2. Gas Analyzers
 - a. Set stack sample flow to about 75 mm on the rotometer.
 - b. Plug with rubber stopper.
 - c. Adjust vacuum to 10" mercury.
 - d. Let system stabilize then record rotometer readings.
 - e. If the rotometer readings do not equal zero, check with the laboratory manager.
 - f. SLOWLY unplug probe and decrease flow rate to zero.
 - g. Turn off stack sampling system.
 - h. Zero, span and calibrate the analyzers (see Gas Analysis). RECORD ONLY these meter values.

B. Particulate Sample Recovery

1. Disassemble filter holder and collect all loose material on filters.
2. Weigh and record probes and filters for each train. NOTE: 24 hours of desiccation must pass before final "no change" weight values can be recorded.
3. Weigh and record probes and fillers at 6-hour intervals until weight change between weighing is less than 0.5 mg.

V. DISPOSITION OF TESTED UNIT.


In order to meet the requirements of section 60.533(b)(8) of the EPA's 40CFR Part 60 Standards of Performance for New Residential Wood Heaters, Intertek Testing Services seals certified wood heaters by:

- 1) Applying tamper-indicating tape to the firebox door, ash pan door, and the air controls.

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- 2) Totally covering the unit with stretch wrap and stamping the stretch wrap with our WHI logo at various locations.
- 3) Strapping the door and ash pan closed with plastic banding so that the banding goes both around the unit laterally and from top to bottom. The banding is then stamped with our WHI logo so that the banding can't be simply replaced.
- 4) The certificate is then placed on the top of the unit and a second layer of stretch wrap is applied and stamped with our WHI logo.
- 5) The unit is placed on a pallet and strapped down with additional strapping to keep it on the pallet. It is then shipped back to the manufacturer.

 Total Quality. Assured.	CLIENT: Ardisam Inc	PERFORMED BY: Ken Slater
	PROJECT #: G104942704	REVIEWED BY: Brian Ziegler
	PRODUCT: Pellet Fueled room heater	MODEL: Castle Serenity 41278
SAMPLE ID #: MID2201060911-001	DATE: 2/16/2022	
STANDARD: ASTM E2779	VERSION YEAR: 2017	LOCATION: Middleton
STANDARD TITLE: Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters		
RESULTS		
PASS	X	FAIL
	na	NO PASS/FAIL
		na

Emissions Testing Initial Stove Check Out

Date Received	1/6/2022	Shipping Carrier	Client
---------------	----------	------------------	--------

Shipping Damage?	No	Yes	Describe Damage	NA	
	X	na			
			Is Damage Repairable?	Yes	No
				na	na

Repairs Affected by	na	Date	na
Client Notified about Irreparable Damage?	na	Date	na

Overall Unit Dimensions (in)			Unit Weight	
Height	Width	Depth	(lbs)	(Kg)
34	18.25	23	170	77.112

Unit Description (check appropriate box)					
Stove	na	Top Vent	na	Manual Draft	na
Insert	na	Rear Vent	X	Bimetal Spring	na
Catalytic	na	Grate	na	Remote T-Stat	X
Non-Catalytic	na	Ashpan	na	Blower	X
Other	Pellet Stove				

48-hr Conditioning Burn Dates	see client folder
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Pre/Post Checks

Facility Conditions	Pre-Test	Post-Test
Air Velocity (fpm)	0	0
Smoke Capture Check	X	X
Heater Conditions		
Date Stack Cleaned	2/15/2022	na
Date Dilution Tunnel Cleaned	2/15/2022	na
Induced Draft Check	X	X
Tunnel Velocity	0.103	0.101
Pitot Leak Check		
Side A	X	X
Side B	X	X
Temperature System		
Ambient (between 65°F -90°F)	71	68
Proportional Checks		
CO Analyzer Drift Check	x	x

CO2 Analyzer Drift Check		x	x
O2 Analyzer Drift Check		x	x
Thermocouple Check		x	x
Sampling Train ID Numbers		Train 1	Train 2
Probe		1	2
Filter - Front		1	3
Filter - Back		2	4
Filter <90°F		X	X

Pre-Test Scale Audit			
Scale Type	Audit Weight	Class	Measured Weight
Analytical (mg)	100.0000	S	100.0000
Platform (lbs)	10.00	F	10.00
Wood (lbs)	25.0	F	25.0

Limits of Weight Ranges	
Analytical Scale	50%-150% of dry filter weight, ± 0.1 mg
Platform Scale	20%-80% of ideal test load weight, ± 0.1 lbs. or 1%
Wood Scale	20%-80% of ideal test load weight, ± 0.1 lbs. or 1%

Sampling Equipment Check out

Leakage Checks Tunnel Samplers						
Sample	1		2		3	
	Pre	Post	Pre	Post	Pre	Post
Vacuum (in Hg)	10	10	10	10	na	na
Final 1 min DGM (ft ³)	0	0	0	0	na	na
Initial 1 min DGM (ft ³)	0	0	0	0	na	na
Change (C) (ft ³)	0	0	0	0	na	na
Allowable leakage (cfm)	0.04	0.04	0.04	0.04	0.04	0.04
Check Okay	X	X	X	X	na	na

Leakage Checks Flue Gas Sampler		
Plugged Probe	Pre Test	Post Test
Vacuum (in Hg)	10	10
Rotameter Reading	0	0
Flow Rate (cfm)	0	0
Allowable (cfm)	0.04	0.04
Check Okay	X	X

Unplugged Flow Rate = .25cfm
Allowable Leakage = .04 x Sample Rate or .02 cfm

Continuous Analyzers

Pre-Test (Adjust and Record)						
Type	Zero		Span		Cal. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO ₂	0	0	24.95	24.92	11.99	11.99
CO	0	0	7.75	7.748	4	4.00

O ₂	0	0	20.89	20.89	10	10.01
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85.809 74.22036

79.02147675


Post Test (Record Only)								
Type	Zero	Span	Cal.	Zero Drift	Span Drift	Cal. Drift	OK?	Not OK*
CO ₂	0	24.92	11.98	0	0.03	0.01	X	na
CO	0	7.7	4	0	0.05	0	X	na
O ₂	0	20.89	9.99	0	0	0.01	X	na

Test Data Log

Raw Dry Gas Meter Readings			
System	1	2	3
Final (ft ³)	51.055	51.056	8.51
Initial (ft ³)	0	0	0

Ambient Conditions	Start	End
Barometer (in Hg)	23.1	28.73
Dry Bulb (°F)	65.2	67
Humidity (%)	21.2	25

Comments
Unit levels, (5)High, (3)Medium, and (1)Low.
8:04am-Pretest started,
9:04am- Test started - setting 5
10:04am changed to medium burn setting -3
12:04pm changed to low burning setting -1
3:04pm end of test

 Total Quality. Assured.	CLIENT: Ardisam Inc	PERFORMED BY: Ken Slater
	PROJECT #: G104942704	REVIEWED BY: Brian Ziegler
	PRODUCT: Pellet Fueled room heater	MODEL: Castle Serenity 41278
SAMPLE ID #: MID2201060911-001	DATE: 2/16/2022	
STANDARD(S): ASTM E2779	VERSION YEAR: 2017	LOCATION: Middleton
STANDARD TITLE: Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters		
RESULTS		
PASS	X	FAIL
	na	NO PASS/FAIL
		na

Room Conditions							
Room Temp (°F)		Barometric Pressure (in Hg)		Relative Humidity (%)		Air Velocity (ft/sec)	
71	68	23.1	28.73	21.2	25	0	0

Ave Dilution Tunnel Measurements				Sample Data			
Burn Time (min)	Velocity (ft/sec)	Flow Rate (dscf/min)	Temp (R) (°F)	Total Sample		Particulate Catch	
				1	2	1	2
360	22.11	220.32	529.56	43.88	43.37	3.20	3.40

Dilution Tunnel Dual Train Precision					
Sample Ratios		Total Emissions (g)		Deviation	
Train 1	Train 2	Train 1	Train 2	(%)	(g/kg)
1807.49	1828.84	5.78	6.22	3.62%	0.055

Results			
Burn Rate (kg/hr)	Initial Draft (in/wc)	Run Time (min)	Ave Draft (in/wc)
1.31	0.029	360	0.023

Emissions	
(g/hr)	(g/kg)
1.000	0.764

Burn Rates (kg/hr)		
High	Medium	Low
2.05	1.48	0.95

Fuel Consumed (lbs)		
High	Medium	Low
4.51	6.51	6.30

Fuel Moisture (% wet)
3.3%



 Total Quality. Assured.	CLIENT: Ardisam Inc	PERFORMED BY: Ken Slater
	PROJECT #: G104942704	REVIEWED BY: Brian Ziegler
	PRODUCT: Pellet Fueled room heater	MODEL: Castle Serenity 41278
SAMPLE ID #: MID2201060911-001	DATE: 2/16/2022	
STANDARD(S): ASTM E2779	VERSION YEAR: 2017	LOCATION: Middleton

Table of Test Equipment Used				
Description	Asset #	Calibration Due	MU	Used in Test(s)
Timer	1212	4/5/2022	0.7 sec	ASTM E2779
Timer	646	4/5/2022	0.7 sec	ASTM E2779
Pressure Transducer	1406	7/7/2022	0.6 in H2O	ASTM E2779
Data Acquisition	986	4/12/2022	0.06 Degrees F	ASTM E2779
Scale	1134	4/6/2022	.118 lbs	ASTM E2779
Hygrometer	1455	4/12/2022	0.35 RH	ASTM E2779
Flow Meter	1413	2/20/2022	0.020 lpm	ASTM E2779
Flow Meter	1414	2/20/2022	0.020 lpm	ASTM E2779
Flow Meter	1519	2/20/2022	0.020 lpm	ASTM E2779
Balance	713	4/11/2022	0.00007 g	ASTM E2779
Anamometer	1457	5/14/2022	4 fpm	ASTM E2779

intertek <small>Total Quality. Assured.</small>	CLIENT: Ardisam Inc	PERFORMED BY: Ken Slater
	PROJECT #: G104942704	REVIEWED BY: Brian Ziegler
SAMPLE ID #: MID2201060911-001	PRODUCT: Pellet Fueled room heater	MODEL: Castle Serenity 4127
STANDARD(S): ASTM E2779	VERSION YEAR: 2017	DATE: 2/16/2022
		LOCATION: Middleton

Pre-Burn Data																											
Time	Flue	Room	Tunnel	Meter #3	DGM 3	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	68.77357	Meter	Meter	Draft	Calculated	
10.0	Temp 1	Temp 2	Dry Bulb 3	11	Out 12	In 13	Out 14	15	In 16	Out 17	18	In 19	20	21	22	23	24	25	25	27	28	Scale	Corrected	#1	#2		Tunnel
																		%	%	%	lbs	Scale	Cu Ft	Cu Ft			
0.0	248.62	68.62	64.88	0.02	69.40	71.26	70.57	68.13	70.01	70.00	67.30	69.27	67.37	0.02	0.02	0.00	1.74	0.00	5.04	15.71	72.37	3.60	0.00	0.00	-0.24982	0.1847569	
10.0	284.42	69.09	65.53	0.02	69.97	71.84	71.33	69.37	70.46	70.98	68.74	70.04	68.39	0.02	0.02	0.00	1.72	0.00	5.42	15.30	71.67	2.90	0.00	0.00	-0.24984	0.180959	
20.0	293.45	69.39	65.96	0.02	70.06	72.04	71.37	69.07	70.76	71.23	68.54	70.47	68.54	0.02	0.02	0.00	1.75	0.00	5.61	15.08	70.96	2.19	0.00	0.00	-0.24982	0.1878994	
30.0	298.99	69.48	66.58	0.02	70.11	71.93	71.44	69.20	70.90	71.36	68.62	70.80	68.81	0.02	0.02	0.00	1.39	0.00	5.45	15.20	70.27	1.49	0.00	0.00	-0.24983	0.0967448	
40.0	300.42	69.44	67.16	0.02	70.42	72.59	71.71	69.68	71.38	71.83	69.19	71.33	69.20	0.02	0.02	0.00	2.07	0.01	5.86	14.82	69.57	0.79	0.00	0.00	-0.24983	0.266804	
50.0	305.08	69.19	67.39	0.02	70.66	72.91	72.12	70.04	71.60	72.13	69.48	71.56	69.62	0.02	0.02	0.00	1.41	0.00	6.91	13.73	68.77	0.00	0.00	0.00	-0.24982	0.1033316	
60.0	303.43	69.85	67.54	0.02	70.78	72.79	72.21	70.22	71.63	72.24	69.90	71.48	69.92	0.02	0.02	0.00	1.39	0.00	6.96	13.53	72.18	3.40	0.00	0.00	-0.24983	0.0986651	


 Total Quality. Assured.	CLIENT: Ardisam Inc		PERFORMED BY: Ken Slater		
	PROJECT #: G104942704		REVIEWED BY: Brian Ziegler		
	PRODUCT: Pellet Fueled room heater		MODEL: Castle Serenity 41278		
SAMPLE ID #: MID2201060911-001		DATE: 2/16/2022			
STANDARD(S): ASTM E2779		VERSION YEAR: 2017		LOCATION: Middleton	
EQUIPMENT					
ASSET # - DESCRIPTION: See Equipment Tab			CALIBRATION DUE: See Equipment Tab		
CONDITIONING					
SAMPLE CONDITIONING (IF APPLICABLE): 48 hr conditioning burn					
AMBIENT TEMPERATURE (°F): 70.88					
RESULTS					
PASS	X	FAIL	na	NO PASS/FAIL	na

E&E Tunnel Traverse Worksheet

Static Pressure (in Hg)	0.248
Barometer (in Hg)	23.1

Position	Tunnel Velocity	
	(ft/sec)	(ft/sec ²)
A CENTER	0.104	0.3225
B CENTER	0.1	0.3162
A1	0.091	0.3017
A2	0.106	0.3256
A3	0.104	0.3225
A4	0.086	0.2933
B1	0.093	0.3050
B2	0.095	0.3082
B3	0.085	0.2915
B4	0.085	0.2915
Average		0.3078

	Pitot
Constant =	0.9638

 Total Quality. Assured.	CLIENT: Ardisam Inc	PERFORMED BY: Ken Slater
	PROJECT #: G104942704	REVIEWED BY: Brian Ziegler
	PRODUCT: Pellet Fueled room heater	MODEL: Castle Serenity 41278
	SAMPLE ID #: MID2201060911-001	DATE: 2/16/2022
STANDARD(S): ASTM E2779	VERSION YEAR: 2017	LOCATION: Middleton

E&E Pellet Fuel Data

Brand of Pellets Used	Marthwood
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	Wet	Dry
Moisture Content (%)	3.25%	3.36%

Weight Used During Test	
Wet (lbs)	Dry (kg)
17.33	7.86

Burn Rate (kg/hr)	1.309423
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Moisture Calculation	
Before Weight of Pellets - Wet (lbs)	1.23
After weight of pellets - Dry (lbs)	1.19
Weight of moisture removed from oven (lbs)	0.04

Weight added to Scale (lbs)	25.00
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 Total Quality. Assured.	CLIENT: Ardisam Inc		PERFORMED BY: Ken Slater		
	PROJECT #: G104942704		REVIEWED BY: Brian Ziegler		
	PRODUCT: Pellet Fuel Room Heater		MODEL: Castle Serenity 41278		
SAMPLE ID #:	MID2201060911-001	DATE: 2/16/2022			
STANDARD(S):	CSA B415.1	VERSION YEAR: 2010(R2020)	LOCATION: Middleton		
EQUIPMENT					
ASSET # - DESCRIPTION: See emissions TDP			CALIBRATION DUE: See emissions TDP		
CONDITIONING					
SAMPLE CONDITIONING (IF APPLICABLE): See Client Folder					
AMBIENT TEMPERATURE (°F): 70.88					
RESULTS					
PASS	na	FAIL	na	NO PASS/FAIL	X

Run: Test 1
Test Duration: 360
Output Category: Overall

	HHV Basis	LHV Basis
Overall Efficiency	78.2%	84.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	79%	84.7%

Output Rate (kJ/h)	18,794	17,828	(Btu/h)
Burn Rate (kg/h)	1.27	2.79	(lb/h)
Input (kJ/h)	24,043	22,807	(Btu/h)

Test Load Weight (dry kg)	7.61	16.76	dry lb
MC wet (%)	3.25		
MC dry (%)	3.36		
Particulate (g)	6		
CO (g)	-1		
Test Duration (h)	6.00		

Emissions	Particulate	CO	
g/MJ Output	0.05	-0.01	
g/kg Dry Fuel	0.79	-0.08	
g/h	1.00	-0.10	-0.0017
lb/MM Btu Output	0.12	-0.01	

Air/Fuel Ratio (A/F)	27.47
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VERSION: 2.2 12/14/2009

Manufacturer: Ardisam Inc
 Model: Castle Serenity 41278
 Date: 2/16/2022
 Run: Test 1
 Control #: G104942704
 Test Duration: 360
 Output Category: Overall

Appliance Type: Pellet (Cat, Non-Cat, Pellet)
 Temp. Units: F (F or C)
 Weight Units: lb (kg or lb)

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

Wood Moisture (% wet): 3.25
 Load Weight (lb wet): 17.33
 Burn Rate (dry kg/h): 1.27
 Total Particulate Emissions: 6 g

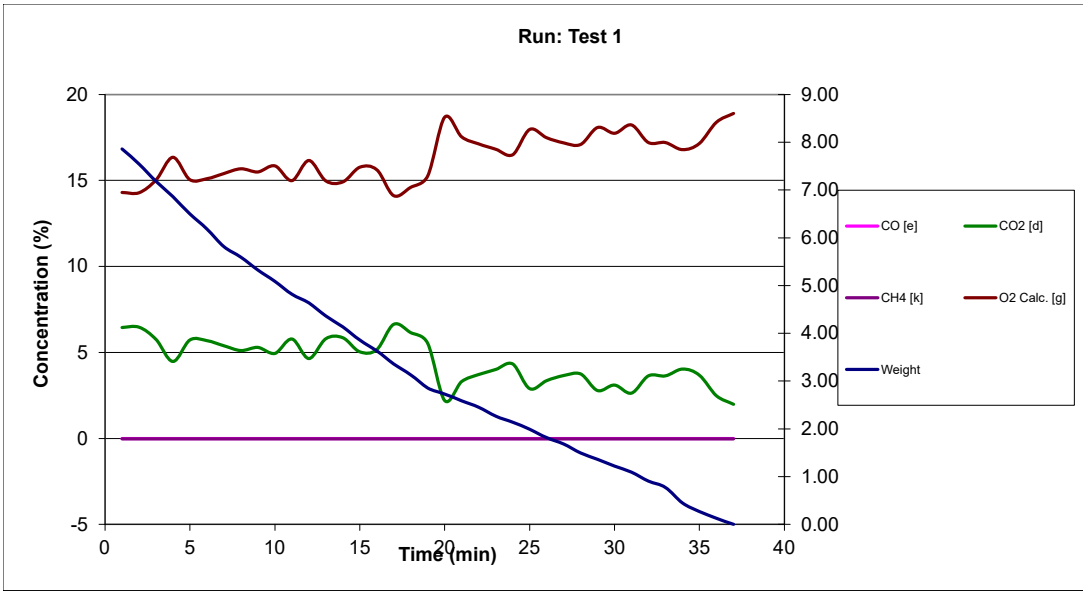
Fuel Data
 Marth
 HHV 18,967 kJ/kg
 %C 46.87
 %H 6.41
 %O 46.62
 %Ash 0.1

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

Averages 0.00 4.46 16.17 230.32 68.90
 Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp	Room Temp
		CO	CO ₂	O ₂		
0	17.33	0.00	6.45	14.33	306.1	70.9
10	16.63	0.00	6.47	14.23	306.2	70.2
20	15.84	0.00	5.76	14.84	305.6	69.6
30	15.12	0.00	4.47	16.37	303.0	69.8
40	14.33	0.00	5.73	14.97	303.9	70.1
50	13.63	0.00	5.68	14.93	303.7	69.8
60	12.82	0.00	5.38	15.32	305.8	70.1
70	12.33	0.00	5.12	15.65	249.0	68.7
80	11.74	0.00	5.29	15.40	242.3	69.4
90	11.22	0.00	4.95	15.72	241.3	69.1
100	10.62	0.00	5.78	14.85	240.8	69.3
110	10.22	0.00	4.64	16.07	238.1	68.7
120	9.62	0.00	5.80	14.68	236.5	69.2
130	9.11	0.00	5.85	14.71	238.5	68.4
140	8.51	0.00	5.03	15.60	238.5	69.3
150	8.01	0.00	5.16	15.49	240.4	68.8
160	7.41	0.00	6.64	13.85	240.6	68.7
170	6.91	0.00	6.16	14.39	239.6	68.7
180	6.30	0.00	5.53	15.09	243.2	69.0
190	6.02	0.00	2.21	18.55	211.0	68.4
200	5.70	0.00	3.30	17.37	197.5	68.9
210	5.41	0.00	3.71	16.85	193.8	68.6
220	5.00	0.00	4.01	16.58	192.4	68.3
230	4.71	0.00	4.32	16.26	194.8	68.2
240	4.40	0.00	2.89	17.76	193.3	68.0
250	4.00	0.00	3.36	17.28	193.8	68.1
260	3.71	0.00	3.65	16.89	194.1	68.4
270	3.30	0.00	3.75	16.86	196.4	68.5
280	3.00	0.00	2.78	17.88	193.3	68.7
290	2.70	0.00	3.11	17.53	190.9	68.5
300	2.41	0.00	2.63	17.96	191.3	67.9
310	2.00	0.00	3.63	16.93	195.8	68.6
320	1.71	0.00	3.63	16.94	194.9	68.3
330	0.99	0.00	4.03	16.50	194.1	68.7
340	0.60	0.00	3.68	16.89	193.0	68.5
350	0.29	0.00	2.48	18.13	189.7	68.6
360	0.00	0.00	1.98	18.60	188.9	68.4

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



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

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-09. In general the column headings correspond to the variables used in the Standard.

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

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

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

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

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-09. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.


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

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

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

Tony Joseph
A.L.P. (Tony) Joseph
Project Manager, Energy & Utilities
Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, ON
L4W 5N6
Tel: 416-747-4035
Direct Fax: 416-401-6807
E-mail: tony.joseph@csa.ca

Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.2 14 December 2009

 Total Quality. Assured.	CLIENT: Ardisam Inc		PERFORMED BY: Ken Slater		
	PROJECT #: G104942704		REVIEWED BY: Brian Ziegler		
	PRODUCT: Pellet Fuel Room Heater		MODEL: Castle Serenity 41278		
SAMPLE ID #: MID2201060911-001		DATE: 2/16/2022			
STANDARD(S): CSA B415.1		VERSION YEAR: 2010(R2020)		LOCATION: Middleton	
EQUIPMENT					
ASSET # - DESCRIPTION: See emissions TDP			CALIBRATION DUE: See emissions TDP		
CONDITIONING					
SAMPLE CONDITIONING (IF APPLICABLE): See Client Folder					
AMBIENT TEMPERATURE (°F): 70.88					
RESULTS					
PASS	na	FAIL	na	NO PASS/FAIL	X

Run: Test #1
Test Duration: 60
Output Category: High

	HHV Basis	LHV Basis
Overall Efficiency	74.4%	80.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75%	80.6%

Output Rate (kJ/h)	27,928	26,493	(Btu/h)
Burn Rate (kg/h)	1.98	4.36	(lb/h)
Input (kJ/h)	37,559	35,629	(Btu/h)

Test Load Weight (dry kg)	1.98	4.36	dry lb
MC wet (%)	3.25		
MC dry (%)	3.36		
Particulate (g)	6		
CO (g)	0		
Test Duration (h)	1.00		

Emissions	Particulate	CO	
g/MJ Output	0.21	0.00	
g/kg Dry Fuel	3.03	-0.06	
g/h	6.00	-0.12	-0.0020
lb/MM Btu Output	0.50	-0.01	

Air/Fuel Ratio (A/F)	21.47
-----------------------------	-------

Comb Eff		99.96%	99.99%	Ultimate CO ₂		CO ₂ in	20.36	Burn Duration:	1.00	N	Load Weight (lbs)		2.85	Fuel Heating		1999	1999	1999	
H2 Fuel		79.75%	80.69%	F1		1.621	Burn Rate:	4.35	lb/h	1.000	lb/h	1.621	Stack Temp:	304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987
Output		27.828	kWh	Stack Temp		304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987	1999	1999	1999	1999	1999	1999	1999	
Burn Rate		1.56	lb/h	Stack Temp		304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987	1999	1999	1999	1999	1999	1999	1999	
Grain CO		9	g/s	Stack Temp		304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987	1999	1999	1999	1999	1999	1999	1999	
Input		27.828	kWh	Stack Temp		304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987	1999	1999	1999	1999	1999	1999	1999	
MC wet		2.95	g/s	Stack Temp		304.7	Deg F	151.5	Deg C	Value in kJ/kg - CV	18.987	1999	1999	1999	1999	1999	1999	1999	

AVERAGE		SUMS		AVERAGE		SUMS	
Elapsed Time	Weight Remaining (kg)	% CO (s)	% CO (s)	Total	Total	Total	Total
0	255	0.00	6.45	255.00	14.30	150.2	21.2
10	173	0.00	6.47	214.7%	142.0	152.3	21.2
20	137	0.00	3.75	258.6%	150.2	152.1	21.2
30	104	0.00	4.47	305.4%	205.1	153.4	21.2
40	83	0.00	3.75	258.6%	150.2	152.1	21.2
50	83	0.00	3.75	258.6%	150.2	152.1	21.2
60	83	0.00	3.75	258.6%	150.2	152.1	21.2

VERSION: 2.2

12/14/2009

Manufacturer: Ardisam Inc
Model: Castle Serenity 41278
Date: 2/16/2022
Run: Test #1
Control #: G104942704
Test Duration: 60
Output Category: High

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

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

Default Fuel Values

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

Wood Moisture (% wet): 3.25
Load Weight (lb wet): 4.51
Burn Rate (dry kg/h): 1.98
Total Particulate Emissions: 6 g

Fuel Data

Marth
HHV 18,967 kJ/kg
%C 46.87
%H 6.41
%O 46.62
%Ash 0.1

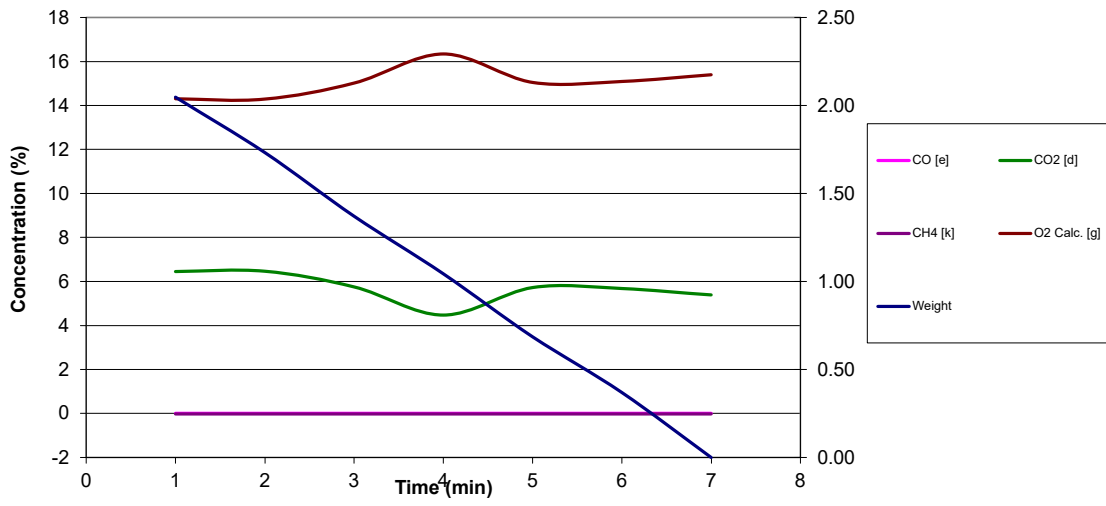
Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages 0.00 5.71 15.00 304.90 70.08
Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp	Room Temp
		CO	CO ₂	O ₂		
0	4.51	0.00	6.45	14.33	306.1	70.9
10	3.82	0.00	6.47	14.23	306.2	70.2
20	3.02	0.00	5.76	14.84	305.6	69.6
30	2.30	0.00	4.47	16.37	303.0	69.8
40	1.51	0.00	5.73	14.97	303.9	70.1
50	0.81	0.00	5.68	14.93	303.7	69.8
60	0.00	0.00	5.38	15.32	305.8	70.1

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

Run: Test #1



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

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

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

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

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

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-09. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.


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

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

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Project Manager, Energy & Utilities
Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, ON
L4W 5N6
Tel: 416-747-4035
Direct Fax: 416-401-6807
E-mail: tony.joseph@csa.ca

Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.2 14 December 2009

 Total Quality. Assured.	CLIENT: Ardisam Inc		PERFORMED BY: Ken Slater		
	PROJECT #: G104942704		REVIEWED BY: Brian Ziegler		
	PRODUCT: Pellet Fuel Room Heater		MODEL: Castle Serenity 41278		
SAMPLE ID #: MID2201060911-001		DATE: 2/16/2022			
STANDARD(S): CSA B415.1		VERSION YEAR: 2010(R2020)		LOCATION: Middleton	
EQUIPMENT					
ASSET # - DESCRIPTION: See emissions TDP			CALIBRATION DUE: See emissions TDP		
CONDITIONING					
SAMPLE CONDITIONING (IF APPLICABLE): See Client Folder					
AMBIENT TEMPERATURE (°F): 70.07					
RESULTS					
PASS	na	FAIL	na	NO PASS/FAIL	X

Run: Test 1
Test Duration: 120
Output Category: Medium

	HHV Basis	LHV Basis
Overall Efficiency	79.4%	85.6%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	80%	86.0%

Output Rate (kJ/h)	21,521	20,415	(Btu/h)
Burn Rate (kg/h)	1.43	3.15	(lb/h)
Input (kJ/h)	27,114	25,720	(Btu/h)

Test Load Weight (dry kg)	2.86	6.30	dry lb
MC wet (%)	3.25		
MC dry (%)	3.36		
Particulate (g)	6		
CO (g)	0		
Test Duration (h)	2.00		

Emissions	Particulate	CO	
g/MJ Output	0.14	0.00	
g/kg Dry Fuel	2.10	-0.07	
g/h	3.00	-0.09	-0.0016
lb/MM Btu Output	0.32	-0.01	

Air/Fuel Ratio (A/F)	22.33
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VERSION: 2.2 12/14/2009

Manufacturer: Ardisam Inc
 Model: Castle Serenity 41278
 Date: 2/16/2022
 Run: Test 1
 Control #: G104942704
 Test Duration: 120
 Output Category: Medium

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

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

Default Fuel Values

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

Wood Moisture (% wet): 3.25
 Load Weight (lb wet): 6.51
 Burn Rate (dry kg/h): 1.43
 Total Particulate Emissions: 6 g

Fuel Data

Marth	
HHV	18,967 kJ/kg
%C	46.87
%H	6.41
%O	46.62
%Ash	0.1

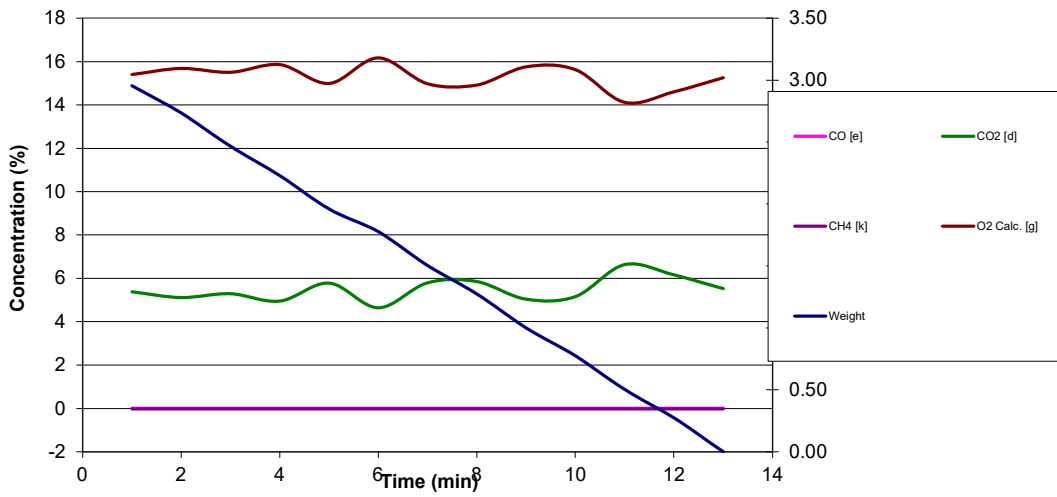
Note 1: For other fuels, use the heating value and fuel composition determined by analysis of fuel sample in accordance with Clause 9.2.

Averages 0.00 5.49 15.14 245.73 69.01
 Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas	Room Temp
		CO	CO ₂	O ₂		
0	6.51	0.00	5.38	15.32	305.8	70.1
10	6.03	0.00	5.12	15.65	249.0	68.7
20	5.44	0.00	5.29	15.40	242.3	69.4
30	4.92	0.00	4.95	15.72	241.3	69.1
40	4.32	0.00	5.78	14.85	240.8	69.3
50	3.92	0.00	4.64	16.07	238.1	68.7
60	3.32	0.00	5.80	14.68	236.5	69.2
70	2.81	0.00	5.85	14.71	238.5	68.4
80	2.21	0.00	5.03	15.60	238.5	69.3
90	1.71	0.00	5.16	15.49	240.4	68.8
100	1.11	0.00	6.64	13.85	240.6	68.7
110	0.60	0.00	6.16	14.39	239.6	68.7
120	0.00	0.00	5.53	15.09	243.2	69.0

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

Run: Test 1



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

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Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.2 14 December 2009

 Total Quality. Assured.	CLIENT: Ardisam Inc		PERFORMED BY: Ken Slater		
	PROJECT #: G104942704		REVIEWED BY: Brian Ziegler		
	PRODUCT: Pellet Fuel Room Heater		MODEL: Castle Serenity 41278		
SAMPLE ID #: MID2201060911-001		DATE: 2/16/2022			
STANDARD(S): CSA B415.1		VERSION YEAR: 2010(R2020)		LOCATION: Middleton	
EQUIPMENT					
ASSET # - DESCRIPTION: See emissions TDP			CALIBRATION DUE: See emissions TDP		
CONDITIONING					
SAMPLE CONDITIONING (IF APPLICABLE): See Client Folder					
AMBIENT TEMPERATURE (°F): 69.03					
RESULTS					
PASS	na	FAIL	na	NO PASS/FAIL	X

Run: Test #1
Test Duration: 180
Output Category: Low

	HHV Basis	LHV Basis
Overall Efficiency	77.2%	83.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	78%	83.7%

Output Rate (kJ/h)	13,501	12,807	(Btu/h)
Burn Rate (kg/h)	0.92	2.03	(lb/h)
Input (kJ/h)	17,490	16,592	(Btu/h)

Test Load Weight (dry kg)	2.77	6.10	dry lb
MC wet (%)	3.25		
MC dry (%)	3.36		
Particulate (g)	6		
CO (g)	0		
Test Duration (h)	3.00		

Emissions	Particulate	CO	
g/MJ Output	0.15	-0.01	
g/kg Dry Fuel	2.17	-0.12	
g/h	2.00	-0.11	-0.0019
lb/MM Btu Output	0.34	-0.02	

Air/Fuel Ratio (A/F)	35.99
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Manufacturer: Axiom Pro
Model: Axiom Security 1278

Date: 02/15/22
Rev: 1.0
Control #: 0104042704

Test Duration: 180 min
EIP: 87.96%
Comb EIP: 89.96%
EIP: 87.96%
Output: 13.801 kWh
Burn Rate: 6.82 kWh
Green CO2: 9.8 kWh
Total: 13.801 kWh
MC Wt: 3.25

Overall Heating Efficiency: 77.19%
Combustion Efficiency: 89.50%
Dry Mass Exhaust (on %): 13.64%
Heat Transfer Efficiency: 77.56%
Heat Output: 12.807 kWh
Heat Input: 16.502 kWh
Ultimate CO₂: 20.38
CO₂: 20.38
Burn Duration: 3:00 h
F: 1.07
Burn Rate: 2.03 kWh
Stack Temp: 194.4 Deg C
Dry Molecular Weight (M): 28.24
Dry Mass Exhaust (on %): 13.64%
Air Fuel Ratio (AF): 35.58
Combustion Efficiency: 89.50%
Total Input (kJ): 52,471 (49,767 (Btu))
Total Output (kJ): 40,264 (38,416 (Btu))
Efficiency: 77.09%
Total CO₂ (kg): 4.34
Moisture of Wood (wet basis): 3.25
Initial Dry Weight (kg): 2.77
Moisture Content Dry: 3.38

Air Fuel Ratio (AF): 35.58
Dry Molecular Weight (M): 28.24
Dry Mass Exhaust (on %): 13.64%
Air Fuel Ratio (AF): 35.58
Moisture of Wood (wet basis): 3.25
Initial Dry Weight (kg): 2.77
Moisture Content Dry: 3.38
Load Weight (kg): 2.86
Fuel Weight: 899
Fuel Value in kJ/kg - CV: 18,987
LHV: 899
HHV: 1898.7
Btu/lb: 8109.8
7652.2

Moisture Content M_{dry}: 3.35

Table with columns: Element, Time, Remaining, Input Data, Air EA, CO₂, CO, CH₄, H₂, H₂O, H₂O (v), H₂O (l), H₂O (g), H₂O (s), H₂O (t), H₂O (b), H₂O (c), H₂O (d), H₂O (e), H₂O (f), H₂O (g), H₂O (h), H₂O (i), H₂O (j), H₂O (k), H₂O (l), H₂O (m), H₂O (n), H₂O (o), H₂O (p), H₂O (q), H₂O (r), H₂O (s), H₂O (t), H₂O (u), H₂O (v), H₂O (w), H₂O (x), H₂O (y), H₂O (z), H₂O (aa), H₂O (ab), H₂O (ac), H₂O (ad), H₂O (ae), H₂O (af), H₂O (ag), H₂O (ah), H₂O (ai), H₂O (aj), H₂O (ak), H₂O (al), H₂O (am), H₂O (an), H₂O (ao), H₂O (ap), H₂O (aq), H₂O (ar), H₂O (as), H₂O (at), H₂O (au), H₂O (av), H₂O (aw), H₂O (ax), H₂O (ay), H₂O (az), H₂O (ba), H₂O (bb), H₂O (bc), H₂O (bd), H₂O (be), H₂O (bf), H₂O (bg), H₂O (bh), H₂O (bi), H₂O (bj), H₂O (bk), H₂O (bl), H₂O (bm), H₂O (bn), H₂O (bo), H₂O (bp), H₂O (bq), H₂O (br), H₂O (bs), H₂O (bt), H₂O (bu), H₂O (bv), H₂O (bw), H₂O (bx), H₂O (by), H₂O (bz), H₂O (ca), H₂O (cb), H₂O (cc), H₂O (cd), H₂O (ce), H₂O (cf), H₂O (cg), H₂O (ch), H₂O (ci), H₂O (cj), H₂O (ck), H₂O (cl), H₂O (cm), H₂O (cn), H₂O (co), H₂O (cp), H₂O (cq), H₂O (cr), H₂O (cs), H₂O (ct), H₂O (cu), H₂O (cv), H₂O (cw), H₂O (cx), H₂O (cy), H₂O (cz), H₂O (da), H₂O (db), H₂O (dc), H₂O (dd), H₂O (de), H₂O (df), H₂O (dg), H₂O (dh), H₂O (di), H₂O (dj), H₂O (dk), H₂O (dl), H₂O (dm), H₂O (dn), H₂O (do), H₂O (dp), H₂O (dq), H₂O (dr), H₂O (ds), H₂O (dt), H₂O (du), H₂O (dv), H₂O (dw), H₂O (dx), H₂O (dy), H₂O (dz), H₂O (ea), H₂O (eb), H₂O (ec), H₂O (ed), H₂O (ee), H₂O (ef), H₂O (eg), H₂O (eh), H₂O (ei), H₂O (ej), H₂O (ek), H₂O (el), H₂O (em), H₂O (en), H₂O (eo), H₂O (ep), H₂O (eq), H₂O (er), H₂O (es), H₂O (et), H₂O (eu), H₂O (ev), H₂O (ew), H₂O (ex), H₂O (ey), H₂O (ez), H₂O (fa), H₂O (fb), H₂O (fc), H₂O (fd), H₂O (fe), H₂O (ff), H₂O (fg), H₂O (fh), H₂O (fi), H₂O (fj), H₂O (fk), H₂O (fl), H₂O (fm), H₂O (fn), H₂O (fo), H₂O (fp), H₂O (fq), H₂O (fr), H₂O (fs), H₂O (ft), H₂O (fu), H₂O (fv), H₂O (fw), H₂O (fx), H₂O (fy), H₂O (fz), H₂O (ga), H₂O (gb), H₂O (gc), H₂O (gd), H₂O (ge), H₂O (gf), H₂O (gg), H₂O (gh), H₂O (gi), H₂O (gj), H₂O (gk), H₂O (gl), H₂O (gm), H₂O (gn), H₂O (go), H₂O (gp), H₂O (gq), H₂O (gr), H₂O (gs), H₂O (gt), H₂O (gu), H₂O (gv), H₂O (gw), H₂O (gx), H₂O (gy), H₂O (gz), H₂O (ha), H₂O (hb), H₂O (hc), H₂O (hd), H₂O (he), H₂O (hf), H₂O (hg), H₂O (hi), H₂O (hj), H₂O (hk), H₂O (hl), H₂O (hm), H₂O (hn), H₂O (ho), H₂O (hp), H₂O (hq), H₂O (hr), H₂O (hs), H₂O (ht), H₂O (hu), H₂O (hv), H₂O (hw), H₂O (hx), H₂O (hy), H₂O (hz), H₂O (ia), H₂O (ib), H₂O (ic), H₂O (id), H₂O (ie), H₂O (if), H₂O (ig), H₂O (ih), H₂O (ii), H₂O (ij), H₂O (ik), H₂O (il), H₂O (im), H₂O (in), H₂O (io), H₂O (ip), H₂O (iq), H₂O (ir), H₂O (is), H₂O (it), H₂O (iu), H₂O (iv), H₂O (iw), H₂O (ix), H₂O (iy), H₂O (iz), H₂O (ja), H₂O (jb), H₂O (jc), H₂O (jd), H₂O (je), H₂O (jf), H₂O (jg), H₂O (jh), H₂O (ji), H₂O (jj), H₂O (jk), H₂O (jl), H₂O (jm), H₂O (jn), H₂O (jo), H₂O (jp), H₂O (jq), H₂O (jr), H₂O (js), H₂O (jt), H₂O (ju), H₂O (jv), H₂O (jw), H₂O (jx), H₂O (jy), H₂O (jz), H₂O (ka), H₂O (kb), H₂O (kc), H₂O (kd), H₂O (ke), H₂O (kf), H₂O (kg), H₂O (kh), H₂O (ki), H₂O (kj), H₂O (kl), H₂O (km), H₂O (kn), H₂O (ko), H₂O (kp), H₂O (kq), H₂O (kr), H₂O (ks), H₂O (kt), H₂O (ku), H₂O (kv), H₂O (kw), H₂O (kx), H₂O (ky), H₂O (kz), H₂O (la), H₂O (lb), H₂O (lc), H₂O (ld), H₂O (le), H₂O (lf), H₂O (lg), H₂O (lh), H₂O (li), H₂O (lj), H₂O (lk), H₂O (lm), H₂O (ln), H₂O (lo), H₂O (lp), H₂O (lq), H₂O (lr), H₂O (ls), H₂O (lt), H₂O (lu), H₂O (lv), H₂O (lw), H₂O (lx), H₂O (ly), H₂O (lz), H₂O (ma), H₂O (mb), H₂O (mc), H₂O (md), H₂O (me), H₂O (mf), H₂O (mg), H₂O (mh), H₂O (mi), H₂O (mj), H₂O (mk), H₂O (ml), H₂O (mm), H₂O (mn), H₂O (mo), H₂O (mp), H₂O (mq), H₂O (mr), H₂O (ms), H₂O (mt), H₂O (mu), H₂O (mv), H₂O (mw), H₂O (mx), H₂O (my), H₂O (mz), H₂O (na), H₂O (nb), H₂O (nc), H₂O (nd), H₂O (ne), H₂O (nf), H₂O (ng), H₂O (nh), H₂O (ni), H₂O (nj), H₂O (nk), H₂O (nl), H₂O (nm), H₂O (nn), H₂O (no), H₂O (np), H₂O (nq), H₂O (nr), H₂O (ns), H₂O (nt), H₂O (nu), H₂O (nv), H₂O (nw), H₂O (nx), H₂O (ny), H₂O (nz), H₂O (oa), H₂O (ob), H₂O (oc), H₂O (od), H₂O (oe), H₂O (of), H₂O (og), H₂O (oh), H₂O (oi), H₂O (oj), H₂O (ok), H₂O (ol), H₂O (om), H₂O (on), H₂O (op), H₂O (oq), H₂O (or), H₂O (os), H₂O (ot), H₂O (ou), H₂O (ov), H₂O (ow), H₂O (ox), H₂O (oy), H₂O (oz), H₂O (pa), H₂O (pb), H₂O (pc), H₂O (pd), H₂O (pe), H₂O (pf), H₂O (pg), H₂O (ph), H₂O (pi), H₂O (pj), H₂O (pk), H₂O (pl), H₂O (pm), H₂O (pn), H₂O (po), H₂O (pp), H₂O (pq), H₂O (pr), H₂O (ps), H₂O (pt), H₂O (pu), H₂O (pv), H₂O (pw), H₂O (px), H₂O (py), H₂O (pz), H₂O (qa), H₂O (qb), H₂O (qc), H₂O (qd), H₂O (qe), H₂O (qf), H₂O (qg), H₂O (qh), H₂O (qi), H₂O (qj), H₂O (qk), H₂O (ql), H₂O (qm), H₂O (qn), H₂O (qo), H₂O (qp), H₂O (qq), H₂O (qr), H₂O (qs), H₂O (qt), H₂O (qu), H₂O (qv), H₂O (qw), H₂O (qx), H₂O (qy), H₂O (qz), H₂O (ra), H₂O (rb), H₂O (rc), H₂O (rd), H₂O (re), H₂O (rf), H₂O (rg), H₂O (rh), H₂O (ri), H₂O (rj), H₂O (rk), H₂O (rl), H₂O (rm), H₂O (rn), H₂O (ro), H₂O (rp), H₂O (rq), H₂O (rr), H₂O (rs), H₂O (rt), H₂O (ru), H₂O (rv), H₂O (rw), H₂O (rx), H₂O (ry), H₂O (rz), H₂O (sa), H₂O (sb), H₂O (sc), H₂O (sd), H₂O (se), H₂O (sf), H₂O (sg), H₂O (sh), H₂O (si), H₂O (sj), H₂O (sk), H₂O (sl), H₂O (sm), H₂O (sn), H₂O (so), H₂O (sp), H₂O (sq), H₂O (sr), H₂O (ss), H₂O (st), H₂O (su), H₂O (sv), H₂O (sw), H₂O (sx), H₂O (sy), H₂O (sz), H₂O (ta), H₂O (tb), H₂O (tc), H₂O (td), H₂O (te), H₂O (tf), H₂O (tg), H₂O (th), H₂O (ti), H₂O (tj), H₂O (tk), H₂O (tl), H₂O (tm), H₂O (tn), H₂O (to), H₂O (tp), H₂O (tq), H₂O (tr), H₂O (ts), H₂O (tt), H₂O (tu), H₂O (tv), H₂O (tw), H₂O (tx), H₂O (ty), H₂O (tz), H₂O (ua), H₂O (ub), H₂O (uc), H₂O (ud), H₂O (ue), H₂O (uf), H₂O (ug), H₂O (uh), H₂O (ui), H₂O (uj), H₂O (uk), H₂O (ul), H₂O (um), H₂O (un), H₂O (uo), H₂O (up), H₂O (uq), H₂O (ur), H₂O (us), H₂O (ut), H₂O (uu), H₂O (uv), H₂O (uw), H₂O (ux), H₂O (uy), H₂O (uz), H₂O (va), H₂O (vb), H₂O (vc), H₂O (vd), H₂O (ve), H₂O (vf), H₂O (vg), H₂O (vh), H₂O (vi), H₂O (vj), H₂O (vk), H₂O (vl), H₂O (vm), H₂O (vn), H₂O (vo), H₂O (vp), H₂O (vq), H₂O (vr), H₂O (vs), H₂O (vt), H₂O (vu), H₂O (vv), H₂O (vw), H₂O (vx), H₂O (vy), H₂O (vz), H₂O (wa), H₂O (wb), H₂O (wc), H₂O (wd), H₂O (we), H₂O (wf), H₂O (wg), H₂O (wh), H₂O (wi), H₂O (wj), H₂O (wk), H₂O (wl), H₂O (wm), H₂O (wn), H₂O (wo), H₂O (wp), H₂O (wq), H₂O (wr), H₂O (ws), H₂O (wt), H₂O (wu), H₂O (wv), H₂O (ww), H₂O (wx), H₂O (wy), H₂O (wz), H₂O (xa), H₂O (xb), H₂O (xc), H₂O (xd), H₂O (xe), H₂O (xf), H₂O (xg), H₂O (xh), H₂O (xi), H₂O (xj), H₂O (xk), H₂O (xl), H₂O (xm), H₂O (xn), H₂O (xo), H₂O (xp), H₂O (xq), H₂O (xr), H₂O (xs), H₂O (xt), H₂O (xu), H₂O (xv), H₂O (xw), H₂O (xx), H₂O (xy), H₂O (xz), H₂O (ya), H₂O (yb), H₂O (yc), H₂O (yd), H₂O (ye), H₂O (yf), H₂O (yg), H₂O (yh), H₂O (yi), H₂O (yj), H₂O (yk), H₂O (yl), H₂O (ym), H₂O (yn), H₂O (yo), H₂O (yp), H₂O (yq), H₂O (yr), H₂O (ys), H₂O (yt), H₂O (yu), H₂O (yv), H₂O (yw), H₂O (yx), H₂O (yz), H₂O (za), H₂O (zb), H₂O (zc), H₂O (zd), H₂O (ze), H₂O (zf), H₂O (zg), H₂O (zh), H₂O (zi), H₂O (zj), H₂O (zk), H₂O (zl), H₂O (zm), H₂O (zn), H₂O (zo), H₂O (zp), H₂O (zq), H₂O (zr), H₂O (zs), H₂O (zt), H₂O (zu), H₂O (zv), H₂O (zw), H₂O (zx), H₂O (zy), H₂O (zz)

VERSION: 2.2 12/14/2009

Manufacturer: Ardisam Inc
 Model: Castle Serenity 41278
 Date: 2/16/2022
 Run: Test #1
 Control #: G104942704
 Test Duration: 180
 Output Category: Low

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

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

Default Fuel Values

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

Wood Moisture (% wet): 3.25
 Load Weight (lb wet): 6.30
 Burn Rate (dry kg/h): 0.92
 Total Particulate Emissions: 6 g

Fuel Data
Marth

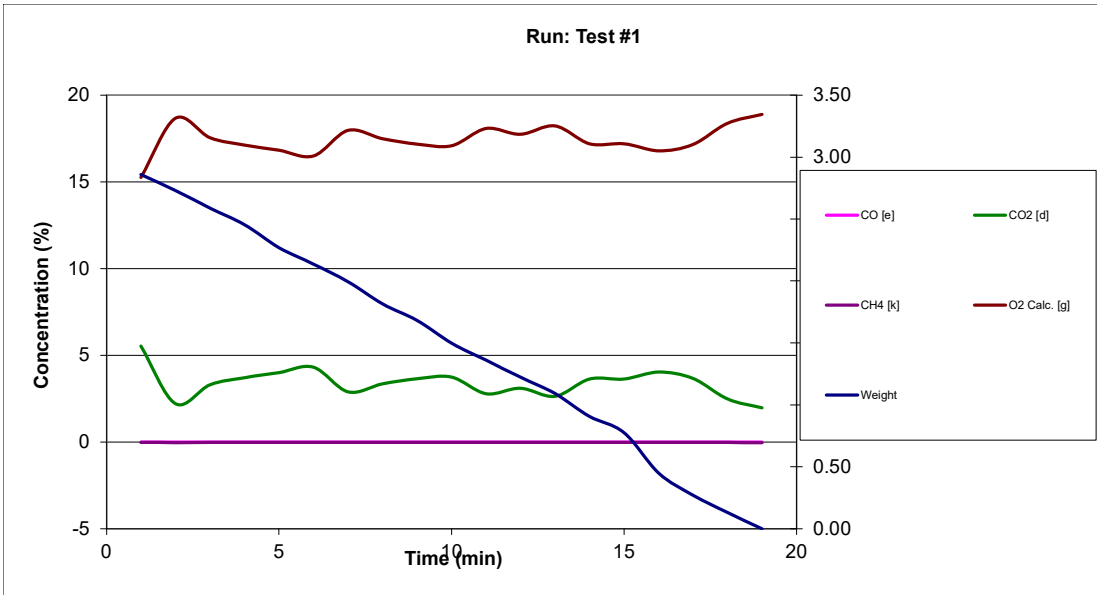
HHV	18,967	kJ/kg
%C	46.87	
%H	6.41	
%O	46.62	
%Ash	0.1	

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

Averages 0.00 3.41 17.20 196.95 68.46
 Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp	Room Temp
		CO	CO ₂	O ₂		
0	6.30	0.00	5.53	15.09	243.2	69.0
10	6.02	0.00	2.21	18.55	211.0	68.4
20	5.70	0.00	3.30	17.37	197.5	68.9
30	5.41	0.00	3.71	16.85	193.8	68.6
40	5.00	0.00	4.01	16.58	192.4	68.3
50	4.71	0.00	4.32	16.26	194.8	68.2
60	4.40	0.00	2.89	17.76	193.3	68.0
70	4.00	0.00	3.36	17.28	193.8	68.1
80	3.71	0.00	3.65	16.89	194.1	68.4
90	3.30	0.00	3.75	16.86	196.4	68.5
100	3.00	0.00	2.78	17.88	193.3	68.7
110	2.70	0.00	3.11	17.53	190.9	68.5
120	2.41	0.00	2.63	17.96	191.3	67.9
130	2.00	0.00	3.63	16.93	195.8	68.6
140	1.71	0.00	3.63	16.94	194.9	68.3
150	0.99	0.00	4.03	16.50	194.1	68.7
160	0.60	0.00	3.68	16.89	193.0	68.5
170	0.29	0.00	2.48	18.13	189.7	68.6
180	0.00	0.00	1.98	18.60	188.9	68.4

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



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

This Excel spreadsheet calculates solid fuel appliance efficiency and heat output in accordance with the procedure specified in CSA B415.1-09. In general the column headings correspond to the variables used in the Standard.

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

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

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

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

The "CSA B415.1 Calculations" and "Report" sheets include calculation of efficiencies based on the Lower Heating Value (LHV) of the fuel, which is not required in CSA B415.1-09. The LHV is calculated from the Higher Heating Value (HHV) and fuel composition data in accordance with ASTM E711.

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

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

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

Tony Joseph
A.L.P. (Tony) Joseph
Project Manager, Energy & Utilities
Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, ON
L4W 5N6
Tel: 416-747-4035
Direct Fax: 416-401-6807
E-mail: tony.joseph@csa.ca

Spreadsheet created by: Rick Curkeet, PE, Intertek Testing Services, NA Inc.
Version 2.2 14 December 2009

Instructions for Emission Testing on 41278 Serenity Pellet Stove

February 8, 2022

The “high” test setting for emission testing on the 41278 Serenity pellet stove is Level 5 in manual mode.

The “medium” test setting for emission testing on the 41278 Serenity pellet stove is Level 3 in manual mode.

The “low” test setting for emission testing on the 41278 Serenity pellet stove is Level 1 in manual mode.

Timber Products Inspection, Inc.

CERTIFICATE OF QUALIFICATION

This is to signify that

MARTH WOOD SHAVING SUPPLY, INC.

6752 State Highway 107 North
Marathon, WI 54448

Is hereby qualified as registration #16006
May 30, 2014

Marth Wood Shaving Supply, Inc. is compliant with the PFI Standards Program as audited by Timber Products Inspection and accredited by the American Lumber Standards Committee. In order to maintain compliance, the producer agrees to:

- ◆ Maintain complete and up to date Densified Fuel production records
- ◆ Produce and market quality products, which conform to PFI & ALSC program documents
- ◆ Apply the quality mark only to products which have been proven through applicable monitoring



A handwritten signature in blue ink that reads "Chris Wiberg". The signature is written in a cursive, flowing style.

Chris Wiberg, Densified Fuel Program Manager
Timber Products Inspection, Inc.
1641 Sigman Road, Conyers GA 30012 770.922.8000



Analytical Report
Report Number: 186096
Report Status: *Interim*

Brian Ziegler
Intertek
8431 Murphy Dr.
Middleton, WI 53562

Sample: Marth wood pellets

C	H	N	O
46.87 %	6.41 %	0.06 %	To Follow.
ROI	LOD		
< 0.1 %	4.32 %		



Analytical Report
Report Number: 186096
Report Status: *Interim*

Brian Ziegler
Intertek
8431 Murphy Dr.
Middleton, WI 53562

non-GMP Statement

All experimental work at Intertek Whitehouse is conducted under the auspices of a rigorous Quality Management System; however, the data presented in this report was generated using procedures that have not been validated in accordance with 21 CFR, parts 210 and 211.

Intertek makes no claims to the applicability of the data and the Client is solely responsible for determining whether the information provided in this report is suitable for the intended application.

From: John Zrucky <Zrucky@marthwood.com>
Sent: Thursday, October 7, 2021 11:02 AM
To: Andrew Reinemann <areinemann@marthwood.com>
Subject: RE: Marth pellet analysis

Andrew,

Yes, we are PFI Certified, our certification numbers are 16005 for Peshtigo and 16006 for Marathon. For cost reduction in printing of the bags, either facility can use either of the certification numbers. To differentiate, you need to look at the code dates stamped on the bag.

Stats for Marathon facility:

YTD average on BTU is 8160.

YTD average on ash is 56.3%.

We do not test for carbon, hydrogen or oxygen. This is not required by PFI or any other standard.

Thank you.


John Zrucky
Marth Wood Shavings
715-842-9200 x-10708
Zrucky@Marthwood.com



**CERTIFICATE OF
 CALIBRATION**



Certificate No. ACT-1272

<p>CERTIFICATION NUMBER CL095-41671-502</p> <p>FOR Intertek 8431 Murphy Drive Middleton, WI 53562</p> <p>PURCHASE ORDER #</p> <p>TEST INSTRUMENT Timer</p> <p>MAKE Cole-Parmer MODEL 94440-10 SERIAL NUMBER N/A IDENTIFICATION 646 </p> <p>CUSTOMER LOCATION Hearth</p> <p>CONDITION RECEIVED In Tolerance CONDITION RETURNED In Tolerance CALIBRATED BY Christopher Moore</p> <p>CALIBRATION LOCATION On Site ENVIRONMENT 72.0°F, 22.2°C, 21.0%RH CALIBRATION DATE 04/05/2021 RECALIBRATION DUE 04/05/2022</p>	<p>PROCEDURES FOLLOWED FVE-033 rev. 1</p> <p>STANDARDS USED</p> <table border="1"> <thead> <tr> <th>INSTRUMENT</th> <th>SERIAL NUMBER</th> <th>TRACE NUMBER</th> <th>NEXT CAL</th> </tr> </thead> <tbody> <tr> <td>FVS-553</td> <td>N/A</td> <td>CL022-19908-397</td> <td>01/31/2022</td> </tr> <tr> <td>FVS-811B</td> <td>N/A</td> <td>CK281-24359-397</td> <td>10/31/2021</td> </tr> </tbody> </table> <p>Total expanded measurement uncertainties expressed are based on a confidence level of 95%; coverage factor of (k=2). The statement of compliance in this certificate was issued without taking the uncertainty of measurement into consideration. The customer shall assess the results and uncertainty when determining if the results meet their needs. (This is considered "shared responsibility.") Uncertainties expressed in nominal units.</p> <p>The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). Calibration was completed in accordance with ISO/IEC 17025:2017, ANSI/NCSL Z540-1-1994 and ANSI/NCSL Z540.3-2006. Other standards listed upon request.</p>	INSTRUMENT	SERIAL NUMBER	TRACE NUMBER	NEXT CAL	FVS-553	N/A	CL022-19908-397	01/31/2022	FVS-811B	N/A	CK281-24359-397	10/31/2021	<p>This certificate shall not be altered in any form or reproduced, except in full, without prior written approval from originating lab. These results relate only to the item(s) calibrated. Form Revision 7: 07/14/2020</p>
INSTRUMENT	SERIAL NUMBER	TRACE NUMBER	NEXT CAL											
FVS-553	N/A	CL022-19908-397	01/31/2022											
FVS-811B	N/A	CK281-24359-397	10/31/2021											

CALIBRATION RESULTS

* DENOTES "OUT OF TOLERANCE"

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
Timer	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	60.0	59.5	60.5	60.0	60.0	0.06
	60.0	59.5	60.5	60.1	60.1	0.07
	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	300.0	299.5	300.5	300.1	300.1	0.06
	300.0	299.5	300.5	300.0	300.0	0.07
	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	1800.0	1799.5	1800.5	1800.2	1800.2	0.06
	1800.0	1799.5	1800.5	1800.1	1800.1	0.07

Fox Valley Metrology

3114 Medalist Drive
 Oshkosh, WI 54902
 (920) 426-5894 • Fax (920) 426-8120
<http://www.FoxValleyMetrology.com>

CERTIFICATE OF CALIBRATION



ISO/IEC 17025
 CALIBRATION AND TESTING
 LABORATORY

Certificate No. ACT-1272

CERTIFICATION NUMBER	CL284-37923-679	IDENTIFICATION	713
FOR	Intertek 8431 Murphy Drive Middleton, WI 53562	SERIAL NUMBER	B258010639
TEST INSTRUMENT	Scales Analytical Balance	PURCHASE ORDER #	
MAKE	Ohaus	PROCEDURES FOLLOWED	FVE-020 rev. 2
MODEL	Explorer E12140	STANDARDS USED	
CUSTOMER LOCATION		INSTRUMENT	SERIAL NUMBER
CONDITION RECEIVED	Out Of Tolerance	FVS-019J	4MMU
CONDITION RETURNED	In Tolerance	FVS-469	N/A
CALIBRATED BY	Danny Scherr	TRACE NUMBER	NEXT CAL
CALIBRATION LOCATION	On Site	CK119-54752-522	04/30/2022
ENVIRONMENT	70.0°F, 21.1°C, 53.0%RH	CL084-50197-397	03/31/2022
CALIBRATION DATE	10/11/2021		
RECALIBRATION DUE	04/11/2022		

CALIBRATION RESULTS

* DENOTES "OUT OF TOLERANCE"

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
Increasing Load	(g)	(g)	(g)	(g)	(g)	(g)
	0.0000	-0.0002	0.0002	0.0000	0.0000	0.00007
	5.0000	4.9998	5.0002	5.0000	5.0000	0.00007
	10.0000	9.9998	10.0002	10.0000	10.0000	0.00006
	20.0000	19.9996	20.0004	19.9996	20.0000	0.00006
	50.0000	49.9994	50.0006	49.9976*	50.0000	0.00007
	100.0000	99.9994	100.0006	99.9960*	99.9999	0.00007
	200.0000	199.9994	200.0006	199.9928*	200.0000	0.00006
	210.0000	209.9994	210.0006	209.9926*	210.0000	0.00006
Decreasing Load	(g)	(g)	(g)	(g)	(g)	(g)
	40.0000	39.9996	40.0004	39.9979*	40.0000	0.00006
	10.0000	9.9998	10.0002	9.9998	10.0000	0.00006
Shift Test	(g)	(g)	(g)	(g)	(g)	(g)
Front	70.0000	69.9994	70.0006	69.9973*	70.0000	0.00007
Left	70.0000	69.9994	70.0006	69.9975*	69.9999	0.00006
Right	70.0000	69.9994	70.0006	69.9974*	69.9999	0.00006
Back	70.0000	69.9994	70.0006	69.9972*	69.9999	0.00006

ADJUSTMENT NOTES

int cal done to bring in to tolernace

COMMENTS

Scale Capacity = 210 g; Precision = .0002 g; Class = I; Total Divisions = 1050000

Fox Valley Metrology

3114 Medalist Drive

Oshkosh, WI 54902

(920) 426-5894 • Fax (920) 426-8120

<http://www.FoxValleyMetrology.com>

CERTIFICATE OF CALIBRATION



Certificate No. ACT-1272

-
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 - Total expanded measurement uncertainties expressed are based on a confidence level of 95%; coverage factor of (k=2). The statement of compliance in this certificate was issued without taking the uncertainty of measurement into consideration. The customer shall assess the results and uncertainty when determining if the results meet their needs. (This is considered "shared responsibility.") Uncertainties expressed in nominal units.
 - The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). Calibration was completed in accordance with ISO/IEC 17025:2017, ANSI/NCSL Z540-1-1994 and ANSI/NCSL Z540.3-2006. Other standards listed upon request.

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CERTIFICATE OF CALIBRATION



ISO/IEC 17025
 CALIBRATION AND TESTING
 LABORATORY

Certificate No. ACT-1272

CERTIFICATION NUMBER	CL285-37806-653	IDENTIFICATION	986
FOR	Intertek 8431 Murphy Drive Middleton, WI 53562	SERIAL NUMBER	N/A
TEST INSTRUMENT	Data Acquisition	PURCHASE ORDER #	
MAKE	Omega	PROCEDURES FOLLOWED	FVE-006 rev. 2
MODEL	OMB-DAQ-56 (Intertek)	STANDARDS USED	
CUSTOMER LOCATION	Hearth	INSTRUMENT	SERIAL NUMBER
CONDITION RECEIVED	In Tolerance	FVS-822A	51710107
CONDITION RETURNED	In Tolerance	FVS-822C	N/A
CALIBRATED BY	Marcus Bradley	STL-585	2125144
CALIBRATION LOCATION	On Site	TRACE NUMBER	NEXT CAL
ENVIRONMENT	70.0°F, 21.1°C, 30.0%RH	CL032-29160-653	02/28/2022
CALIBRATION DATE	10/12/2021	CL035-34887-397	02/28/2022
RECALIBRATION DUE	04/12/2022	CL090-39332-594	06/30/2022



CALIBRATION RESULTS

* DENOTES "OUT OF TOLERANCE"

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
TEMPERATURE INPUT	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
K -Type						
CH1	1000.0	998.2	1001.8	999.8	999.8	0.06
CH2	1000.0	998.2	1001.8	1000.3	1000.3	0.06
CH3	1000.0	998.2	1001.8	1000.3	1000.3	0.07
CH4	1000.0	998.2	1001.8	998.7	998.7	0.07
CH5	1000.0	998.2	1001.8	999.9	999.9	0.07
CH6	1000.0	998.2	1001.8	999.3	999.3	0.07
CH7	1000.0	998.2	1001.8	999.7	999.7	0.06
CH8	1000.0	998.2	1001.8	999.8	999.8	0.07
CH9	1000.0	998.2	1001.8	999.7	999.7	0.06
CH11(#1 on right side of box)	5.0000	4.9989	5.0012	5.0004	5.0004	0.00006
	10.0000	9.9977	10.0023	10.0003	10.0003	0.00007
CH12	1000.0	998.2	1001.8	1000.1	1000.1	0.06

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**CERTIFICATE OF
 CALIBRATION**



Certificate No. ACT-1272

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
CH13	1000.0	998.2	1001.8	999.6	999.6	0.06
CH14	1000.0	998.2	1001.8	999.6	999.6	0.07
CH15	1000.0	998.2	1001.8	999.7	999.7	0.07
CH16	1000.0	998.2	1001.8	999.8	999.8	0.07
CH17	1000.0	998.2	1001.8	999.5	999.5	0.07
CH18	1000.0	998.2	1001.8	999.3	999.3	0.07
CH19	1000.0	998.2	1001.8	999.4	999.4	0.07
CH20	1000.0	998.2	1001.8	999.2	999.2	0.06
	(VDC)	(VDC)	(VDC)	(VDC)	(VDC)	(VDC)
CH21	5.0000 10.0000	4.9989 9.9977	5.0012 10.0023	5.0006 10.0007	5.0006 10.0007	0.00007 0.00007
CH22	5.0000 10.0000	4.9989 9.9977	5.0012 10.0023	5.0006 10.0007	5.0006 10.0007	0.00006 0.00007
CH23	5.0000 10.0000	4.9989 9.9977	5.0012 10.0023	5.0006 10.0006	5.0006 10.0006	0.00006 0.00007
CH24	5.0000 10.0000	4.9989 9.9977	5.0012 10.0023	5.0006 10.0006	5.0006 10.0006	0.00007 0.00007

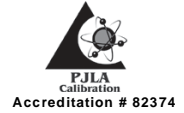
COMMENTS

Channel 11 is actually number 1 on the right side of junction block. Channel 11 is also wired backwards.

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Certificate of Calibration

Customer: Intertek Testing Services
Address: 8431 Murphy Drive
City, State Zip: Middleton, WISCONSIN 53562

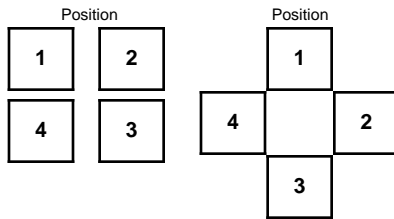
Certificate ID: 1134210610_286292
ISO Number: ISO/IEC 17025 82374
Date: 10/6/2021

Indicator Mfg. Rice Lake	Base Mfg. Rice Lake	Cal Date 10/6/2021	Scale ID 1134	Scale Location Hearth
Indicator Model 520	Base Model 4x4 HP-1K	Due Date 4/6/2022	Scale Class III	Scale Range 0 - 1000 lb x 0.1 lb
Indicator Serial 1494600044	Base Serial C42769	Procedure QWI 6.4.2	Scale Status In Service	
Test Interval 6 Months				

EQUIPMENT CONDITIONS

[Working] Non-Working [Clean] Dirty Out Of Level

SHIFT TEST Shift Test Result: [Pass] Fail Adjust Not Applicable



All tolerances calculated in conformance with Handbook 44 Table 6.

LOAD TEST

Preliminary Load Test		
Test Wt.	Reading	Error
0.0 lb	0.0 lb	0.0 lb
100.0 lb	100.0 lb	0.0 lb
250.0 lb	250.0 lb	0.0 lb
500.0 lb	500.0 lb	0.0 lb
1000.0 lb	1000.0 lb	0.0 lb

Final Load Test		
Test Wt.	Reading	Error
0.0 lb	0.0 lb	0.0 lb
100.0 lb	100.0 lb	0.0 lb
250.0 lb	250.0 lb	0.0 lb
500.0 lb	500.0 lb	0.0 lb
1000.0 lb	1000.0 lb	0.0 lb

In maintenance tolerance? [Yes] No N/A

In acceptance tolerance? [Yes] No N/A

TEST INFORMATION

Test Weight Classification: F
Traceability Certificate Number(s): W20-004A Cal Date: 1/6/2020 Recal Date: 1/6/2022, W20-004B Cal Date: 1/6/2020 Recal Date: 1/6/2022
Standards Used: 1000 lb #81; 50 lb #81, 82, 83, 84, 85, 86, 87, 88, 89, 90
Expanded Uncertainty: See Comments
Test Location: [Onsite] Offsite
Overall Result: [Pass] Fail Adjust
Was the scale within customers required accuracy? [Yes] No N/A
Environmental Conditions: [Acceptable] Unacceptable
Temperature: 71°F
Humidity: 46%
Comments / Notes: Scale is accurate and correct. Measurement of Uncertainty: 100 lbs.= .0118 lb./ 250 lbs.= .0295 lb./ 500 lbs.= .059 lb./ 1000 lbs.= .118 lb.
Technician: Mark Baker

Scales were calibrated with certified test weights. Adjustments made to restore and/or maintain the accuracy of the scale conform to the tolerances established by the National Institute of Standards and Technology as specified in Handbook 44 Section 2.20, manufacturers specifications or other written agreement with customer. Best measurement of uncertainty calculated using a coverage factor of K=2. This provides confidence level of 95%. Acceptance rule w=0. Overall result of PASS or ADJUST indicates measurement below or equal to the acceptance limit: AL=TL. Overall result of FAIL indicates measurement result above acceptance limit AL=TL. This certificate shall not be reproduced, except in full, without the written approval of the laboratory. Measurement uncertainty available upon request. This calibration test is accredited and meets the requirements of ISO/IEC 17025:2017 & ANSI/NCSL Z540-1-1994 as verified by Perry Johnson Laboratory Accreditation. Refer to certificate and scope of accreditation 82374.

**CERTIFICATE OF
 CALIBRATION**



Certificate No. ACT-1272

<p>CERTIFICATION NUMBER CL095-41794-502</p> <p>FOR Intertek 8431 Murphy Drive Middleton, WI 53562</p> <p>PURCHASE ORDER #</p> <p>TEST INSTRUMENT Timer</p> <p>MAKE Cole-Parmer MODEL 94440-10 SERIAL NUMBER 101587800 IDENTIFICATION 1212</p> <p>CUSTOMER LOCATION Hearth</p> <p>CONDITION RECEIVED In Tolerance CONDITION RETURNED In Tolerance CALIBRATED BY Christopher Moore</p> <p>CALIBRATION LOCATION On Site ENVIRONMENT 72.0°F, 22.2°C, 21.0%RH CALIBRATION DATE 04/05/2021 RECALIBRATION DUE 04/05/2022</p>	<p>PROCEDURES FOLLOWED FVE-033 rev. 1</p> <p>STANDARDS USED</p> <table border="1"> <thead> <tr> <th>INSTRUMENT</th> <th>SERIAL NUMBER</th> <th>TRACE NUMBER</th> <th>NEXT CAL</th> </tr> </thead> <tbody> <tr> <td>FVS-553</td> <td>N/A</td> <td>CL022-19908-397</td> <td>01/31/2022</td> </tr> <tr> <td>FVS-811B</td> <td>N/A</td> <td>CK281-24359-397</td> <td>10/31/2021</td> </tr> </tbody> </table> <p>Total expanded measurement uncertainties expressed are based on a confidence level of 95%; coverage factor of (k=2). The statement of compliance in this certificate was issued without taking the uncertainty of measurement into consideration. The customer shall assess the results and uncertainty when determining if the results meet their needs. (This is considered "shared responsibility.") Uncertainties expressed in nominal units.</p> <p>The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). Calibration was completed in accordance with ISO/IEC 17025:2017, ANSI/NCSL Z540-1-1994 and ANSI/NCSL Z540.3-2006. Other standards listed upon request.</p>	INSTRUMENT	SERIAL NUMBER	TRACE NUMBER	NEXT CAL	FVS-553	N/A	CL022-19908-397	01/31/2022	FVS-811B	N/A	CK281-24359-397	10/31/2021
INSTRUMENT	SERIAL NUMBER	TRACE NUMBER	NEXT CAL										
FVS-553	N/A	CL022-19908-397	01/31/2022										
FVS-811B	N/A	CK281-24359-397	10/31/2021										

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 Form Revision 7: 07/14/2020

CALIBRATION RESULTS

* DENOTES "OUT OF TOLERANCE"

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
Timer	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	60.0	59.5	60.5	60.0	60.0	0.06
	60.0	59.5	60.5	59.9	59.9	0.07
	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	300.0	299.5	300.5	300.0	300.0	0.06
	300.0	299.5	300.5	300.0	300.0	0.06
	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
	1800.0	1799.5	1800.5	1800.0	1800.0	0.07
	1800.0	1799.5	1800.5	1799.9	1799.9	0.06

**CERTIFICATE OF
 CALIBRATION**



Certificate No. ACT-1272

CERTIFICATION NUMBER	CM007-32566-679	IDENTIFICATION	1406
FOR	Intertek 8431 Murphy Drive Middleton, WI 53562	SERIAL NUMBER	X15160229
TEST INSTRUMENT	Pressure Transducer Differential Pressure Transducer	PURCHASE ORDER #	
MAKE	Omega	PROCEDURES FOLLOWED	FVE-060 rev. 0
MODEL	PX263-01D5V (Intertek)	STANDARDS USED	
CUSTOMER LOCATION		INSTRUMENT	SERIAL NUMBER
CONDITION RECEIVED	In Tolerance	FVS-469	N/A
CONDITION RETURNED	In Tolerance	FVS-789	7543203
CALIBRATED BY	Danny Scherr	FVS-789A	7461971
CALIBRATION LOCATION	On Site		
ENVIRONMENT	66.0°F, 18.9°C, 18.0%RH		
CALIBRATION DATE	01/07/2022		
RECALIBRATION DUE	07/07/2022		
		TRACE NUMBER	NEXT CAL
		CL084-50197-397	03/31/2022
		CL138-51841-614	05/31/2022
		CL138-52996-466	05/31/2022



CALIBRATION RESULTS

* DENOTES "OUT OF TOLERANCE"

FEATURE	NOMINAL	LOWER LIMIT	UPPER LIMIT	AS FOUND	AS LEFT	UNCERTAINTY
Pressure/Vacuum	(inH20)	(inH20)	(inH20)	(inH20)	(inH20)	(inH20)
Low	-0.0000	-0.0025	0.0025	0.0007	0.0007	0.6
Vacuum	-0.0500	-0.0525	-0.0475	-0.0497	-0.0497	0.6
	-0.1000	-0.1025	-0.0975	-0.1000	-0.1000	0.6
	-0.5000	-0.5025	-0.4975	-0.4978	-0.4978	0.6
	-1.0000	-1.0025	-0.9975	-0.9990	-0.9990	0.6
High	0.0000	-0.0025	0.0025	0.0007	0.0007	0.6
pressure	0.0500	0.0475	0.0525	0.0500	0.0500	0.6
	0.1000	0.0975	0.1025	0.0999	0.0999	0.6
	0.5000	0.4975	0.5025	0.5000	0.5000	0.6
	1.0000	0.9975	1.0025	0.9994	0.9994	0.6

COMMENTS
 (custom calibration)

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CERTIFICATE OF CALIBRATION

Certificate Number: 48251

CALIBRATION LABORATORY

INTERTEK B&C
130 DERRY COURT
YORK, PA 17406

OWNER

INTERTEK - 625
8431 MURPHY DRIVE
MIDDLETON, WI 53562

EQUIPMENT INFORMATION

Asset Number: 001455
Serial Number: 16966351
Manufacturer: COMET
Model Number: T7510
Description: TEMPERATURE AND HUMIDITY SENSOR
Size/Range: -30 to 80°C, 0 to 100% RH
Resolution: 2

CALIBRATION INFORMATION

Procedure: 31-33 RH - TEMP
Temp./RH: 78.4 °F / 20.4 %
Cal Date: 04/12/21
Due Date: 04/12/22
Calibration Result: PASS
Performed By: Ed Sullivan

CALIBRATION NOTES

No Visual Defects.

Uncertainties 15% RH: 1.65, 50% RH: 0.35, 80% RH: 1.16, 59 F: 0.22, 73.4 F: 0.21



Architectural Testing, Inc., an Intertek company ("Intertek B&C"), certifies that the above listed instrument meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST). Intertek B&C's Calibration Laboratory is accredited by the International Accreditation Service, Inc. (IAS) to ISO/IEC 17025:2017 (Certificate CL-118). The measurement uncertainties for this calibration are based upon 95% (k=2) confidence limits. A simple acceptance decision rule is applied on all pass/fail statements unless otherwise noted. This report may not be reproduced, except in full, without the


Ed Sullivan (METROLOGY TECHNICIAN) - 4/12/2021



Matthew Rosario (CALIBRATIONS MANAGER) - 4/15/2021

This certificate is complete only when all data pages are included.

CERTIFICATE OF CALIBRATION

Certificate Number: 48251

TEST POINTS

Seq.	Description	Standard	Tolerance -	Tolerance +	As Found	As Left	Units	Uncertainty
1	59 Degr F	59.0	58.0	60.0	59.3	59.3	Degr F	0
2	59 Degr F	59.0	58.0	60.0	59.3	59.3	Degr F	0
3	59 Degr F	59.0	58.0	60.0	59.3	59.3	Degr F	0
4	15% RH (59 F)	15.0	12.5	17.5	15.0	15.0	%	0
5	15% RH (59 F)	15.0	12.5	17.5	15.0	15.0	%	0
6	15% RH (59 F)	15.0	12.5	17.5	14.9	14.9	%	0
7	50% RH (59 F)	50.0	47.5	52.5	48.3	48.3	%	0
8	50% RH (59 F)	50.0	47.5	52.5	48.3	48.3	%	0
9	50% RH (59 F)	50.0	47.5	52.5	48.3	48.3	%	0
10	80% RH (59 F)	80.0	77.5	82.5	77.5	77.5	%	0
11	80% RH (59 F)	80.0	77.5	82.5	77.5	77.5	%	0
12	80% RH (59 F)	80.0	77.5	82.5	77.5	77.5	%	0
13	73.4 Degr F	73.4	72.4	74.4	73.6	73.6	Degr F	0
14	73.4 Degr F	73.4	72.4	74.4	73.7	73.7	Degr F	0
15	73.4 Degr F	73.4	72.4	74.4	73.8	73.8	Degr F	0
16	15% RH (73.4 F)	15.0	12.5	17.5	15.4	15.4	%	0
17	15% RH (73.4 F)	15.0	12.5	17.5	15.4	15.4	%	0
18	15% RH (73.4 F)	15.0	12.5	17.5	15.2	15.2	%	0
19	50% RH (73.4 F)	50.0	47.5	52.5	49.4	49.4	%	0
20	50% RH (73.4 F)	50.0	47.5	52.5	49.4	49.4	%	0
21	50% RH (73.4 F)	50.0	47.5	52.5	49.1	49.1	%	0
22	80% RH (73.4 F)	80.0	77.5	82.5	78.0	78.0	%	0
23	80% RH (73.4 F)	80.0	77.5	82.5	78.0	78.0	%	0
24	80% RH (73.4 F)	80.0	77.5	82.5	78.0	78.0	%	0

STANDARDS USED TO CALIBRATE EQUIPMENT

Company	I.D.	Description	Last Cal.	Cal. Due Date
INTERTEK - 118	005581	HUMIDITY & TEMPERATURE GENERATOR	7/10/2020	7/10/2021
INTERTEK - 118	INT01927	TEMPERATURE AND HUMIDITY SENSOR	5/22/2020	5/22/2021

END OF DATA



CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 90275

Customer Information

Customer: Intertek
 Address : 8431 Murphy Drive
 Middleton WI 53562



Customer PO #: Verbal - Christine Schultze

Calibration Procedure Information

Procedure ID: GTP AIRVEL

Revision #: 7

Revision Date: 10/17/2018

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10086	Furness Controls	FC0332	DP Transmitter	5/7/2022
10100	Graftel	n/a	Temperature	10/18/2022
10171	Furness	FC0332-2W	0 - .4" H ₂ O	5/7/2022
10187	Vaisala	PTB210	Barometric Pressure Gauge	12/1/2021
10157	HOBO	UX100-011	RH/Temp logger	10/15/2021
10017	Hart Scientific/Burns	1502A/3925	PRT, Temperature	8/3/2021

Sensor Information

Manufacturer: Lutron Description: Anemometer Method Used: Pitot Tube
 Model #: LM-81AM Rated Accuracy: ± See Attachment Accuracy Specified By: Lutron
 Instrument ID#: 001457 Range: 80 to 5910 fpm Condition: Functional
 Serial #: AB.50584

Comments: Calibration Date: 05/14/2021
 Calibration Due: 05/14/2022

The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2017, ANSI/NCSL Z540-I-1994 and ISO 9001. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

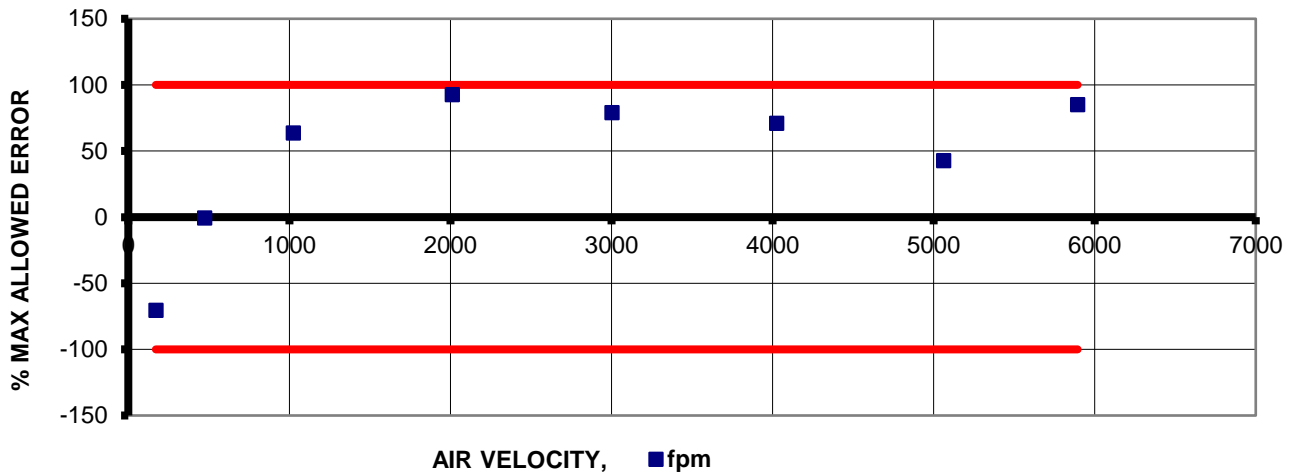
Performed By: 
 Kevin Garcia
 Calibration Technician

Date: 5/14/2021

**ATTACHMENT TO CALIBRATION CERTIFICATE 90275
AS FOUND / AS LEFT DATA
Page 2 of 2**

Reading From Standard,	Lower Limit of Meter Reading,	Measured Reading From Meter,	Upper Limit of Meter Reading,	Error,	Measurement Uncertainty (k=2)	CMC (k=2)	STATUS
Actual Air Velocity							
fpm	fpm	fpm	fpm	fpm	fpm	fpm	STATUS
171	-6	46	348	-125	4	4	Pass
473	296	472	650	-1	8	8	Pass
1025	848	1138	1202	113	15	15	Pass
2011	1834	2175	2188	164	28	28	Pass
3002	2825	3142	3179	140	41	41	Pass
4025	3789	4193	4261	168	54	54	Pass
5062	4826	5163	5298	101	68	68	Pass
5894	5658	6095	6130	201	79	79	Pass

ERROR CHART



Instrument Specifications

Test Fluid:	Air	
Lower Velocity Range:	80	fpm
Upper Velocity Range:	5910	fpm
Velocity Resolution:	1	
Velocity Accuracy:	+/- (3%FS <=3937)(4%FS >3937)	

Laboratory Ambient Conditions

Pressure:	14.46	psia
Humidity:	22.60	%RH
Temperature:	75.90	°F



FLOW - TEMPERATURE - HUMIDITY - PRESSURE - DESIGN - CONSULTING - ENGINEERING

NIST Traceable Calibration Data Sheet

WWW.GRAFTEL.COM

95 Chancellor Dr., Roselle, IL 60172

Phone: 847-364-2600

Fax: 847-364-3899




Operator's Manual
**Serenity
Pellet Stove**
Model 41278

ENGLISH

FRANÇAIS



! CAUTION

DO NOT DISCARD MANUAL!
IMPORTANT OPERATING AND
MAINTENANCE INSTRUCTIONS
INCLUDED. 
SAVE THESE INSTRUCTIONS AND
LEAVE THIS MANUAL WITH ANY
PERSON RESPONSIBLE FOR USE AND
OPERATION.

! ATTENTION NE PAS JETER!

**IMPORTANTES INSTRUCTIONS
D'UTILISATION ET D'ENTRETIEN
INCLUSES.**
CONSERVEZ CES INSTRUCTIONS
ET LAISSEZ CE MANUEL À TOUTE
PERSONNE RESPONSABLE
DE L'UTILISATION ET DU
FONCTIONNEMENT.

! WARNING

**PLEASE READ THIS ENTIRE
MANUAL BEFORE INSTALLATION
AND USE OF THIS PELLET
FUEL-BURNING ROOM HEATER.**
FAILURE TO FOLLOW THESE
INSTRUCTIONS COULD RESULT
IN PROPERTY DAMAGE, BODILY
INJURY OR EVEN DEATH.

! AVERTISSEMENT

**VEUILLEZ LIRE CE MANUEL EN
ENTIER AVANT D'INSTALLER
ET D'UTILISER CET APPAREIL
DE CHAUFFAGE AUTONOME À
GRANULES, AFIN D'ÉCARTER LES
RISQUES DE DÉGÂTS MATÉRIELS,
DE BLESSURES CORPORELLES,
VOIRE DE MORT.**

! CAUTION

**CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS
AND INSTALLATION INSPECTION REQUIREMENTS FOR YOUR AREA.**

! ATTENTION

**CONSULTER LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX
CONCERNANT LES RESTRICTIONS ET LES EXIGENCES D'INSPECTION
D'INSTALLATION EN VIGUEUR.**

Get parts online at
www.CastleStoves.com



P/N: 41723
ECN: 13598

REV1: 03/18/2022
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WARNINGS AND SAFETY PRECAUTIONS

Owner's Responsibility

- Accurate assembly and safe and effective use of the stove is the owner's responsibility.
- Read and follow all safety instructions.
- Carefully follow all assembly instructions.
- Maintain the stove according to directions and schedule included in this Castle operator's manual.
- Ensure that anyone who uses the stove is familiar with all controls and safety precautions.

Special Messages

Your manual contains special messages to bring attention to potential safety concerns, stove damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and stove damage.

NOTE: General information is given throughout the manual that may help the operator in the operation or service of the stove.

IMPORTANT SAFETY PRECAUTIONS

Please read this section carefully. Operate the stove according to the safety instructions and recommendations outlined here and inserted throughout the text. Anyone who uses this stove must read the instructions and be familiar with the controls.



THIS SYMBOL POINTS OUT IMPORTANT SAFETY INSTRUCTIONS WHICH IF NOT FOLLOWED COULD ENDANGER YOUR PERSONAL SAFETY. READ AND FOLLOW ALL INSTRUCTIONS IN THIS MANUAL BEFORE ATTEMPTING TO OPERATE THIS EQUIPMENT.



DANGER

DANGER INDICATES A SERIOUS INJURY OR FATALITY WILL RESULT IF THE SAFETY INSTRUCTIONS THAT FOLLOW THIS SIGNAL WORD ARE NOT OBEYED.



WARNING

WARNING INDICATES A SERIOUS INJURY OR FATALITY COULD RESULT IF THE SAFETY INSTRUCTIONS THAT FOLLOW THIS SIGNAL WORD ARE NOT OBEYED.



CAUTION

CAUTION INDICATES YOU CAN OR YOUR EQUIPMENT CAN BE HURT IF THE SAFETY INSTRUCTIONS THAT FOLLOW THIS SIGNAL WORD ARE NOT OBEYED.



IMPORTANT

IMPORTANT INDICATES HELPFUL INFORMATION FOR PROPER ASSEMBLY, OPERATION, OR MAINTENANCE OF YOUR EQUIPMENT.



WARNING

YOU MUST READ, UNDERSTAND AND COMPLY WITH ALL SAFETY AND OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE ATTEMPTING TO SETUP AND OPERATE YOUR STOVE.

FAILURE TO COMPLY WITH ALL SAFETY AND OPERATING INSTRUCTIONS CAN RESULT IN SERIOUS PERSONAL INJURY TO YOU AND/OR BYSTANDERS, AND RISK OF EQUIPMENT AND PROPERTY DAMAGE. THE TRIANGLE IN THE TEXT SIGNIFIES IMPORTANT CAUTIONS OR WARNINGS WHICH MUST BE FOLLOWED.



WARNING



PLEASE READ THIS ENTIRE MANUAL BEFORE INSTALLATION AND USE OF THIS PELLET FUEL-BURNING ROOM HEATER. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH.

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

DO NOT OVERFIRE - IF ANY EXTERNAL PART STARTS TO GLOW, YOU ARE OVERFIRING. REDUCE FEED RATE. OVERFIRING WILL VOID THE WARRANTY.

COMPLY WITH ALL MINIMUM CLEARANCES TO COMBUSTIBLES AS SPECIFIED. FAILURE TO COMPLY MAY CAUSE A HOUSE FIRE.



WARNING



HOT SURFACE ! DO NOT TOUCH! SEVERE BURNS MAY RESULT. CLOTHING IGNITION MAY RESULT. GLASS AND OTHER SURFACES ARE HOT DURING OPERATION AND COOL DOWN.

KEEP CHILDREN AWAY.

CAREFULLY SUPERVISE CHILDREN IN SAME ROOM AS APPLIANCE.

DO NOT OPERATE WITH PROTECTIVE BARRIERS OPEN OR REMOVED.

KEEP CLOTHING, FURNITURE, DRAPERIES AND OTHER COMBUSTIBLES AWAY.



CAUTION

CHECK BUILDING CODES PRIOR TO INSTALLATION. CONTACT THE REGULATING AUTHORITY PRIOR TO INSTALLATION TO DETERMINE THE NEED FOR A PERMIT.

INSTALLATION MUST COMPLY WITH LOCAL, REGIONAL, STATE AND NATIONAL CODES AND REGULATIONS

CONSULT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

TESTED AND APPROVED FOR PELLET FUEL. BURNING ANY OTHER TYPE OF FUEL VOIDS WARRANTY.



CAUTION



DO NOT DISCARD

IMPORTANT OPERATING AND MAINTENANCE INSTRUCTIONS INCLUDED.

READ, UNDERSTAND AND FOLLOW THESE INSTRUCTIONS FOR SAFE INSTALLATION AND OPERATION.

LEAVE THIS MANUAL WITH PARTY RESPONSIBLE FOR USE AND OPERATION.



WARNING

WARNING INDICATES A SERIOUS INJURY OR FATALITY COULD RESULT IF THE SAFETY INSTRUCTIONS THAT FOLLOW THIS SIGNAL WORD ARE NOT OBEYED.

READ THIS ENTIRE MANUAL BEFORE YOU INSTALL AND USE YOUR NEW PELLETT STOVE. FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY, OR EVEN DEATH.

CHILDREN AND ADULTS SHOULD BE ALERTED TO THE HAZARDS OF HIGH SURFACE TEMPERATURES AND SHOULD STAY AWAY TO AVOID CONTACT TO SKIN AND/OR CLOTHING.

YOUNG CHILDREN SHOULD BE CAREFULLY SUPERVISED WHEN THEY ARE IN THE SAME ROOM AS THE STOVE.

CLOTHING AND OTHER FLAMMABLE MATERIALS SHOULD NOT BE PLACED ON OR NEAR THIS UNIT.

FLAMMABLE OR EXPLOSIVE LIQUIDS SUCH AS GASOLINE, NAPHTHA, ALCOHOL, OR ENGINE OIL MUST NEVER BE USED IN OR AROUND STOVE. THESE LIQUIDS MUST BE STORED IN A SEPARATE ROOM AS THE OPEN FLAME IN THE FIRE BOX COULD IGNITE THE FUMES OF SUCH LIQUIDS.

DO NOT BURN GARBAGE IN THIS UNIT. THE BURNING OF OTHER SOLID FUELS SUCH AS CORD WOOD OR WOOD CHIPS IN THIS STOVE IS NOT PERMITTED. ANY FUELS NOT CERTIFIED BY CASTLE PELLETT STOVES WHICH ARE BURNED IN THIS STOVE WILL VOID THE WARRANTY.

DO NOT ROUTE POWER CORD IN HIGH TRAFFIC AREAS. A POWER SURGE PROTECTOR PLUGGED INTO A GROUNDED 120 VOLT POWER SOURCE IS REQUIRED.



WARNING

DO NOT INSTALL A FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.

DO NOT INSTALL IN A SLEEPING ROOM.

DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

- **DO NOT CONNECT DIRECTLY TO A MASONRY CHIMNEY.**

- **DO NOT TERMINATE VENT IN ANY ENCLOSED OR SEMI-ENCLOSED AREA, SUCH AS; CARPORTS, GARAGE, ATTIC, CRAWL SPACE, UNDER A SUN DECK OR PORCH, NARROW WALKWAY OR CLOSED AREA, OR ANY LOCATION THAT CAN BUILD UP A CONCENTRATION OF FUMES SUCH AS A STAIRWELL, COVERED BREEZEWAY ETC.**

- **NEVER TOUCH DOOR LATCHES WHILE STOVE IS IN OPERATION; THEY GET EXTREMELY HOT.**

PROPER INSTALLATION OF THIS STOVE IS NECESSARY FOR SAFE AND EFFICIENT OPERATION. INSTALLING THIS PRODUCT IMPROPERLY MAY RESULT IN A HOUSE FIRE AND PERSONAL INJURY.

ALL APPLICABLE BUILDING CODES FOR YOUR LOCATION MUST BE FOLLOWED. IN AREAS WHERE BUILDING CODES REQUIRE ADDITIONAL STEPS TO THE INSTALLATION OF THIS PRODUCT NOT INCLUDED IN THIS MANUAL, THE BUILDING CODES WILL TAKE PRECEDENT AND MUST BE FOLLOWED. CONTACT YOUR LOCAL BUILDING INSPECTOR TO OBTAIN ANY NECESSARY PERMITS OR INSPECTION GUIDELINES BEFORE INSTALLING THE PRODUCT.



Serenity Pellet Stove

ENGLISH



CAUTION

ALL APPLICABLE BUILDING CODES FOR YOUR LOCATION MUST BE FOLLOWED. IN AREAS WHERE BUILDING CODES REQUIRE ADDITIONAL STEPS TO THE INSTALLATION OF THIS PRODUCT NOT INCLUDED IN THIS MANUAL, THE BUILDING CODES WILL TAKE PRECEDENT AND MUST BE FOLLOWED. CONTACT YOUR LOCAL BUILDING INSPECTOR TO OBTAIN ANY NECESSARY PERMITS OR INSPECTION GUIDELINES BEFORE INSTALLING THE PRODUCT.

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

CONTACT YOUR LOCAL AUTHORITY (SUCH AS MUNICIPAL BUILDING DEPARTMENT, FIRE DEPARTMENT, FIRE PREVENTION BUREAU, ETC.) TO DETERMINE THE NEED FOR A PERMIT.

THE CASTLE PELLET STOVES PELLET STOVE IS DESIGNED TO BURN PELLET FUEL ONLY.

A WORKING SMOKE DETECTOR IS REQUIRED AND MUST BE INSTALLED IN THE SAME ROOM AS THE STOVE.

THIS STOVE IS NOT INTENDED FOR USE IN COMMERCIAL APPLICATIONS.

DOOR AND ASH PAN MUST BE CLOSED AND LATCHED DURING OPERATION.

NOTIFY YOUR INSURANCE COMPANY OF PELLET STOVE INSTALLATION.

THIS INSTALLATION MUST CONFORM WITH LOCAL CODES. IN THE ABSENCE OF LOCAL CODES YOU MUST COMPLY WITH ASTM E1509, (UM) 84-HUD, ULC/ORDC-1482, AND UCL S627-2000.

THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

KEEP COMBUSTIBLE MATERIALS (SUCH AS GRASS, LEAVES, ETC.) AT LEAST THREE FEET AWAY FROM THE FLUE OUTLET ON THE OUTSIDE OF THE BUILDING.

THIS STOVE SHOULD NOT BE USED AS THE ONLY SOURCE OF HEAT IN THE HOUSE. POWER OUTAGES AND PERIODIC MAINTENANCE WILL RESULT IN A TOTAL LOSS OF HEAT.

DO NOT LEAVE HOPPER DOOR OPEN.



CAUTION

INSTALLATION AND REPAIR OF THIS PELLET STOVE SHOULD BE DONE BY A QUALIFIED SERVICE PERSON. THE APPLIANCE SHOULD BE INSPECTED BEFORE USE AND AT LEAST ONCE A YEAR BY A QUALIFIED SERVICE PERSON. IT IS IMPERATIVE THAT THE CONTROL COMPARTMENTS, FIRE BOX, AND THE CIRCULATING AIR PASSAGEWAYS OF THE STOVE BE KEPT CLEAN.

THE OPERATION OF EXHAUST FANS SUCH AS BATHROOM FANS, ATTIC FANS, ETC. MIGHT STARVE THE PELLET STOVE OF COMBUSTIBLE AIR CREATING A NEGATIVE PRESSURE IN THE ROOM. PROVIDE ADEQUATE VENTILATION OF THE ROOM ACCOMPANYING THE PELLET STOVE. IF NOT, THE PRESSURE SWITCH MAY SHUT OFF OPERATION OF THE PELLET STOVE.

THE MOVING PARTS OF THIS STOVE ARE PROPELLED BY HIGH TORQUE ELECTRIC MOTORS. THESE PARTS CAN CAUSE SEVERE DAMAGE TO BODY PARTS THAT GET NEAR THEM. KEEP ALL BODY PARTS AWAY FROM AUGER AND FANS WHILE THE STOVE IS PLUGGED INTO AN ELECTRICAL OUTLET. THESE MOVING PARTS MAY BEGIN TO MOVE AT ANY TIME THE STOVE IS PLUGGED IN.

THE VENT SURFACES CAN GET HOT ENOUGH TO CAUSE BURNS IF TOUCHED. NONCOMBUSTIBLE SHIELDING OR GUARDS MAY BE REQUIRED.

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

ALL VENTING JOINTS, WHETHER VERTICAL OR HORIZONTAL, SHOULD BE MADE GAS-TIGHT WITH RECOMMENDED SEALANTS SPECIFIED BY VENT MANUFACTURER.

ACCORDING TO HUD (HOUSING & URBAN DEVELOPMENT) REQUIREMENTS, WHEN INSTALLED IN A MOBILE HOME, THIS STOVE MUST BE GROUNDED DIRECTLY TO THE STEEL CHASSIS OF THE MOBILE HOME AND BOLTED TO THE FLOOR. DIRECT AIR ACCESS MUST BE PROVIDED, USE A FRESH AIR KIT.

FOR USE IN THE UNITED STATES AND CANADA. APPROVED FOR INSTALLATION IN MOBILE HOMES.

CASTLE PELLET STOVES, PRODUCER OF THIS APPLIANCE, RESERVES THE RIGHT TO ALTER ITS PRODUCTS, SPECIFICATIONS AND/OR PRICE WITHOUT NOTICE.



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Serenity Pellet Stove

ENGLISH

REGISTRATION, SERVICE AND MAINTENANCE LOG

Record the model number and serial number in the space provided for easy reference. Fill out and mail the registration card located in the parts packet or register online at www.castlepelletstoves.com. Warranty is valid only if the completed registration is received by Castle within 30 days of purchase.

OWNERSHIP RECORDS		
Dealer's Name:		
Dealer's Address:		
City:	State/Province:	Zip Code/Postal Code:
Model Number:	Serial Number:	
Date of Purchase:		
Notes:		

SERVICE DATE	SERVICE TECHNICIAN	SERVICE DESCRIPTION



Serenity Pellet Stove

INTRODUCTION

Congratulations on your investment in quality. Thank you for your purchase on a Castle Pellet Stove. We have worked to ensure that this pellet stove meets the highest standards for usability and durability. With proper care, your stove will provide many years of dependable service. Please read entire manual before installation and use.

Burning Pellet Fuel

Ashes need to be removed from the stove periodically. See "Normal Care and Maintenance" section for cleaning procedure. Due to the nature of pellet fuels, this stove will require attention periodically. Regular cleaning is an important part of burning pellet fuel.

Pellets

- This pellet stove is designed and approved to burn wood pellets, that comply with pellet fuels industry standards. Minimum of 40 lbs. density per cubic foot, 1/4" to 5/16" in diameter, with a maximum length of 1-1/2", and less than 1% ash.
- The performance of your pellet stove is greatly affected by the type and quality of wood pellets. As the heat output of various quality wood pellets differ, so will the performance and heat output of the pellet stove.
- Wood pellets are generally produced out of wood waste such as sawdust and shavings. The raw material is dried, mechanically fractioned to size and extruded into pellets under high pressure. Wood pellets need to be protected from direct exposure to water. Water from sources such as condensation and humidity causes pellets to expand and break down into unusable fuel. Keep fuel dry.
- It is important to select and use only pellets that are dry and free from dirt and debris. Dirty fuel will adversely affect the operation and performance of the unit and will void the warranty. The Pellet Fuel Institute (PFI) has established standards for wood pellet manufacturers. Only use pellets that meet or exceed PFI standards for premium fuel pellets. Pellets that contain colored paper, cardboard, solvents, trash, garbage, or other non-woody waste material should be avoided.

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; paper products, cardboard, plywood, or particleboard.

Clinkers

- Impurities, such as silica (clinkers), will need to be regularly cleaned and removed from the pellet stove. Clinkers will form a hard mass and block airflow through the pot liner. High quality fuels will result in fewer clinkers.

Automatic Safety Features

Power Outage

During a power outage, the stove will shutdown safely. Do not open the main door or ash door. During a power failure the exhaust fan will not run. Keeping the doors sealed will allow the exhaust vent to draft out naturally. When the power is restored, the stove will not restart. If the exhaust temperature is still 120 degrees Fahrenheit when power is restored, the exhaust and room fans will continue to run until the stove cools. See "Operation" section for instructions on restarting the stove.

Overheating

Over Fire Protection: If the stove is being over fired or burning too hot, the high limit switches will automatically shut down the stove to avoid damage to components. The exhaust fan will continue to run until the proof of fire switch cools. Allow stove to cool before attempting to re-ignite. See the "Operation" section for more information.



WARNING

IF THE ELECTRICAL POWER FAILS ANY TIME WHEN THE STOVE IS HOT, KEEP ALL STOVE DOORS CLOSED. THE AUTOMATIC SAFETY FEATURES MUST NOT BE BYPASSED.



CAUTION

BURNING WOOD PELLETS ACCORDING TO RECOMMENDATIONS WILL ASSURE LONGER STOVE LIFE AND LESS FUEL RELATED PROBLEMS. THE USE OF GRATES OR OTHER METHODS OF SUPPORTING THE FUEL IN THIS STOVE IS PROHIBITED AND WILL VOID ALL WARRANTIES.

SPECIFICATIONS

Model Number	Serenity 41728
Heating Capacity (1)	1,500 sq. ft.
Electrical Rating (2)	120 Volts, 60 Hz
Power Consumption	402 Watts ignition 77 Watts operating
Fuel Storage Capacity	40 lb
Flue Size (3)	3 in.
Width	18.25 in.
Height	34 in.
Depth	23.75 in.
Weight	186 lb

- (1) Based on post 1982 home construction, requiring 35 BTU/Hr. per Sq. Ft. Heat output will vary, depending on the brand, type and quality of fuel and the moisture content. Consult your dealer for best results.
- (2) Install per NFPA 70 and follow all state and local codes, contact licensed electrical contractor for assistance.
- (3) Install per NFPA 211 and follow all state and local codes, contact licensed installers for assistance.

Listing label:



Tested to the following standards: UL1482, ASTM E1509, ULC S627, and ASTM E2779, ASTM E2515, and CSA B415.1

Glass Specifications:

This stove is equipped with 5 mm ceramic glass. Replace glass only with Castle Pellet Stoves ceramic glass. Call your servicing dealer or Castle at 1-800-345-6007 for replacement parts.



CAUTION

THIS INSTALLATION MUST CONFORM WITH LOCAL CODES. IN THE ABSENCE OF LOCAL CODES YOU MUST COMPLY WITH ASTM E1509, ASTM E2779, UL 1482, ASTM E-2515, CSA B415.1, AND ULC S627.

CASTLE PELLET STOVES, MANUFACTURER OF THIS APPLIANCE, RESERVES THE RIGHT TO ALTER ITS PRODUCTS AND/OR THEIR SPECIFICATIONS WITHOUT NOTICE.

MAKE SURE THE HOPPER IS FREE OF ALL FOREIGN MATTER BEFORE FILLING WITH FUEL. FOREIGN MATERIAL WILL CAUSE AUGER JAMS AND WILL VOID STOVE WARRANTY.

COMPLIANCE NOTE

The Serenity pellet heater, by Castle, meets the U.S. Environmental Protection Agency's emission limits for pellet heaters sold after May 15, 2020.

This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual. 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.

UNPACKING

Your Castle Serenity will come partially assembled. Remove all packing material and tape from the inside of the firebox. Remove any tape on the outside of the glass. Open the hopper, remove all packing material, parts bag, manual bag, firepot, controller assembly, and power cord. A parts bag containing one (1) remote control, one (1) spare fuse, one (1) 13 mm wrench, one (1) 4 mm hex wrench, and four (4) adjustable feet are included for your convenience.

1. Using the 13 mm wrench, remove the four (4) bolts from the bottom of the pallet that secure the stove to the pallet.
2. Install the four (4) adjustable feet to the bottom of the stove according to the instructions on page 14 of the operator's manual.
3. Open the door and install the firepot as shown on page 30 of the operator's manual.
4. Using the 4 mm hex wrench, install the controller assembly according to the instructions on page 24 of the operator's manual.

INSTALLATION

It is recommended the stove be installed and serviced by authorized professionals who are certified by the National Fireplace Institute (NFI) as NFI Pellet Specialists.

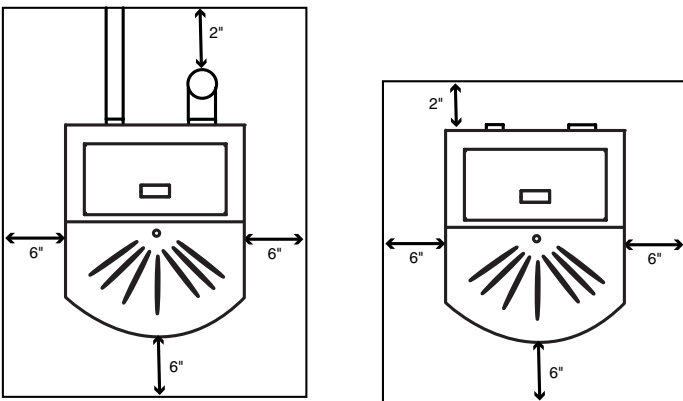
Proper installation of this stove is necessary for safe and efficient operation. Installing this product improperly may result in a house fire and personal injury. All applicable building codes for your location must be followed. In areas where building codes require additional steps to the installation of this product not included in this manual, the building codes will take precedent and must be followed. Contact your local building inspector to obtain any necessary permits or inspection guidelines before installing the product.

Stove Placement

Sketch out a plan for installing the stove including dimensions before permanent placement. When determining the location for the stove, wall stud location is critical. You may need to adjust the location of the stove to avoid trying to vent through a wall stud. Before placing the pellet stove, connect the vent and allow for minimum clearance to combustible walls.

Floor Protection Requirements

The stove must be installed on a noncombustible floor, with proper floor protection, or on a masonry hearth. When a clean out t-vent is installed in the inside of a home, the floor protector must extend 2" beyond rear of t-vent. **SEE FIGURE 1.** When stove is vented straight through the wall and the clean out t-vent is on the exterior of the home, the minimum clearance is 2" from the back of the stove to the wall. **SEE FIGURE 2.** The minimum floor protector material is 24 GA sheet metal.



Figures 1 And 2: Pellet Stove Floor Pad Clearances



WARNING

READ THIS ENTIRE MANUAL BEFORE YOU INSTALL AND USE THIS STOVE. FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY, OR EVEN DEATH.

DO NOT INSTALL A FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

CHILDREN AND ADULTS SHOULD BE ALERTED TO THE HAZARDS OF HIGH SURFACE TEMPERATURES AND SHOULD STAY AWAY TO AVOID BUMPS TO SKIN AND/OR CLOTHING.

YOUNG CHILDREN SHOULD BE CAREFULLY SUPERVISED WHEN THEY ARE IN THE SAME ROOM AS THE STOVE.

CLOTHING AND OTHER FLAMMABLE MATERIALS SHOULD NOT BE PLACED ON OR NEAR THIS UNIT.



CAUTION

THIS STOVE SHOULD NOT BE USED AS THE ONLY SOURCE OF HEAT IN THE HOUSE. POWER OUTAGES AND PERIODIC MAINTENANCE WILL RESULT IN A TOTAL LOSS OF HEAT.

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

CONTACT YOUR LOCAL AUTHORITY (SUCH AS MUNICIPAL BUILDING DEPARTMENT, FIRE DEPARTMENT, FIRE PREVENTION BUREAU, ETC.) TO DETERMINE THE NEED FOR A PERMIT.

KEEP COMBUSTIBLE MATERIALS (SUCH AS GRASS, LEAVES, ETC.) AT LEAST 3 FEET AWAY FROM THE FLUE OUTLET ON THE OUTSIDE OF THE BUILDING.

INSTALLATION AND REPAIR OF THIS PELLET STOVE SHOULD BE DONE BY A QUALIFIED SERVICE PERSON. THE APPLIANCE SHOULD BE INSPECTED BEFORE USE AND AT LEAST ANNUALLY BY A QUALIFIED SERVICE PERSON. IT IS IMPERATIVE THAT CONTROL COMPARTMENTS, FIRE BOX, AND CIRCULATING AIR PASSAGeways OF THE STOVE BE KEPT CLEAN.

Clearances To Combustibles

NOTE: These are minimum clearances to combustible walls established by the ASTM testing lab. (SEE FIGURES 3, 4, 5, & 6.)

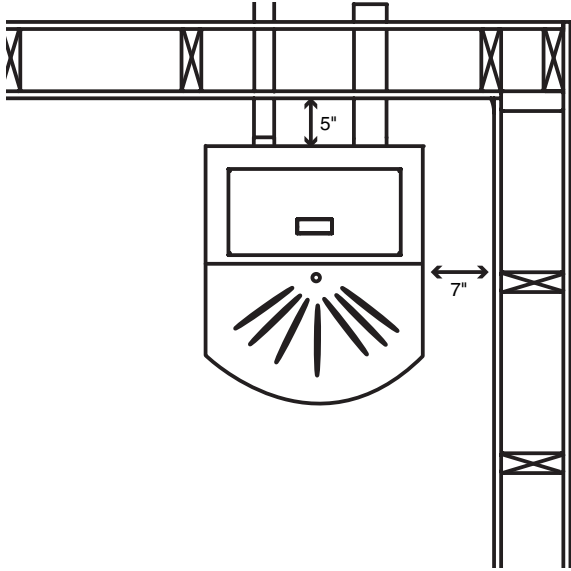


Figure 3: Straight Installation Through Wall

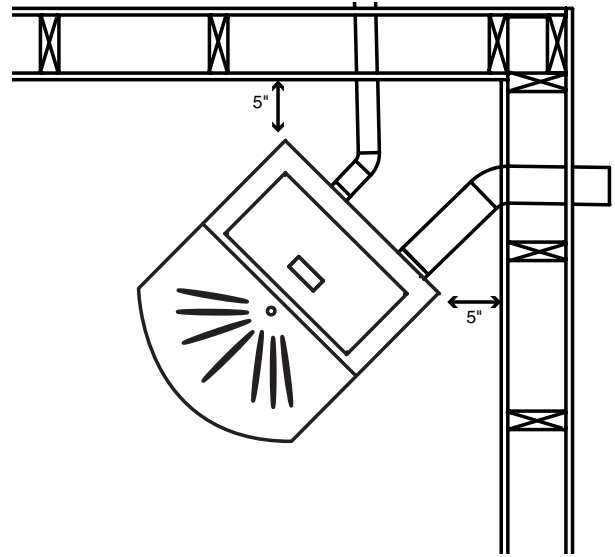


Figure 4: Corner Installation Through The Wall Vents

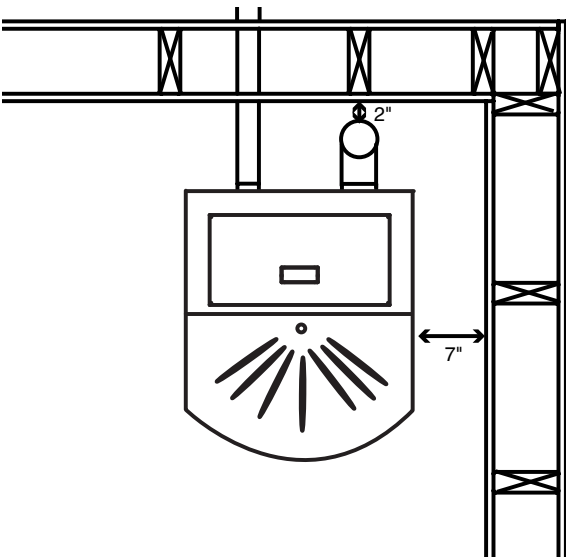


Figure 5: Straight Installation Interior Vertical Vents

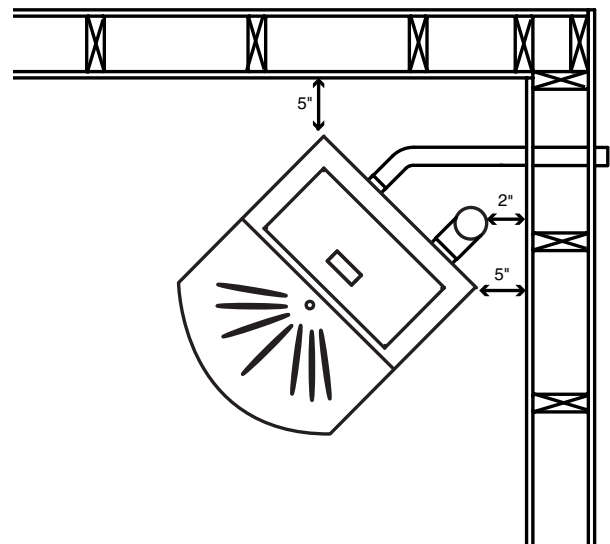


Figure 6: Corner Installation Interior Vertical Vents

NOTE: When interior vent is installed vertically, the clearance to the back wall is determined by the vent size used. Install vent at clearance specified by the vent manufacturer. Take into consideration any upward turning elbows or tees.

Venting

Before venting, consult vent manufacturer's specifications and recommendations for all venting installations.

The following installation guidelines must be followed to ensure conformity with both the safety listing of this stove and to local building codes.

Note: Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA -8365.

Type Of Vent

The pellet venting pipe (also known as L vent) is constructed of two layers with air space between the layers. This air space acts as an insulator and reduces outside surface temperature of pipe to allow a clearance to combustibles.

A UL listed 3" or 4" type L pellet vent exhaust system must be used for installation and attached to the pipe connector provided on the back of the stove. Use a 3" to 4" adapter for 4" pipe. A cap must be used at the termination of type L vent chimneys. For elevations above 2,500 feet above sea level, a 4" L is required.

Pellet Stove Vent Installation

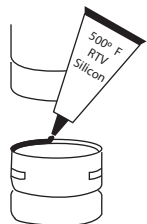
Vent termination **MUST** exhaust above air inlet elevation.

It is required to install at least three feet (3') of vertical pellet vent pipe. This vertical pipe will create some natural draft to prevent the possibility of smoke or odor during appliance shutdown and will keep exhaust from causing a nuisance or hazard from exposure to high temperatures.

The installation must include a clean out tee to enable collection of fly ash and to permit periodic cleaning of the exhaust system.

Total length of horizontal vent must not exceed 10 feet. The maximum recommended vertical venting height is 18 feet.

All joints for pellet vent are required to be fastened with at least three screws and all pellet vent connections (including adapters, elbows, etc.) should be sealed airtight by injecting 500° F. RTV silicone into the gap between sections.



The area where the vent pipe goes through to the exterior of the home must be sealed with silicone or other means to maintain the vapor barrier between the exterior and the interior of the home.



CAUTION

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

DO NOT INSTALL A FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.

DO NOT CONNECT DIRECTLY TO A MASONRY CHIMNEY.

DO NOT TERMINATE VENT IN ANY ENCLOSED OR SEMI-ENCLOSED AREA, SUCH AS; CARPORTS, GARAGE, ATTIC, CRAWL SPACE, UNDER A SUN DECK OR PORCH, NARROW WALKWAY OR CLOSED AREA, OR ANY LOCATION THAT CAN BUILD UP A CONCENTRATION OF FUMES SUCH AS A STAIRWELL, COVERED BREEZEWAY ETC.



WARNING

VENT SURFACES CAN GET HOT ENOUGH TO CAUSE BURNS IF TOUCHED. NONCOMBUSTIBLE SHIELDING OR GUARDS MAY BE REQUIRED.

PELLET VENT MUST MAINTAIN MINIMUM CLEARANCES SPECIFIED BY VENT MANUFACTURER FOR CLEARANCE TO ANY COMBUSTIBLES.

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

ALL VENTING, WHETHER VERTICAL OR HORIZONTAL, JOINTS SHOULD BE MADE GAS-TIGHT WITH RECOMMENDED SEALANTS.

Preferred Pellet Vent Termination Clearances

- The stove vent must terminate on the outside of the building. Horizontal terminations must extend a minimum of 12" from the wall. Vertical terminations must protrude a minimum 24" from the roof surface. **In addition, all clearances listed below must be met. SEE FIGURE 7.**
- Must have an approved cap (to prevent water from entering) or a 45° downturn with rodent screen.
- If the termination is located on a windy side of the house, we suggest using an approved house shield to prevent soot from building up on the side of the house.
- A vent must not be located where it will become plugged by snow or other material.

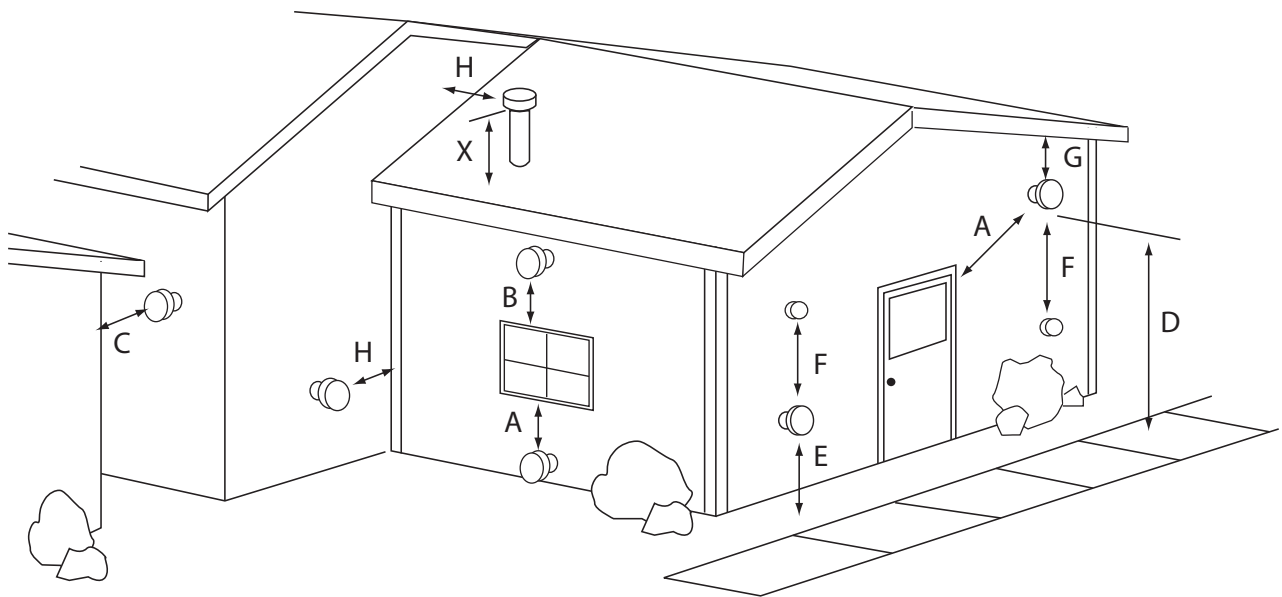


Figure 7: Vent Termination

- A: A Minimum 4' clearance below or beside any door or window that opens. (This clearance may be reduced to 18" if using outside air). We recommend the door or window be kept closed during operation. Minimum 1' clearance below or beside any window that does not open.
- B: Minimum 1' clearance above any door or window that opens.
- C: Minimum 2' clearance from any adjacent building.
- D: Minimum 7' clearance above any grade when adjacent to public walkways.
- NOTE: Vent may not terminate in covered walkway or breezeway.**
- E: Minimum 2' clearance above any grass, plants, or other

combustible materials.

- F: Minimum 3' clearance from any forced air intake of any other appliance.
- G: Minimum 2' clearance below eaves or overhangs.
- H: Minimum 1' clearance horizontally from combustible wall.
- X: Must be a minimum of 2' above the roof.

Venting The Pellet Stove (See Figures 8 through 16.)



CAUTION

MAKE SURE PELLETT STOVE IS VENTED CORRECTLY. DO NOT INSTALL FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.

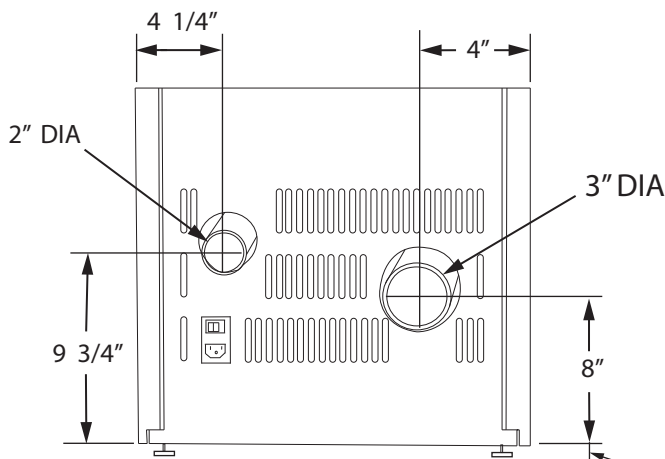
USE AN APPROVED WALL THIMBLE WHEN PASSING THE VENT THROUGH WALLS. USE A CEILING SUPPORT/FIRE STOP SPACER WHEN PASSING THE VENT THROUGH CEILINGS (MAKE SURE TO MAINTAIN CLEARANCE TO ANY COMBUSTIBLES.)

IF USING MORE THAN ONE TEE AND 180° OF ELBOWS, YOU MUST USE 4" VENTING PIPES.

The vent must have a support bracket every 5' of pellet vent when on the exterior of the structure.

The vent height and run must not exceed the distance as illustrated in the diagram below.

Venting into this (the lighter) shaded area may require combustion motor voltage adjustments and/or inlet air adjustments (intake). **SEE FIGURE 9.**



NOTE: THE ADJUSTABLE FOOT PAD CAN ADD UP TO 1 INCH TO HEIGHT MEASUREMENTS DEPENDING ON YOUR INSTALLATION LEVELING REQUIREMENTS. THIS DIMENSION MUST BE ADDED TO THE HEIGHT FOR PROPER INSTALLATION OF VENT PIPES.

Figure 8: Intake and Exhaust Positions

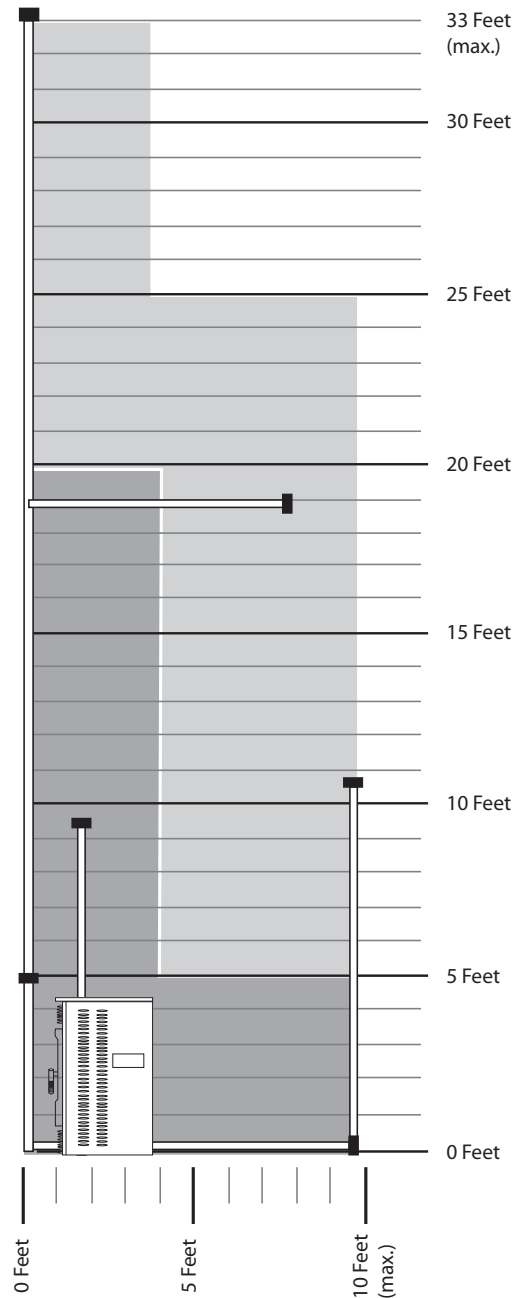


Figure 9: Venting and Combustion Motor Voltage Adjustment Chart



Serenity Pellet Stove

Outside Air Connection

Connection from the intake pipe (2" diameter pipe in rear of stove, See Figure 8) to the outside of the house is **REQUIRED** for mobile home installation. It is recommended in tightly sealed homes with exhaust fans such as kitchen or bathroom fans. This will eliminate poor performance due to negative pressure.

Only noncombustible pipe 2" (or greater) in diameter is approved to use for outside air connections (straight or flexible).

NOTE: PVC pipe is NOT approved and should NEVER be connected to the stove.

HINT: A Castle Pellet Stove air inlet will accept automotive exhaust pipes and couplers

If the air inlet is connected to the outside, it **MUST** be terminated with a vertical 90° bend (down) or with a wind hood. Failure to do so could result in a burn back during high winds blowing directly up the air inlet during a simultaneous power failure.

Blockage, excessive length, or extra bends in the air intake pipe will starve the stove of combustion air. A 90° bend is equivalent in restriction to approximately 30" of straight inlet pipe.

Mobile Home

Installation in a mobile home should be in accordance with the manufactured home and safety standard. *Department of Housing and Urban Development (HUD) CITE: 24CFR3280.707* stating this stove must be vented to the outside. In addition to the standard installation instructions, the following requirements are mandatory for installation in a mobile home:

1. The stove must be permanently attached to the floor.
2. Stove must have an outside air source.
3. Stove must be electrically grounded to the steel chassis of the mobile home.
4. All vertical chimney vents must have wall supports.
5. All exhaust systems must have a spark arrestor.
6. Check with local building officials to see if other codes may apply.



WARNING

CARBON MONOXIDE POISONING HAZARD. DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM. DO NOT INSTALL IN A SLEEPING ROOM.



CAUTION

THE OPERATION OF EXHAUST FANS SUCH AS BATHROOM FANS, ATTIC FANS, ETC. MIGHT STARVE THE PELLETT STOVE OF COMBUSTIBLE AIR CREATING A NEGATIVE PRESSURE IN THE ROOM. PROVIDE ADEQUATE VENTILATION IN THE ROOM ACCOMPANYING THE PELLETT STOVE. IF NOT, THE PRESSURE SWITCH MAY SHUT OFF OPERATION OF THE PELLETT STOVE.

THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

SIMPLE STOVE VENTILATION EXAMPLES

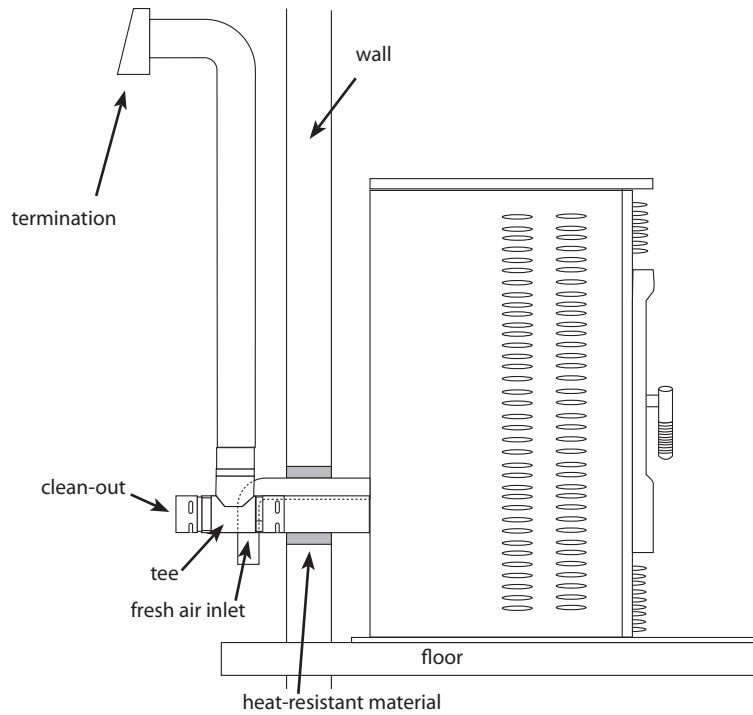


Figure 10: Straight Installation—Outside Vertical Rise, Horizontal Termination

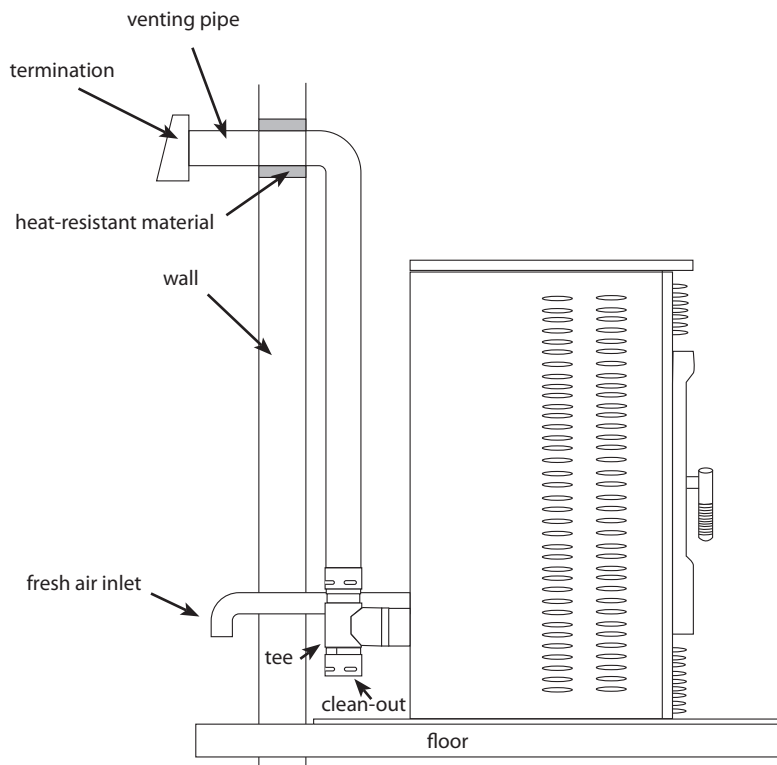
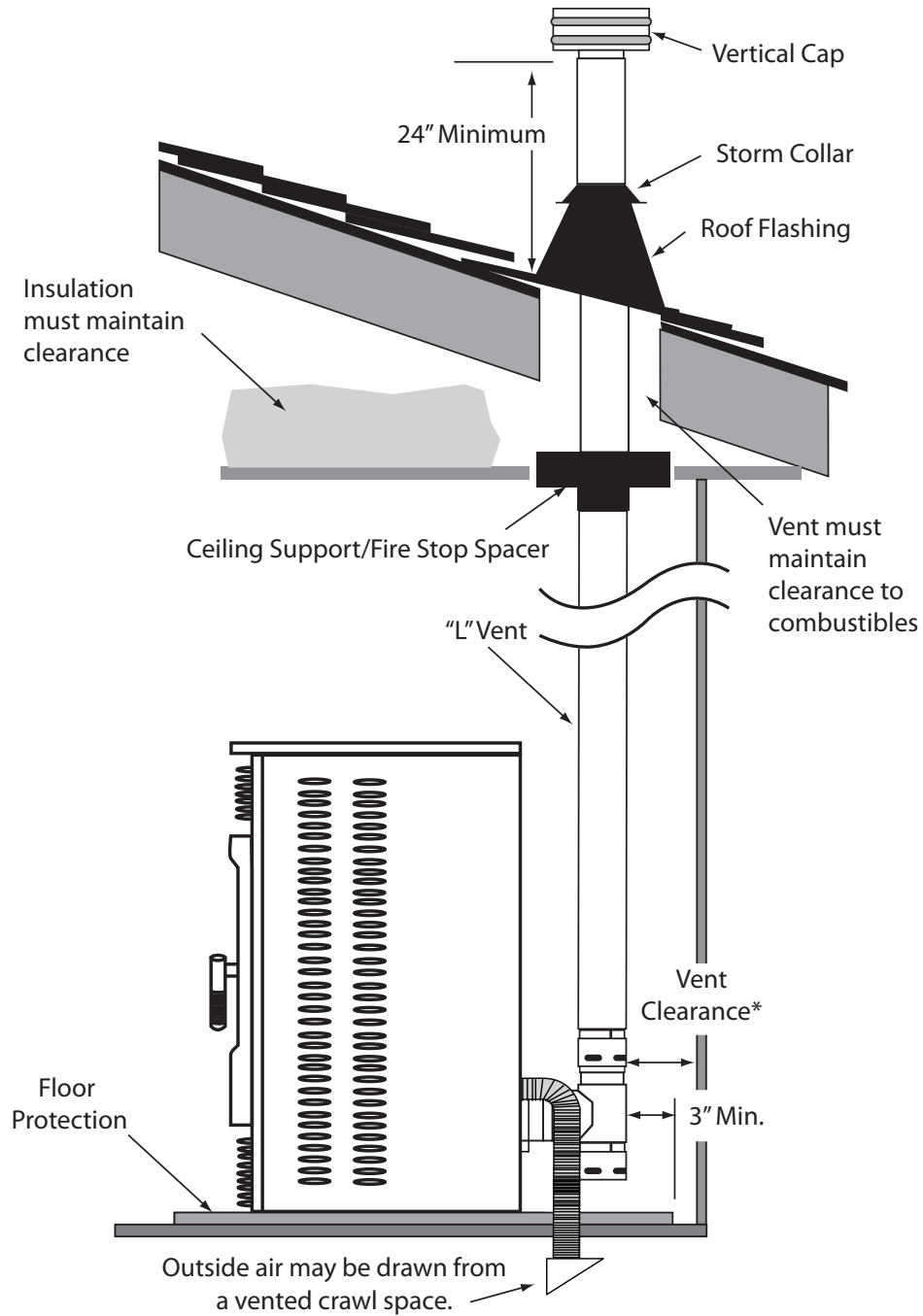


Figure 11: Straight Installation—Inside Vertical Rise, Horizontal Termination

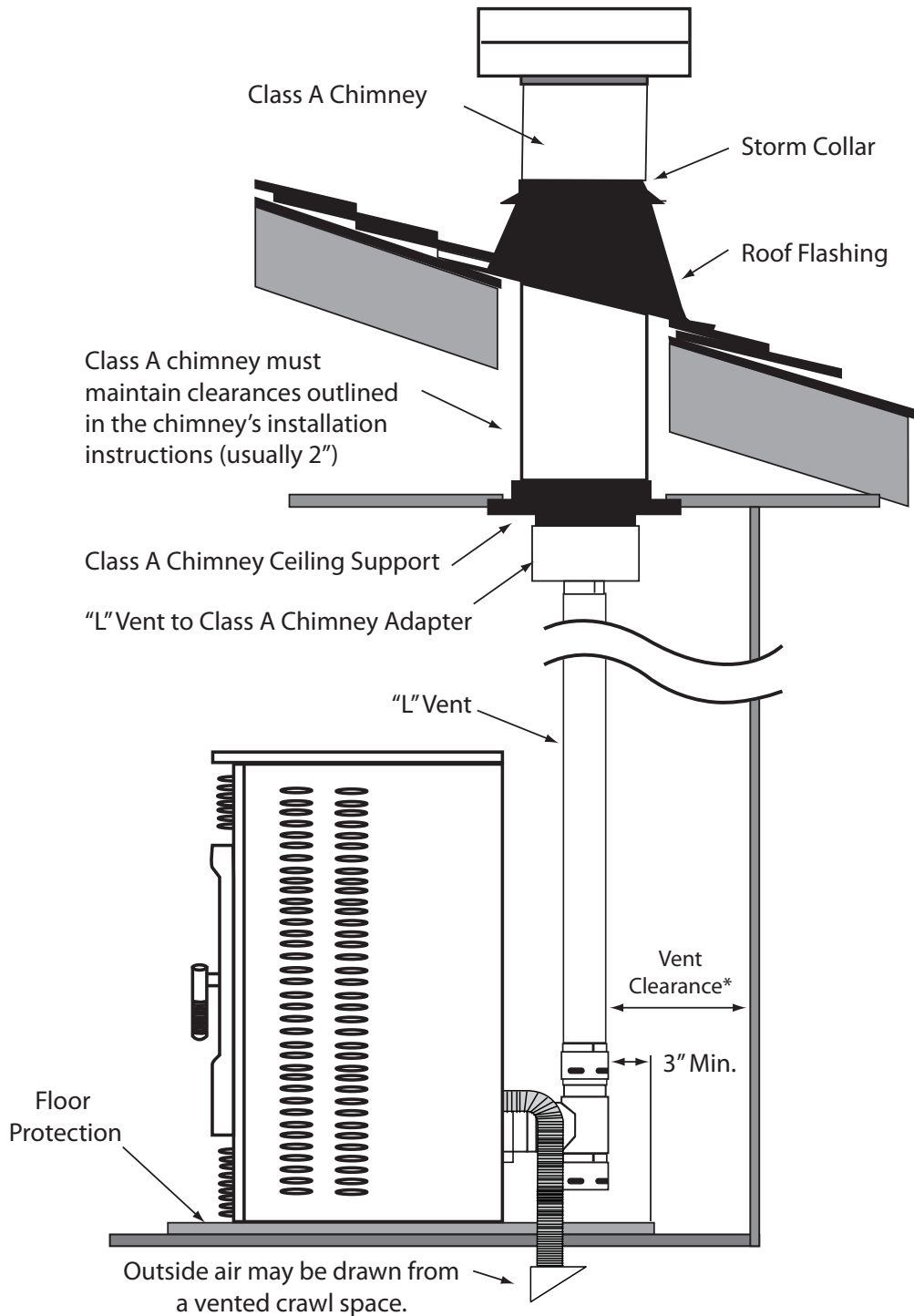
COMPLEX STOVE VENTILATION EXAMPLES



* Install a vent at clearance specified by the vent manufacturer

Figure 12: Interior Vertical Installation

CLASS A CHIMNEY RETROFIT



* Install a vent at clearance specified by the vent manufacturer

Figure 13: Class A Chimney Retrofit

MASONRY FIREPLACE HEARTH STOVE

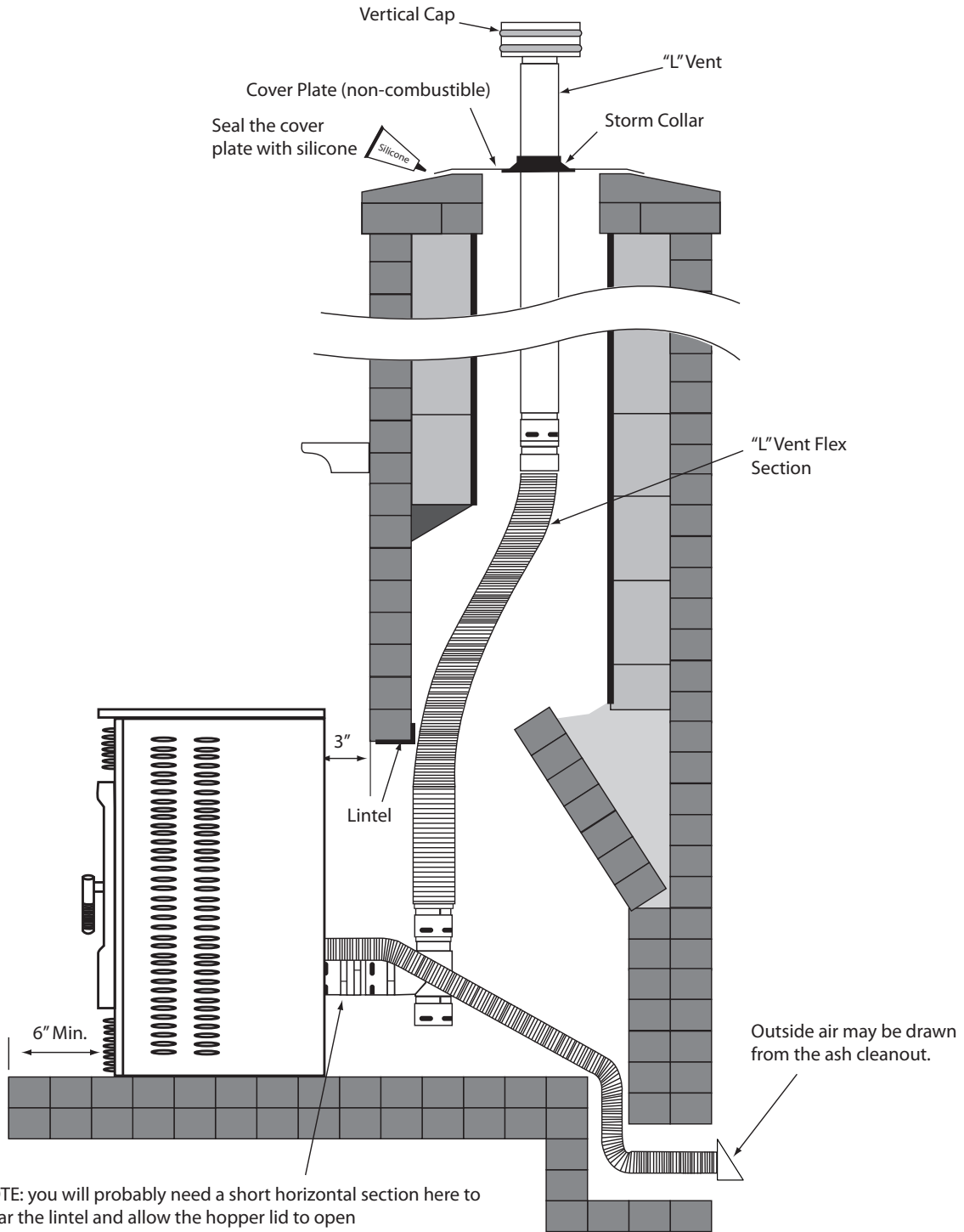


Figure 14: Masonry Fireplace Hearth Stove

ZERO-CLEARANCE (METAL) FIREPLACE HEARTH STOVE

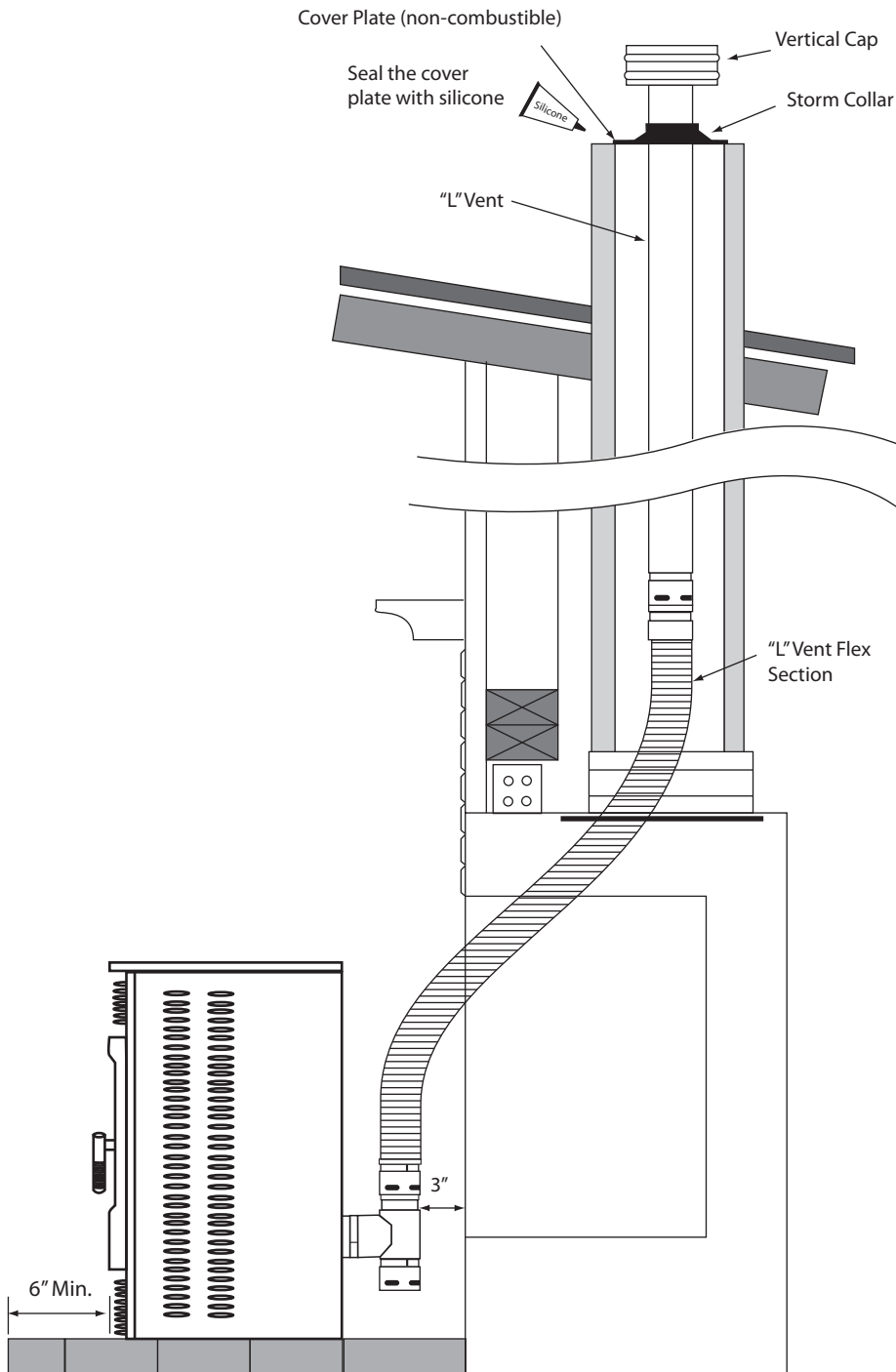


Figure 15: Zero-Clearance (Metal) Fireplace Hearth Stove

FREESTANDING MASONRY CHIMNEY

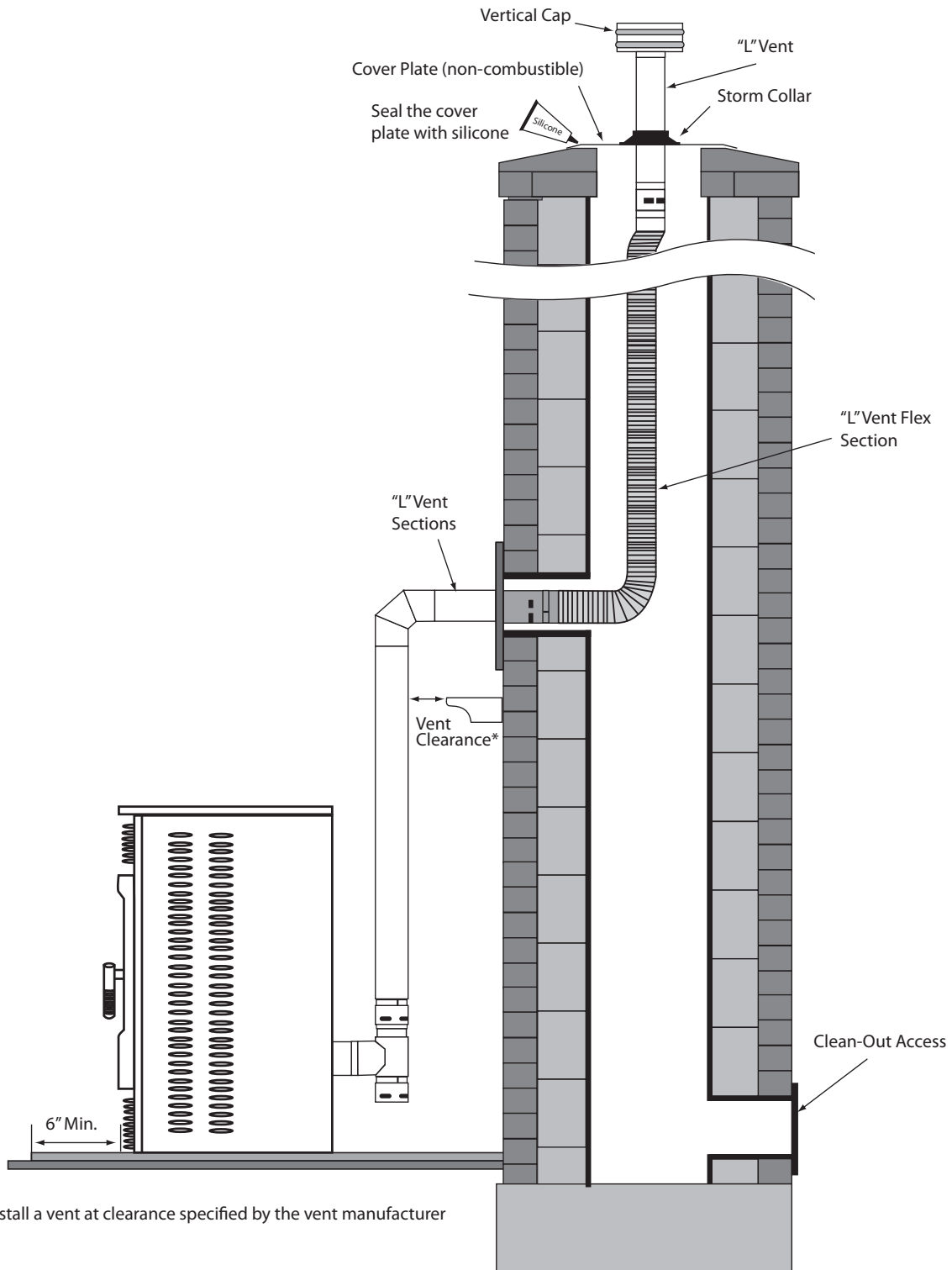


Figure 16: Freestanding Masonry Chimney

UNDERSTANDING YOUR STOVE

Your Castle Pellet Stove utilizes a vertical auger fuel feed system that is operated by a microprocessor controlled digital circuit board. The digital circuit board allows the vertical auger fuel system to run in a timer based, non-continuous cycle; this cycling allows the auger to run for a predetermined amount of time. The auger pushes pellets up a chute located in the hopper. The pellets will then turn and fall through another chute into the burn pot. Your stove is equipped with an automatic ignition system that should ignite the fuel within 3-5 minutes of pressing the On/Off button. As pellets fill the burnpot and ignite, outside air is drawn across the fuel and heated during the combustion process which is then pulled across the heat exchanger by the exhaust motor or the draft fan. As the stove reaches operating temperature, room air is then circulated around the heat exchanger by a room air blower, distributing warm air into the room.

The amount of heat that is produced by the stove is proportional to the rate of fuel that is burned.

Because a forced draft pressure is required for the combustion process inside your stove, it is extremely important that the exhaust system be properly installed and maintained. Also, the doors must remain closed while in operations and the seals on the doors must be properly maintained.

BECOMING FAMILIAR WITH YOUR CONTROLLER

Controller Buttons (SEE FIGURE 17 & 18)

1. **Infrared Receiver:** Receives signal from remote control.
2. **Power Indicator** - Illuminates when the main power switch is on.
3. **Alarm Light** - Illuminates if stove is not operating properly.
4. **On/Off Button** - Starts and stops operation of stove.
5. **Timer Button** - Allows you to choose the start time or shutdown time of the unit.
6. **Mode Transfer Button** - Allows you to set the unit to one of three main mode settings: Manual, Temp, and Weekly.
7. **Hold Button** - Pressing the "Hold" button in weekly mode after raising the "Call To" temperature will maintain that temperature until the button is pressed again or the stove is shut down.
8. **Scroll Up Button** - Allows you to scroll up to choose items in the menu.
9. **Exit Button:** Takes you out of current selection and returns to previous option and/or screen. When entering data, pressing the EXIT button will also delete your entries.

10. **Scroll Down Button** - Allows you to scroll down to choose items in the menu.
11. **Enter Button** - Pressing "Enter" button allows you to adjust and select data on the screen. Pressing the ENTER button for two seconds will take you to a main menu screen in which you'll have the ability to change the time, date, temperature display, weekly operation schedule (for Weekly Mode only) and combustion motor and voltage settings.
12. **Controller Lock Out Mode** - By pushing 8 and 10 simultaneously, the controller key pad can be locked. In the lock mode the stove cannot be adjusted or turned **ON** or **OFF**. Activation is indicated by a small key icon in the upper right corner of the controller display.



Figure 17: Control Pad Key



Figure 18: Control Pad Location

MAIN OPERATION CONTROLLER SCREEN DISPLAY

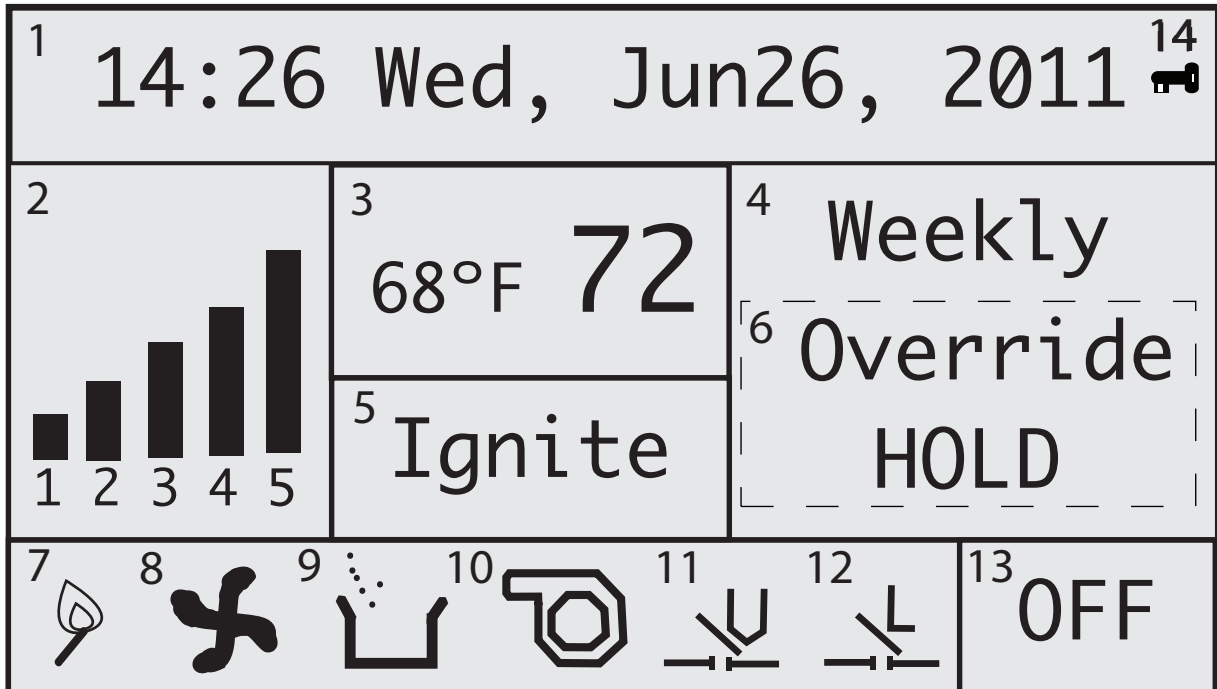


Figure 19: Main Operation Controller Screen Display

1. **Date and Time:** Displays time and date.
2. **Heating Power Level:** Indicates the level of power at which the stove is currently heating.
3. **Current Room Temperature/Call To Temperature:** Displays current room temperature and, in the thermostat mode, the "call to" temperature.
4. **Main Mode:** Displays operation mode--weekly, thermostat (temperature) and manual.
5. **Work Stage:** Displays operational stage in which the stove is currently operating (i.e. ignite, heating room).
6. **Additional Control Mode:** Only appears if weekly temp setting is changed manually.
7. **Igniter Indicator:** Indicates ignition cycle/burning cycle is currently happening.
8. **Exhaust Blower Indicator:** Indicates combustion blower is running to feed air to the firebox.
9. **Auger Indicator:** Indicates auger is feeding pellets.
10. **Room Blower Indicator:** Indicates room blower is running and the fan is heating the room.
11. **Vacuum Switch Indicator:** Indicates there is vacuum pressure in the stove.
12. **Hopper Lid Open Indicator (Limit Indicator):** If lit, indicates the hopper lid is closed. When hopper lid is open, this will disappear.
13. **On/Off State Indicator:** Indicates if the stove is on and in operational mode or if it is in the process of shutting down.
14. **Controller Lockout Mode Activated**

NOTE: During stove operation number 11 and 12 must be displayed or the stove will not feed pellets.

PRE-OPERATION

Once the stove has been properly installed and plugged into a grounded surge protector you are ready to begin operation.

Mounting Your Controller

Mount the controller and the controller bracket to top and back of your stove using the hardware that accompanied the controller. **SEE FIGURE 18.**

Prior To Starting

Turn on the main power switch located on the back of the stove. **SEE FIGURE 20A.**

NOTE: If for some reason the stove does not appear to be powering on, there is a fuse located just below the power switch that can be checked. SEE FIGURE 20B. There is a spare fuse located in the fuse holder.

Make sure the hopper is clean and free of foreign matter including pellet fines and dust.

Fill the hopper with wood pellets, making sure that NO parts of the bag or any foreign objects enter the hopper as this may cause harm to the auger feed system. **SEE FIGURE 21.**

Also take care in making sure there is no pellet material in the hopper lid seating surfaces.

Close the lid. This stove has a safety switch that will not allow pellets to feed with the hopper door open.

Make sure the main glass door is closed. The stove has a safety switch that will not allow the stove to feed fuel unless there is negative draft pressure inside the stove.

Before starting your Castle Stove, you will need to determine in which mode you would like to run the stove. The Serenity can operate in three modes:

1. **Manual:** Under this mode, you can personally adjust and set the heating phase to control the heat level.
2. **Thermostat Control (Temperature):** Under his mode, you can set the room temperature and the stove will automatically run to ensure the room is at that temperature.
3. **Weekly:** Under this mode, the stove will work automatically during days and times you designate. You can have a program for each of the seven days of the week and four periods during the day.

You must select your mode before turning on the stove.

Selecting a mode while the stove is burning can cause the stove to shut down and may force a 30-minute delay in restarting.

You do not need to start operation of the stove to select your mode. To choose the mode, select the mode transfer button (6, Fig. 17). Pressing the mode button once selects the thermostat setting; pressing it twice will bring you to the weekly mode.



WARNING

NEVER USE FLAMMABLE LIQUIDS SUCH AS GASOLINE, GASOLINE TYPE LIGHTER FUEL, CHARCOAL LIGHTER FUEL OR FIRE STARTING GELS IN OR AROUND THIS STOVE. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE STOVE WHEN IT IS IN USE.

NEVER OPEN SIDE PANELS OR MAIN DOOR WHEN STOVE IS IN OPERATION.

NEVER TOUCH DOOR LATCHES WHILE IN OPERATION, THEY GET EXTREMELY HOT. NEVER OPEN GLASS DOOR WHILE STOVE IS OPERATING OR WHILE STOVE IS HOT.

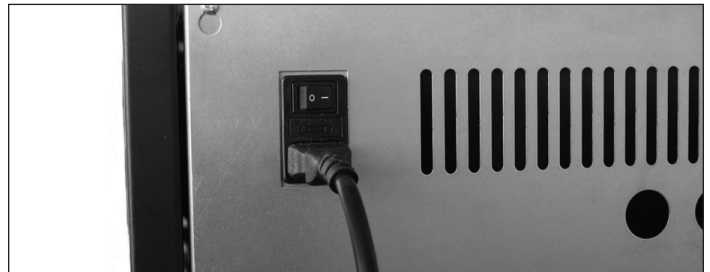


Figure 20a: Main power switch




Figure 20b: Main power switch



Figure 21: Pellet load

OPERATION

After you have chosen the mode in which to operate your stove, press the **ON/OFF** button  (4, Fig. 17) to start the stove ignite cycle.

Start Up



When the stove turns on, the ignition indicator and the exhaust blower indicator will appear on the screen (7 and 8, Fig. 19). "Ignite" will also appear in the work stage box (5, Fig. 19) on the screen. After approximately four seconds, the vacuum switch indicator (11, Fig. 19) will appear. Also note that the hopper lid open indicator (limit indicator) (12, Fig. 19) will appear anytime the stove's hopper lid is properly shut and sealed.

The stove exhaust blower will continue to run for three minutes, then the auger indicator (9, Fig. 19) will flash on the screen, indicating that the auger is feeding pellets into the stove. Within three to five minutes of the auger feeding pellets, a fire should ignite. Once a fire is lit, the work stage box on the screen will read "Heating Room".

Working in the Different Operation Modes:

Manual Mode

The Manual Mode is the default mode setting if no other mode is chosen before the stove is turned on. In the manual mode, you have the ability to change the heat levels, which will increase or decrease the amount of heat that the stove puts out.

To change the power level in manual mode, use the scroll down or scroll up buttons   on the control pad. (See buttons 8 and 10 on Figure 17.) Pressing either of these buttons once will move the power level up or down one level.

NOTE: *This mode does not allow you to directly adjust specific temperatures. The manual mode simply allows you to dictate the level of heat the stove is pushing out.*

Thermostat/Temperature Control Mode

The Thermostat Mode allows you to set the temperature of the room. The stove will increase or decrease the level of heat it puts out automatically to keep the room at the set temperature.

To increase or decrease the "call to" temperature, use the **SCROLL UP** or **SCROLL DOWN** button (8 and 10, Fig. 17). The current room temperature will be displayed in the temperature display box (3, Fig. 19) on the screen, as will the "call to" temperature.

NOTE: *Thermostat mode does not turn the stove off when the call to temperature is met. Thermostat mode will only regulate between low and high settings.*



WARNING

NEVER SHUT THE STOVE DOWN BY UNPLUGGING IT FROM THE POWER SOURCE.
NEVER SHUT THE STOVE DOWN BY SWITCHING OFF THE MAIN POWER SWITCH ON THE REAR OF THE STOVE.
NEVER OPEN SIDE PANELS OR MAIN DOOR WHEN STOVE IS IN OPERATION.
NEVER TOUCH GLASS DOOR AND ASH PAN LATCHES WHILE IN OPERATION, THEY GET EXTREMELY HOT AND WILL BURN YOU.

If the room temperature falls below the "call to" temperature, the stove's heat power level indicator will automatically rise to five. When the temperature has been reached, the heat power level will return to one and it will stay there until more heat is needed.


Note: *In thermostat mode, the stove will not go into standby. It will simply idle and continue to produce a fire until the room is no longer at the set "call to" temperature. When it is idling, the stove will read at power level one in the power level box on the display screen.*

Weekly Mode

The Weekly Mode allows an Serenity user to control and schedule the stove operation during set times and days throughout the week. You can select four different operation times for each of the seven days of the week.

IMPORTANT: Remember to set your weekly schedule in Weekly Mode before igniting a fire. If you try to set the stove schedule and weekly mode while running in Manual or Thermostat modes, the weekly schedule will not set, and the screen will prompt you to wait until you have turned the stove off and it has cooled down before setting the schedule.

To Set Weekly Schedule:

1. Press and hold the **ENTER**  button (11, Fig. 17) until the "Set Data" menu appears on the screen. Using the **SCROLL DOWN** button (10, Fig. 17), select "Set Weekly." Press **ENTER**. This will take you into the "Weekly Schedule" screen. **SEE FIGURE 22.**

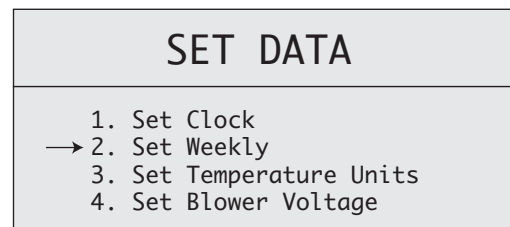


Figure 22: Set Data

Serenity Pellet Stove

- In the **"WEEKLY SCHEDULE"** screen, you can begin with setting the operation times for Sunday. Press **ENTER** to highlight the hour and use the **SCROLL UP** and **SCROLL DOWN** buttons until you reach your desired hour of start time. Press **ENTER** again to highlight the minutes and use **SCROLL UP** and **SCROLL DOWN** until you've reached your desired minute of start. **SEE FIGURE 23.**

NOTE: Your Serenity controller uses 24 hour time to set your weekly schedule.

- Pressing **ENTER** again will allow you to set the stop time of your stove. Use the same procedure for setting your stove's start time for selecting when you would like the stove to stop. Once you've selected the stop time, press **ENTER**.
- Next you will have the opportunity to set the desired temperature. Use the **SCROLL UP** or **SCROLL DOWN** keys until you've reached the appropriate temperature for the times you have selected. Press **ENTER**.
- "Yes"** will now be highlighted. If you have set this particular time correctly, press **ENTER**. This will take you out of your first set time.

If you wish to erase a scheduled time, use your **ENTER** key to highlight **"YES"** on the screen for that scheduled time. Select **"No"** using your **SCROLL UP** or **SCROLL DOWN** key. With **"No"** highlighted, press **ENTER** to erase the data.

- To set another time for that particular day, press **SCROLL DOWN** and continue by repeating steps 2-5 as appropriate.

NOTE: You must set your times in chronological order. The first schedule slot of one day MUST be earlier in the day than the second schedule slot on your weekly schedule list, etc.

- Once you have set all times for Sunday, **SCROLL DOWN** to **"NEXT"**. Pressing **ENTER** once will highlight **"NEXT"**. Pressing **ENTER** again will take you to the following day. Proceed with setting a schedule for the rest of the week using the preceding instructions.

SET WEEKLY			
Sun. Weekly Set			
1:	1:15~ 7:00	67°F	Yes
→ 2:	17:00~23:45	72°F	Yes
3:	--:--~--:--	--°F	No
4:	--:--~--:--	--°F	No
5:	--:--~--:--	--°F	No
Next	All		

Figure 23

NOTE: Along with the "Next" option on the screen, there is also an "All" Option. After you have set a particular time for a day, if you wish to set that time for every day of the week, scroll down to "Next" and press ENTER. Press the SCROLL DOWN key to select and highlight "All." Pressing ENTER will then select that scheduled time and apply it to each day of the week.

TIP: If at any point you need to leave the weekly schedule screen or once you have finished with setting all of your times, select the EXIT button (9, Fig. 17) to return to the previous menu.

- Once you've finished setting your schedule, without any of the options highlighted, press the **EXIT** button. This will save your schedule.
- With a schedule set, make sure that the main display screen on the controller reads **'WEEKLY'** (for operating in the Weekly Mode) and that the unit is turned on. The schedule will not take effect unless the unit is turned on in the Weekly Mode. (13, Fig. 19).

Setting Other Data On Your Controller

Setting The Time And Date

- Press and hold the **ENTER** button. This will take you to the **"SET DATA"** screen.
- Press **ENTER** again to enter the **"SET CLOCK"** screen. **SEE FIGURE 24.**
- To change the hour, press **ENTER**. This will highlight the hour. Use your **SCROLL UP** and **SCROLL DOWN** buttons to choose the appropriate time. Press **ENTER** to select the correct hour, and then press **ENTER** a second time to begin setting the minutes.
- Continue this process for selecting and setting the day, month, date and year.
- When finished, and with nothing highlighted on the screen, press the **EXIT** button.

SET CLOCK
10:45 Fri. May 20, 2011

Figure 24

Setting The Temperature Units

1. Press and hold the **ENTER** button. This will take you to the "SET DATA" screen.
2. Using the **SCROLL DOWN** key, move down to option 3: "SET TEMPERATURE UNITS". Press **ENTER** again to move into the "SET TEMPERATURE UNITS" screen. **SEE FIGURE 25.**
3. In the set temperature units menu, press the **ENTER** button to highlight the units. Use the **SCROLL UP** and **SCROLL DOWN** buttons to choose either Celsius (C°) or Fahrenheit (F°).
4. When finished, press **ENTER**. With nothing highlighted on the screen, press the **EXIT** button.

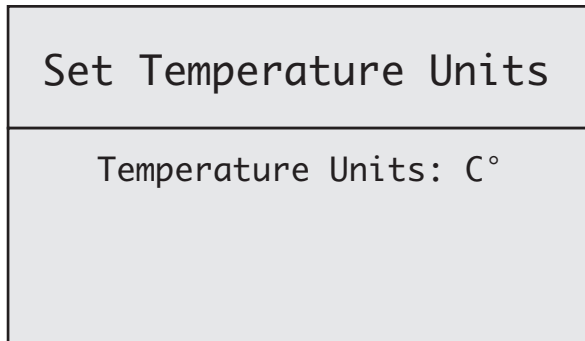


Figure 25

Setting The Room Blower Voltage

The blower voltage (controlling the room fan) can be turned up or down for each power level to regulate the amount of heat circulated into a room during stove operation. Some fuels radiate heat better than others. You have the ability to speed up or slow down the room fan to extract the optimum amount of heat without blowing cold air.

Increasing the room blower voltage causes the room motor to run faster, extracting more heat from the unit.

NOTE: If having issues with the stove overtemping in any setting, increase the blower voltage.

Decreasing the blower voltage allows you to slow the exchange of heat from the stove so it blows less cold air.

To Set The Room Blower Voltage:

1. Press and hold the **ENTER** button. This will take you to the "SET DATA" screen.
 2. Using the **SCROLL DOWN** key, move down to option 4: "SET BLOWER VOLTAGE". Press **ENTER** again to move into the "SET BLOWER VOLTAGE" screen. **SEE FIGURE 26.**
 3. Select the stall (or heating power level) for the voltage you'd like to change by scrolling up or down and pressing **ENTER**. The voltage amount will automatically be highlighted.
 4. Using the **SCROLL UP** or **SCROLL DOWN** keys, select the appropriate voltage.
- NOTE: Voltage can be decreased or increased only in increments of five (5 volts).**
5. Press **ENTER** to finalize your changes. Repeat steps 2-4 for the other stalls if you so desire.

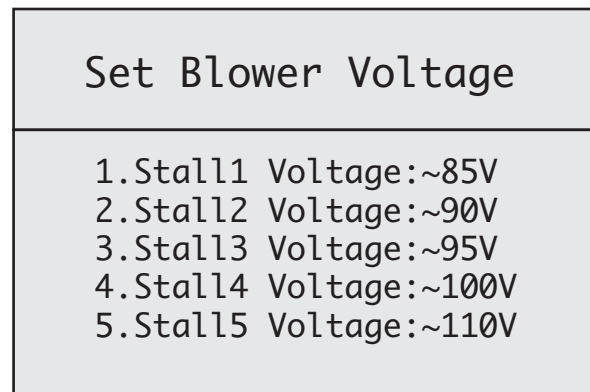


Figure 26

Setting The Exhaust Voltage

IMPORTANT NOTE:

ADJUST THE AIRFLOW GATE BEFORE INCREASING THE EXHAUST VOLTAGE. If you are having issues with getting enough air to your fire, **FIRST** try to adjust the air flow gate. **SEE FIGURE 27.** This will also adjust the air flow to the stove. In most installations, the air flow gate should be 1/2 open. this is best viewed from the front of the stove with the fire pot removed.

The exhaust voltage (controlling the exhaust motor) allows you to adjust the stove for the fuel you are burning or compensate for inadequate ventilation situations. In less than optimum venting situations, you can increase the exhaust speed for additional air circulation through the stove should ventilation be an issue.

IMPORTANT NOTE:

Changing the exhaust voltage does NOT change the feed rate. Therefore, on high heat power levels where the feed rate is faster, a low voltage level will not push out enough air and the stove may overheat and pellets may back up into the pot. Decreasing exhaust voltage will increase the amount of heat coming into the room. Do not adjust the exhaust voltage too low, as it can cause pellets to backup in the burn pot.

Increasing the exhaust voltage, and thereby increasing the amount of air in the burn pot, will also assist in burning lower-quality fuels that may otherwise cause unwanted buildup.

NOTE: Be sure to visually watch the burn rate if the exhaust voltage is decreased, as to not cause pot overloading. Exhaust voltage should ONLY be adjusted to get the optimum performance out of the fuel you are burning. Setting the exhaust voltage too high will increase the amount of fly ash being pushed out of the vent.

To Set The Exhaust Blower Voltage:

1. Press and hold the **ENTER** button. This will take you to the "SET DATA" screen.
2. Using the **SCROLL DOWN** key, move to option 4: "**Set Exhaust Voltage**". Press **ENTER** again to move into the "**SET EXHAUST VOLTAGE**" screen. **SEE FIGURE 28.**
3. Select the stall (heating level) for the voltage you'd like to change by scrolling up or down and pressing **ENTER**. The voltage amount will automatically be highlighted.
4. Using the **SCROLL UP** or **SCROLL DOWN** keys, select the appropriate voltage.

NOTE: Voltage can only be decreased or increased in increments of five (5 volts).

5. Press **ENTER** to finalize your changes. Repeat steps 2-4 for the other stalls if you so desire.

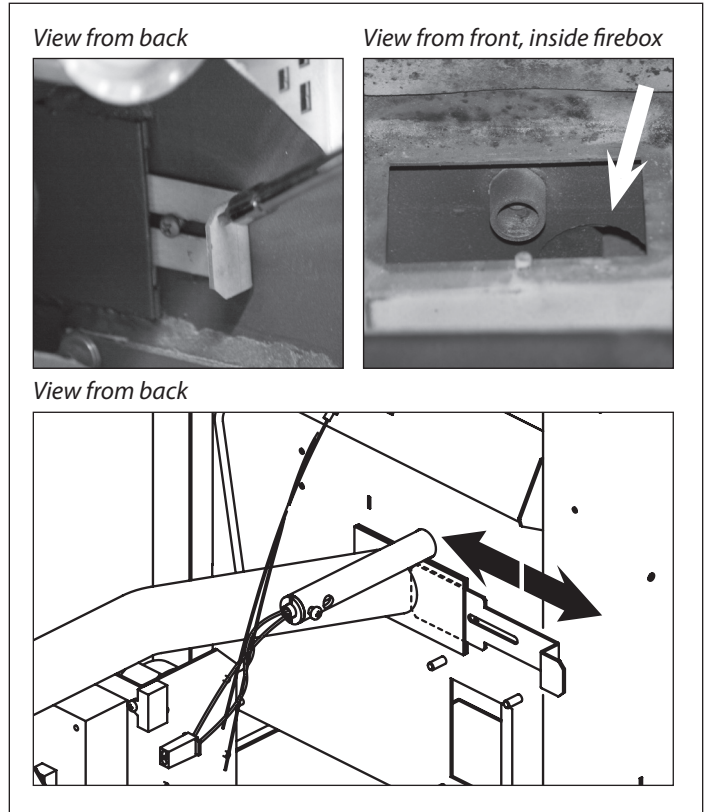


Figure 27

Set Exhaust Voltage	
1. Stall1	Voltage: ~80V
2. Stall2	Voltage: ~85V
3. Stall3	Voltage: ~90V
4. Stall4	Voltage: ~95V
5. Stall5	Voltage: ~100V

Figure 28

DIAGNOSTICS

Your Castle Stove's controller comes equipped with an on-board diagnostics option that will let you test some components of your stove.



WARNING

NEVER OPERATE THE STOVE IN DIAGNOSTIC MODE. DIAGNOSTIC MODE IS TO TEST AND CONFIRM THE OPERATION OF INDIVIDUAL COMPONENTS ONLY. OPERATION IN DIAGNOSTIC MODE WILL CREATE AN UNSAFE CONDITION AND CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

NOTE: You will only be able to enter the diagnostic screen when the stove is turned OFF.

To get into the diagnostics screen:

1. Press and hold the **ENTER** button. This will take you to the "SET DATA" screen.
2. Using the **SCROLL DOWN** key, move to option 6, "DIAGNOSTICS". Press **ENTER**. This will take you to the "DIAGNOSTICS" screen. **SEE FIGURE 29.**

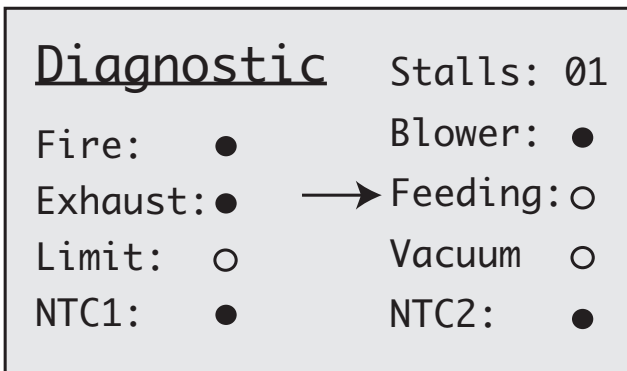



Figure 29

If all components are working properly, the circles next to the components will be shaded.

- Stalls:** Changing the stall will allow you to test the component in the various heating power levels.
- Fire:** Indicates whether the igniter is working properly.
- Exhaust:** Indicates whether the exhaust motor and exhaust system is working properly.

- Limit:** Indicates the hopper lid is properly shut.
- Blower:** Indicates whether the room fan/blower is working properly.
- Feeding:** Indicates if the auger is properly feeding pellets.
- Vacuum:** Indicates there is sufficient vacuum and suction.
- NTC1:** Indicates the proof of fire switch is properly working.
- NTC2:** Indicates temperature being read by room temp sensor.
(Temperature is in Celsius)

SHUT DOWN PROCEDURE

Press the  button on the control pad to initiate the shut down mode. The On/Off indicator on the screen will read **OFF**. The auger will stop feeding pellets, but the room blower and exhaust blower will continue to operate. Once the stove has cooled down, the screen light will turn off.

Shut down times will vary.

MAINTENANCE

Normal Care and Maintenance

Due to differences in fuel, stove cleaning intervals will vary. The cleaner the stove is, the more efficiently it will burn.

Cleaning the Firepot

Remove and clean the burn pot/firepot daily. Make sure all holes in the burn pot are unobstructed. Use a small metal pick or drill bit to keep these holes clean. **SEE FIGURE 30.**

Firepot Remains

Every time the hopper is filled with fuel, the firepot should be emptied. To empty the firepot, lift it out of the pot holder and dump it directly into the ash pan. Be sure any build-up is removed and that the holes are clean.

Cleaning the Glass

Only clean the glass when the glass is cool. Wipe glass off frequently. Wipe the glass clean with a dry or damp rag. If this does not clean the glass, use any non-abrasive cleaner. Using ceramic stove top cleaner can be helpful in removing soot from the glass. Inspect gaskets around the door periodically. Replace any worn, frayed or compacted gaskets. Replace broken glass only with high temperature ceramic glass, available from Castle Pellet Stoves. **SEE FIGURE 31.**

Stove Emissions

Stove emissions should be visually checked on a regular basis. Emission visibility is an indicator of inefficient combustion. In order to minimize impact on the environment, maintenance costs, and fuel consumption, this pellet heater should be operated in a manner that minimizes emission visibility.

Interior Chamber

Clean the interior chamber with an ash vacuum. Ash vacuums are specially designed to contain soot and have a metal exterior. This should be done weekly.

WARNING

HOT SURFACES CAN CAUSE BURNS. NEVER PERFORM CLEANING OR MAINTENANCE ON A HOT STOVE. ALLOW UNIT TO COOL FOR A MINIMUM OF TWO HOURS. NEVER PERFORM SERVICE WITH POWER SUPPLIED TO THE UNIT. INJURY TO PERSONEL OR DAMAGE TO EQUIPMENT CAN OCCUR.

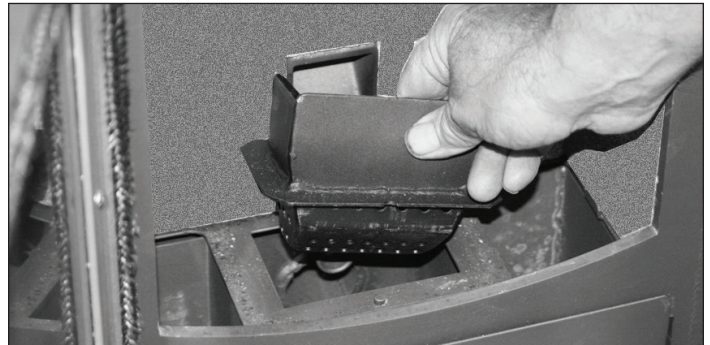


Figure 30: Fire pot clean

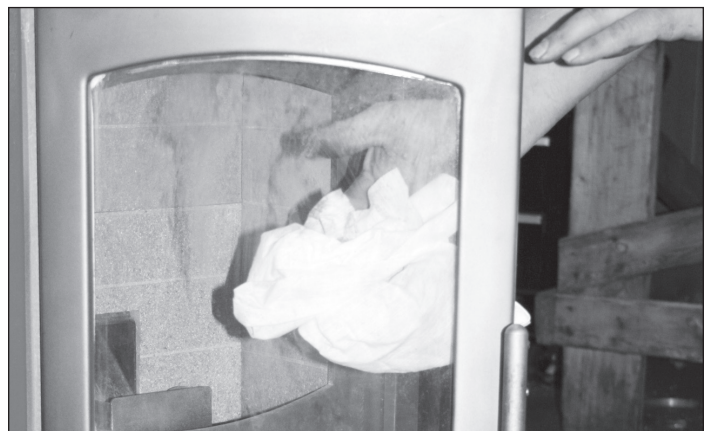


Figure 31: Wipe glass and inspect gasket

Daily Maintenance

The surfaces of the stove may be hot. Always wear a protective glove, even when the stove is cool to the touch. Be sure to shut the stove off and allow to cool for one hour before performing any maintenance or service tasks.

Empty firepot of ashes. Lift the firepot from the holder and dump it directly into the ash pan. **SEE FIGURE 32.**

Remove any build-ups and be sure all of the holes are clean.

Dump the ash pan into a metal container with a tightly fitting lid. The closed-container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. The ash dumping will be determined by the amount of fuel burned. It may need to be done once or twice a week.

Weekly Maintenance

Ash Pan Removal

1. Turn off the stove and allow it to cool for one hour prior to cleaning.
2. Open the front door. Using a cleaning brush, brush any ash build-up on the ash deflector into the ash pan below.
3. Lift the ash deflector and hook it to the retainer pin located on the inside back wall. Do this for the left and right side of the ash pan. **SEE FIGURE 33.** This will allow the ash pan to be easily removed.
4. Remove the ash pan by lifting straight up and out the front door. **SEE FIGURE 34.**

Disposal of Ash

Dump the ash pan regularly. Ashes should be contained in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non combustible floor or on the ground, well away from all combustible materials. If ashes are disposed of by burial or otherwise locally dispersed, they should be retained in the closed container until all cinders have been cooled.

Soot and Fly Ash

The products of combustion will contain small particles of fly ash. The fly ash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during startup, shutdown, or incorrect operation of the room heater will lead to some soot formation which will collect in the exhaust venting system. The exhaust venting system should be inspected at least once per month to determine if cleaning is necessary. If cleaning is necessary, disassemble the exhaust vent and clean the individual parts. **When cleaning ash, use an approved ash vacuum. See a dealer for more details.**

Check clean out tees regularly to determine the required cleaning interval. Use a 3" or 4" chimney cleaning brush to clean the exhaust venting. Plugged venting will effect the quality of the fire. Make sure to clean any screens in the venting regularly. A plugged screen will shut off combustion air and cause the fire to die or burn poorly.

WARNING

HOT SURFACES CAN CAUSE BURNS. NEVER PERFORM CLEANING OR MAINTENANCE ON A HOT STOVE. ALLOW UNIT TO COOL FOR A MINIMUM OF TWO HOURS. NEVER PERFORM SERVICE WITH POWER SUPPLIED TO THE UNIT. INJURY TO PERSONEL OR DAMAGE TO EQUIPMENT CAN OCCUR.

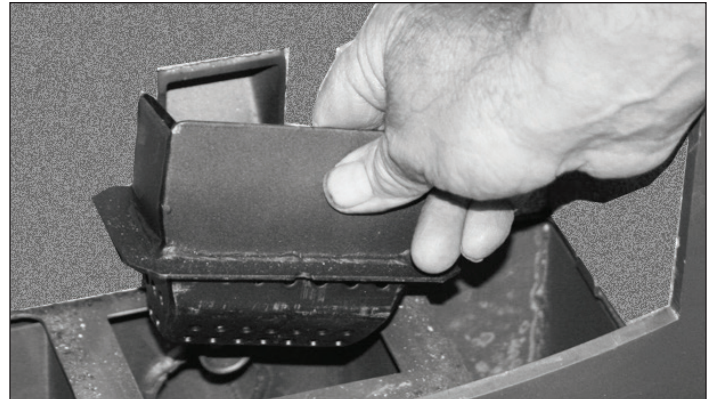


Figure 32: Empty Firepot

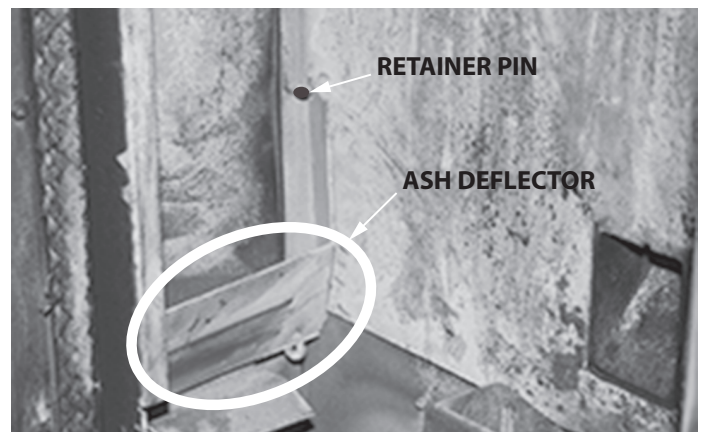


Figure 33: Ash Pan Dump



Figure 34: Dump Ash Pan

In addition to daily maintenance tasks, use an ash vacuum to clean the inside of the firebox.

Remove the firepot from the pot holder and vacuum beneath. Be sure to remove any ash from the incoming igniter tube. **SEE FIGURE 34.**

Monthly Maintenance

The exhaust venting system should be inspected at least once per month to determine if cleaning is necessary.

Annually/ Biannually

Remove and clean the exhaust venting.

Remove and clean the exhaust motor, housing and impellers.

To remove the exhaust motor, you will have to remove the side panel on the stove. To remove the panel:

Remove four screws, two at the top and two at the bottom of the panel. **SEE FIGURE 35.**

Pivot rear panel outward and push front of panel inward to release and remove panel.

Once you've removed the side panel, you can remove and clean the exhaust motor, housing and impellers. **SEE FIGURE 36.**



Figure 34: Remove ash from igniter tube (underneath firepot)



Figure 35: Remove (2) screws from rear of side panel, at the top and bottom of the panel. Remove (2) screws from the front face of the side panel, at the top and bottom of the panel.

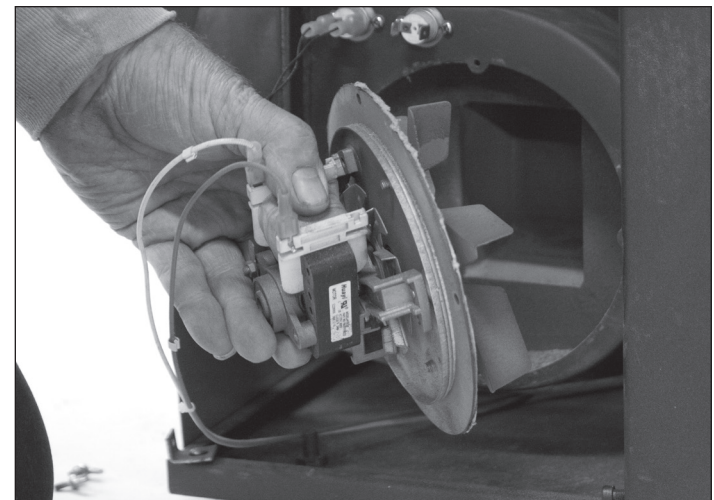


Figure 36: Remove exhaust motor and clean



TROUBLESHOOTING AND REPAIR

At Castle, we build quality and durability into the design of our products; but no amount of careful design by us, and careful maintenance by you, can guarantee a repair-free life for your stove. Most repairs will be minor, and easily fixed by following the suggestions in the troubleshooting guide in this section.

The guide will help you pinpoint the causes of common problems and identify remedies.

For more complicated repairs, you may want to rely on your authorized dealer or Castle. A parts catalog is included in this section.

We will always be glad to answer any questions you have, or help you find suitable assistance. To order parts or inquire about warranty, call or e-mail us as found below.

ORDERING REPLACEMENT PARTS

Parts can be obtained from the store where the stove was purchased or direct from the factory. To order from the factory, call or e-mail:

Castle Stoves
1-800-345-6007

E-mail: info@castlestoves.com

Please include the following information with your order:

1. Model number and serial number
2. Part description
3. Quantity
4. Part numbers

See warranty section of this manual for more information on warranty-related claims and repairs.

WARNING

WHEN PERFORMING ANY INTERNAL MAINTENANCE.

DO NOT OPERATE UNIT WITH PANELS REMOVED OR OPEN. MOVING PARTS INSIDE OF THE CABINET MAY CAUSE INJURY.

USE THE CORRECT PERSONAL PROTECTION, PARTS ARE HOT. DO NOT OPERATE THE UNIT WITH PANEL OPEN.

DISCONNECT POWER BEFORE SERVICING UNIT. RISK OF ELECTRIC SHOCK.

USE ONLY ORIGINAL FACTORY EQUIPMENT WHEN REPLACING PARTS.

CAUTION

THIS IS A MINIMUM REQUIREMENT FOR SOOT AND FLY ASH REMOVAL. ASHES SHOULD BE PLACED IN A METAL CONTAINER WITH A TIGHT FITTING LID. THE CONTAINER SHOULD BE PLACED ON A NON-COMBUSTIBLE FLOOR, WELL AWAY FROM COMBUSTIBLE MATERIALS, PENDING FINAL DISPOSAL. IF ASHES ARE DISPOSED OF BY BURIAL IN SOIL OR OTHERWISE LOCALLY DISPERSED, THEY SHOULD BE RETAINED IN THE CLOSED CONTAINER UNTIL ALL CINDERS ARE THOROUGHLY COOL.

DO NOT OPERATE STOVE WITH BROKEN GLASS.

DO NOT SLAM THE DOOR SHUT.

DO NOT STRIKE GLASS.

DO NOT USE ABRASIVE CLEANERS.

DO NOT CLEAN HOT GLASS.

REPLACE CERAMIC GLASS WITH FACTORY AUTHORIZED REPLACEMENT PARTS ONLY.

THE CLINKER WILL REMAIN HOT FOR SEVERAL MINUTES AFTER IT IS PULLED OUT OF THE FIRE POT.

TROUBLESHOOTING GUIDE

WARNING

UNPLUG STOVE AND LET COOL BEFORE PERFORMING ANY MAINTENANCE. HOT PARTS CAN CAUSE BURNS. NEVER TEST OR CHECK ELECTRICAL COMPONENTS UNLESS THE STOVE IS UNPLUGGED FROM POWER SUPPLY. ELECTRICAL SHOCK CAN OCCUR.

WARNING

NEVER SERVICE OR TOUCH THE FEED AUGER WITH THE STOVE PLUGGED IN.

NEGATIVE PRESSURE IN A HOME IS A SERIOUS ISSUE. IF THERE IS A PROBLEM, THE STOVE SHOULD BE INSTALLED WITH A FRESH AIR KIT (NOT INCLUDED).

PROBLEM	CAUSE	SOLUTION
Fault light comes on	Fire goes out	Control reads out of fuel, check burn pot. Add fuel to the hopper. If the hopper is full, relight if it continues to give that signal. Then enter the diagnostic area of the controller. A circle next to "NTC1" should be highlighted. If not, replace the 52C proof of fire switch. Check pigtail leads, replace spade terminals as necessary.
PROBLEM	CAUSE	SOLUTION
Fault light is on	Overtemp	The room fan can be tested by highlighted the circle next to "Blower". Allow stove to cool and restart. Check exhaust pipe for obstructions. Increase blower voltage, through controller, in each stall.
PROBLEM	CAUSE	SOLUTION
Fuel not feeding, no vacuum signal on the control	Main door or ash pan not sealed. No negative pressure in fire chamber Piping or stove may be plugged with ash Exhaust Motor has failed	The pressure sensor shuts off the feed auger when there is no negative pressure in fire chamber. Check door seals. Check viewing glass seals. Clean venting and stove. Verify exhaust motor is turning. Enter the diagnostic area on the controller and highlight the circle next to feeding; this should cycle the auger and feed pellets. Then highlight the circle next to "exhaust". The exhaust motor should turn on and within 20 seconds, the vacuum signal should also become highlighted.

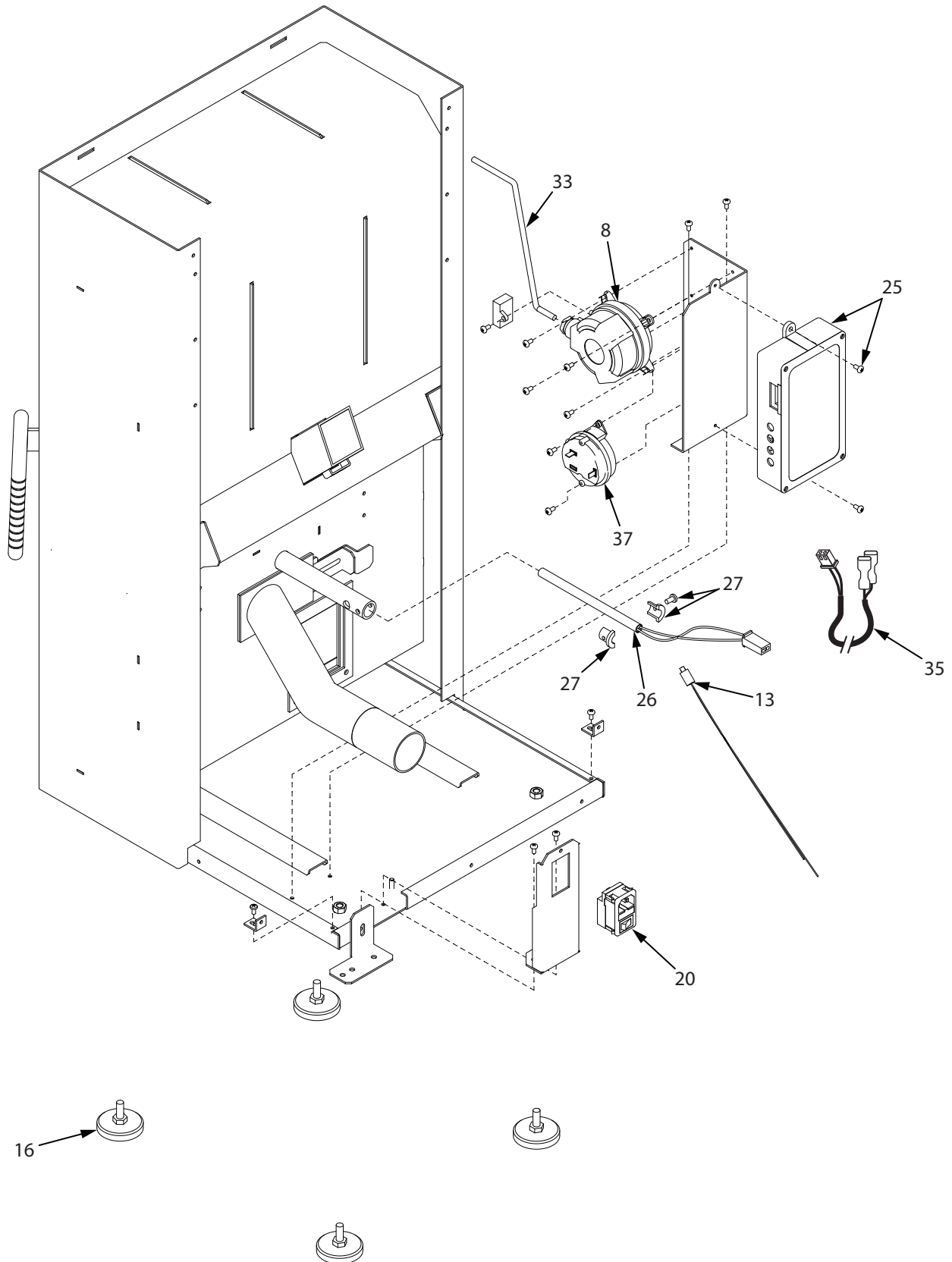


Serenity Pellet Stove

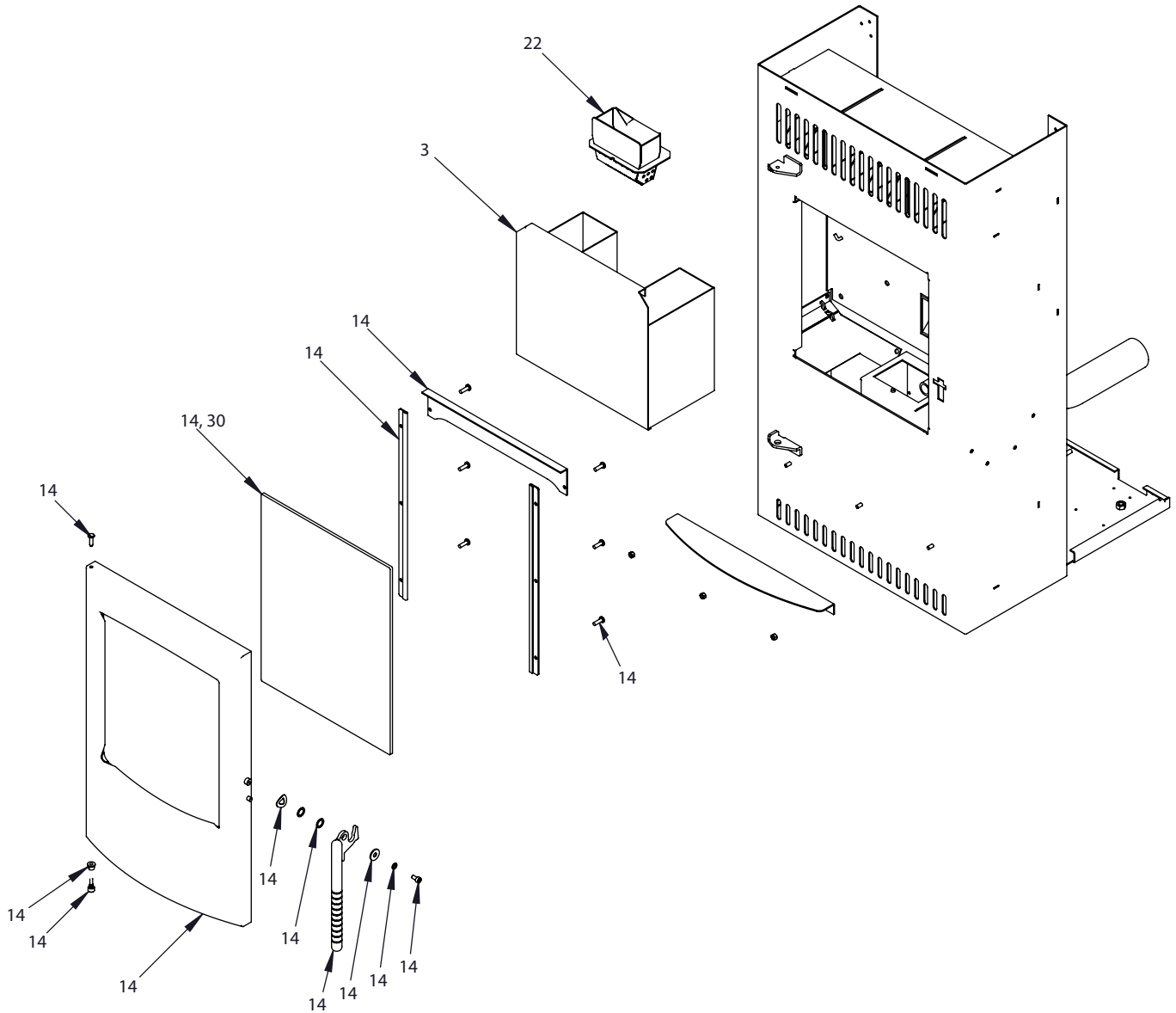
ENGLISH

PROBLEM	CAUSE	SOLUTION
Fuel not feeding, vacuum and hopper lid signal present on the control.	Auger is obstructed Auger not working	Remove auger from housing and clean obstruction first. Enter the diagnostic area in the controller and highlight the circle next to "feeding". This should cycle the auger and feed pellets. Replace auger if necessary
Fuel not feeding, no hopper lid signal on control	Hopper lid is open Hopper lid switch not functioning correctly	Close hopper door. Enter the diagnostic area on the controller; circle next to "limit" should be highlighted when the hopper lid is closed. The circle will be unshaded if the hopper lid is opened. Check hopper door seal. Replace hopper safety switch if not operating properly.
PROBLEM	CAUSE	SOLUTION
Fire burns lazy and smoky	Stove is dirty Poor quality fuel	Clean fire pot. Clean ash pan. Clean exhaust vent system. Clean stove through cover plate clean-out hole. Increase exhaust motor voltage.
PROBLEM	CAUSE	SOLUTION
Feeds fuel will not light all; control indicators are on	Igniter tube or burn pot plugged with ash, Faulty igniter	Clean fire pot, clean igniter tube. Verify igniter adjustment. Only the wire leads should be out of the igniter retainer. Enter the diagnostic area in the controller and test the igniter by highlighting "fire". You should feel heat coming from the igniter holder within two minutes. Replace if necessary

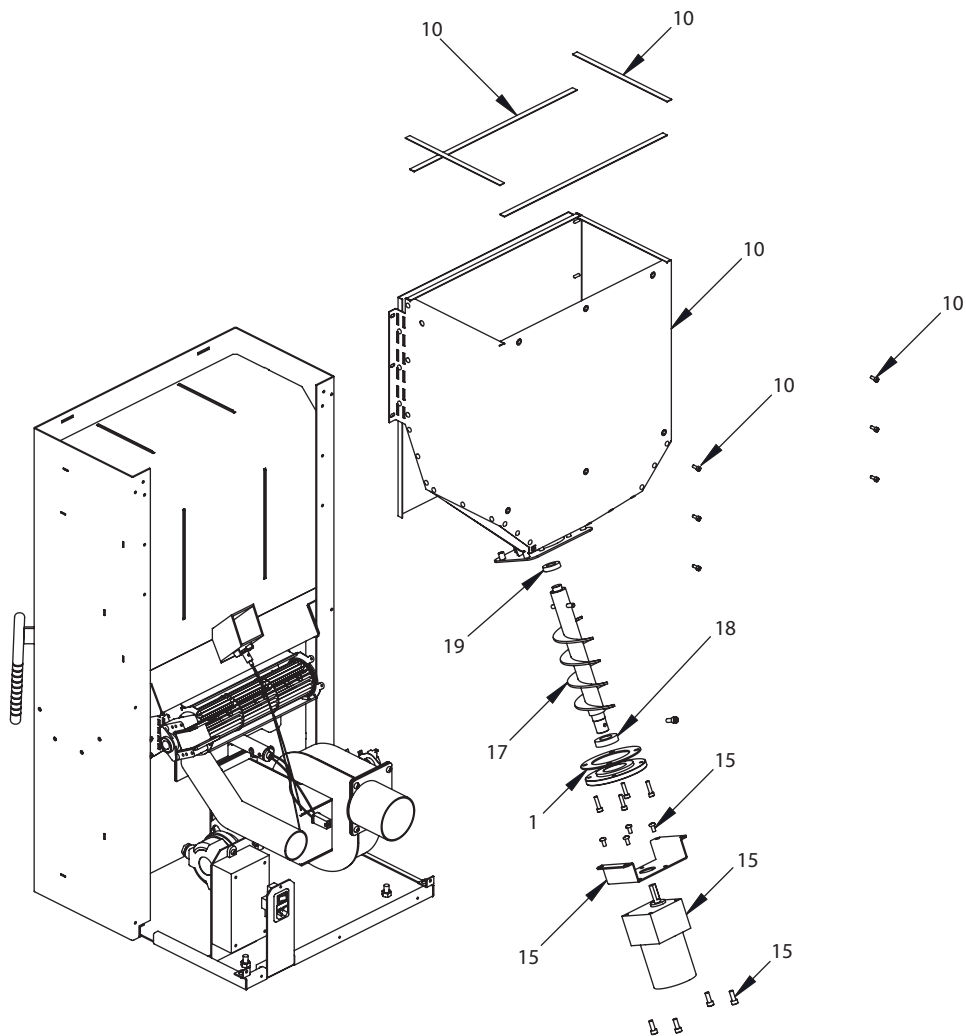
ILLUSTRATED PARTS BREAKDOWN



ILLUSTRATED PARTS BREAKDOWN



ILLUSTRATED PARTS BREAKDOWN



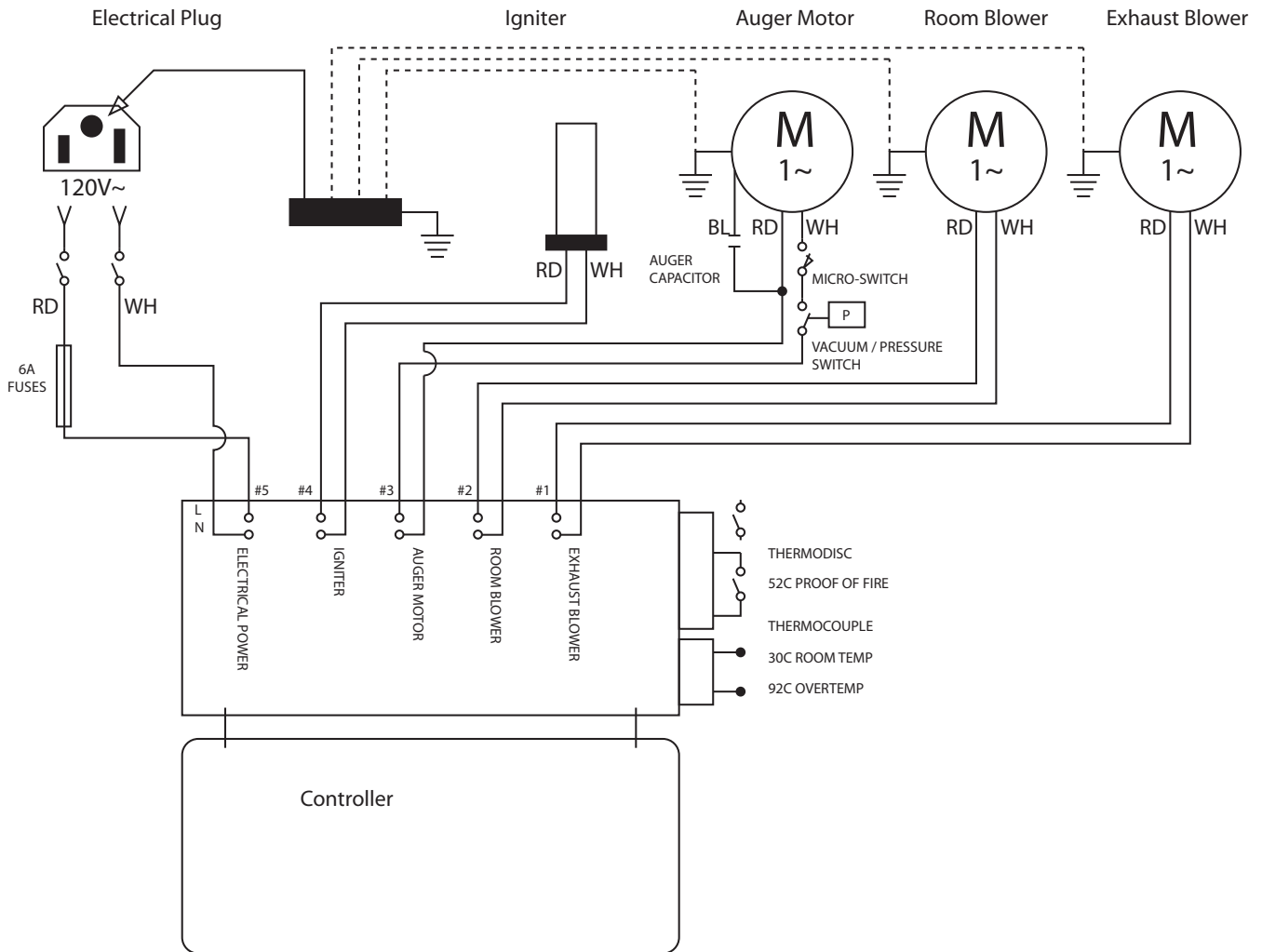


ILLUSTRATED PARTS BREAKDOWN

ENGLISH

ITEM #	PART #	DESCRIPTION	QTY.
1	12225	GASKET AUGER HOUSING HPS FEED SYSTEM	1
2	720110	EXHAUST BLOWER	1
3	16135	ASH PAN WELDMENT	1
4	16278	PANEL RIGHT REPLACEMENT KIT	1
5	16279	PANEL LEFT REPLACEMENT KIT	1
6	16280	PANEL BACK REPLACEMENT KIT	1
7	16281	TOP AND HOPPER WELDMENT LID REPLACEMENT KIT	1
8	720238	VACUUM SWITCH	1
9	720103	52C SENSOR REPLACEMENT	1
10	16284	KIT HOPPER ASSEMBLY REPLACEMENT	1
11	21565	ROOM BLOWER REPLACEMENT KIT	1
12	720055	HOPPER LID SWITCH	1
13	720106	SENSOR TEMPERATURE 92 DEG C	1
14	720204	DOOR ASSEMBLY REPLACEMENT KIT	1
15	720107	AUGER MOTOR HPS & SERENITY	1
16	720216	ADJUSTABLE FOOT	4
17	720219	WELDMENT AUGER FEED SYSTEM	1
18	720220	BEARING LOWER AUGER	1
19	720221	BEARING UPPER AUGER	1
20	720227	POWER SUPPLY SWITCH REPLACEMENT KIT	1
21	720229	HOPPER HANDLE REPLACEMENT	1
22	720235	FIREPOT WELDMENT	1
23	18522	EXHAUST MOTOR GASKET KIT	1
24	720298	CONTROL HEAD REPLACEMENT KIT	1
25	720304	INTERFACE MODULE REPLACEMENT KIT	1
26	720307	IGNITER REPLACEMENT KIT	1
27	720308	COLLAR IGNITER RETAINER REPLACEMENT KIT	1
28	13512	LEAD, PIGTAIL, 30C ROOM SENSOR	1
29	28663	BRACKET, MOUNTING 30C ROOM SENSOR	1
30	720242	GLASS HPS10 & SERENITY	1
31	11090	PIGTAIL LEAD 52 FOR 10IC SERENITY	1
32	11721	REMOTE CONTROL	1
33	12283	TUBE VACUUM SWITCH PORT	1
34	12429	BRACKET CONTROLLER	1
35	11392	PIGTAIL LEAD VACUUM SWITCH	1
36	23063	COMPLETE WIRING HARNESS SERENITY	1
37	28662	VACUUM SWITCH 0.05 WC	1

WIRING DIAGRAM





Serenity Pellet Stove

ENGLISH

Efficiency

Efficiency is the measure of an appliance's efficacy in converting energy input in the form of fuel to energy output in the form of heat. Discrepancies in heating efficiency in the marketplace are not uncommon. When determining efficiency values for wood heaters, higher heating value (HHV) is preferred to lower heating value (LHV) which ignores the heat of vaporization of the water vapor that is inherent to the combustion of wood fuel.

Your Serenity™ pellet heater's efficiency will be influenced by factors such as where it is installed, what fuels are used, and how it is operated. To maximize the efficiency of your Serenity™ pellet heater, the following recommendations should be followed:

- Select fuels that are low in moisture. Burning fuels high in moisture draws heat from the fuel and tends to cool the appliance, robbing heat from your home. Pellets that meet or exceed PFI Premium Grade standards are recommended, in part, because they have a low moisture content.

- The efficient combustion of any fuel source is reliant on a proper balance of fuel and oxygen. This principle holds true for your Serenity™ wood heater and the wood pellets that it burns. Burning at a low setting inherently limits oxygen supply. Constant operation at the lowest burn setting will result in a lower efficiency than if the stove were operated at medium and high burn rates.
- This wood heater is most efficient when installed in a main living area. Installation in basement locations will result in some heat being lost to the surrounding earth through foundation walls. Outdoor installation or installation in unenclosed rooms where heat is readily lost to the environment is discouraged.

EPA Certified Emissions:	1.00 grams / hr.
*HHV Tested Efficiency:	78.2%
**BTU Output Range:	12,808 - 26,493 BTU / hr.
***BTU Input:	35,660 BTU / hr.
Fuel:	Wood Pellets (PFI Premium or better)
* Weighted average HHV efficiency using data collected during EPA emission test.	
** A range of BTU outputs based on measured efficiency and burn rates from EPA testing at low and high burn rate settings using HHV.	
*** Based on tested per-hour feed rate on high setting multiplied by tested 8528 BTU/hr. content of pellets used for emissions testing.	

Fire Safety

Carbon monoxide (CO) is a potentially deadly gas that results from unideal combustion. CO is generated when fuels have insufficient air available to completely combust a fuel source. To minimize the production of CO, ensure that your Serenity™ wood heater is properly cleaned and maintained, that the air intake damper is set properly (not too wide or too open), and that the air intake remains free from obstructions.

Make sure your home has working smoke and CO detectors. These detectors should be installed and maintained in accordance with manufacturer's recommendations. Additionally, it is recommended that CO monitors be located in areas that are expected to generate CO. Such areas include heater fueling areas, pellet fuel bulk storage areas, sheds containing hydronic heaters, and rooms where heaters are located.

Burn Rate (kg/hr) (Dry)	CO Emissions (g/hr)	Heating Efficiency (% HHV)	Heat Output (Btu/hr)
High - 1.98	0.0	74.4	26,493
Medium - 1.43	0.0	79.4	20,415
Low - 0.92	0.0	77.2	12,808
Overall - 1.27	0.0	78.2	17,828



SERENITY™ BY CASTLE™ PRODUCT WARRANTY: LIMITED ONE-YEAR WARRANTY

Ardisam Inc., a manufacturing company, warrants this Castle Pellet stove to be free from defects in the material and workmanship for a period of one year. During that one-year period, Ardisam Inc. will, at their discretion, furnish parts to correct any defect caused by faulty material or workmanship. For other warranty repairs, please read the one-year warranty listed below.

All electrical components, such as but not limited to blowers, wiring, vacuum switches, speed controls, control boxes, switches, pilot assemblies, thermostats and igniters, are covered under this one-year warranty. All warranty replacement of parts is the owner's responsibility.

The manufacturer makes no written or implied performance warranty, having no control of fuel type, installation or daily operation and maintenance. Specifically there is no warranty on the paint, glass, burn pot, fire brick, seals or gaskets.

All cost of removal, shipment to and from the dealer or manufacturer, any loss during shipment and reinstallation and any other losses due to the stove being removed shall be the owner's responsibility.

THIS WARRANTY IS LIMITED TO DEFECTIVE PARTS AND DOES NOT COVER DAMAGE TO PARTS CAUSED BY IMPROPER INSTALLATION, IMPROPER MAINTENANCE OR THE LACK OF, AND IMPROPER USE OR OVER FIRING. REPAIR AND/OR REPLACEMENT IS AT THE DISCRETION OF ARDISAM, INC. AND EXCLUDES ANY INCIDENTAL AND CONSEQUENTIAL DAMAGES CONNECTED THEREWITH.

This warranty is not transferable and supersedes all other warranties either expressed or implied and all other obligations to liabilities on our part. Ardisam Inc. does not assume, and does not authorize any other person to assume for us, any liability in connection with the sale of our products. The warranty applies only to products which have not been subjected to negligent use, misuse, alteration, or accident. This guarantee is void unless the warranty card is properly filled out and returned to Ardisam Inc. Cumberland, WI, within 30 days of purchase. To obtain warranty service and/or replacement instructions, contact the customer service department at 800-345-6007 Monday through Friday from 8 a.m. to 5 p.m. or visit www.castlepelletstoves.com. If you choose to ship your product to Ardisam™ for warranty repair, you must first have prior approval from Ardisam™ by calling our customer service department at 800-345-6007 for a return material authorization number (RMA#). Under these circumstances, all items must be shipped pre-paid. Ardisam™ will at no charge, repair or replace, at their discretion, any defective part which falls under the conditions stated above. Ardisam™ retains the right to change models, specifications and price without notice. Ardisam shall not be obligated to ship any repair or replacement product to any location outside of the United States of America or Canada. Some states and countries do not allow the limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and country to country.



Castle Stoves™, Division of Ardisam, Inc.
1730 Industrial Avenue, PO Box 666
Cumberland, WI 54829
800-345-6007 | Fax 715-822-2223
E-mail: info@castlestoves.com



Manuel de l'utilisateur

Poêle à granules Serenity

Modèle 41278

FRANÇAIS

CAUTION

**DO NOT DISCARD MANUAL!
IMPORTANT OPERATING AND
MAINTENANCE INSTRUCTIONS
INCLUDED.**



**SAVE THESE INSTRUCTIONS AND
LEAVE THIS MANUAL WITH ANY
PERSON RESPONSIBLE FOR USE AND
OPERATION.**

ATTENTION NE PAS JETER!

**IMPORTANTES INSTRUCTIONS
D'UTILISATION ET D'ENTRETIEN
INCLUSES.
CONSERVEZ CES INSTRUCTIONS
ET LAISSEZ CE MANUEL À TOUTE
PERSONNE RESPONSABLE
DE L'UTILISATION ET DU
FONCTIONNEMENT.**

WARNING

**PLEASE READ THIS ENTIRE
MANUAL BEFORE INSTALLATION
AND USE OF THIS PELLET
FUEL-BURNING ROOM HEATER.
FAILURE TO FOLLOW THESE
INSTRUCTIONS COULD RESULT
IN PROPERTY DAMAGE, BODILY
INJURY OR EVEN DEATH.**

AVERTISSEMENT

**VEUILLEZ LIRE CE MANUEL EN
ENTIER AVANT D'INSTALLER
ET D'UTILISER CET APPAREIL
DE CHAUFFAGE AUTONOME À
GRANULES, AFIN D'ÉCARTER LES
RISQUES DE DÉGÂTS MATÉRIELS,
DE BLESSURES CORPORELLES,
VOIRE DE MORT.**



CAUTION

**CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS
AND INSTALLATION INSPECTION REQUIREMENTS FOR YOUR AREA.**

ATTENTION

**CONSULTER LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX
CONCERNANT LES RESTRICTIONS ET LES EXIGENCES D'INSPECTION
D'INSTALLATION EN VIGUEUR.**



AVERTISSEMENTS ET MESURES DE PRÉCAUTION

Responsabilité du propriétaire

- L'assemblage correct et l'utilisation sûre et efficace du poêle relèvent de la responsabilité du propriétaire.
- Lire et suivre toutes les instructions de sécurité.
- Suivre avec attention toutes les instructions d'assemblage.
- Entretenir le poêle conformément aux instructions et au calendrier figurant dans le manuel de l'utilisateur Castle.
- S'assurer que quiconque utilise le poêle est familiarisé avec toutes les commandes et mesures de précaution.

Messages spéciaux

Ce manuel contient des messages spéciaux attirant l'attention sur des problèmes de sécurité et dommages potentiels au poêle, ainsi que des informations utiles sur le fonctionnement et l'entretien. Veiller à lire toutes ces informations avec attention pour éviter les blessures et les dommages au poêle.

REMARQUE : Des informations générales sont fournies à travers ce manuel pouvant aider l'opérateur dans l'utilisation ou l'entretien du poêle.

PRÉCAUTIONS DE SÉCURITÉ IMPORTANTES

Veiller à lire cette section avec attention. Utiliser le poêle conformément aux instructions et conseils de sécurité fournis ici et tout au long du manuel. Quiconque utilise ce poêle doit lire les instructions et être familiarisé avec les commandes.



CE SYMBOLE SIGNE DES INSTRUCTIONS DE SÉCURITÉ IMPORTANTES QUI DOIVENT ÊTRE RESPECTÉES POUR NE PAS METTRE EN DANGER LA SÉCURITÉ DES PERSONNES. LIRE ET RESPECTER TOUTES LES INSTRUCTIONS DU MANUEL AVANT DE TENTER DE FAIRE FONCTIONNER CET APPAREIL.



DANGER

DANGER INDIQUE QUE DES BLESSURES GRAVES OU LA MORT RÉSULTERAIENT SI LES INSTRUCTIONS DE SÉCURITÉ QUI SUIVENT CE MOT-INDICATEUR NE SONT PAS RESPECTÉES.



AVERTISSEMENT

AVERTISSEMENT INDIQUE QUE DES BLESSURES GRAVES OU LA MORT POURRAIENT RÉSULTER SI LES INSTRUCTIONS DE SÉCURITÉ QUI SUIVENT CE MOT-INDICATEUR NE SONT PAS RESPECTÉES.



ATTENTION

ATTENTION INDIQUE LE RISQUE DE BLESSURES OU DE DOMMAGES MATÉRIELS SI LES INSTRUCTIONS DE SÉCURITÉ QUI SUIVENT CE MOT-INDICATEUR NE SONT PAS RESPECTÉES.



IMPORTANT

IMPORTANT SIGNE DES INFORMATIONS UTILES CONCERNANT L'ASSEMBLAGE, L'UTILISATION OU L'ENTRETIEN DU MATÉRIEL.



AVERTISSEMENT

VEILLER À LIRE, À COMPRENDRE ET À RESPECTER TOUTES LES INSTRUCTIONS DE SÉCURITÉ ET D'UTILISATION FIGURANT DANS CE MANUEL AVANT DE TENTER D'INSTALLER ET DE FAIRE FONCTIONNER LE POÊLE.

TOUT MANQUEMENT À OBSERVER LES INSTRUCTIONS DE SÉCURITÉ ET D'UTILISATION PEUT PROVOQUER DES BLESSURES CORPORELLES GRAVES POUR L'UTILISATEUR ET D'AUTRES PERSONNES PRÉSENTES ET DES DÉGÂTS MATÉRIELS. LE TRIANGLE DANS LE TEXTE SIGNIFIE QUE DES MISES EN GARDES ET AVERTISSEMENTS IMPORTANTS DOIVENT ÊTRE SUIVIS.



AVERTISSEMENT



POUR ÉCARTER LES RISQUES DE DÉGÂTS MATÉRIELS, DE BLESSURES CORPORELLES, VOIRE DE MORT, VEILLER À LIRE CE MANUEL EN ENTIER AVANT D'INSTALLER ET D'UTILISER CET APPAREIL DE CHAUFFAGE AUTONOME À GRANULES.

NE PAS ENTREPOSER NI UTILISER D'ESSENCE OU AUTRES LIQUIDES ET VAPEURS INFLAMMABLES AU VOISINAGE DE CET APPAREIL OU DE TOUT AUTRE.

NE PAS FAIRE SURCHAUFFER - SI UNE PARTIE EXTÉRIEURE COMMENCE À ROUGEoyer, LE POÊLE EST SURCHAUFFÉ. RÉDUIRE LE TAUX D'ALIMENTATION. LA SURCHAUFFE ANNULE LA GARANTIE.

RESPECTER TOUS LES DÉGAGEMENTS MINIMUM SPÉCIFIÉS PAR RAPPORT AUX MATÉRIAUX COMBUSTIBLES AFIN D'ÉCARTER LES RISQUES D'INCENDIE.



AVERTISSEMENT



SURFACE CHAUDE! NE PAS TOUCHER! DANGER DE BRÛLURES GRAVES. LES VÊTEMENTS PEUVENT S'ENFLAMMER. LA VITRE ET LES AUTRES SURFACES SONT CHAUDES DURANT LE FONCTIONNEMENT ET LE REFROIDISSEMENT.

TENIR LES ENFANTS À L'ÉCART.

SURVEILLER AVEC ATTENTION LES ENFANTS PRÉSENTS DANS LA MÊME PIÈCE QUE L'APPAREIL.

NE PAS FAIRE FONCTIONNER AVEC DES ÉLÉMENTS PROTECTEURS OUVERTS OU DÉMONTÉS.

TENIR LES VÊTEMENTS, LE MOBILIER, LES RIDEAUX ET AUTRES MATÉRIAUX COMBUSTIBLES À L'ÉCART.



ATTENTION

CONSULTER LES CODES DU BÂTIMENT AVANT L'INSTALLATION. S'ADRESSER AUX AUTORITÉS RÉGLEMENTAIRES AVANT L'INSTALLATION POUR DÉTERMINER SI UN PERMIS EST NÉCESSAIRE.

L'INSTALLATION DOIT IMPÉRATIVEMENT ÊTRE CONFORME À TOUS LES CODES ET RÉGLEMENTATIONS EN VIGUEUR.

CONSULTER LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX CONCERNANT LES RESTRICTIONS ET LES EXIGENCES D'INSPECTION D'INSTALLATION EN VIGUEUR.

TESTÉ ET APPROUVÉ POUR LE COMBUSTIBLE EN GRANULES. LA COMBUSTION DE TOUT AUTRE TYPE DE COMBUSTIBLE ANNULE LA GARANTIE.



ATTENTION



NE PAS JETER!

IMPORTANTES INSTRUCTIONS D'UTILISATION ET D'ENTRETIEN INCLUSES.

VEILLER À LIRE, COMPRENDRE ET RESPECTER CES INSTRUCTIONS POUR ASSURER UNE INSTALLATION ET UN FONCTIONNEMENT SÛRS.

LAISSER CE MANUEL À LA PERSONNE RESPONSABLE DE L'UTILISATION ET DU FONCTIONNEMENT.



AVERTISSEMENT

AVERTISSEMENT INDIQUE QUE DES BLESSURES GRAVES OU LA MORT POURRAIENT RÉSULTER SI LES INSTRUCTIONS DE SÉCURITÉ QUI SUIVENT CE MOT-INDICATEUR NE SONT PAS RESPECTÉES.

LIRE CE MANUEL EN ENTIER AVANT D'INSTALLER ET D'UTILISER CE POÊLE À GRANULES. TOUT MANQUEMENT À RESPECTER LES INSTRUCTIONS PEUT PROVOQUER DES DÉGÂTS MATÉRIELS, DES BLESSURES CORPORELLES, VOIRE LA MORT.

LES ENFANTS ET LES ADULTES DOIVENT ÊTRE ALERTÉS DES DANGERS DE HAUTE TEMPÉRATURE DES SURFACES ET SE TENIR À L'ÉCART POUR ÉVITER LE CONTACT AVEC LES PEAU ET LES VÊTEMENTS.

LES JEUNES ENFANTS DOIVENT ÊTRE SURVEILLÉS AVEC ATTENTION S'ILS SONT DANS LA MÊME PIÈCE QUE LE POÊLE.

NE PAS PLACER DE VÊTEMENTS NI D'AUTRES MATIÈRES INFLAMMABLES SUR OU PRÈS DE CET APPAREIL.

NE JAMAIS UTILISER DE LIQUIDES INFLAMMABLES OU EXPLOSIFS TELS QUE L'ESSENCE, LE NAPHTA, L'ALCOOL OU L'HUILE MOTEUR À L'INTÉRIEUR OU AU VOISINAGE DU POÊLE. CES LIQUIDES DOIVENT ÊTRE ENTREPOSÉS DANS UNE PIÈCE SÉPARÉE CAR LA FLAMME NUE DANS LE FOYER PEUT ENFLAMMER LEURS VAPEURS.

NE PAS BRÛLER DE DÉCHETS DANS CET APPAREIL. LA COMBUSTION D'AUTRES COMBUSTIBLES SOLIDES TELS QUE LE BOIS EN BÛCHES OU EN COPEAUX DANS CE POÊLE N'EST PAS PERMISE. LA COMBUSTION DE TOUT COMBUSTIBLE NON CERTIFIÉ PAR CASTLE PELLET STOVES DANS CE POÊLE A POUR EFFET D'ANNULER LA GARANTIE.

NE PAS FAIRE PASSER LE CORDON ÉLECTRIQUE PAR DES ENDROITS DE GRANDE CIRCULATION. UN SYSTÈME DE PROTECTION CONTRE LES SURTENSIONS RACCORDÉ À SOURCE ÉLECTRIQUE DE 120 V AVEC TERRE EST REQUIS.



AVERTISSEMENT

NE PAS POSER DE REGISTRE DE TIRAGE DANS LE SYSTÈME D'ÉVACUATION DE L'APPAREIL.

NE PAS RACCORDER CET APPAREIL À UN CONDUIT DE FUMÉE UTILISÉ POUR UN AUTRE APPAREIL.

NE PAS INSTALLER DANS UNE CHAMBRE À COUCHER.

NE PAS RACCORDER À UN AUTRE CONDUIT OU SYSTÈME DE DISTRIBUTION D'AIR.

- NE PAS RACCORDER DIRECTEMENT À UNE CHEMINÉE EN MAÇONNERIE.

- NE PAS FAIRE DÉBOUCHER L'ÉVACUATION DANS UN ESPACE FERMÉ OU SEMI-FERMÉ TEL QU'UN ABRI À VOITURE, GARAGE, GRENIER, VIDE SANITAIRE, SOLARIUM, GALERIE, PASSAGE PIÉTON OU AUTRE ENDROIT FERMÉ, NI DANS AUCUN ENDROIT OÙ LES FUMÉES PEUVENT S'ACCUMULER TEL QU'UNE CAGE D'ESCALIER, UN PASSAGE COUVERT, ETC.

- NE JAMAIS TOUCHER LES LOQUETS DE PORTE ALORS QUE LE POÊLE EST ALLUMÉ, ILS DEVIENNENT EXTRÊMEMENT CHAUDS.

CE POÊLE DOIT ÊTRE INSTALLÉ CORRECTEMENT POUR ASSURER UN FONCTIONNEMENT SÛR ET EFFICACE. UNE MAUVAISE INSTALLATION DE CE PRODUIT PEUT ENTRAÎNER UN INCENDIE ET DES BLESSURES CORPORELLES.

VEILLER À RESPECTER TOUS LES CODES DU BÂTIMENT EN VIGUEUR LOCALEMENT. AUX ENDROITS OÙ LE CODE DU BÂTIMENT PRÉVOIT, POUR L'INSTALLATION DE CE PRODUIT, DES ÉTAPES SUPPLÉMENTAIRES NE FIGURANT PAS DANS CE MANUEL, LE CODE DU BÂTIMENT PRÉVAUT ET DOIT ÊTRE RESPECTÉ. S'ADRESSER À L'INSPECTEUR EN BÂTIMENT LOCAL POUR OBTENIR TOUS LES PERMIS OU LES RÈGLES D'INSPECTION NÉCESSAIRES AVANT D'INSTALLER LE PRODUIT.



ATTENTION

VEILLER À RESPECTER TOUS LES CODES DU BÂTIMENT EN VIGUEUR LOCALEMENT. AUX ENDROITS OÙ LE CODE DU BÂTIMENT PRÉVOIT, POUR L'INSTALLATION DE CE PRODUIT, DES ÉTAPES SUPPLÉMENTAIRES NE FIGURANT PAS DANS CE MANUEL, LE CODE DU BÂTIMENT PRÉVAUT ET DOIT ÊTRE RESPECTÉ. S'ADRESSER À L'INSPECTEUR EN BÂTIMENT LOCAL POUR OBTENIR TOUS LES PERMIS OU LES RÈGLES D'INSPECTION NÉCESSAIRES AVANT D'INSTALLER LE PRODUIT.

CONSULTER LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX CONCERNANT LES RESTRICTIONS ET LES EXIGENCES D'INSPECTION D'INSTALLATION EN VIGUEUR.

S'ADRESSER AUX AUTORITÉS LOCALES (SERVICE DE LA CONSTRUCTION MUNICIPAL, SERVICE D'INCENDIE, BUREAU DE LA PRÉVENTION DES INCENDIES, ETC.) POUR DÉTERMINER SI UN PERMIS EST NÉCESSAIRE.

LE POÊLE À GRANULES CASTLE PELLET STOVES EST CONÇU POUR BRÛLER UNIQUEMENT DES COMBUSTIBLES EN GRANULES.

UN DÉTECTEUR DE FUMÉE EN ÉTAT DE MARCHÉ DOIT ÊTRE INSTALLÉ DANS LA MÊME PIÈCE QUE LE POÊLE.

CE POÊLE N'EST PAS DESTINÉ À UNE UTILISATION DANS DES APPLICATIONS COMMERCIALES.

LA PORTE ET LE CENDRIER DOIVENT ÊTRE FERMÉS ET VERROUILLÉS DURANT LE FONCTIONNEMENT.

VEILLER À INFORMER L'ASSURANCE DE L'INSTALLATION DU POÊLE À GRANULES.

CETTE INSTALLATION DOIT ÊTRE CONFORME AUX CODES LOCAUX. EN L'ABSENCE DE CODES LOCAUX, ELLE DOIT ÊTRE CONFORME À ASTM E1509, (UM) 84-HUD, ULC/ORDC-1482 ET UCL S627-2000.

L'INTÉGRITÉ STRUCTURELLE DU PLANCHER, DES MURS ET DU PLAFOND/TOIT DES MAISONS MANUFACTURÉES DOIT ÊTRE PRÉSERVÉE.

GARDER LES MATIÈRES COMBUSTIBLES (HERBES, FEUILLES, ETC.) À 1 MÈTRE AU MOINS DE LA BOUCHE D'ÉVACUATION DE FUMÉE SUR L'EXTÉRIEUR DU BÂTIMENT.

CE POÊLE NE DOIT PAS ÊTRE UTILISÉ EN TANT QU'UNIQUE SOURCE DE CHAUFFAGE DE LA MAISON. LES COUPURES D'ÉLECTRICITÉ ET L'ENTRETIEN PÉRIODIQUE RÉSULTERAIENT EN UNE PERTE TOTALE DE CHAUFFAGE.

NE PAS LAISSER LE COUVERCLE DE TRÉMIE OUVERT.



ATTENTION

L'INSTALLATION ET LES RÉPARATIONS DE CE POÊLE À GRANULES DOIVENT ÊTRE CONFIEES À UN TECHNICIEN D'ENTRETIEN QUALIFIÉ. L'APPAREIL DOIT ÊTRE INSPECTÉ AVANT UTILISATION ET AU MOINS UNE FOIS PAR AN PAR UN TECHNICIEN D'ENTRETIEN QUALIFIÉ. IL EST IMPÉRATIF QUE LES COMPARTIMENTS DE COMMANDE, LE FOYER ET LES CANAUX DE CIRCULATION D'AIR DU POÊLE SOIENT MAINTENUS PROPRES.

L'UTILISATION DE VENTILATEURS D'EXTRACTION TELS QUE LES VENTILATEURS DE SALLE DE BAIN OU DE GRENIER PEUT PRIVER LE POÊLE À GRANULES D'AIR DE COMBUSTION EN CRÉANT UNE DÉPRESSION DANS LA PIÈCE. PRÉVOIR UNE VENTILATION SUFFISANTE DE LA PIÈCE OÙ SE TROUVE LE POÊLE À GRANULES. SINON, LE MANOCONTACT PEUT COUPER LE FONCTIONNEMENT DU POÊLE À GRANULES.

LES PIÈCES EN MOUVEMENT DE CE POÊLE SONT ENTRAÎNÉES PAR DES MOTEURS ÉLECTRIQUES DE COUPLE ÉLEVÉ. CES PIÈCES PEUVENT CAUSER DE GRAVES BLESSURES AUX PARTIES DU CORPS QUI S'EN APPROCHENT. GARDER TOUTES LES PARTIES DU CORPS À L'ÉCART DE LA VIS SANS FIN ET DES VENTILATEURS LORSQUE LE POÊLE EST BRANCHÉ SUR UNE PRISE ÉLECTRIQUE. CES PIÈCES PEUVENT SE METTRE EN MOUVEMENT À TOUT MOMENT QUAND LE POÊLE EST BRANCHÉ.

LES SURFACES DU CONDUIT D'ÉVACUATION PEUVENT ÊTRE SUFFISAMMENT CHAUDES POUR CAUSER DES BRÛLURES AU TOUCHER. UN ÉCRAN OU DES PROTECTIONS NON COMBUSTIBLES PEUVENT ÊTRE REQUIS.

POSER LE CONDUIT D'ÉVACUATION EN RESPECTANT LES DÉGAGEMENTS SPÉCIFIÉS PAR LE FABRICANT.

TOUS LES RACCORDS D'ÉVACUATION, QU'ILS SOIENT VERTICAUX OU HORIZONTAUX, DOIVENT ÊTRE RENDUS ÉTANCHES AUX GAZ À L'AIDE DE PRODUITS D'ÉTANCHÉITÉ RECOMMANDÉS PAR LE FABRICANT DE L'ÉVACUATION.

EN VERTU DES EXIGENCES HUD (HOUSING & URBAN DEVELOPMENT), SI CE POÊLE EST INSTALLÉ DANS UNE MAISON MOBILE, IL DOIT ÊTRE MIS À LA MASSE PAR RACCORDEMENT DIRECT AU CHÂSSIS EN ACIER DE LA MAISON ET BOULONNÉ AU PLANCHER. UNE ARRIVÉE D'AIR DIRECTE DOIT ÊTRE PRÉVUE, UTILISER UN NÉCESSAIRE AIR FRAIS.

À UTILISER AUX ÉTATS-UNIS ET AU CANADA. HOMOLOGUÉ POUR UNE INSTALLATION DANS DES MAISONS MOBILES.

CASTLE PELLET STOVES, LE FABRICANT DE CET APPAREIL, SE RÉSERVE LE DROIT DE MODIFIER SES PRODUITS, LEURS CARACTÉRISTIQUES OU LEURS PRIX SANS PRÉAVIS.

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Poêle à granules Serenity

ENREGISTREMENT ET REGISTRE D'ENTRETIEN

Noter le numéro de modèle et le numéro de série dans l'espace prévu pour toujours les avoir à disposition. Complétez et envoyez par courrier postal la carte d'enregistrement trouvée dans le paquet de pièces ou effectuez l'enregistrement en ligne à www.castlepelletstoves.com. La garantie est valable uniquement si l'enregistrement dûment rempli est reçu par Castle dans les 30 jours après l'achat.

RENSEIGNEMENTS SUR LE PROPRIÉTAIRE		
Nom du revendeur :		
Adresse du revendeur :		
Ville :	État/Province :	Code postal :
Numéro de modèle :	Numéro de série :	
Date d'achat :		
Notes :		

FRANÇAIS

DATE	TECHNICIEN D'ENTRETIEN	DESCRIPTION DE L'OPÉRATION D'ENTRETIEN

INTRODUCTION

Nous vous félicitons pour votre investissement dans la qualité. Merci d'avoir acheté un poêle à granules Castle. Nous sommes attachés à ce que ce poêle à granules réponde aux plus hautes normes d'utilisation et de durabilité. Moyennant des soins corrects, il offrira de nombreuses années de service fiable. Lire le manuel en entier avant installation et utilisation.

Combustion de granules

Les cendres doivent être enlevées du poêle à intervalles réguliers. Voir la procédure de nettoyage dans la section Soins et entretien courants. En raison de la nature des combustibles en granules, ce poêle nécessite une attention périodique. Le nettoyage régulier est un aspect important de la combustion de granules.

Granules

- Ce poêle à granules est conçu et homologué pour brûler des granules de bois conformes aux normes de l'industrie en la matière, d'une densité minimale de $0,64 \text{ g/cm}^3$ (40 lb/pi^3), d'un diamètre de 6,4 à 8 mm (1/4 à 5/16 po), d'une longueur maximale de 38 mm (1,5 po) et de moins de 1 % de cendre.
- Les performances du poêle dépendent grandement du type et de la qualité des granules de bois. Comme le rendement thermique des diverses qualités de granules de bois varie, les performances et le rendement thermique du poêle varient en conséquence.
- Les granules de bois sont généralement produits à partir de déchets de bois tels que la sciure et les copeaux. Cette matière première est séchée, fractionnée mécaniquement puis extrudée en granules sous haute pression. Les granules de bois doivent être protégés contre l'exposition directe à l'eau. L'eau issue de la condensation ou de l'humidité ambiante provoque le gonflement et l'éclatement des granules en un combustible inutilisable. Garder le combustible au sec.
- Il est important de sélectionner et d'utiliser uniquement des granules bien secs et exempts de saleté et de débris. L'emploi d'un combustible sale est préjudiciable au fonctionnement et aux performances de l'appareil et a pour effet d'annuler la garantie. Le Pellet Fuel Institute (PFI) a établi des normes pour les fabricants de granules de bois. Utiliser uniquement des granules conformes ou supérieurs aux normes PFI pour les granules combustibles de qualité supérieure. Les granules qui contiennent du papier coloré, du carton, des solvants, des ordures, des débris et autres déchets non ligneux devront être évités.

Ne pas brûler : ordures; déchets de tonte ou de jardinage; matériaux contenant du caoutchouc, y compris des pneus; matériaux contenant du plastique; déchets de produits pétroliers, peintures et diluants ou produits bitumineux; matériaux contenant de l'amiante; débris de construction ou de démolition; traverses de chemin de fer ou bois traité sous pression; fumier ou restes d'animaux; produits papetiers, carton, contreplaqué ou panneau de particules.

Scories

- Les impuretés, telles que la silice (scories), doivent être régulièrement nettoyées et enlevées du poêle à granules. Les scories forment une masse dure qui bloque la circulation d'air à travers les parois de la boîte à feu. Les combustibles de haute qualité produisent moins de scories.

Fonctions de sécurité automatiques

Panne d'électricité

Durant une panne d'électricité, le poêle s'éteint en toute sécurité. Ne pas ouvrir la porte principale ni le cendrier. Durant une coupure d'électricité, le ventilateur d'extraction ne fonctionne pas. Le maintien des portes fermées permet un tirage naturel de la fumée vers l'extérieur. Lorsque l'électricité est rétablie, le poêle ne redémarre pas. Si la température des gaz d'évacuation est toujours de $49 \text{ }^\circ\text{C}$ ($120 \text{ }^\circ\text{C}$) au rétablissement du courant électrique, les ventilateurs d'extraction et d'air ambiant se mettent en marche jusqu'au refroidissement du poêle. Voir les instructions de redémarrage du poêle à la section « Fonctionnement ».

Surchauffe

Protection contre l'emballement : Si la combustion du poêle s'emballe ou devient trop chaude, les contacteurs de haute température arrêtent automatiquement le poêle pour éviter les dommages à ses composants. Le ventilateur d'extraction continue de fonctionner jusqu'au refroidissement du détecteur de flamme. Laisser le poêle refroidir avant de tenter de le rallumer. Pour de plus amples renseignements, voir la section « Fonctionnement ».



AVERTISSEMENT

EN CAS DE COUPURE D'ÉLECTRICITÉ ALORS QUE LE POÊLE EST CHAUD, GARDER TOUTES LES PORTES DU POÊLE FERMÉES.

LES FONCTIONS DE SÉCURITÉ AUTOMATIQUE NE DOIVENT PAS ÊTRE NEUTRALISÉES.



ATTENTION

LA COMBUSTION DE GRANULES DE BOIS CONFORMÉMENT AUX RECOMMANDATIONS ASSURERA UNE GRANDE DURABILITÉ DU POÊLE ET MOINS DE PROBLÈMES LIÉS AU COMBUSTIBLE.

L'UTILISATION DE GRILLES OU AUTRES MOYENS DE SUPPORT DU COMBUSTIBLE DANS CE POÊLE EST INTERDITE ET ANNULE TOUTES LES GARANTIES.

CARACTÉRISTIQUES

Numéro de modèle	Serenity 41278
Capacité de chauffage (1)	140 m ² (1500 p ²)
Alimentation électrique (2)	120 V, 60 Hz
Consommation électrique	402 W allumage 77 W fonctionnement
Capacité de combustible	18 kg (40 lb)
Diamètre d'évacuation (3)	76 mm (3 po)
Largeur	464 mm (18,25 po)
Hauteur	864 mm (34 po)
Profondeur	603 mm (23,75 po)
Poids	84 kg (186 lb)

- (1) Basé sur une maison post-1982 nécessitant 35 BTU/h par pied carré. Le rendement thermique dépend de la marque, du type et de la qualité du combustible et de sa teneur en humidité. Pour obtenir les meilleurs résultats, consulter le revendeur.
- (2) Installer suivant NFPA 70 et respecter tous les codes provinciaux et locaux, obtenir l'assistance d'un électricien agréé.
- (3) Installer suivant NFPA 211 et respecter tous les codes provinciaux et locaux, obtenir l'assistance d'un installateur agréé.

Étiquette d'homologation :



Testé suivant les normes suivantes : UL1482, ASTM E1509, ULC S627, and ASTM E2779, ASTM E2515, et CSA B415.1

Caractéristiques de la vitre

Ce poêle est équipé d'une vitre céramique de 5 mm. Remplacer la vitre uniquement par une vitre céramique de marque Castle Pellet Stoves. Pour les pièces de rechange, appeler le revendeur ou Castle au 1-800-345-6007.

REMARQUE CONCERNANT LA CONFORMITÉ

L'appareil de chauffage à granules Serenity de Castle est conforme aux limites d'émission de l'U.S. Environmental Protection Agency pour les appareils de chauffage à granules vendus après le 15 mai 2020.



ATTENTION

CETTE INSTALLATION DOIT ÊTRE CONFORME AUX CODES LOCAUX. EN L'ABSENCE DE CODES LOCAUX, ELLE DOIT ÊTRE CONFORME À ASTM E1509, ASTM E2779, UL 1482, ASTM E-2515, CSA B415.1, AND ULC S627.

CASTLE PELLET STOVES, LE FABRICANT DE CET APPAREIL, SE RÉSERVE LE DROIT DE MODIFIER SES PRODUITS ET LEURS CARACTÉRISTIQUES SANS PRÉAVIS.

S'ASSURER QUE LA TRÉMIE EST EXEMPTÉ DE TOUTE MATIÈRE ÉTRANGÈRE AVANT DE LA REMPLIR DE COMBUSTIBLE. LES MATIÈRES ÉTRANGÈRES PROVOQUENT DES BLOCAGES DE LA VIS SANS FIN ET ANNULENT LA GARANTIE.

Cet appareil de chauffage au bois nécessite un entretien et des réparations périodiques pour fonctionner correctement. En vertu des lois fédérales, il est interdit d'utiliser cet appareil de chauffage au bois de façon contraire aux instructions d'utilisation figurant dans ce manuel. Cet appareil de chauffage au bois présente un taux de combustion bas minimum qui est réglé par le fabricant et ne devra pas être modifié. En vertu des lois fédérales, il est interdit de modifier ce réglage ni d'utiliser autrement cet appareil de chauffage au bois de façon contraire aux instructions d'utilisation figurant dans ce manuel.

DÉBALLAGE

Le poêle Castle Serenity est livré partiellement assemblé. Enlever tout le matériau d'emballage et le ruban adhésif de l'intérieur du foyer. Décoller tout ruban adhésif de l'extérieur de la vitre. Ouvrir la trémie, retirer tout le matériel d'emballage, le sac de pièces, le sac manuel, le creuset de combustion, le contrôleur et le cordon d'alimentation. Un sac de pièces contenant une (1) télécommande, un (1) fusible de rechange, une (1) clé de 13 mm, une (1) clé hexagonale de 4 mm et quatre (4) pieds réglables est inclus pour votre commodité.

1. À l'aide de la clé de 13 mm, retirez les quatre (4) boulons du bas de la palette qui fixent le poêle à la palette.
2. Installez les quatre (4) pieds réglables au bas du poêle conformément aux instructions de la page 14 du manuel de l'opérateur.
3. Ouvrez la porte et installez le pot de combustion comme indiqué à la page 30 du manuel de l'opérateur.
4. À l'aide de la clé hexagonale de 4 mm, installez le contrôleur en suivant les instructions de la page 24 du manuel de l'opérateur.

INSTALLATION

Il est recommandé de faire installer et entretenir le poêle par des professionnels agréés qui sont certifiés spécialistes des granules NFI par le National Fireplace Institute (NFI).

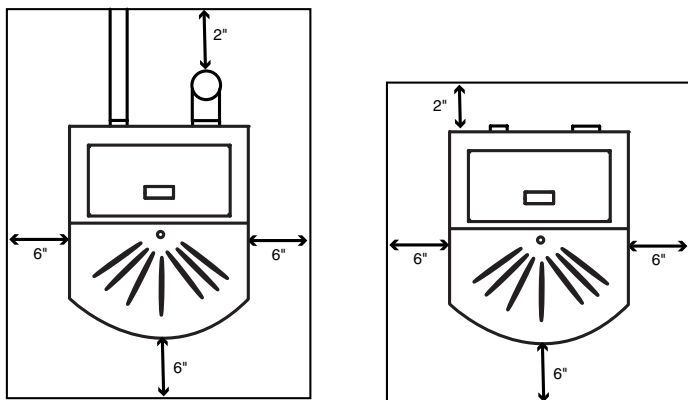
Ce poêle doit être installé correctement pour assurer un fonctionnement sûr et efficace. Une mauvaise installation de ce produit peut entraîner un incendie de maison et des blessures corporelles. Veiller à respecter tous les codes du bâtiment en vigueur localement. Aux endroits où le code du bâtiment prévoit, pour l'installation de ce produit, des étapes supplémentaires ne figurant pas dans ce manuel, le code du bâtiment prévaut et doit être respecté. S'adresser à l'inspecteur en bâtiment local pour obtenir tous les permis ou les règles d'inspection nécessaires avant d'installer le produit.

Placement du poêle

Dessiner un schéma dimensionné de l'installation du poêle avant son placement permanent. Lors de la détermination de l'emplacement du poêle, l'emplacement des poteaux muraux est essentiel. Il peut être nécessaire d'ajuster la position du poêle pour éviter de faire passer le tuyau de fumée à travers un poteau. Avant de positionner le poêle à granules, raccorder l'évacuation en respectant les dégagements minimum requis pour les murs combustibles.

Exigences de protection du plancher

Le poêle doit être installé sur un plancher non combustible, avec une protection de plancher appropriée, ou sur un âtre en maçonnerie. Lorsqu'un conduit en T de nettoyage est prévu à l'intérieur d'une maison, la protection de plancher doit dépasser de 5 cm (2 po) au-delà du T. **VOIR FIGURE 1.** Lorsque l'évacuation du poêle se fait tout droit à travers le mur et que le T de nettoyage est à l'extérieur de la maison, le dégagement minimum est de 5 cm (2 po) entre l'arrière du poêle et le mur. **VOIR FIGURE 2.** Le matériau protecteur de plancher doit être de la tôle métallique de 24 ga (0,6 mm) minimum.



Figures 1 et 2 : Dégagements de la plaque de sol du poêle à granules



AVERTISSEMENT

LIRE CE MANUEL EN ENTIER AVANT D'INSTALLER ET D'UTILISER LE POÊLE. TOUT MANQUEMENT À RESPECTER LES INSTRUCTIONS PEUT PROVOQUER DES DÉGÂTS MATÉRIELS, DES BLESSURES CORPORELLES, VOIRE LA MORT.

NE PAS POSER DE REGISTRE DE TIRAGE DANS LE SYSTÈME D'ÉVACUATION DE L'APPAREIL.

NE PAS RACCORDER CET APPAREIL À UN CONDUIT DE FUMÉE UTILISÉ POUR UN AUTRE APPAREIL.

LES ENFANTS ET LES ADULTES DOIVENT ÊTRE ALERTÉS DES DANGERS DE HAUTE TEMPÉRATURE DES SURFACES ET SE TENIR À L'ÉCART POUR ÉVITER LE CONTACT AVEC LES PEAU ET LES VÊTEMENTS.

LES JEUNES ENFANTS DOIVENT ÊTRE SURVEILLÉS AVEC ATTENTION S'ILS SONT DANS LA MÊME PIÈCE QUE LE POÊLE.

NE PAS PLACER DE VÊTEMENTS NI D'AUTRES MATIÈRES INFLAMMABLES SUR OU PRÈS DE CET APPAREIL.



ATTENTION

CE POÊLE NE DOIT PAS ÊTRE UTILISÉ EN TANT QU'UNIQUE SOURCE DE CHAUFFAGE DE LA MAISON. LES COUPURES D'ÉLECTRICITÉ ET L'ENTRETIEN PÉRIODIQUE RÉSULTERAIENT EN UNE PERTE TOTALE DE CHAUFFAGE.

CONSULTER LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX CONCERNANT LES RESTRICTIONS ET LES INSPECTIONS D'INSTALLATION EN VIGUEUR.

S'ADRESSER AUX AUTORITÉS LOCALES (SERVICE DE LA CONSTRUCTION MUNICIPALE, SERVICE D'INCENDIE, BUREAU DE LA PRÉVENTION DES INCENDIES, ETC.) POUR DÉTERMINER SI UNE PERMIS EST NÉCESSAIRE. GARDER LES MATIÈRES COMBUSTIBLES (HERBES, FEUILLES, ETC.) À 1 MÈTRE AU MOINS DE LA BOUCHE D'ÉVACUATION DE FUMÉE SUR L'EXTÉRIEUR DU BÂTIMENT.

L'INSTALLATION ET LES RÉPARATIONS DE CE POÊLE À GRANULES DOIVENT ÊTRE CONFIEES À UN TECHNICIEN D'ENTRETIEN QUALIFIÉ. L'APPAREIL DOIT ÊTRE INSPECTÉ AVANT UTILISATION ET AU MOINS UNE FOIS PAR AN PAR UN TECHNICIEN D'ENTRETIEN QUALIFIÉ. IL EST IMPÉRATIF QUE LES COMPARTIMENTS DE COMMANDE, LE FOYER ET LES CANAUX DE CIRCULATION D'AIR DU POÊLE SOIENT MAINTENUS PROPRES.

Dégagements jusqu'aux matériaux combustibles

REMARQUE : Ces distances sont les dégagements minimum jusqu'aux matériaux combustibles établis par le laboratoire d'essai de l'ASTM (VOIR FIGURES 3, 4, 5 et 6).

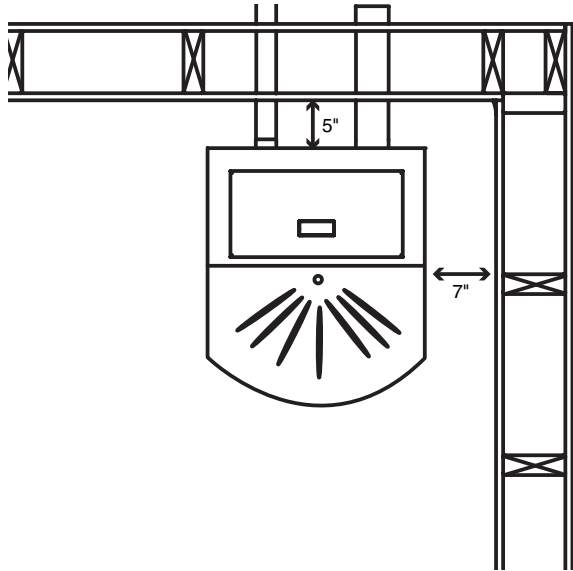


Figure 3 : Pose droite, évacuation à travers le mur

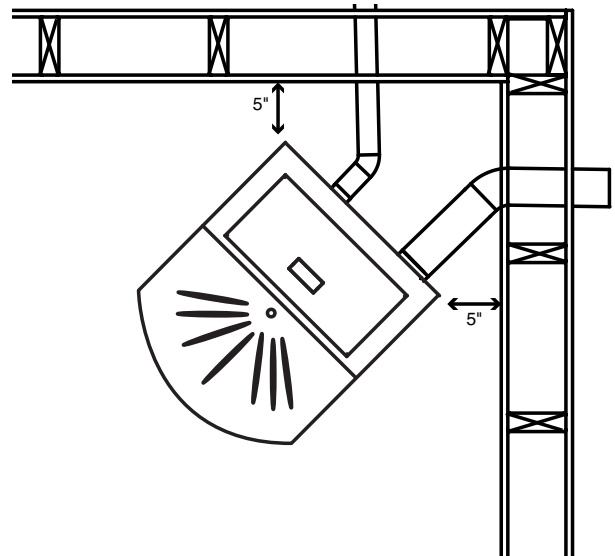


Figure 4 : Pose d'angle, évacuation à travers le mur

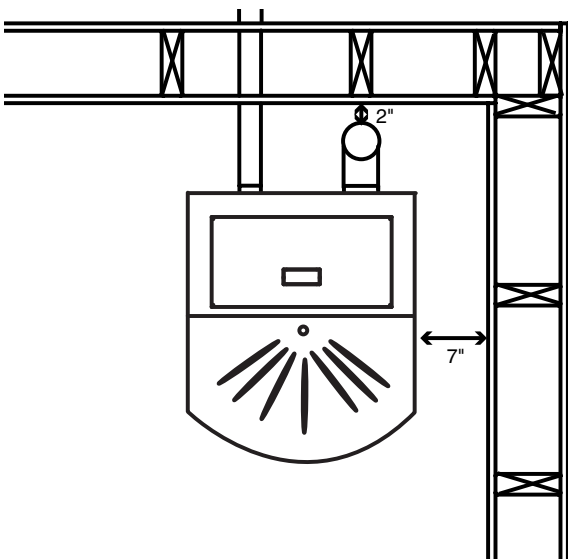


Figure 5 : Pose droite, évacuation verticale intérieure

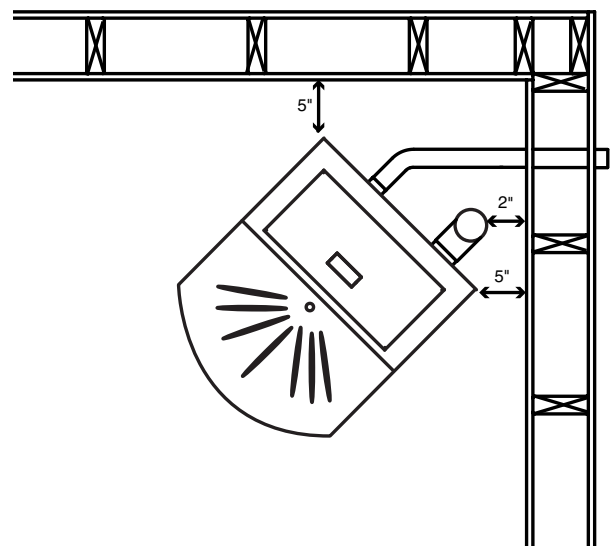


Figure 6 : Pose d'angle, évacuation verticale intérieure

REMARQUE : Lorsqu'un conduit d'évacuation intérieure est installé verticalement, le dégagement jusqu'au mur arrière dépend de la taille du conduit utilisé. Poser le conduit d'évacuation en respectant le dégagement spécifié par le fabricant du conduit. Veiller à tenir compte de tous les coudes ou tés tournés vers le haut.

Évacuation

Avant de poser l'évacuation, consulter les spécifications et recommandations du fabricant de conduits pour toutes les installations d'évacuation.

Les directives de pose suivantes doivent être respectées pour assurer la conformité à la fois avec l'homologation de sécurité de ce poêle et les codes du bâtiment locaux.

Remarque : Lorsque la traversée d'un mur ou d'une cloison de matériaux combustibles est souhaité, la pose doit être conforme à CAN/CSA-8365.

Type d'évacuation

Le tuyau d'évacuation du poêle à granules (appelé conduit en L) comporte deux épaisseurs de tôle séparées par une couche d'air. Cette couche d'air joue un rôle isolant qui réduit la température de la surface extérieure du tuyau et créer un espacement par rapport aux matériaux combustibles.

Un système d'évacuation de poêle à granules de type L de 3 ou 4 pouces homologué UL doit être utilisé pour l'installation et attaché au raccord de tuyau sur l'arrière du poêle. Utiliser adaptateur de 3 po à 4 po si un tuyau de 4 po est utilisé. Les cheminées d'évacuation de type L doivent être terminées par un chapeau. Aux altitudes de plus de 750 m (2500 pi) au-dessus du niveau de la mer, un conduit L de 4 po est requis.

Pose de l'évacuation du poêle à granules

La sortie d'évacuation doit **IMPÉRATIVEMENT** déboucher plus haut que la prise d'air.

Il est requis de poser au moins 90 cm (3 pi) de conduit d'évacuation vertical. Ce tuyau vertical crée une forme de tirage naturel pour éviter le risque de refoulement de fumée ou d'odeurs lorsque l'appareil est éteint et évite que l'évacuation présente une nuisance ou un danger d'exposition à des températures élevées.

L'installation doit comporter un té de nettoyage pour la collecte des cendres volantes et le nettoyage périodique du système d'évacuation.

La longueur totale de conduit horizontal ne doit pas dépasser 3 mètres (10 pi). La hauteur d'évacuation verticale maximale conseillée est de 5,5 mètres (18 pi).



Tous les joints de conduit d'évacuation doivent être attachés avec au moins trois vis et tous les raccords d'évacuation (y compris adaptateurs, coudes, etc.) doivent être rendus étanches à l'air par l'injection de silicone RTV de 500 °F (260 °C) dans les interstices entre les sections de tuyau.

La traversée du tuyau d'évacuation vers l'extérieur de la maison doit être rendu étanche avec du silicone ou tout autre moyen de maintien de l'écran pare-vapeur entre l'extérieur et l'intérieur de la maison.



ATTENTION

NE PAS RACCORDER CET APPAREIL À UN CONDUIT DE FUMÉE UTILISÉ POUR UN AUTRE APPAREIL.

NE PAS POSER DE REGISTRE DE TIRAGE DANS LE SYSTÈME D'ÉVACUATION DE L'APPAREIL.

NE PAS RACCORDER DIRECTEMENT À UNE CHEMINÉE EN MAÇONNERIE.

NE PAS FAIRE DÉBOUCHER L'ÉVACUATION DANS UN ESPACE FERMÉ OU SEMI-FERMÉ TEL QU'UN ABRI À VOITURE, GARAGE, GRENIER, VIDE SANITAIRE, SOLARIUM, GALERIE, PASSAGE PIÉTON OU AUTRE ENDROIT FERMÉ, NI DANS AUCUN ENDROIT OÙ LES FUMÉES PEUVENT S'ACCUMULER TEL QU'UNE CAGE D'ESCALIER, UN PASSAGE COUVERT, ETC.



AVERTISSEMENT

LES SURFACES DU CONDUIT D'ÉVACUATION PEUVENT ÊTRE SUFFISAMMENT CHAUDES POUR CAUSER DES BRÛLURES AU TOUCHER. UN ÉCRAN OU DES PROTECTIONS NON COMBUSTIBLES PEUVENT ÊTRE REQUIS.

L'ÉVACUATION DU POÊLE DOIT RESPECTER LES DÉGAGEMENTS MINIMUM SPÉCIFIÉS PAR LE FABRICANT DU CONDUIT POUR TOUS LES MATÉRIAUX COMBUSTIBLES.

POSER LE CONDUIT D'ÉVACUATION EN RESPECTANT LES DÉGAGEMENTS SPÉCIFIÉS PAR LE FABRICANT.

TOUS LES RACCORDS D'ÉVACUATION, QU'ILS SOIENT VERTICAUX OU HORIZONTAUX, DOIVENT ÊTRE RENDUS ÉTANCHES AUX GAZ À L'AIDE DE PRODUITS D'ÉTANCHÉITÉ RECOMMANDÉS.

Dégagements préconisés pour la sortie d'évacuation

- L'évacuation du poêle doit déboucher sur l'extérieur du bâtiment. Les sorties horizontales doivent dépasser d'un minimum de 30 cm (12 po) du mur. Les sorties verticales doivent dépasser d'un minimum de 60 cm (24 po) de la surface du toit. **En outre, tous les dégagements indiqués ci-dessous doivent être respectés. VOIR FIGURE 7.**
- La sortie doit comporter un chapeau homologué (pour empêcher la pénétration d'eau) ou un coude à 45° vers le bas avec écran anti-rongeurs.
- Si la bouche de sortie se trouve sur une façade exposée au vent, il est conseillé de protéger la maison par un écran homologué pour éviter l'accumulation de suie sur le mur extérieur.
- Ne pas faire déboucher l'évacuation à un endroit où elle peut être obstruée par la neige ou autres matières.

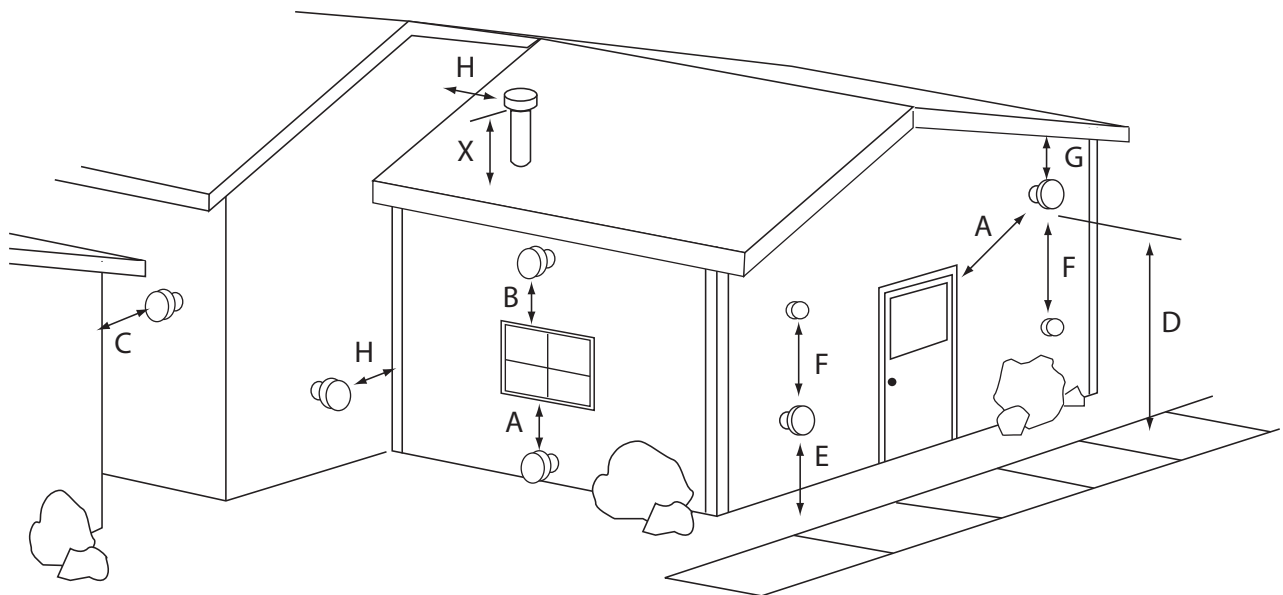


Figure 7 : Sortie d'évacuation

- A : Dégagement minimum de 122 cm (4 pi) en dessous et à côté de toute porte ou fenêtre qui s'ouvre. (Ce dégagement peut être réduit à 46 cm [18 po] en cas d'utilisation d'air extérieur). Il est conseillé de garder la porte ou fenêtre fermée durant la marche. Dégagement minimum de 30 cm (1 pi) en dessous et à côté de toute fenêtre qui ne s'ouvre pas.
- B : Dégagement minimum de 30 cm (1 pi) au-dessus de toute porte ou fenêtre qui s'ouvre.
- C : Dégagement minimum de 60 cm (2 pi) depuis tout bâtiment adjacent.
- D : Dégagement minimum de 2,1 m (7 pi) au-dessus du niveau du sol de toute allée piétonne publique adjacente.

- E : Dégagement minimum de 60 cm (2 pi) au-dessus de toute herbe, plante ou autre matériau combustible.
- F : Dégagement minimum de 90 cm (3 pi) depuis toute prise d'air forcé de tout autre appareil.
- G : Dégagement minimum de 60 cm (2 pi) en dessous des avant-toits et surplombs.
- H : Dégagement horizontal minimum de 30 cm (1 pi) depuis un mur combustible.
- X : Doit être d'un minimum de 60 cm (2 pi) au-dessus du toit.

REMARQUE : La sortie d'évacuation ne doit pas déboucher dans un passage ou une allée couverts.

Évacuation du poêle à granules (voir Figures 8 à 16)



ATTENTION

S'ASSURER QUE L'ÉVACUATION DU POÊLE À GRANULES EST CORRECTE. NE PAS POSER DE REGISTRE DE TIRAGE DANS LE SYSTÈME D'ÉVACUATION DE L'APPAREIL.

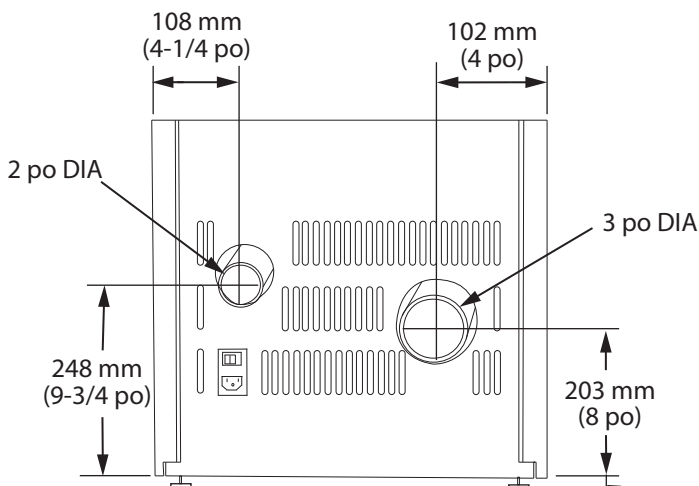
UTILISER UN MANCHON MURAL HOMOLOGUÉ POUR FAIRE PASSER L'ÉVACUATION À TRAVERS UN MUR. UTILISER UN SUPPORT/BOUCLIER PARE-FEU DE PLAFOND POUR FAIRE PASSER L'ÉVACUATION À TRAVERS UN PLAFOND (VEILLER À MAINTENIR LES DÉGAGEMENTS PRÉVUS PAR RAPPORT À TOUTE MATIÈRE COMBUSTIBLE).

SI LE CONDUIT COMPORTE PLUS D'UN TÉ ET UN TOTAL DE 180° DE COUDES, UTILISER IMPÉRATIVEMENT DES TUYAUX D'ÉVACUATION DE 4 POUCES.

L'évacuation doit comporter un support d'appui tous les 1,5 m (5 pi) de conduit lorsqu'il est à l'extérieur du bâtiment.

La hauteur et la longueur de l'évacuation ne doivent pas dépasser les valeurs illustrées dans le diagramme ci-dessous.

Une évacuation dans cette zone grisée (claire) peut nécessiter des ajustements de tension du moteur d'évacuation et/ou des ajustements de la prise d'air (admission). **VOIR FIGURE 9.**



REMARQUE : LES PIEDS RÉGLABLES PEUVENT AJOUTER JUSQU'À 2,5 CM DE HAUTEUR EN FONCTION DES BESOINS DE MISE DE NIVEAU DE L'INSTALLATION. CETTE DIMENSION DEVRA ÊTRE AJOUTÉE À LA HAUTEUR POUR ASSURER LA BONNE INSTALLATION DES CONDUITS D'ÉVACUATION.

Figure 8 : Positions de l'admission et de l'évacuation

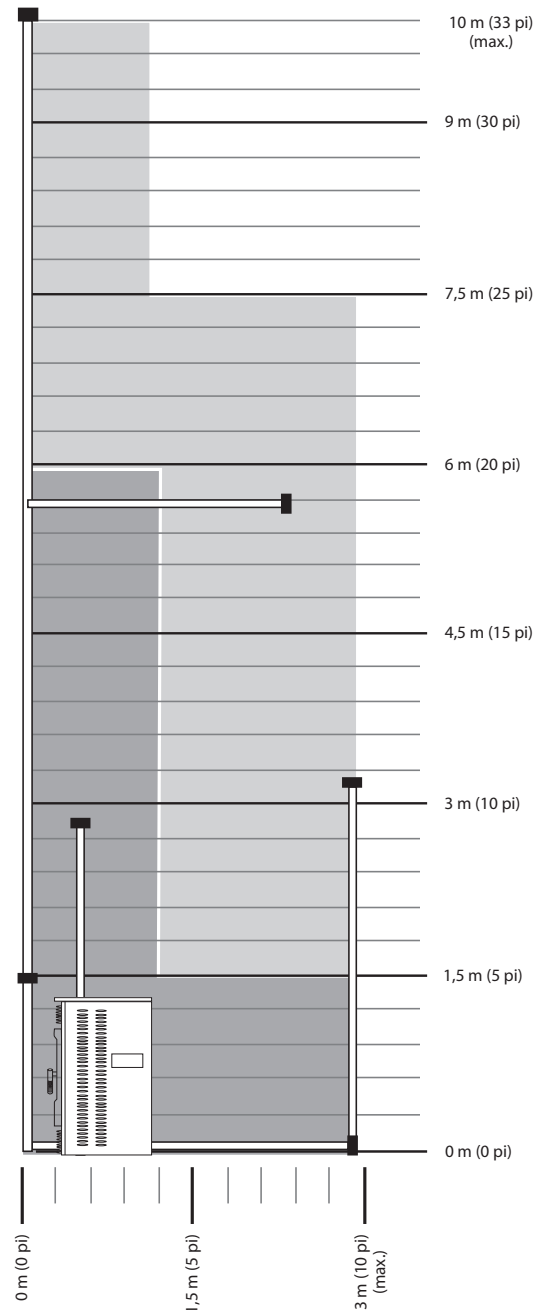


Figure 9 : Table d'évacuation et d'ajustement de tension du moteur d'évacuation

Raccordement d'air extérieur

Le raccordement du tuyau d'admission (tuyau de 2 po de diamètre à l'arrière du poêle, voir Figure 8) vers l'extérieur est OBLIGATOIRE dans les maisons mobiles. Il est conseillé dans les maisons très hermétiques équipées de ventilateurs d'extraction dans la cuisine ou la salle de bains. Cela élimine les problèmes de fonctionnement causés par une dépression ambiante.

Seul un tuyau non combustible (droit ou flexible) de 2 po (ou plus) de diamètre peut être utilisé pour les raccordements d'air extérieurs.

REMARQUE : Les tuyaux de PVC ne sont PAS homologués et ne doivent JAMAIS être raccordés au poêle.

CONSEIL PRATIQUE : L'admission d'air d'un poêle à granules Castle accepte des tuyaux et raccords d'échappement automobiles.

Si l'admission d'air est raccordée à l'extérieur, elle doit **IMPÉRATIVEMENT** se terminer par un coude vertical de 90° (vers le bas) ou par un chapeau. Dans le cas contraire, il peut se produire une réinflammation en cas de grand vent soufflant directement dans l'admission d'air durant une panne d'électricité.

Une obstruction, une longueur excessive ou des coudes supplémentaires dans le tuyau d'admission ont pour effet de priver le poêle d'air d'évacuation. Un coude de 90° produit une restriction équivalente à environ 75 cm (30 pi) de tuyau droit.

Maison mobile

L'installation dans une maison mobile doit être en conformité avec la norme sur la sécurité et les maisons manufacturées du *Department of Housing and Urban Development (HUD) CITE: 24CFR3280.707* qui prévoit que le poêle doit être évacué vers l'extérieur. En plus des instructions d'installation standard, les exigences suivantes sont obligatoires pour l'installation dans une maison mobile :

1. Le poêle doit être attaché au plancher de façon permanente.
2. Le poêle doit avoir une source d'air extérieure.
3. Le poêle doit être électriquement relié à la masse par raccordement au châssis en acier de la maison mobile.
4. Tous les conduits de fumée verticaux doivent comporter des supports muraux.
5. Tous les systèmes d'évacuation doivent comporter un pare-étincelles.
6. Vérifier auprès des services du bâtiment locaux si d'autres codes s'appliquent.



AVERTISSEMENT

DANGER D'INTOXICATION AU MONOXYDE DE CARBONE. NE PAS RACCORDER À UN AUTRE CONDUIT OU SYSTÈME DE DISTRIBUTION D'AIR. NE PAS INSTALLER DANS UNE CHAMBRE À COUCHER.



ATTENTION

L'UTILISATION DE VENTILATEURS D'EXTRACTION TELS QUE LES VENTILATEURS DE SALLE DE BAIN OU DE GRENIER PEUT PRIVER LE POÊLE À GRANULES D'AIR DE D'ÉVACUATION EN CRÉANT UNE DÉPRESSION DANS LA PIÈCE. PRÉVOIR UNE VENTILATION SUFFISANTE DE LA PIÈCE OÙ SE TROUVE LE POÊLE À GRANULES. SINON, LE MANOCONTACT PEUT COUPER LE FONCTIONNEMENT DU POÊLE À GRANULES.

L'INTÉGRITÉ STRUCTURELLE DU PLANCHER, DES MURS ET DU PLAFOND/TOIT DES MAISONS MANUFACTURÉES DOIT ÊTRE PRÉSERVÉE.

EXEMPLES DE VENTILATION SIMPLE DU POÊLE

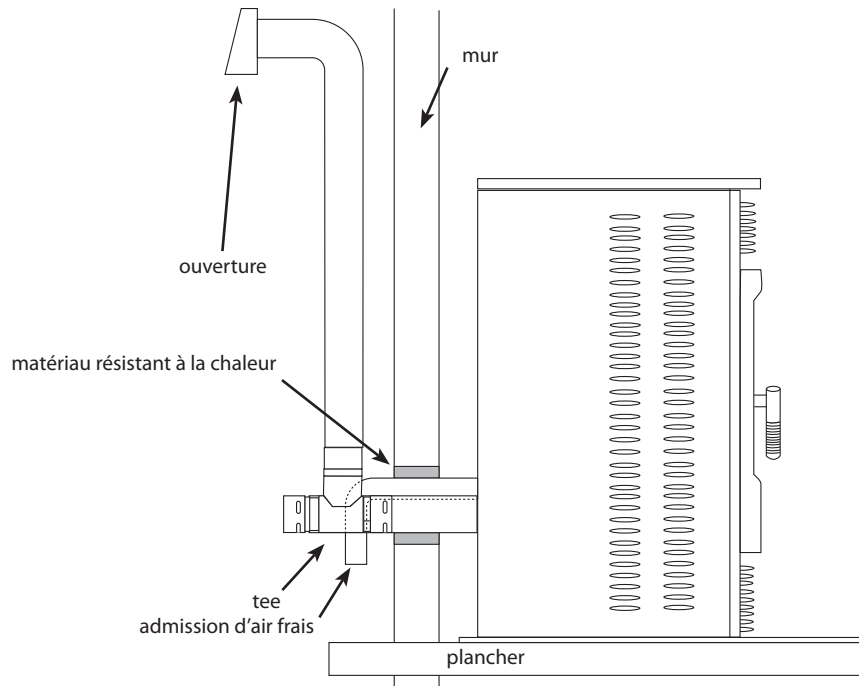


Figure 10 : Pose droite — En dehors élévation verticale, sortie horizontale

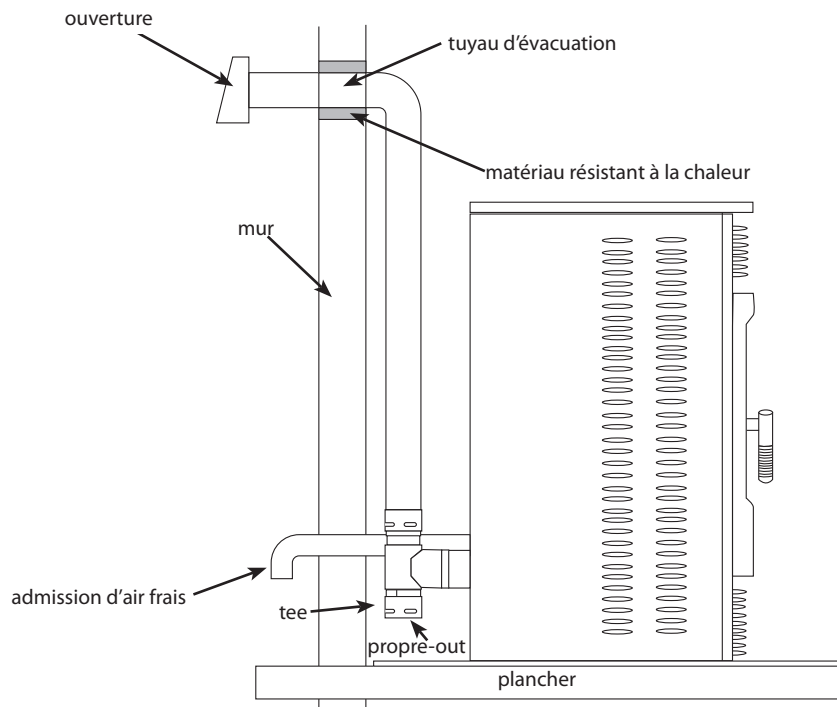
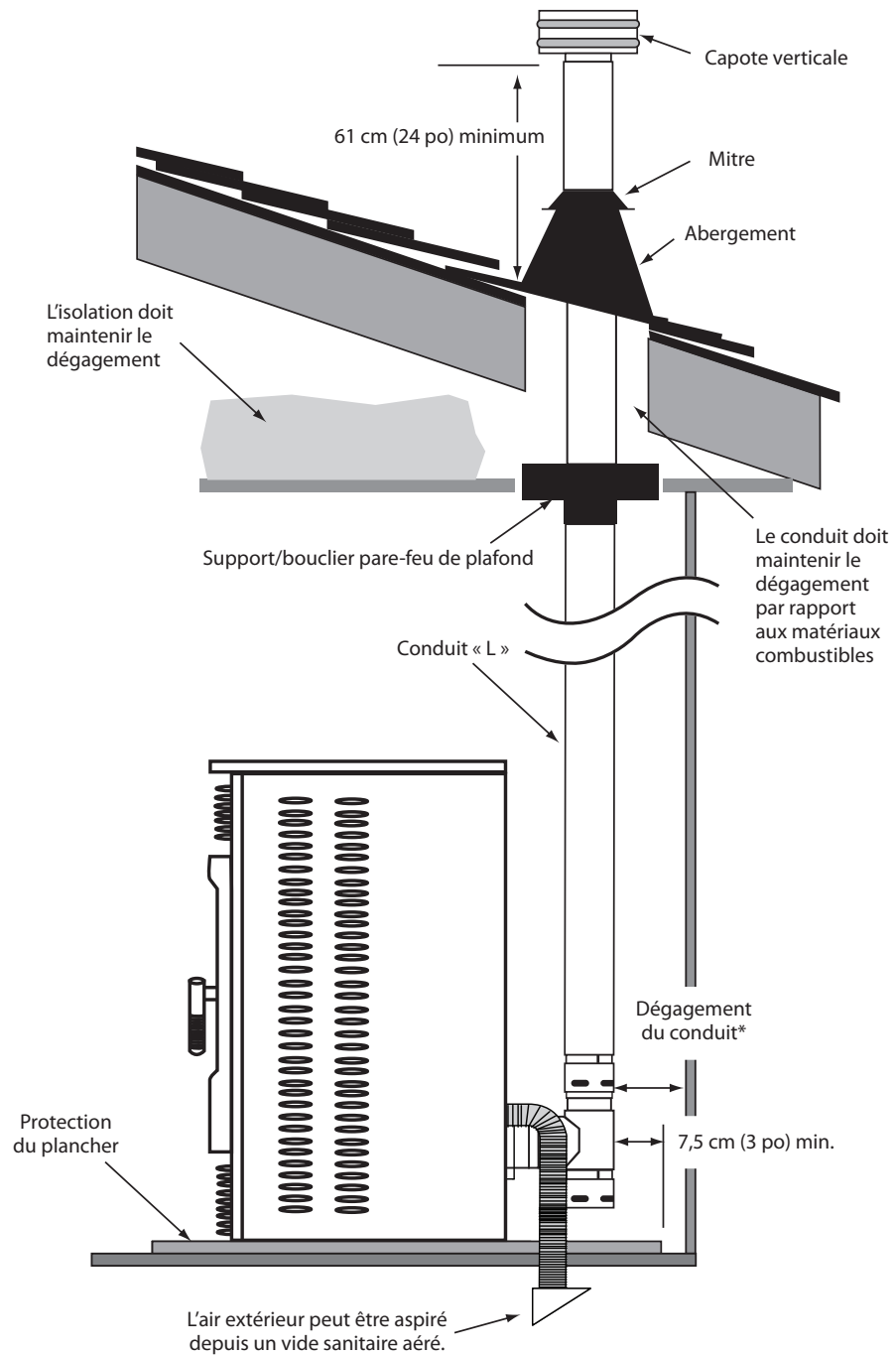


Figure 11 : Pose droite — portion verticale intérieure, sortie horizontale

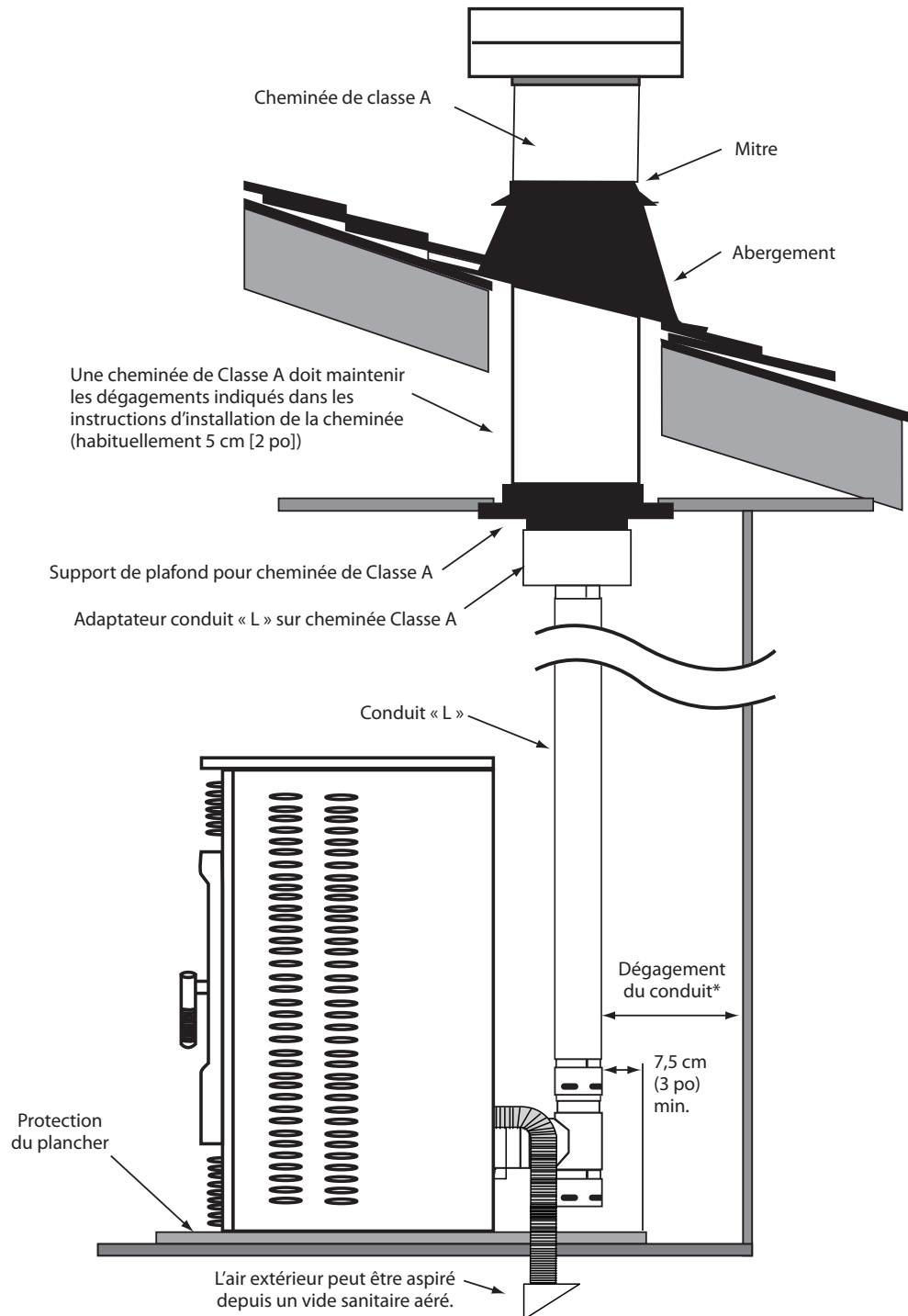
EXEMPLES DE VENTILATION COMPLEXE DU POÊLE



* Poser un conduit d'évacuation en respectant le dégagement spécifié par le fabricant du conduit.

Figure 12 : Pose verticale intérieure

ADAPTATION D'UNE CHEMINÉE DE CLASSE A



* Poser un conduit d'évacuation en respectant le dégagement spécifié par le fabricant du conduit.

Figure 13 : Adaptation d'une cheminée de classe A

POÊLE POUR ÂTRE DE CHEMINÉE EN MAÇONNERIE

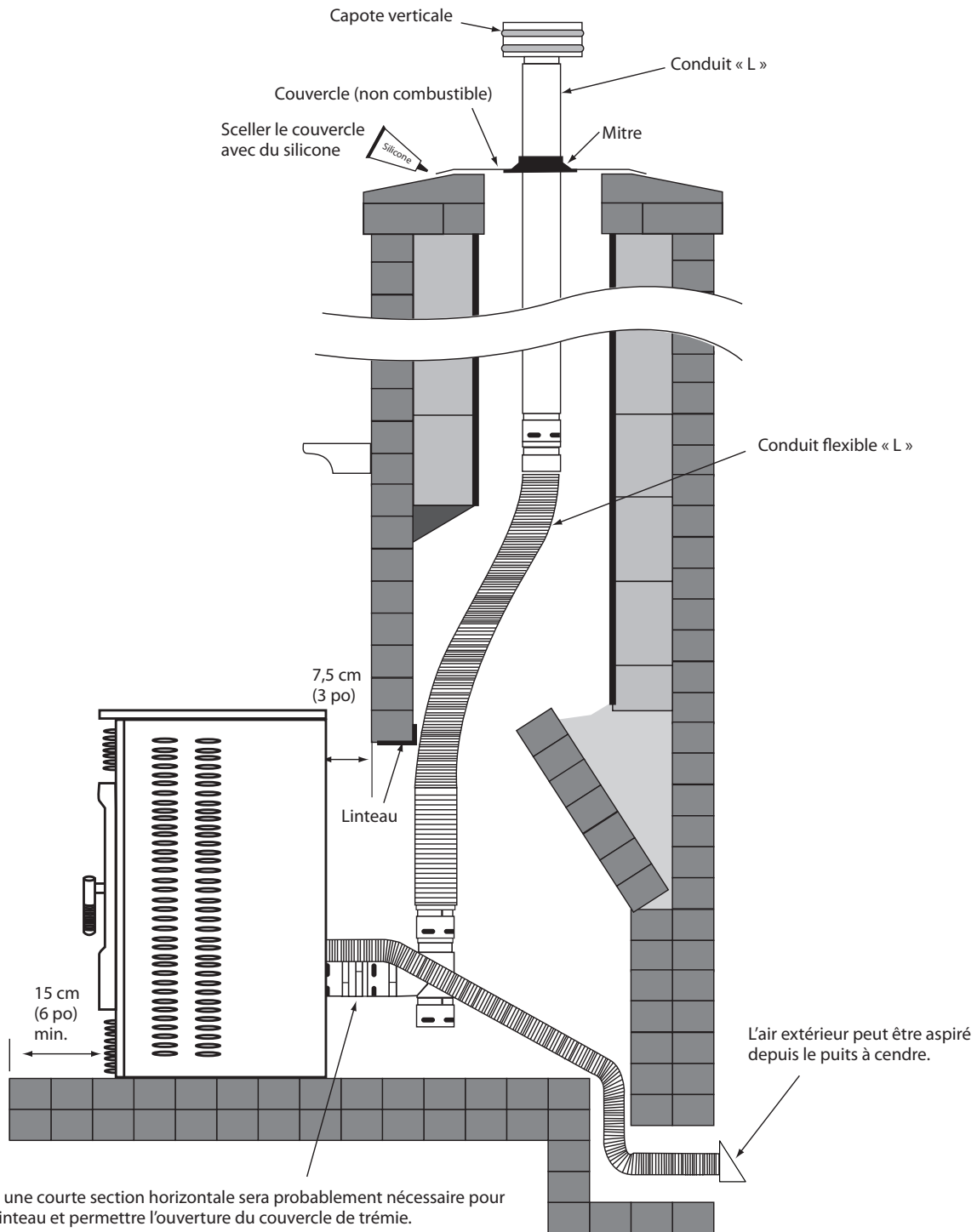
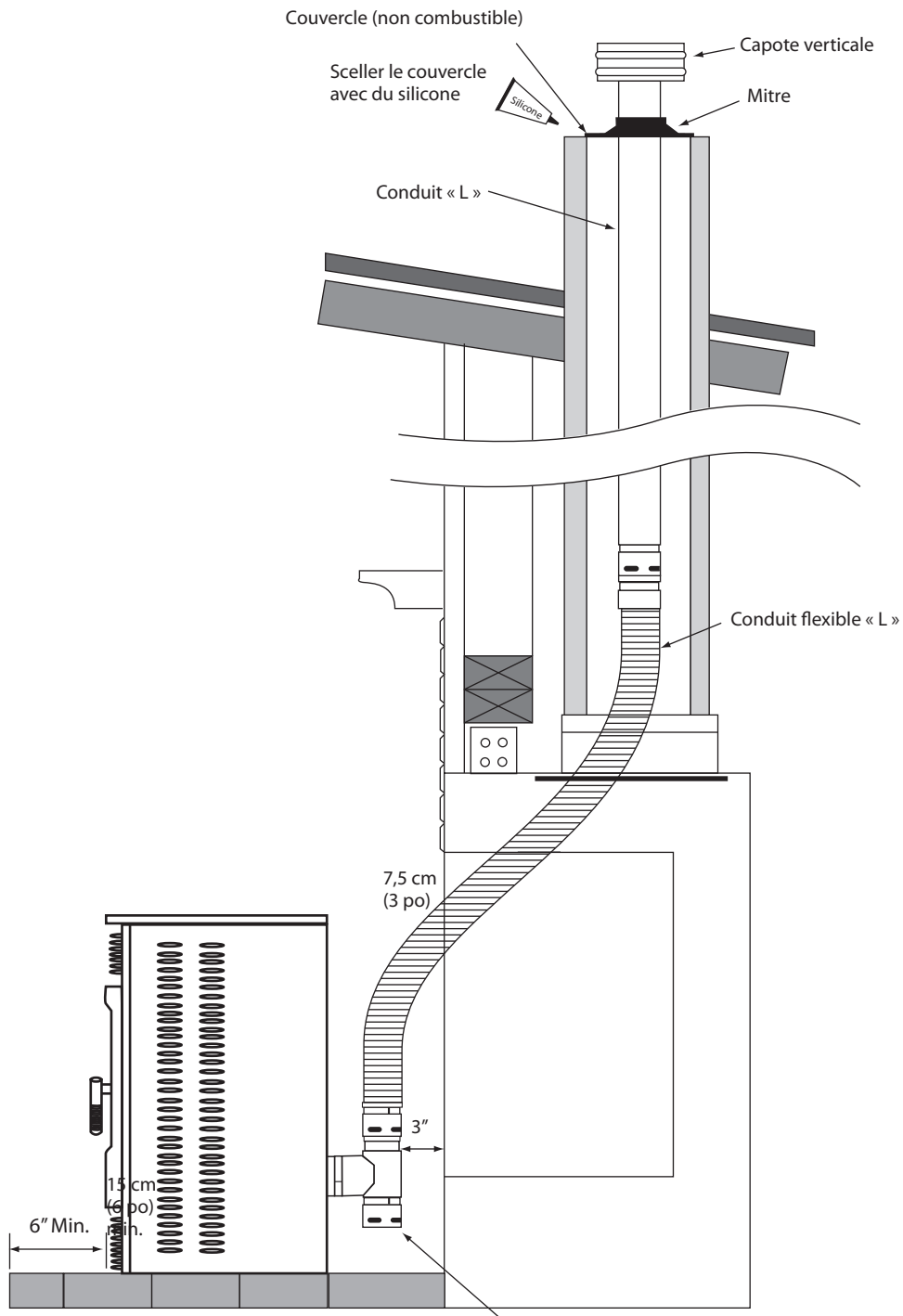


Figure 14 : Poêle pour âtre de cheminée en maçonnerie

POÊLE POUR ÂTRE DE CHEMINÉE À DÉGAGEMENT ZÉRO (MÉTALLIQUE)



REMARQUE : une courte section horizontale sera probablement nécessaire pour dépasser le linteau et permettre l'ouverture du couvercle de trémie.

Figure 15 : Poêle pourâtre de cheminée à dégagement zéro (métallique)

CHEMINÉE EN MAÇONNERIE SEULE

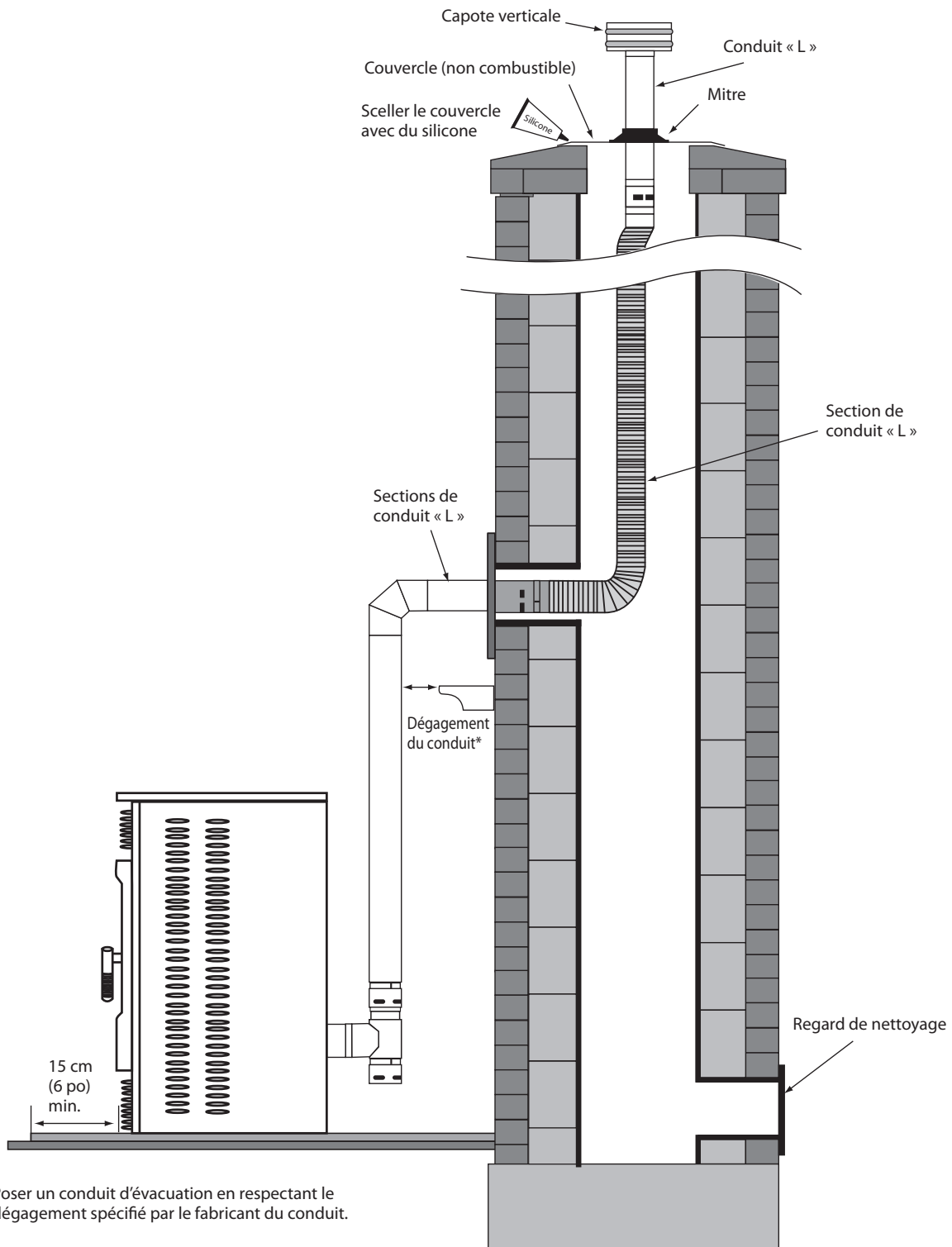


Figure 16 : Cheminée en maçonnerie seule

COMPRENDRE LE POÊLE

Le poêle à granules Castle comporte un système d'alimentation de combustible à vis sans fin verticale commandée par un circuit numérique contrôlé par microprocesseur. Le circuit numérique permet un fonctionnement du système d'alimentation en combustible suivant un cycle temporisé non continu ; cela permet à la vis sans fin de tourner pendant une durée préétablie. La vis sans fin fait remonter les granules dans une goulotte à l'intérieur de la trémie. Les granules tombent ensuite à travers une autre goulotte jusqu'à la boîte à feu. Le poêle est équipé d'un système d'allumage automatique qui doit allumer le combustible dans les 3 à 5 minutes après avoir appuyé sur la touche Marche/Arrêt. Lorsque les granules remplissent la boîte à feu et s'allument, l'air extérieur est aspiré à travers le combustible et chauffé durant le processus d'évacuation, puis aspiré à travers l'échangeur thermique par le moteur d'évacuation ou le ventilateur de tirage. Lorsque le poêle atteint sa température de fonctionnement, l'air de la pièce est circulé autour de l'échangeur thermique par une soufflante d'air ambiant et l'air chaud est distribué dans la pièce.

La quantité de chaleur produite par le poêle est proportionnelle au taux de combustible qui est brûlé.

Comme une pression de tirage forcé est requise par le processus d'évacuation à l'intérieur du poêle, est extrêmement important que le système d'évacuation soit installé et entretenu correctement. En outre, les portes doivent rester fermées durant le fonctionnement et les joints des portes doivent être correctement entretenus.

SE FAMILIARISER AVEC LA COMMANDE

Touches de commande (VOIR FIGURES 17 et 18)

1. **Récepteur infrarouge** - Reçoit les signaux de la télécommande (proposée séparément).
2. **Indicateur de marche** - S'allume lorsque l'interrupteur principal est en marche.
3. **Voyant d'alarme** - S'allume si le poêle ne fonctionne pas correctement.
4. **Touche Marche/Arrêt** - Démarre et arrête le poêle.
5. **Touche Minuterie** - Permet de choisir l'heure de démarrage ou l'heure de mise à l'arrêt de l'appareil.
6. **Touche de transfert de mode** - Permet de régler l'appareil sur l'un des trois modes principaux : manuel, température et hebdomadaire.
7. **Touche Maintien** - En mode hebdomadaire, une pression sur le bouton Maintien après avoir augmenté la température de consigne a pour effet de maintenir cette température jusqu'à une nouvelle pression sur ce bouton ou la mise à l'arrêt du poêle.
8. **Touche de défilement haut** - Permet de faire défiler le menu affiché vers le haut.
9. **Touche Sortie** - Permet de quitter la sélection en cours et de revenir à l'option et/ou écran précédent. Lors de la saisie de données, la touche Sortie a aussi pour effet de supprimer les données saisies.

10. **Touche de défilement bas** - Permet de faire défiler le menu affiché vers le bas.
11. **Touche Entrée** - Permet d'ajuster et de sélectionner des données à l'écran. Une pression de deux secondes sur la touche Entrée renvoie au menu principal, d'où il est possible de changer l'heure, la date, l'affichage de température, le calendrier de marche hebdomadaire (en mode hebdomadaire seulement) et les réglages de tension et du moteur d'évacuation.
12. **Mode de verrouillage de la commande** - Une pression sur les touches 8 et 10 simultanément permet de verrouiller le clavier de la commande. En mode verrouillé, le poêle ne peut pas être ajusté ni mis en **MARCHE** ou à l'**ARRÊT**. L'activation du verrouillage est indiquée par une petite icône de clé dans le coin supérieur droit de l'affichage de la commande.



Figure 17 : Tableau de commande



Figure 18 : Emplacement du tableau de commande

ÉCRAN D'AFFICHAGE PRINCIPAL DE LA COMMANDE

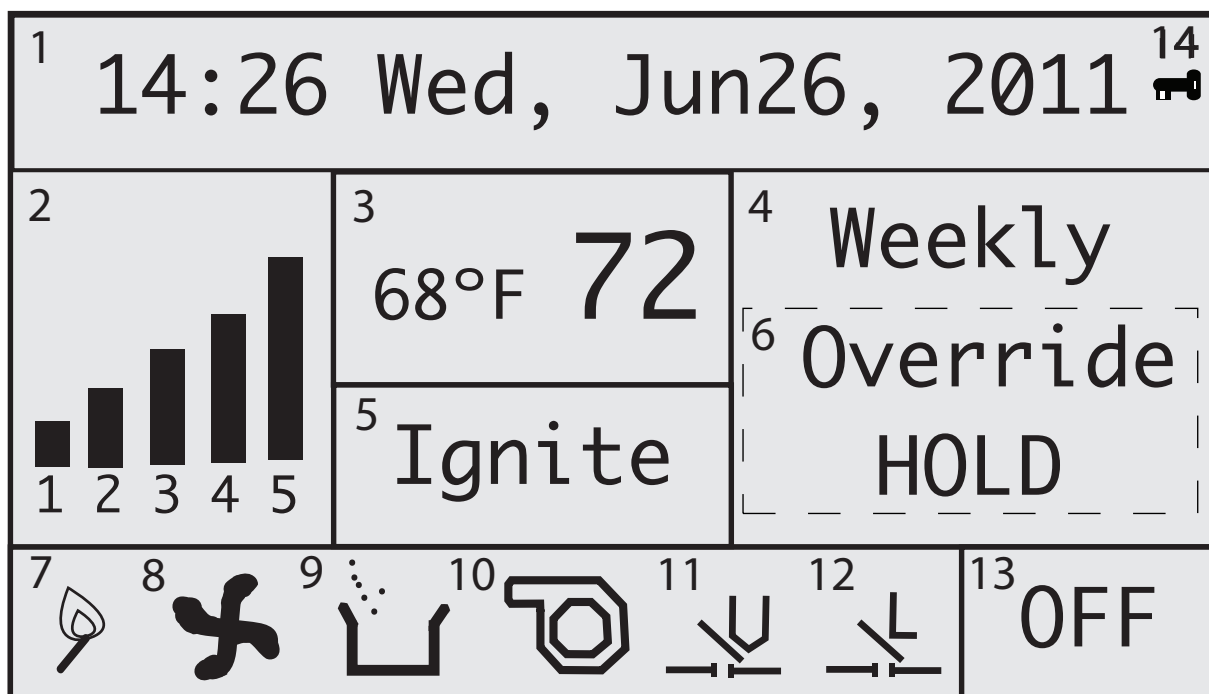


Figure 19 : Écran d'affichage principal de la commande

1. **Date et heure** : Affiche l'heure et la date.
2. **Niveau de puissance de chauffage** : Indique le niveau de puissance de chauffage actuel du poêle.
3. **Température ambiante actuelle / température de consigne** : Affiche la température ambiante actuelle et, en mode thermostat, la température de « consigne ».
4. **Mode principal** : Affiche le mode d'exploitation - hebdomadaire, thermostat (température) et manuel.
5. **Phase de marche** : Affiche la phase de fonctionnement dans laquelle se trouve actuellement le poêle (allumage, chauffage en cours, etc.).
6. **Mode de commande supplémentaire** : S'affiche uniquement si le réglage de température hebdomadaire est changé manuellement.
7. **Indicateur d'allumeur** : Indique que le cycle d'allumage/cycle d'évacuation est en cours d'exécution.
8. **Indicateur de ventilateur d'évacuation** : Indique que le ventilateur d'air d'évacuation est en marche.
9. **Indicateur de vis sans fin** : Indique que la vis sans fin d'alimentation en granules est en marche.
10. **Indicateur de soufflante de chambre** : Indique que la soufflante de chambre est en marche et pour chauffer la pièce.
11. **Indicateur de contacteur à dépression** : Indique qu'il y a une pression négative dans le poêle.
12. **Indicateur d'ouverture du couvercle de trémie (indicateur de limite)** : S'allume pour indiquer que le couvercle de trémie est fermé. Lorsque le couvercle de trémie est ouvert, l'indicateur disparaît.
13. **Indicateur d'état Marche/Arrêt** : Indique si le poêle est en marche (ON) et en mode opérationnel ou s'il est en cours de mise à l'arrêt (OFF).
14. **Mode de verrouillage de commande activé**

REMARQUE : Durant la marche du poêle, les symboles 11 et 12 doivent être affichés sinon l'alimentation en granules ne se fait pas.

AVANT UTILISATION

Une fois que la poêle est correctement installé et branché sur une prise à protection contre les surtensions, il est prêt à être utilisé.

Montage de la commande

Monter la commande et le support de commande sur le dessus et l'arrière du poêle à l'aide de la visserie fournie avec la commande.

VOIR FIGURE 18.

Avant de démarrer

Mettre l'interrupteur d'alimentation principal au dos du poêle en position de marche. **VOIR FIGURE 20A.**

REMARQUE : *Si le poêle ne semble pas se mettre en marche, contrôler le fusible qui se trouve directement sous l'interrupteur d'alimentation. VOIR FIGURE 20B. Il y a un fusible de rechange dans le porte-fusible.*

S'assurer que la trémie est propre et exempte de matières étrangères, y compris de poussières et de fines de granules.

Remplir la trémie de granules de bois, en s'assurant qu'AUCUNE partie du sac ou autre objet étranger n'entre dans la trémie car cela peut endommager le système de vis sans fin. **VOIR FIGURE 21.**

S'assurer également qu'il n'y a aucune parcelle de granule sur les surfaces de contact du joint du couvercle de trémie.

Fermer le couvercle. Ce poêle comporte un contacteur de sécurité qui empêche l'alimentation en granules avec le couvercle de trémie ouvert.

Vérifier que la porte vitrée principale est fermée. Le poêle comporte un contacteur de sécurité qui empêche l'alimentation en combustible s'il n'y a pas une dépression de tirage à l'intérieur du poêle.

Avant de démarrer le poêle Castle, il convient de déterminer dans quel mode on souhaite le faire fonctionner. Le Serenity comporte trois modes d'exploitation :

1. **Manuel** : Ce mode permet de fixer et d'ajuster la phase de chauffage pour contrôler le niveau de chaleur.
2. **Commande thermostatique (température)** : Ce mode permet de fixer la température ambiante et le poêle fonctionne automatiquement de telle manière que l'air ambiant soit à cette température.
3. **Hebdomadaire** : Dans ce mode, le poêle fonctionne automatiquement durant les jours et les heures choisis. Il est possible d'avoir un programme différent pour chacun des sept jours de la semaine et quatre périodes différentes durant la journée.

Le mode doit être sélectionné avant de mettre le poêle en marche. La sélection d'un mode alors que le poêle brûle peut provoquer sa mise à l'arrêt et imposer une temporisation de 30 minutes avant son redémarrage.

Il n'est pas nécessaire de démarrer le poêle pour sélectionner le mode. Pour choisir le mode, appuyer sur la touche de transfert de mode (6, Fig. 17). Appuyer une fois sur la touche de mode pour sélectionner le thermostat, deux fois pour passer au mode hebdomadaire.



AVERTISSEMENT

NE JAMAIS UTILISER DE LIQUIDE INFLAMMABLE TEL QUE DE L'ESSENCE, LE COMBUSTIBLE POUR BRIQUET OU LES GELS ALLUME-BARBECUE À L'INTERIEUR OU AUTOUR DU POÊLE. GARDER DE TELS LIQUIDES BIEN À L'ÉCART DU POÊLE PENDANT QU'IL EST UTILISÉ.

NE JAMAIS OUVRIR LES PANNEAUX LATÉRAUX NI LA PORTE PRINCIPALE PENDANT QUE LE POÊLE EST EN MARCHE.

NE JAMAIS TOUCHER LES VEROUS DE PORTE ALORS QUE LE POÊLE EST ALLUMÉ, ILS DEVIENNENT EXTRÊMEMENT CHAUDS. NE JAMAIS OUVRIR LA PORTE VITRÉE PENDANT QUE LE POÊLE EST EN MARCHE OU QU'IL EST CHAUD.

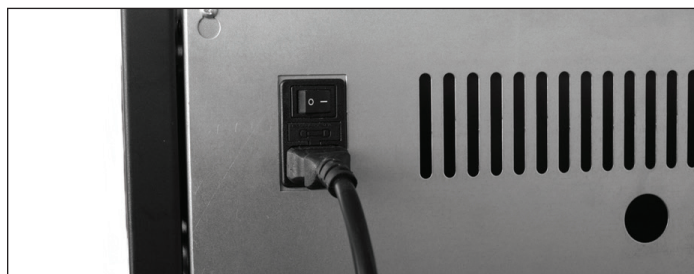


Figure 20a : Interrupteur d'alimentation principal



Figure 20b : Interrupteur d'alimentation principal



Figure 21 : Chargement des granules

FONCTIONNEMENT

Après avoir choisi le mode de fonctionnement du poêle, appuyer sur la touche de **marche/arrêt** (4, Fig. 17) pour lancer le cycle d'allumage du poêle.

Démarrage

Lorsque le poêle se met en marche, l'indicateur d'allumage et l'indicateur de ventilateur d'évacuation s'affichent à l'écran (icônes 7 et 8 à la Figure 19). Le message **Ignite** (allumage) s'affiche également dans la zone de phase de marche de l'écran (5, Fig. 19). Après quatre secondes environ, l'indicateur de contacteur à dépression s'affiche. Noter également que l'indicateur d'ouverture du couvercle de trémie (indicateur de limite) (12, Fig. 19) s'affiche dès lors que le couvercle de la trémie du poêle est hermétiquement fermé.

Le moteur du poêle continue de fonctionner pendant trois minutes, puis l'indicateur (9, Fig. 19) de vis sans fin clignote à l'écran pour indiquer que la vis sans fin alimente le poêle en granules. Au bout de trois à cinq minutes d'alimentation en granules par la vis sans fin, un feu devrait démarrer. Une fois que le feu est allumé, la zone de phase de marche à l'écran affiche « Heating room » (chauffage en cours).

Utilisation des différents modes de fonctionnement :

Mode manuel

Le mode manuel est le mode de configuration par défaut lorsqu'aucun autre mode n'a été choisi avant de mettre le poêle en marche. Le mode manuel permet de modifier le niveau de puissance de chauffage, c'est-à-dire d'augmenter ou de diminuer la quantité de chaleur produite par le poêle.

Pour modifier le niveau de puissance en mode manuel, appuyer sur la touche de défilement bas ou défilement haut (9, 10) du tableau de commande (boutons 8 et 10 à la Figure 17). Chaque pression sur l'une de ces touches augmente ou diminue la puissance de chauffage d'un niveau.

REMARQUE : Ce mode ne permet pas de régler le chauffage directement sur une température donnée. Le mode manuel permet simplement de fixer le niveau de chauffage dégagé par le poêle.

Mode de commande par thermostat/température

Le mode thermostat permet de régler la température de la pièce. Le poêle augmente ou diminue automatiquement la puissance de chauffage produite de façon à maintenir la pièce à la température fixée.

Pour augmenter ou diminuer la température de **consigne**, utiliser la touche de **DÉFILEMENT HAUT** ou de **DÉFILEMENT BAS** (8 & 10, Fig. 17). La température ambiante actuelle s'affiche dans la zone de température de l'écran, à côté de la température de **consigne** (3, Fig. 19).

REMARQUE : Le mode thermostat n'éteint le poêle lorsque la température de consigne est atteinte. Le mode thermostat effectue uniquement une régulation entre les réglages haut et bas.



AVERTISSEMENT

NE JAMAIS ÉTEINDRE LE POÊLE EN LE DÉBRANCHANT DE LA PRISE ÉLECTRIQUE.
NE JAMAIS ÉTEINDRE LE POÊLE EN METTANT L'INTERRUPTEUR D'ALIMENTATION PRINCIPAL AU DOS DU POÊLE EN POSITION D'ARRÊT.
NE JAMAIS OUVRIR LES PANNEAUX LATÉRAUX NI LA PORTE PRINCIPALE PENDANT QUE LE POÊLE EST EN MARCHÉ.
NE JAMAIS TOUCHER LES VEROUS DE LA PORTE VITRÉE ET DU CENDRIER DURANT LA MARCHÉ, ILS DEVIENNENT BRÛLANTS.

Si la température ambiante chute en dessous de la température de **consigne**, l'indicateur de niveau de chauffage du poêle monte automatiquement au niveau 5. Une fois que la température est atteinte, le niveau de puissance de chauffage revient à 1 et y reste jusqu'à ce que plus de chaleur soit nécessaire.

Remarque : En mode thermostat, le poêle ne passe jamais en veille. Il fonctionne simplement au ralenti et continue de brûler jusqu'à ce que l'air ambiant ne soit plus à la température de consigne. En phase de ralenti, le poêle affiche un niveau 1 dans la zone de puissance de chauffage de l'écran.

Mode hebdomadaire

Le mode hebdomadaire permet de contrôler et de programmer la marche du poêle Serenity à des heures et des jours définis durant la semaine. Il est possible de sélectionner quatre périodes de marche différentes pour chacun des sept jours de la semaine.

IMPORTANT : Veiller à bien définir le calendrier hebdomadaire en mode hebdomadaire avant d'allumer le feu. Si on tente de définir le calendrier et le mode hebdomadaire du poêle alors qu'il est en marche en mode manuel ou thermostat, le calendrier hebdomadaire ne se configure pas et l'écran affiche un message demandant d'attendre l'arrêt et le refroidissement du poêle avant de programmer le calendrier.

Pour configurer le calendrier hebdomadaire :

1. Tenir la touche **ENTRÉE** (11, Fig. 17) enfoncée (11, Fig. 17) jusqu'à ce que le menu « **SET DATA** » (configuration de données) s'affiche à l'écran. Utiliser la touche de **DÉFILEMENT BAS** pour sélectionner (10, Fig. 17) « **SET WEEKLY** » (réglage hebdomadaire). Appuyer sur **ENTRÉE**. L'écran de configuration du **calendrier hebdomadaire** s'affiche. **VOIR FIGURE 22.**

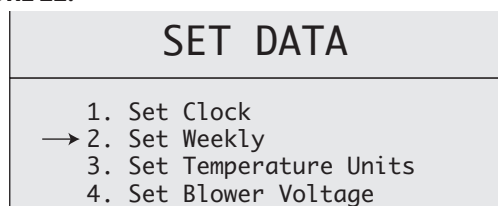


Figure 22 : Menu Set Data

Poêle à granules Serenity

2. Dans l'écran du **CALENDRIER HEBDOMADAIRE**, le cas échéant, régler les heures de marche du dimanche (« Sun. »). Appuyer sur **ENTRÉE** pour mettre les heures en surbrillance puis utiliser les touches de **DÉFILEMENT HAUT** et **DÉFILEMENT BAS** pour atteindre l'heure de démarrage souhaitée. Appuyer de nouveau sur **ENTRÉE** pour mettre les minutes en surbrillance puis utiliser les touches de **DÉFILEMENT HAUT** et **DÉFILEMENT BAS** pour régler les minutes sur la valeur de démarrage souhaitée. **VOIR FIGURE 23.**

REMARQUE : La commande Serenity utilise un affichage sur 24 heures pour la configuration du calendrier hebdomadaire.

3. Appuyer une nouvelle fois sur **ENTRÉE** pour régler l'heure d'arrêt du poêle. Suivre la même procédure que pour le réglage de l'heure de démarrage du poêle. Une fois que l'heure d'arrêt est sélectionnée, appuyer sur **ENTRÉE**.
4. La commande passe ensuite au réglage de la température souhaitée. Appuyer sur la touche de **DÉFILEMENT HAUT** ou **DÉFILEMENT BAS** jusqu'à atteindre la température souhaitée pour la période de marche sélectionnée. Appuyer sur **ENTRÉE**.
5. « Yes » est à présent en surbrillance. Si la période considérée est correctement configurée, appuyer sur **ENTRÉE**. La commande sort alors de la première période de chauffage configurée. Pour effacer une période programmée, utiliser la touche **ENTRÉE** pour mettre « Yes » en surbrillance pour la période considérée. Sélectionner « No » à l'aide de la touche de **DÉFILEMENT HAUT** ou de **DÉFILEMENT BAS**. Lorsque « No » est en surbrillance, appuyer sur **ENTRÉE** pour effacer les données.
6. Pour configurer une autre période pour le jour considéré, appuyer sur la touche **DÉFILEMENT BAS** et répéter les étapes 2 à 5 comme il se doit.

REMARQUE : Les périodes doivent être configurées dans l'ordre chronologique. La première période programmée d'une journée doit **IMPÉRATIVEMENT** être antérieure à la deuxième période programmée sur le calendrier hebdomadaire et ainsi de suite.

7. Une fois que toutes les périodes du dimanche sont configurées, appuyer sur **DÉFILEMENT BAS** jusqu'à « Next » (suivant). Appuyer une fois sur **ENTRÉE** pour mettre « Next » en surbrillance. Appuyer de nouveau sur **ENTRÉE** pour passer au jour suivant. Poursuivre la configuration du calendrier pour le reste de la semaine conformément aux instructions précédentes.

SET WEEKLY				
Sun. Weekly Set				
1:	1:15~	7:00	67°F	Yes
→ 2:	17:00~	23:45	72°F	Yes
3:	--:--~	--:--	--°F	No
4:	--:--~	--:--	--°F	No
5:	--:--~	--:--	--°F	No
Next	All			

Figure 23

REMARQUE : En plus de l'option « Next », l'écran comporte une option « All » (tous). Après avoir défini une période particulière pour un jour donnée, cette période peut être associée à chaque jour de la semaine. Pour cela, faire défiler vers le bas jusqu'à « Next » et appuyer sur **ENTRÉE**. Appuyer sur la touche de **DÉFILEMENT BAS** pour mettre « All » en surbrillance. Appuyer ensuite sur **ENTRÉE** pour que la période programmée soit sélectionnée et appliquée à chaque jour de la semaine.

ASTUCE : Pour quitter l'écran du calendrier hebdomadaire à un moment quelconque ou une fois que sa configuration est terminée, cliquer sur la touche **SORTIE** pour revenir au menu précédent (9, Fig. 17).

8. Une fois que la configuration du calendrier est terminée, s'assurer qu'aucune option n'est en surbrillance et appuyer sur la touche **SORTIE**. Cela enregistre le calendrier.
9. Lorsqu'un calendrier est configuré, vérifier que l'écran principal de la commande affiche « Weekly » (pour la marche en mode hebdomadaire) et que l'appareil est en marche. Le calendrier ne prend effet que si le poêle est en marche en mode hebdomadaire (voir repère 13 à la Figure 19).

Configuration des autres données sur la commande

Réglage de l'heure et de la date

1. Tenir la touche **ENTRÉE** enfoncée. Le menu « SET DATA » (configuration de données) s'affiche à l'écran.
2. Appuyer une nouvelle fois sur **ENTRÉE** pour accéder au menu « SET CLOCK » (réglage de l'horloge). **VOIR FIGURE 24.**
3. Pour modifier l'heure, appuyer sur **ENTRÉE**. Les chiffres des heures sont en surbrillance. Utiliser les touches de **DÉFILEMENT HAUT** et de **DÉFILEMENT BAS** pour régler l'heure correcte. Appuyer sur **ENTRÉE** pour valider les heures puis appuyer une deuxième fois sur **ENTRÉE** pour régler les minutes.
4. Poursuivre ce processus pour sélectionner et régler le jour, le mois, la date et l'année.
5. Lorsque le réglage est terminé et que rien n'est en surbrillance à l'écran, appuyer sur la touche **SORTIE**.

SET CLOCK
10:45 Fri. May 20, 2011

Figure 24

Choix de l'unité de température

1. Tenir la touche **ENTRÉE** enfoncée. Le menu « **SET DATA** » (configuration de données) s'affiche à l'écran.
2. À l'aide de la touche de **DÉFILEMENT BAS**, descendre jusqu'à l'option 3 : « **Set Temperature Units** » (définir l'unité de température). Appuyer de nouveau sur **ENTRÉE** pour accéder au menu « **Set Temperature Units** ». **VOIR FIGURE 25.**
3. Dans le menu « **Set Temperature Units** », appuyer sur la touche **ENTRÉE** pour mettre les unités en surbrillance. Utiliser les touches de **DÉFILEMENT HAUT** et **DÉFILEMENT BAS** pour choisir Celsius (« C° ») ou Fahrenheit (« F° »).
4. Pour finir, appuyer sur **ENTRÉE**. Vérifier que rien n'est en surbrillance à l'écran et appuyer sur la touche **SORTIE**.

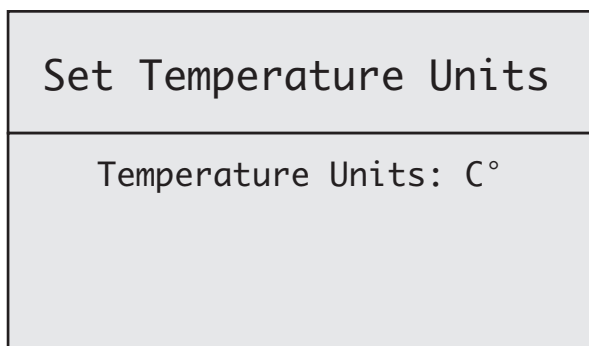


Figure 25

Réglage de la tension du ventilateur

La tension du ventilateur (qui contrôle le ventilateur d'air ambiant) peut être augmentée ou diminuée pour chaque niveau de puissance afin de réguler la quantité de chaleur refoulée dans une pièce durant la marche du poêle. Certains combustibles rayonnent mieux la chaleur que d'autres. Il est possible d'accélérer ou de ralentir le ventilateur d'air ambiant afin d'extraire la quantité optimale de chaleur sans souffler d'air froid.

L'augmentation de la tension du ventilateur fait tourner le moteur de chambre à plus haut régime, ce qui extrait plus de chaleur de l'appareil.

REMARQUE : En cas de problème de surchauffe du poêle à tout niveau de puissance, augmenter la tension du ventilateur.

La réduction de la tension du ventilateur permet de ralentir l'échange de chaleur au niveau du poêle afin qu'il souffle moins d'air froid.

Pour régler la tension du ventilateur :

1. Tenir la touche **ENTRÉE** enfoncée. Le menu « **SET DATA** » (configuration de données) s'affiche à l'écran.
2. À l'aide de la touche de **DÉFILEMENT BAS**, descendre jusqu'à l'option 4 : « **Set Blower Voltage** » (réglage de la tension du ventilateur). Appuyer de nouveau sur **ENTRÉE** pour accéder au menu « **Set Blower Voltage** ». **VOIR FIGURE 26.**
3. À l'aide des touches de défilement haut ou bas, sélectionner le « Stall » (niveau de puissance de chauffage) dont la tension doit être changée puis appuyer sur **ENTRÉE**. La valeur de tension est automatiquement mise en surbrillance.
4. À l'aide des touches de **DÉFILEMENT HAUT** ou de **DÉFILEMENT BAS**, sélectionner la tension qui convient.

REMARQUE : La tension peut être diminuée ou augmentée uniquement par intervalles de 5 V.

5. Appuyer sur **ENTRÉE** pour valider les modifications. Répéter les étapes 2 à 4 pour les autres niveaux de puissance le cas échéant.

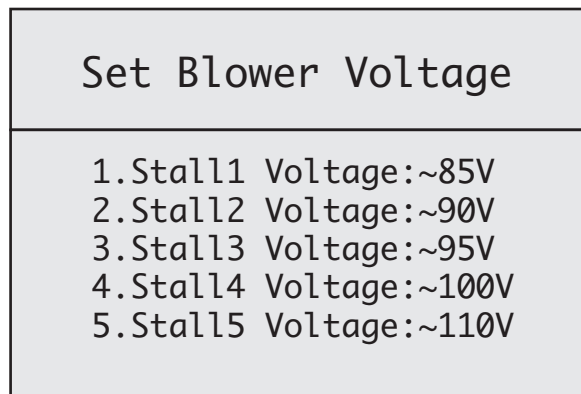


Figure 26

Réglage de la tension d'évacuation

REMARQUE IMPORTANTE :

AJUSTER LE VOLET DE DÉBIT D'AIR AVANT D'AUGMENTER LA TENSION D'ÉVACUATION. En cas de tirage d'air insuffisant, essayer D'ABORD d'ajuster le volet de débit d'air. VOIR FIGURE 27. Cela modifie également le débit d'air entrant dans le poêle. Dans la plupart des installations, la porte de l'écoulement de l'air devrait être moitié ouverte. ce est mieux vu de l'avant du poêle avec le pot au feu enlevé.

La tension d'évacuation (qui contrôle le moteur d'évacuation) permet de régler le poêle en fonction du combustible brûlé ou pour compenser une insuffisance de ventilation. Dans les situations où le tirage est moins qu'optimal, il est possible d'augmenter la vitesse d'évacuation pour accroître la circulation d'air à travers le poêle si le tirage pose problème.

REMARQUE IMPORTANTE :

La modification de la tension d'évacuation ne change PAS le taux d'alimentation. Par conséquent, aux niveaux de puissance de chauffage élevée où le taux d'alimentation est plus rapide, un bas niveau de tension ne produit pas un refoulement d'air suffisant et le poêle peut surchauffer et les granules s'accumuler dans la boîte à feu. La réduction de tension d'évacuation accroît la quantité de chaleur dégagée dans la pièce. Ne pas régler la tension d'évacuation trop bas, car cela peut provoquer l'accumulation de granules dans la boîte à feu.

L'augmentation de la tension d'évacuation, et par conséquent l'augmentation de la quantité d'air dans la boîte à feu, facilite également l'évacuation des granules de qualité inférieure pour éviter leur accumulation indésirable.

REMARQUE : Veiller à contrôler visuellement le taux d'évacuation si la tension d'évacuation est diminuée, afin de ne pas provoquer de surcharge de la boîte à feu. La tension d'évacuation doit UNIQUEMENT être ajustée pour obtenir un rendement optimal du combustible brûlé. Réglage de la tension d'échappement trop élevée va augmenter la quantité de cendres volantes étant poussé hors de l'évent.

Pour régler la tension d'évacuation :

1. Tenir la touche **ENTRÉE** enfoncée. Le menu « **SET DATA** » (configuration de données) s'affiche à l'écran.
2. À l'aide de la touche de **DÉFILEMENT BAS**, aller à l'option 4 : « **Set Exhaust Voltage** » (réglage de la tension d'évacuation). Appuyer de nouveau sur **ENTRÉE** pour accéder au menu « **Set Exhaust Voltage** ». **VOIR FIGURE 28.**
3. À l'aide des touches de défilement haut ou bas, sélectionner le « Stall » (niveau de chauffage) dont la tension doit être changée puis appuyer sur **ENTRÉE**. La valeur de tension est

automatiquement mise en surbrillance.

4. À l'aide des touches de **DÉFILEMENT HAUT** ou de **DÉFILEMENT BAS**, sélectionner la tension qui convient.

REMARQUE : La tension peut uniquement être diminuée ou augmentée par intervalles de 5 V.

5. Appuyer sur **ENTRÉE** pour valider les modifications. Répéter les étapes 2 à 4 pour les autres niveaux de puissance le cas échéant.

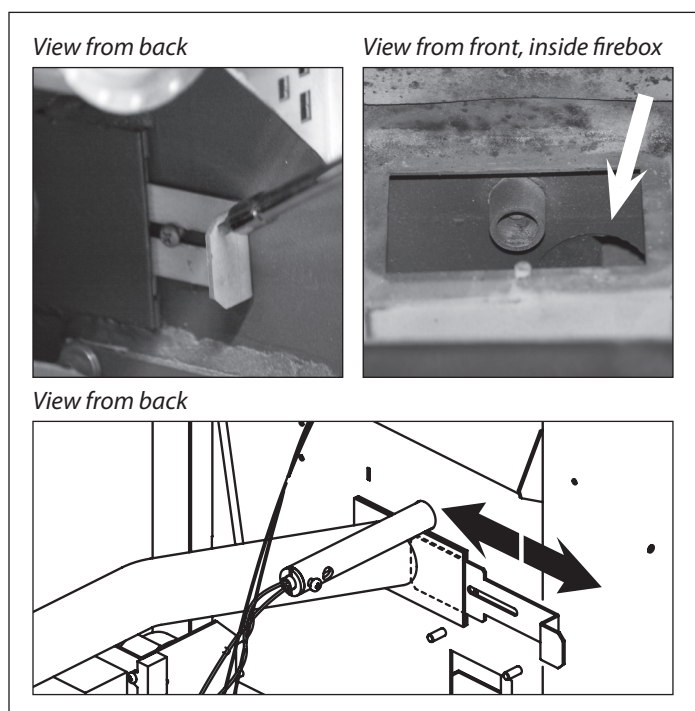


Figure 27

Set Exhaust Voltage	
1. Stall1	Voltage: ~80V
2. Stall2	Voltage: ~85V
3. Stall3	Voltage: ~90V
4. Stall4	Voltage: ~95V
5. Stall5	Voltage: ~100V

Figure 28

DIAGNOSTIC

La commande du poêle Castle est équipée d'une option de diagnostic embarquée qui permet de contrôler certains éléments du poêle.



AVERTISSEMENT

NE JAMAIS FAIRE FONCTIONNER LE POÊLE EN MODE DIAGNOSTIC. LE MODE DIAGNOSTIC S'UTILISE POUR CONTRÔLER ET CONFIRMER LE FONCTIONNEMENT DES COMPOSANTS INDIVIDUELS UNIQUEMENT. L'UTILISATION DU POÊLE EN MODE DIAGNOSTIC CRÉE DES CONDITIONS DANGEREUSES ET PEUT PROVOQUER DES BLESSURES CORPORELLES ET DES DOMMAGES AU MATÉRIEL.

REMARQUE : L'écran de diagnostic est accessible uniquement lorsque le poêle est à l'arrêt.

Pour accéder à l'écran de diagnostic :

1. Tenir la touche **ENTRÉE** enfoncée. Le menu « **SET DATA** » (configuration de données) s'affiche à l'écran.
2. À l'aide de la touche de **DÉFILEMENT BAS**, aller à l'option 6 : « **DIAGNOSTICS** ». Appuyer sur **ENTRÉE**. Le menu « **DIAGNOSTICS** » s'affiche à l'écran. **VOIR FIGURE 29.**

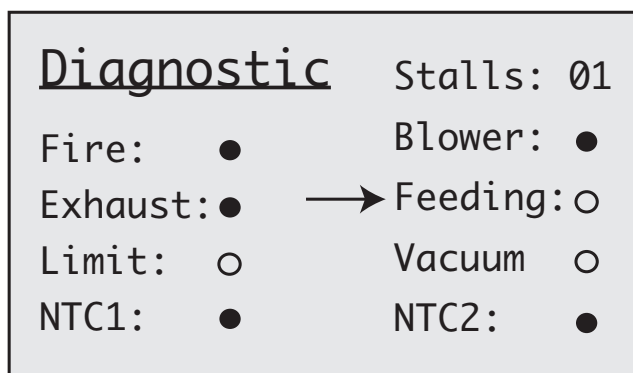



Figure 29

Si un élément fonctionne correctement, le cercle correspondant est noirci (plein).

- Stalls :** (niveaux de chauffage) Changer la valeur « Stalls » pour tester les éléments aux différents niveaux de puissance de chauffage.
- Fire :** (feu) Indique si l'allumeur fonctionne correctement.
- Exhaust :** (évacuation) Indique si le moteur d'évacuation et le système d'évacuation fonctionnent correctement.

- Limit :** (limite) Indique si le couvercle de la trémie est correctement fermé.
- Blower :** (soufflante) Indique si le ventilateur d'air ambiant fonctionne correctement.
- Feeding :** (alimentation) Indique si la vis sans fin assure une alimentation correcte en granules.
- Vacuum :** (dépression) Indique s'il y a une dépression et une aspiration suffisantes.
- NTC1 :** Indique si le détecteur de flamme fonctionne correctement.
- NTC2 :** Indique si la température est mesurée par le capteur de surchauffe.
(La température est en Celsius)

MISE À L'ARRÊT

Appuyer sur le bouton  du tableau de commande pour passer en mode de mise à l'arrêt. L'indicateur de Marche/Arrêt à l'écran affiche « **OFF** » (arrêt). La vis sans fin d'alimentation s'arrête mais la soufflante de distribution d'air ambiant et le ventilateur d'évacuation continuent de tourner. Une fois que le poêle a refroidi, l'éclairage de l'écran s'éteint.

La durée de mise à l'arrêt peut varier.

ENTRETIEN

Soins et entretien courants

Les intervalles de nettoyage du poêle peuvent varier en raison des différences entre combustibles. Plus le poêle est propre et plus il brûle efficacement.

Nettoyage de la boîte à feu

Sortir et nettoyer la boîte à feu chaque jour. Vérifier qu'aucun trou de la boîte à feu n'est obstrué. Nettoyer ces trous avec une petite pointe métallique ou un foret. **VOIR FIGURE 30.**

Résidus de la boîte à feu

La boîte à feu doit être vidée chaque fois que la trémie est remplie de combustible. Pour vider la boîte à feu, la soulever hors du porte-boîte et la vider directement dans le cendrier. Veiller à éliminer tout dépôt et s'assurer que les trous sont propres.

Nettoyage de la vitre

Nettoyer la vitre seulement quand le verre est froid. Essuyer fréquemment la vitre. Essuyer la vitre avec un chiffon sec ou humide. Si cela ne nettoie pas la vitre, utiliser tout produit nettoyant non abrasif. Un produit nettoyant pour cuisinière en céramique peut s'avérer utile pour nettoyer la suie de la vitre. Contrôler régulièrement les joints sur le pourtour de la vitre. Changer tout joint usé, effiloché ou écrasé. Remplacer une vitre brisée uniquement par une vitre céramique haute température, disponible auprès de Castle Pellet Stoves. **VOIR FIGURE 31.**

Émissions du poêle

Les émissions du poêle doivent être contrôlées visuellement à intervalles réguliers. Des émissions visibles sont l'indication d'une combustion inefficace. Pour minimiser l'impact sur l'environnement, les coûts d'entretien et la consommation de combustible, cet appareil de chauffage à granules devra fonctionner de façon à minimiser la visibilité des émissions.

Chambre intérieure

Nettoyer la chambre intérieure avec un aspirateur à cendres. Les aspirateurs à cendres sont conçus spécialement pour contenir la suie et ont un extérieur métallique. Effectuer cette opération chaque semaine.

AVERTISSEMENT

LES SURFACES CHAUDES PEUVENT PROVOQUER DES BRÛLURES. NE JAMAIS EFFECTUER DE NETTOYAGE OU D'ENTRETIEN SUR UN POÊLE CHAUD. LAISSER L'APPAREIL REFROIDIR PENDANT UN MINIMUM DE DEUX HEURES. NE JAMAIS EFFECTUER D'ENTRETIEN ALORS QUE L'APPAREIL EST SOUS TENSION. CELA PRÉSENTE UN RISQUE DE BLESSURE CORPORELLE OU DE DOMMAGE MATÉRIEL.



Figure 30 : Nettoyage de la boîte à feu

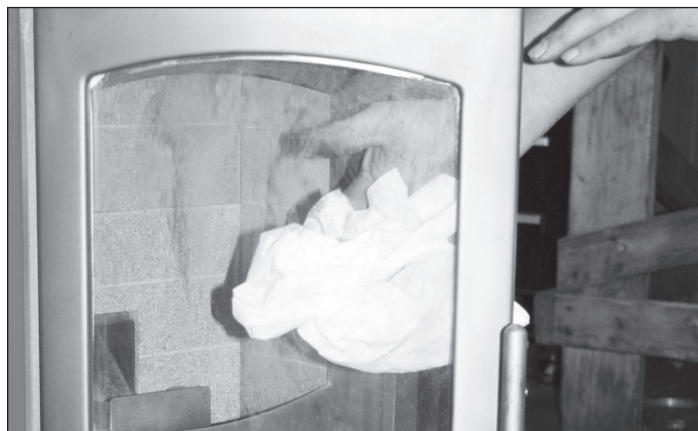


Figure 31 : Essuyer la vitre et contrôler le joint

Entretien quotidien

Les surfaces du poêle peuvent être chaudes. Toujours porter un gant protecteur, même si le poêle est froid au toucher. Veiller à éteindre le poêle et le laisser refroidir pendant une heure avant d'effectuer toute tâche d'entretien ou de réparation.

Vider les cendres de la boîte à feu. Soulever la boîte à feu hors du porte-boîte et la vider directement dans le cendrier. **VOIR FIGURE 32.**

Éliminer tous les dépôts et s'assurer que tous les trous sont propres.

Vider le cendrier dans un récipient métallique à couvercle hermétique. Le récipient à cendres fermé doit être placé sur un plancher non combustible ou sur le sol, bien à l'écart de tout matériau combustible. Le vidage des cendres dépend de la quantité de combustible brûlé. Il peut être nécessaire une à deux fois par semaine.

Entretien hebdomadaire

Dépose du cendrier

1. Éteindre le poêle et le laisser refroidir pendant une heure avant de le nettoyer.
2. Ouvrir la porte frontale. À l'aide d'une brosse de nettoyage, faire tomber tout dépôt de cendres sur le déflecteur de cendres dans le cendrier en dessous.
3. Soulever le déflecteur de cendres et l'accrocher à la broche de retenue située sur l'intérieur de la paroi arrière. Faire cela sur les côtés gauche et droit du cendrier. **VOIR FIGURE 33.** Cela permet de retirer le cendrier sans difficulté.
4. Pour sortir le cendrier, le soulever verticalement puis hors de la porte frontale. **VOIR FIGURE 34.**

Élimination des cendres

Vider régulièrement le cendrier. Les cendres doivent être contenues dans un récipient métallique à couvercle hermétique. Le récipient à cendres fermé doit être placé sur un plancher non combustible ou sur le sol, bien à l'écart de tout matériau combustible. Si les cendres sont éliminées par enfouissement ou dispersées localement, elles doivent rester dans le récipient fermé jusqu'à ce que toutes les braises aient refroidi.

Suie et cendres volantes

Les produits d'évacuation contiennent des fines particules de cendres volantes. La cendre volante s'accumule dans le système d'évacuation et restreint l'écoulement des gaz brûlés. Une combustion incomplète, notamment durant le démarrage, la mise à l'arrêt ou un mauvais fonctionnement du poêle, entraîne la formation de suie, qui s'accumule alors dans le système d'évacuation. Le système d'évacuation doit être contrôlé au moins une fois par mois pour déterminer si un nettoyage est nécessaire. Si le nettoyage est nécessaire, démonter le système d'évacuation et nettoyer les pièces individuelles. **Pour nettoyer les cendres, utiliser un aspirateur à cendres homologué. Pour plus de détails, s'adresser à un revendeur.**

Contrôler les tés de nettoyage régulièrement pour déterminer l'intervalle de nettoyage requis. Utiliser une brosse de ramonage de 3 ou 4 pouces pour nettoyer le conduit d'évacuation. Un conduit obstrué influe sur la qualité du feu. Veiller à nettoyer tous les tamis éventuels dans l'arrivée d'air. Un tamis obstrué coupe l'arrivée d'air d'évacuation et provoque une mauvaise d'évacuation ou l'extinction du feu.

⚠ AVERTISSEMENT

LES SURFACES CHAUDES PEUVENT PROVOQUER DES BRÛLURES. NE JAMAIS EFFECTUER DE NETTOYAGE OU D'ENTRETIEN SUR UN POÊLE CHAUD. LAISSER L'APPAREIL REFRROIDIR PENDANT UN MINIMUM DE DEUX HEURES. NE JAMAIS EFFECTUER D'ENTRETIEN ALORS QUE L'APPAREIL EST SOUS TENSION. CELA PRÉSENTE UN RISQUE DE BLESSURE CORPORELLE OU DE DOMMAGE MATÉRIEL.

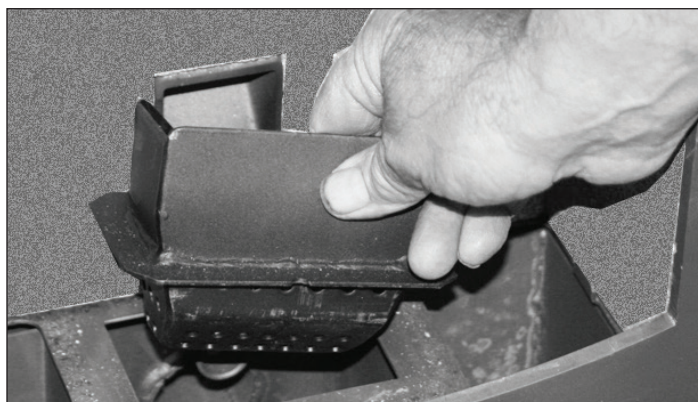


Figure 32 : Vider la boîte à feu



Figure 33 : Vidage du cendrier



Figure 34 : Vider le cendrier.

Poêle à granules Serenity

En plus des tâches d'entretien quotidien, nettoyer l'intérieur de la boîte à feu avec un aspirateur à cendres.

Sortir la boîte à feu du porte-boîte et passer l'aspirateur en dessous. Veille à bien éliminer toutes les cendres de l'entrée du tube d'allumeur. **VOIR FIGURE 34.**

Entretien mensuel

Le système d'évacuation doit être contrôlé au moins une fois par mois pour déterminer si un nettoyage est nécessaire.

Tous les ans / tous les deux ans

Démonter et nettoyer le système d'évacuation.

Déposer et nettoyer le moteur d'évacuation, son logement et le rotor. **Pour déposer le moteur d'évacuation, il est nécessaire de déposer le panneau latéral du poêle.** Pour déposer le panneau :

Retirer quatre vis, deux en haut et deux en bas du panneau. **VOIR FIGURE 35.**

Faire pivoter le panneau arrière vers l'extérieur et pousser l'avant du panneau vers l'intérieur pour le dégager et l'enlever.

Une fois que le panneau latéral est déposé, il est possible de déposer et de nettoyer le moteur d'évacuation, son logement et le rotor. **VOIR FIGURE 36.**



Figure 34 : Éliminer les cendres de tube d'allumeur (sous la boîte à feu)



Figure 35 : Retirer les (2) vis de l'arrière du panneau latéral, en haut et en bas du panneau. Retirer les (2) vis de la face avant du panneau latéral, en haut et en bas du panneau.

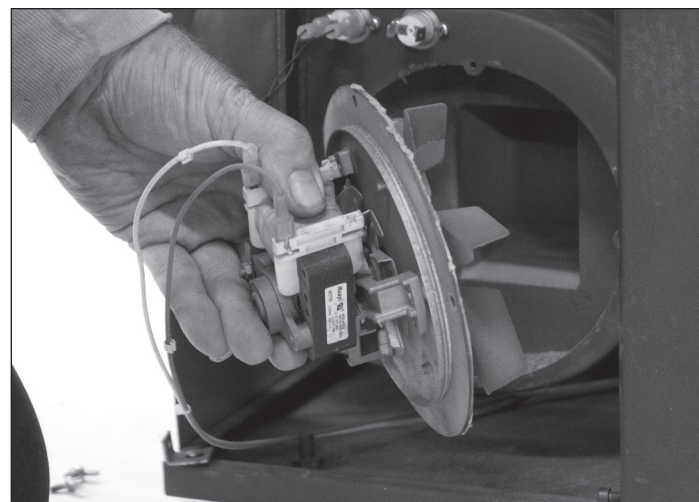


Figure 36 : Déposer le moteur d'évacuation et le nettoyer

DÉPANNAGE ET RÉPARATION

Chez Castle, nous intégrons la qualité et la durabilité dans la conception de nos produits; mais toute la conception soignée et tout l'entretien attentionné ne sauraient garantir une existence totalement exempte de réparation du poêle. La majorité des problèmes sont mineurs et aisément résolus en suivant les indications du guide de dépannage dans cette section.

Ce guide aide à diagnostiquer les causes des problèmes les plus courants et à identifier leurs solutions.

Pour les réparations plus complexes, vous voudrez peut-être compter sur votre revendeur ou Château autorisé. Un catalogue de pièces est inclus dans cette section.

Nous sommes toujours heureux de répondre à toute question ou d'aider à trouver l'assistance qui convient. Pour commander des pièces ou se renseigner au sujet de la garantie, veuillez nous contacter par téléphone ou par courriel comme indiqué ci-dessous.

COMMANDE DE PIÈCES DE RECHANGE

Les pièces peuvent s'obtenir dans le magasin où le poêle a été acheté ou directement auprès de l'usine. Pour commander des pièces auprès de l'usine, appeler ou envoyer un courriel à :

Castle Stoves
1-800-345-6007

Courriel : info@castlestoves.com

Veiller à joindre les renseignements suivants à la commande :

1. Numéro de modèle et numéro de série
2. Description des pièces
3. Quantité
4. Référence des pièces

Pour plus de renseignements sur les réclamations et les réparations sous garantie, voir la section Garantie de ce manuel.



AVERTISSEMENT

LORS DE TOUTE OPÉRATION D'ENTRETIEN INTERNE.

NE PAS UTILISER LE POÊLE AVEC DES PANNEAUX OUVERTS OU ENLEVÉS. LES PIÈCES EN MOUVEMENT À L'INTÉRIEUR PEUVENT CAUSER DES BLESSURES.

UTILISER LA PROTECTION PERSONNELLE QUI CONVIENT, LES PIÈCES SONT CHAUDES. NE PAS FAIRE FONCTIONNER L'APPAREIL AVEC UN PANNEAU OUVERT.

DÉBRANCHER L'ALIMENTATION AVANT TOUT ENTRETIEN DE L'APPAREIL. RISQUE DE CHOC ÉLECTRIQUE.

UTILISER EXCLUSIVEMENT DES PIÈCES DE RECHANGE D'ORIGINE.



ATTENTION

CECI EST UNE EXIGENCE MINIMALE POUR L'ÉLIMINATION DE LA SUIE ET DES CENDRES VOLANTES. LES CENDRES DOIVENT ÊTRE PLACÉES DANS UN RÉCIPIENT MÉTALLIQUE À COUVERCLE HERMÉTIQUE. LE RÉCIPIENT DOIT ÊTRE PLACÉ SUR UN PLANCHER NON COMBUSTIBLE, TRÈS À L'ÉCART DE MATÉRIAUX COMBUSTIBLES, EN ATTENDANT L'ÉLIMINATION FINALE. SI LES CENDRES SONT ÉLIMINÉES PAR ENFOUISSEMENT OU DISPERSÉES LOCALEMENT, ELLES DOIVENT ÊTRE CONSERVÉES DANS LE RÉCIPIENT FERMÉ JUSQU'À CE QUE TOUTES LES BRAISES AIENT BIEN REFROIDI.

NE PAS FAIRE FONCTIONNER LE POÊLE AVEC LA VITRE BRISÉE.

NE PAS CLAQUER LA PORTER EN LA FERMANT.

NE PAS HEURTER LA VITRE.

NE PAS UTILISER DE PRODUIT NETTOYANT ABRASIF.

NE PAS NETTOYER LA VITRE CHAUDE.

REMPLENER LA VITRE CÉRAMIQUE UNIQUEMENT PAR UNE PIÈCE DE RECHANGE AUTORISÉE.

LES SCORIES RESTENT CHAUDES PENDANT PLUSIEURS MINUTES APRÈS QU'ELLES SONT RETIRÉES DE LA BOÎTE À FEU.

GUIDE DE DÉPANNAGE

⚠ AVERTISSEMENT

DÉBRANCHER LE POÊLE ET LE LAISSER REFROIDIR AVANT TOUTE OPÉRATION D'ENTRETIEN. LES PIÈCES CHAUDES PEUVENT PROVOQUER DES BRÛLURES.

NE JAMAIS TESTER NI CONTRÔLER DES COMPOSANTS ÉLECTRIQUES ALORS QUE LE POÊLE EST BRANCHÉ SUR L'ALIMENTATION ÉLECTRIQUE. CELA PRÉSENTE UN RISQUE DE CHOC ÉLECTRIQUE.

⚠ AVERTISSEMENT

NE JAMAIS TOUCHER NI EFFECTUER L'ENTRETIEN DE LA VIS SANS FIN ALORS QUE LE POÊLE EST BRANCHÉ.

L'EXISTENCE D'UNE DÉPRESSION DANS LA MAISON EST UNE QUESTION IMPORTANTE. SI CELA POSE UN PROBLÈME, LE POÊLE DOIT ÊTRE INSTALLÉ AVEC UN NÉCESSAIRE AIR FRAIS (NON FOURNI).

PROBLÈME	CAUSE	SOLUTION
Le voyant de panne s'allume	Le feu s'éteint	La commande indique un épuisement de combustible, contrôler la boîte à feu. Ajouter du combustible dans la trémie. Si la trémie est pleine, rallumer le poêle s'il continue de fournir ce signal. Accéder ensuite au mode de diagnostic de la commande. Le cercle à côté de « NTC1 » doit être noirci. Si ce n'est pas le cas, changer le détecteur de flamme 52C. Contrôler les fils queue de cochon, changer les cosses le cas échéant.
PROBLÈME	CAUSE	SOLUTION
Le voyant de panne est allumé	Surchauffe	Le ventilateur d'air ambiant peut être testé en mettre le cercle à côté de « Blower » à l'état noirci. Laissez le poêle refroidir puis le redémarrer. Vérifier que conduit d'évacuation n'est pas obstrué. Augmenter la tension du ventilateur, depuis le tableau de commande, dans chaque niveau de chauffage (Stall).
PROBLÈME	CAUSE	SOLUTION
Pas d'alimentation en combustible, aucun signal de dépression sur la commande	Porte principale ou cendrier pas fermé hermétiquement Pas de dépression dans la chambre d'évacuation Les tuyaux ou le poêle sont bouchés par les cendres Défaillance du moteur d'évacuation	Le capteur de pression coupe la vis sans fin en l'absence de dépression dans la chambre d'évacuation. Contrôler les joints de la porte. Contrôler les joints de la vitre. Nettoyer l'évacuation et le poêle. Vérifier que le moteur d'évacuation fonctionne. Accéder au mode de diagnostic de la commande et noircir le cercle à côté de « Feeding »; cela devrait activer la vis sans fin et l'alimentation en granules. Noircir ensuite le cercle d'« Exhaust ». Le moteur d'évacuation doit se mettre en marche et, dans les 20 secondes, le signal de dépression (Vacuum) doit aussi s'afficher en noirci.

PROBLÈME	CAUSE	SOLUTION
Pas l'alimentation en combustible, présence de signal de dépression et de couvercle sur la commande.	La vis sans fin est obstruée La vis sans fin ne fonctionne pas	Sortir la vis sans fin de son logement et nettoyer d'abord l'obstruction. Accéder au mode de diagnostic de la commande et activer (noircir) le cercle de « Feeding ». Cela devrait activer la vis sans fin et l'alimentation en granules. Changer la vis sans fin le cas échéant.
Pas l'alimentation en combustible, pas de signal de couvercle sur la commande.	Le couvercle de trémie est ouvert Le contacteur de couvercle de trémie ne fonctionne pas correctement	Fermer le couvercle de trémie. Accéder au mode de diagnostic de la commande; le cercle de « Limit » doit être noirci lorsque la trémie est fermée. Le cercle est en blanc si le couvercle de la trémie est ouvert. Contrôler le joint du couvercle de trémie. Changer le contacteur de sécurité de la trémie s'il ne fonctionne pas correctement.
PROBLÈME	CAUSE	SOLUTION
D'évacuation lente et enfumée	Le poêle est sale Combustible de mauvaise qualité	Nettoyer la boîte à feu. Nettoyer le cendrier. Nettoyer le système d'évacuation. Nettoyer le poêle par le regard de nettoyage à cache. Augmenter la tension du moteur d'évacuation.
PROBLÈME	CAUSE	SOLUTION
Alimentation de carburant, ne s'allume pas du tout ; indicateurs de commande en marche	Tube d'allumeur ou boîte à feu obstrués par des cendres Allumeur défectueux	Nettoyer la boîte à feu, nettoyer le tube d'allumeur. Vérifier le réglage de l'allumeur. Seuls les fils de raccordement devraient sortir du porte-allumeur. Accéder au mode de diagnostic de la commande et tester l'allumeur en activant l'option « Fire ». De la chaleur doit se dégager du support d'allumeur dans les deux minutes. Le changer le cas échéant.

ILLUSTRATION DES PIÈCES DÉTACHÉES

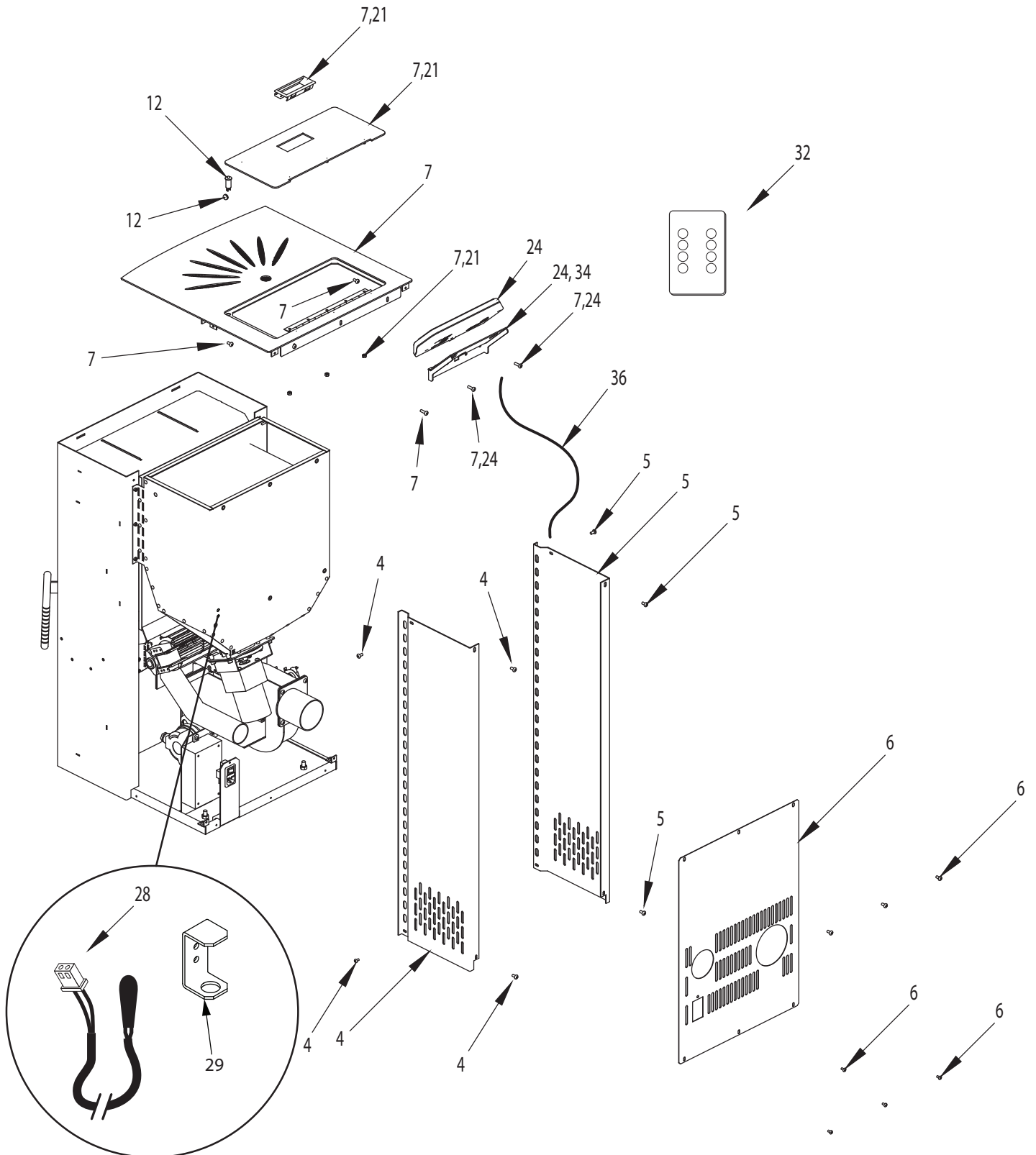


ILLUSTRATION DES PIÈCES DÉTACHÉES

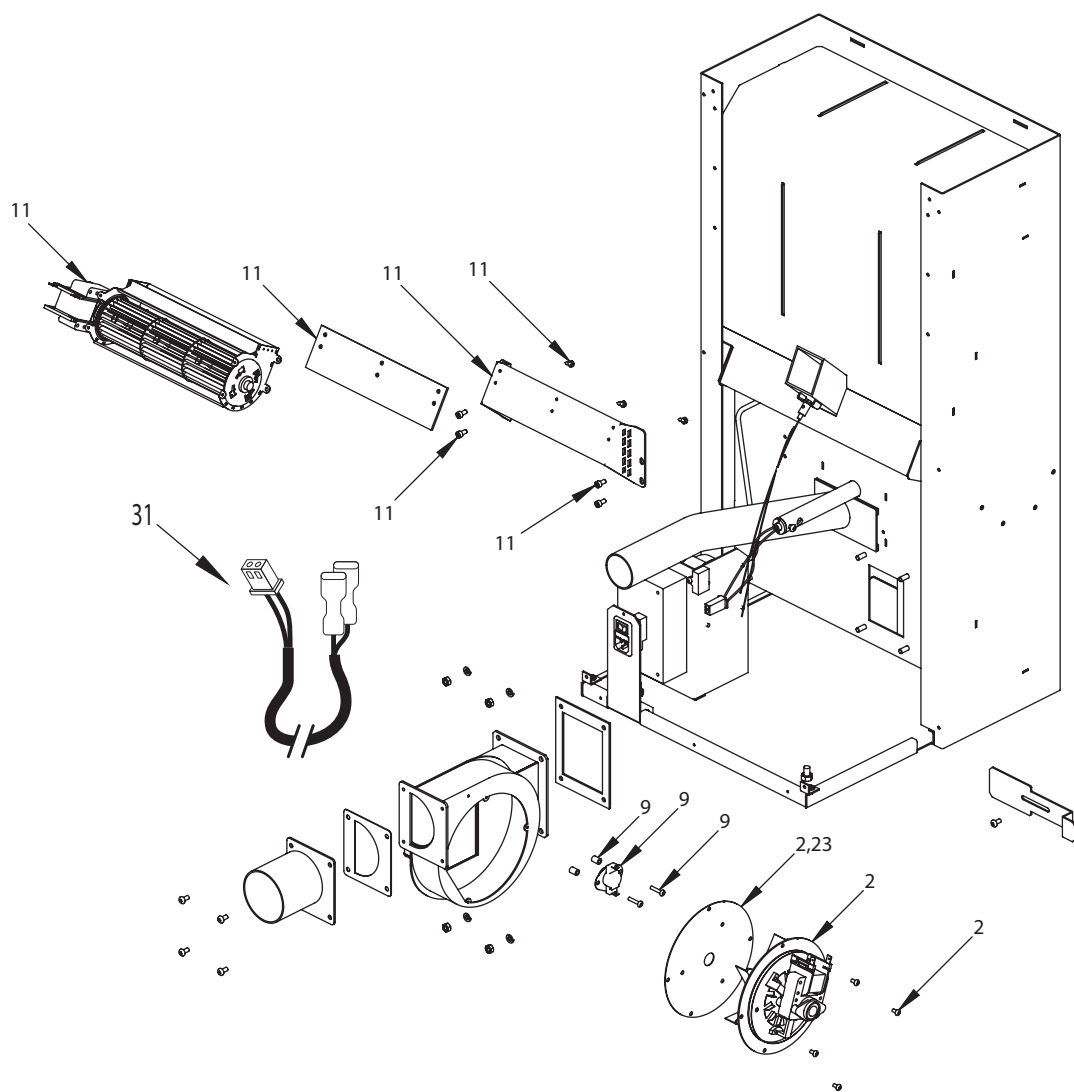


ILLUSTRATION DES PIÈCES DÉTACHÉES

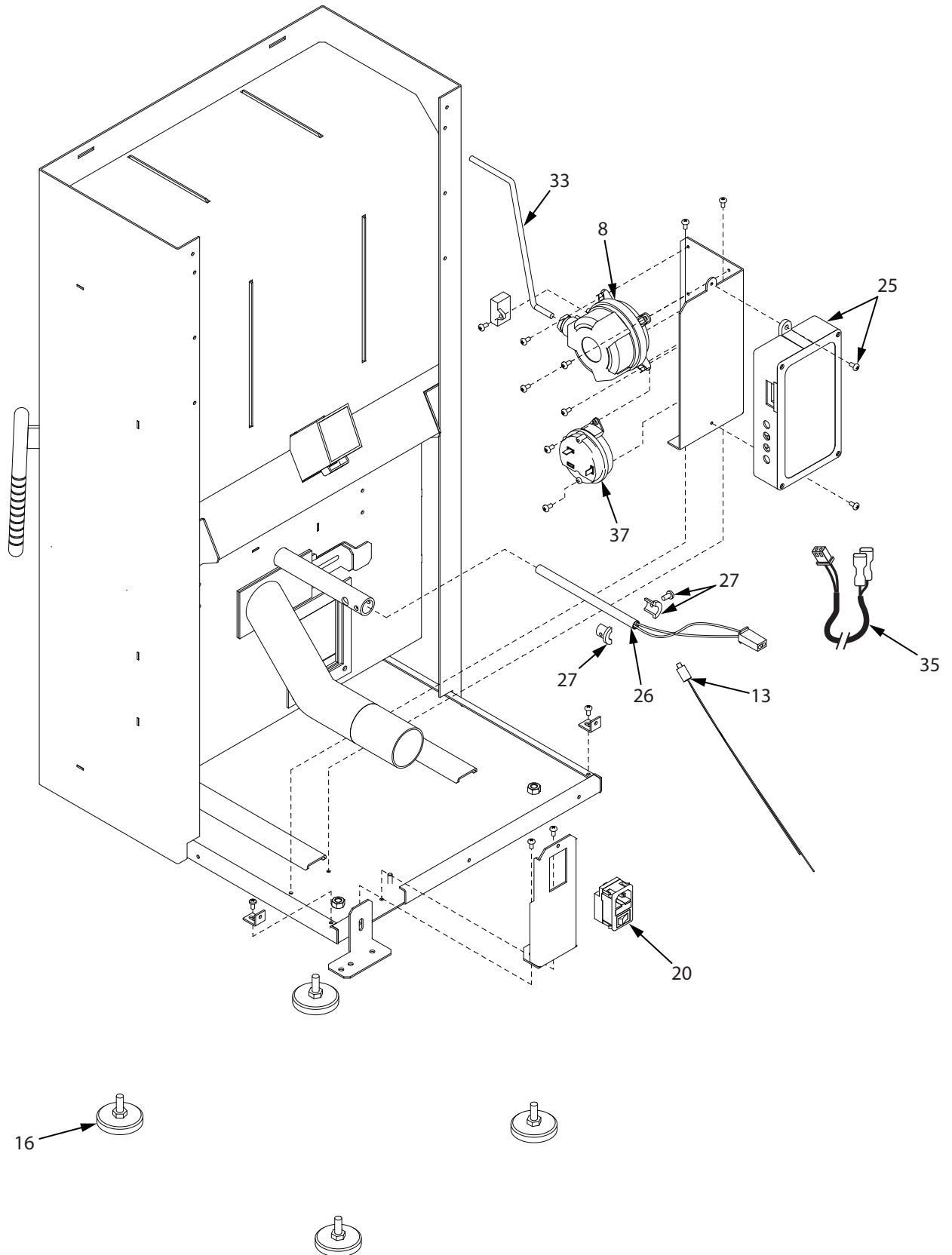


ILLUSTRATION DES PIÈCES DÉTACHÉES

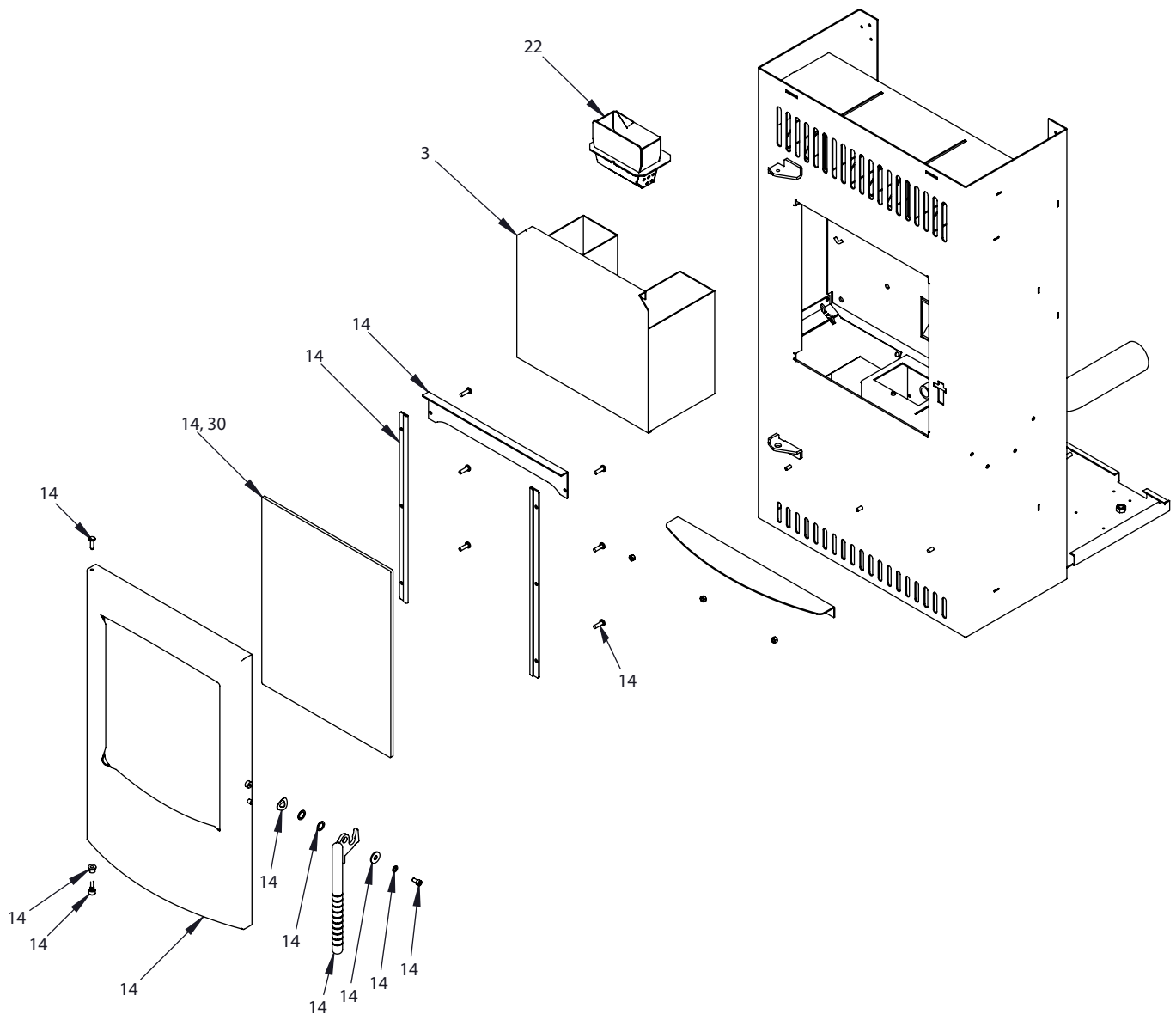


ILLUSTRATION DES PIÈCES DÉTACHÉES

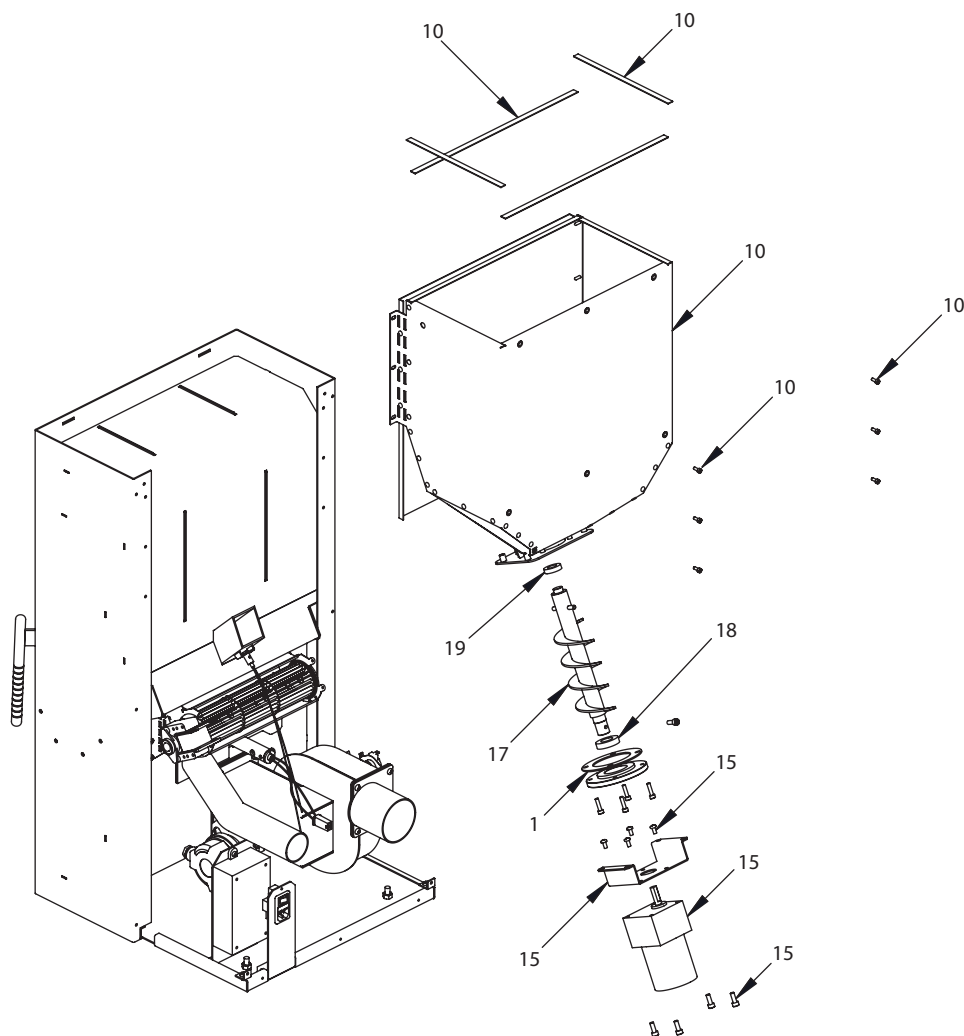
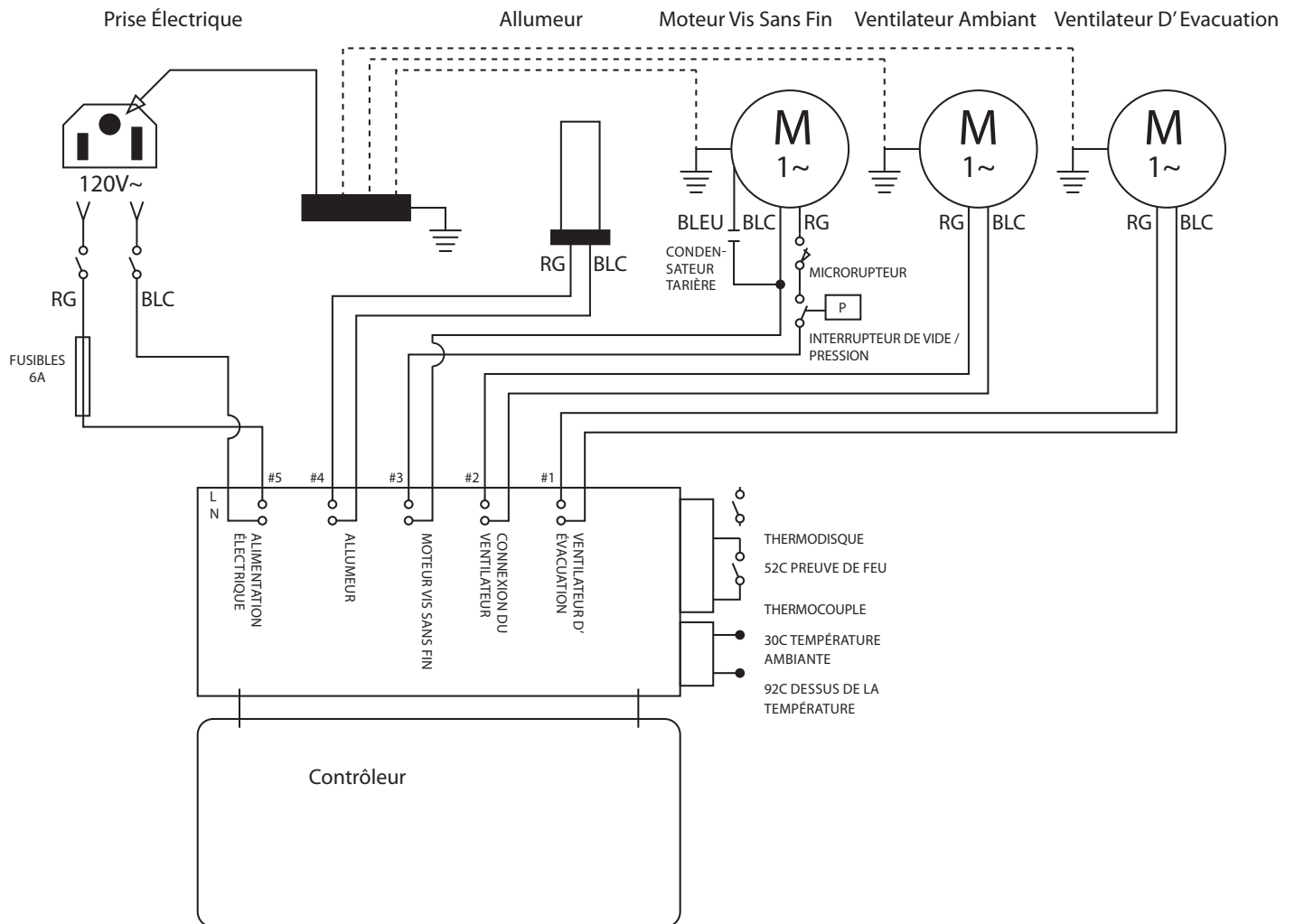


ILLUSTRATION DES PIÈCES DÉTACHÉES

REPÈRE	RÉF.	DESCRIPTION	QTÉ
1	12225	JOINT DE LOGEMENT DE VIS SANS FIN SYSTÈME ALIM HPS	1
2	720110	VENTILATEUR DE D'ÉVACUATION	1
3	16135	CENDRIER	1
4	16278	KIT PANNEAU DROIT DE RECHANGE	1
5	16279	KIT PANNEAU GAUCHE DE RECHANGE	1
6	16280	KIT PANNEAU ARRIÈRE DE RECHANGE	1
7	16281	KIT CAPOT SUPÉRIEUR ET COUVERCLE DE TRÉMIE DE RECHANGE	1
8	720238	CONTACTEUR À DÉPRESSION	1
9	720103	CAPTEUR 52C DE RECHANGE	1
10	16284	KIT TRÉMIE DE RECHANGE	1
11	21565	KIT VENTILATEUR DE CONVECTION DE RECHANGE	1
12	720055	CONTACTEUR DE COUVERCLE DE TRÉMIE	1
13	720106	SONDE DE TEMPÉRATURE 92 °C	1
14	720204	KIT PANNEAU DE PORTE DE RECHANGE	1
15	720107	MOTEUR DE VIS SANS FIN HPS & SERENITY	1
16	720216	PIED RÉGLABLE	4
17	720219	VIS SANS FIN SYSTÈME D'ALIMENTATION	1
18	720220	PALIER INFÉRIEUR VIS SANS FIN	1
19	720221	PALIER SUPÉRIEUR VIS SANS FIN	1
20	720227	KIT INTERRUPTEUR D'ALIMENTATION DE RECHANGE	1
21	720229	POIGNÉE DE TRÉMIE DE RECHANGE	1
22	720235	BOÎTE À FEU	1
23	18522	KIT JOINT DE MOTEUR D'ÉVACUATION	1
24	720298	KIT TÊTE DE COMMANDE DE RECHANGE	1
25	720304	KIT MODULE D'INTERFACE DE RECHANGE	1
26	720307	KIT ALLUMEUR DE RECHANGE	1
27	720308	KIT COLLIER PORTE-ALLUMEUR DE RECHANGE	1
28	13512	FIL QUEUE DE COCHON LEAD, 30C	1
29	28663	SUPPORT, CAPTEUR DE CHAMBRE DE MONTAGE 30C	1
30	720242	GLASS HPS10 & SERENITY	1
31	11090	PIGTAIL LEAD 52 FOR 10IC SERENITY	1
32	11721	REMOTE CONTROL	1
33	12283	TUBE VACUUM SWITCH PORT	1
34	12429	BRACKET CONTROLLER	1
35	11392	PIGTAIL LEAD VACUUM SWITCH	1
36	23063	FAISCEAU DE CÂBLAGE SERENITY COMPLET	1
37	28662	CONTACTEUR À DÉPRESSION 0.05 WC	1

SCHÉMA DE CÂBLAGE



Rendement

Le rendement est la mesure de l'efficacité d'un appareil à transformer une entrée d'énergie fournie sous forme de carburant en une sortie d'énergie sous forme de chaleur. Les incohérences concernant le rendement de chauffage ne sont pas rares sur le marché. Lors de la détermination des valeurs de rendement pour les appareils de chauffage au bois, le pouvoir calorifique supérieur (PCS) est préférable au pouvoir calorifique inférieur (PCI), qui ignore la chaleur latente de vaporisation de la vapeur d'eau, qui est inhérente à la combustion du bois de chauffage.

Le rendement de l'appareil de chauffage à granules Serenity™ dépend de facteurs tels que l'emplacement d'installation, les combustibles utilisés ou la façon dont il est utilisé. Pour obtenir un rendement maximal de l'appareil de chauffage à granules Serenity™, veiller à respecter les recommandations suivantes :

- Choisir des combustibles à faible teneur en humidité. L'utilisation de combustibles à forte teneur en humidité absorbe de la chaleur du combustible et tend à refroidir l'appareil, privant la maison d'une partie de la chaleur. Il est conseillé d'utiliser des granules conformes ou supérieurs aux normes PFI Premium Grade (qualité

supérieure), notamment parce qu'ils ont une faible teneur en humidité.

- La combustion efficace de toute source de combustible suppose des proportions correctes de combustible et d'oxygène. Ce principe s'applique aussi à l'appareil de chauffage au bois Serenity™ et aux granules de bois qui y sont brûlés. La combustion à un réglage bas consiste à limiter l'arrivée d'oxygène. L'utilisation constante à son réglage le plus bas se traduit par un rendement moindre que si le poêle est utilisé à des taux de combustion moyens à élevés.
- L'appareil de chauffage au bois offre un rendement optimal s'il est installé dans un espace à vivre principal. Une installation en sous-sol entraînerait une certaine déperdition de chaleur vers la terre environnante à travers les murs de fondation. Les installations à l'extérieur ou dans un local non fermé qui facilite la dissipation de la chaleur dans l'environnement sont fortement déconseillées.

Émissions certifiées EPA :	1,00 g/h
*Rendement PCS testé :	78,2 %
**Plage de puissance de sortie :	3,8 à 7,8 kW (12 808 à 26 493 BTU/h)
***Puissance consommée :	10,5 kW (36 660 BTU/h)
Combustible :	Granules de bois (PFI Premium ou mieux)
* Moyenne pondérée de valeurs de rendement PCS mesurées lors d'essais d'émissions de l'EPA.	
** Intervalle de puissance de sortie obtenu à partir de taux de rendement et de combustion mesurés lors d'essais de l'EPA à des taux de combustion bas et élevés utilisant la PCS.	
*** Calculée à partir du débit d'alimentation au réglage élevé multiplié par la teneur testée de 2,5 kW (8 528 BTU/h) des granules utilisés pour les essais d'émissions.	

Sécurité incendie

Le monoxyde de carbone (CO) est un gaz potentiellement mortel qui résulte d'une combustion imparfaite. Le CO se produit lorsque les combustibles ne disposent pas de suffisamment d'air pour brûler complètement. Pour minimiser la production de CO, vérifier que l'appareil de chauffage au bois Serenity™ est nettoyé et entretenu comme il se doit, que le registre d'admission d'air est correctement réglé (pas trop large ou trop ouvert) et que la prise d'air est toujours bien dégagée.

Vérifier que la maison est équipée de détecteurs de fumée et de CO en bon état de marche. Ces détecteurs devront être installés et entretenus conformément aux conseils du fabricant. En outre, il est conseillé de prévoir des détecteurs de CO dans les endroits susceptibles de produire du CO. Il s'agit notamment des zones de chargement de combustible, des zones de stockage des granules en vrac, des abris contenant des appareils de chauffage hydronique et les pièces où les appareils de chauffage sont installés.

Taux de combustion (kg/h) (sec)	Émissions de CO (g/h)	Rendement de chauffage (% PCS)	Puissance thermique (kW [BTU/h])
Haut - 1,98	0,0	74,4	7,8 (26 493)
Moyen - 1,43	0,0	79,4	6,0 (20 415)
Bas - 0,92	0,0	77,2	3,8 (12 808)
Global - 1,29	0,0	78,2	5,2 (17 828)



GARANTIE PRODUIT SERENITY™ DE CASTLE™ : GARANTIE LIMITÉE UN AN

Ardisam Inc., une entreprise de fabrication, garantit que ce poêle à granules Castle est exempt de vices de matériaux et de fabrication pendant une durée d'un an. Pendant cette durée d'un an, Ardisam Inc., à son entière discrétion, fournira les pièces nécessaires pour corriger toute défaillance résultant de vices de matériaux ou de fabrication. Pour les autres réparations sous garantie, veuillez lire la garantie un an décrite ci-dessous.

Tous les composants électriques, notamment les soufflantes, câblages, contacteurs à dépression, commandes de vitesse, boîtes de commande, interrupteurs, veilleuses, thermostats et allumeurs sont couverts par la présente garantie un an. Tout remplacement de pièce sous garantie relève de la responsabilité du propriétaire.

Le fabricant n'offre aucune garantie écrite ou implicite de performances, n'exerçant aucun contrôle sur le type de combustible, l'installation, l'utilisation au quotidien ou l'entretien. En particulier, aucune garantie n'est offerte sur la peinture, le vitrage, la boîte à feu, les briques réfractaires ou les joints d'étanchéité.

Tous les coûts de dépose et de transport à destination et en provenance du concessionnaire ou du fabricant, toute perte durant le transport et le remontage et toute autre perte liée à l'enlèvement du poêle seront à la charge du propriétaire.

LA PRÉSENTE GARANTIE EST LIMITÉE AUX PIÈCES DÉFECTUEUSES ET NE COUVRE PAS LES DOMMAGES CAUSÉS PAR UNE INSTALLATION INCORRECTE, UN ENTRETIEN INCORRECT OU INSUFFISANT, UNE UTILISATION INCORRECTE OU UN EMBALLEMENT DE LA COMBUSTION. LA RÉPARATION ET/OU LE REMPLACEMENT DE PIÈCES SONT LAISSÉS À LA DISCRÉTION D'ARDISAM INC. ET EXCLUENT TOUS LES DOMMAGES ACCESSOIRES ET INDIRECTS ASSOCIÉS.

La présente garantie n'est pas cessible et remplace toute les autres garanties expresses ou implicites et toutes les autres obligations ou responsabilités de notre part. Ardisam Inc. n'assume aucune responsabilité, et n'autorise personne à assumer en son nom une quelconque responsabilité, en rapport avec la vente de ses produits. La garantie s'applique uniquement à des produits n'ayant pas subi de négligence, d'emploi abusif, de modification ni d'accident. Cette garantie est annulée si la carte de garantie dûment remplie n'est pas renvoyée à Ardisam Inc. à Cumberland (WI) dans les 30 jours après l'achat. Pour recourir aux services de réparation ou de remplacement sous garantie, s'adresser au service après-vente au 800-345-6007, du lundi au vendredi de 08h00 à 17h00 ou visitez www.castlepelletstoves.com. Avant d'envoyer le produit à Ardisam™ pour une réparation sous garantie, l'accord préalable d'Ardisam™ doit être obtenu en appelant notre service après-vente pour recevoir un numéro d'autorisation de renvoi de matériel (RMA#). Sous ces circonstances, tous les articles doivent être envoyés en port payé. Ardisam™, à son entière discrétion, réparera ou remplacera sans frais toute pièce défectueuse qui remplit les conditions énoncées ci-dessus. Ardisam™ se réserve le droit de modifier les modèles, les spécifications et les prix sans préavis. Ardisam n'est sous aucune obligation d'expédier un produit réparé ou échangé à une quelconque adresse en dehors des États-Unis d'Amérique et du Canada. Certains pays et provinces n'autorisent pas la limitation de la durée d'une garantie implicite, ni l'exclusion ou la limitation des dommages indirects ou accessoires, par conséquent les limites ci-dessus peuvent ne pas s'appliquer à vous. La présente garantie vous accorde des droits juridiques particuliers et vous pouvez jouir d'autres droits susceptibles de varier d'une province ou d'un pays à l'autre.



Castle Stoves™, Division of Ardisam, Inc.

1730 Industrial Avenue, PO Box 666

Cumberland, WI 54829

800-345-6007 | Télécopie 715-822-2223

Courriel : info@castlestoves.com

Engineering Print Specifications 工程图纸要求

Company 公司: Ardisam
Part No 零件号: 41697
Description 名称: DECAL CASTLE CERTIFICATION SERIAL
Type 类型: Decal 标贴
Print Process 印刷工艺: Silk Screen 丝网印刷
REV 版本号: 1
Born 设计完成日期: 03-18-22
ECN 工程变更号: 13598
Artist 设计: SAW-1775
Approved 批准: Seth Bailey
Notes 备注: -

Material Specifications 材质要求

Support File 支持性文件: W100804 (SERIAL NUMBER SEQUENCING 序列号编制)
Adhesive 粘性: ARD0004
Material 材质(基材): Aluminum 铝
Over-Laminate 覆膜: Gloss 光亮
UV Resist 抗紫外线: ARD0004

Bonding Surface Specifications 黏贴表面的情况

Material 材质: Steel 金属
Finish 表面: Smooth 纹理光滑
Geometry (所贴表面)几何形状: Flat 平的

Colors Used 所使用的颜色:



Pantone
Process Black

DIELINE SIZE 刀模线尺寸: 110mm x 110mm

PELLET FUEL ROOM HEATER

“This wood heater needs periodic inspection and repair for proper operation. Consult the owner’s manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner’s manual.”

“U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emissions standards using pellet fuel.”

Certified To: ASTM E2779, ASTM E2515, CSA B415.1


This appliance requires the use of “Premium Quality” Wood Pellet fuel.

Model: Serenity 41278 Emission: 1.00 g/hr

Date of Manufacture:

Manufactured By:

Serial Number:


Intertek
W/N 21187

41697

CAUTION

HOT - WHILE IN OPERATION. DO NOT TOUCH-KEEP CHILDREN, CLOTHING AND FURNISHINGS AWAY-CONTACT MAY CAUSE SKIN BURNS. SEE MANUAL FOR COMPLETE INSTRUCTIONS.

ATTENTION

CHAUD - DURANT LE FONCTIONNEMENT. NE PAS TOUCHER-TENIR LES ENFANTS, LES VÊTEMENTS ET LE MOBILIER À L'ÉCART-LE CONTACT PEUT PROVOQUER DES BRÛLURES CUTANÉES. VOIR LES INSTRUCTIONS COMPLÈTES DANS LE MANUEL.

PRECAUCIÓN

ESTÁ CALIENTE, MIENTRAS ESTÁ EN FUNCIONAMIENTO. NO TOCAR. MANTENGA A LOS NIÑOS, EL VESTUARIO Y EL MOBILIARIO ALEJADOS. EL CONTACTO PODRÍA PROVOCAR QUEMADURAS EN LA PIEL. CONSULTE EL MANUAL PARA CONOCER LAS INSTRUCCIONES COMPLETAS.

MODEL, MODÈLE, MODELO: SERENITY 41278
CERTIFIED TO, CERTIFIÉ SUIVANT, CERTIFICADO PARA:
UL 1482, ASTM E1509, ULCS627

WHI -

OPERATE THIS UNIT ONLY WITH THE FUEL HOPPER LID CLOSED-FAILURE TO DO SO MAY RESULT IN EMISSION OF PRODUCTS OF COMBUSTION FROM THE HOPPER UNDER CERTAIN CONDITIONS-MAINTAIN HOPPER SEAL IN GOOD CONDITION-DO NOT OVERFILL THE HOPPER. DO NOT REMOVE OR COVER THIS LABEL.

LISTED ROOM HEATERS
FOR USE ONLY WITH PELLETIZED WOOD.
ROOM HEATER, PELLET FUEL-BURNING TYPE, ALSO FOR USE IN MOBILE HOMES.
WARNING: DO NOT INSTALL IN SLEEPING ROOM.

UNIT MUST BE PLACED ON A NON-COMBUSTIBLE FLOOR PROTECTOR EXTENDING 6" TO THE FRONT, 6" TO SIDES AND 3" TO REAR.
EXHAUST TYPE: LISTED TYPE L OR PL VENT INSTALLED TO VENT MANUFACTURER'S INSTRUCTIONS AND LOCAL BUILDING CODES.
ELECTRICAL RATING: 115 VOLTS, 60 HERTZ.

INSTALL AND USE ONLY IN ACCORDANCE WITH CASTLE STOVES INSTALLATION AND OPERATING INSTRUCTIONS. CONTACT LOCAL

UTILISER CET APPAREIL UNIQUEMENT AVEC LE COUVERCLE DE TRÉMIE À COMBUSTIBLE FERMÉ SOUS PEINE D'ÉMISSION DE PRODUITS DE COMBUSTION PAR LA TRÉMIE SOUS CERTAINES CONDITIONS-MAINTENIR LE JOINT DE LA TRÉMIE EN BON ÉTAT-NE PAS TROP REMPLIR LA TRÉMIE. NE PAS ENLEVER NI COUVRIR CETTE ÉTIQUETTE.

APPAREILS DE CHAUFFAGE AUTONOMES HOMOLOGUÉS
UTILISER UNIQUEMENT AVEC DU BOIS EN GRANULÉS.
APPAREIL DE CHAUFFAGE AUTONOME, POUR COMBUSTIBLE EN GRANULÉS, ÉGALEMENT UTILISABLE EN MAISON MOBILE.
AVERTISSEMENT : NE PAS INSTALLER DANS UNE CHAMBRE À COUCHER.

L'APPAREIL DOIT ÊTRE PLACÉ SUR UN PROTECTEUR DE PLANCHER NON COMBUSTIBLE DÉPASSANT DE 15 CM SUR L'AVANT, DE 15 CM SUR LES CÔTÉS ET DE 7,5 CM SUR L'ARRIÈRE. TYPE D'ÉVACUATION : ÉVACUATION HOMOLOGUÉE DE TYPE L OU PL INSTALLÉE CONFORMÉMENT AUX INSTRUCTIONS DU FABRICANT ET AU CODE DU BÂTIMENT EN VIGUEUR. ALIMENTATION ÉLECTRIQUE : 115 VOLTS, 60 HERTZ.

INSTALLER ET UTILISER UNIQUEMENT EN CONFORMITÉ AVEC LES INSTRUCTIONS D'INSTALLATION ET D'UTILISATION DES POÊLES

OPERE ESTA UNIDAD SÓLO CON LA TAPA DE LA TOLVA DE COMBUSTIBLE CERRADA. DE LO CONTRARIO, SE PODRÍAN PRODUCIR EMISIONES DE PRODUCTOS DE COMBUSTIÓN DESDE LA TOLVA BAJO CIERTAS CIRCUNSTANCIAS. MANTENGA EL SELLO DE LA TOLVA EN BUEN ESTADO. NO LLENE LA TOLVA EN EXCESO. NO RETIRE O CUBRA ESTA ETIQUETA.

CALEFACTORES DE HABITACIÓN EN LA LISTA
SÓLO PARA USO CON PELLETS DE MADERA.
CALEFACTOR DE HABITACIÓN, DE TIPO COMBUSTIBLE A BASE DE PELLETS, TAMBIÉN PARA USO EN CASAS MÓVILES.
ADVERTENCIA: NO LO INSTALE EN DORMITORIOS.

LA UNIDAD SE DEBE COLOCAR EN UN PROTECTOR DE PISO NO COMBUSTIBLE QUE SE EXTIENDA 15 CM HACIA EL FRENTE, 15 CM HACIA LOS LADOS Y 7,5 CM HACIA ATRÁS. TIPO DE ESCAPE: VENTILACIÓN INSTALADA TIPO L O PL EN LISTA PARA VENTILAR SEGÚN LAS INSTRUCCIONES DEL FABRICANTE Y LOS CÓDIGOS DE CONSTRUCCIÓN LOCALES. CLASIFICACIÓN ELÉCTRICA: 115 VOLTIOS, 60 HERCIOS.

INSTALE Y UTILICE SÓLO DE ACUERDO CON LAS INSTRUCCIONES DE OPERACIÓN E INSTALACIÓN DE LAS ESTUFAS CASTLE.



**TESTED AND LISTED BY:
TESTÉ ET HOMOLOGUÉ
PAR:
PROBADO E INDICADO
EN LISTA POR:**



**Intertek
W/N 20357**

BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE. REVIEW THE LOCAL BUILDING CODE AND MANUFACTURER'S INSTRUCTIONS FOR PRECAUTIONS REQUIRED FOR PASSING THROUGH A COMBUSTIBLE WALL OR CEILING.

KEEP VIEWING AND ASH REMOVAL DOORS TIGHTLY CLOSED DURING OPERATION. INSPECT AND CLEAN EXHAUST VENTING SYSTEM FREQUENTLY AND ACCORDING TO MANUFACTURER'S MANUAL. INPUT RATING 0 to 4.1 LBS PER HR. ROUTE POWER SUPPLY CORD AWAY FROM UNIT.

CAUTION: MOVING PARTS MAY CAUSE INIURY-DO NOT OPERATE WITH LID OPEN.
DANGER: RISK OF ELECTRICAL SHOCK-DISCONNECT POWER BEFORE SERVICING.

CASTLE. COMMUNIQUER AVEC LES SERVICES DU BÂTIMENT OU D'INCENDIE LOCAUX CONCERNANT LES RESTRICTIONS ET LES INSPECTIONS D'INSTALLATION EN VIGUEUR.

NE PAS RACCORDER CET APPAREIL À UN CONDUIT DE FUMÉE UTILISÉ POUR UN AUTRE APPAREIL. CONSULTER LE CODE DU BÂTIMENT EN VIGUEUR ET LES INSTRUCTIONS DU FABRICANT CONCERNANT LES MESURES DE PRÉCAUTION REQUISES POUR TRAVERSER UN MUR OU UN PLAFOND COMBUSTIBLE.

GARDER LES PORTES D'OBSERVATION ET D'ENLÈVEMENT DES CENDRES BIEN FERMÉES DURANT LA MARCHÉ. CONTRÔLER ET NETTOYER LE SYSTÈME D'ÉVACUATION FRÉQUEMMENT ET CONFORMÉMENT AU MANUEL DU FABRICANT. CONSOMMATION NOMINALE DE 0 à 1,9 kg/h. FAIRE PASSER LE CORDON ÉLECTRIQUE À L'ÉCART DE L'APPAREIL.

ATTENTION : LES PIÈCES EN MOUVEMENT PEUVENT PROVOQUER DES BLESSURES-NE PAS UTILISER AVEC LE COUVERCLE OUVERT.
DANGER : RISQUE DE CHOC ÉLECTRIQUE - DÉBRANCHER L'ALIMENTATION ÉLECTRIQUE AVANT TOUT ENTRETIEN.

COMUNÍQUESE CON LOS FUNCIONARIOS DEL DEPARTAMENTO DE BOMBEROS O DE CONSTRUCCIÓN LOCAL PARA CONOCER LAS RESTRICCIÓNES E INSPECCIONES DE INSTALACIÓN EN SU ÁREA.

NO CONECTE ESTA UNIDAD A UN CAÑÓN DE CHIMENEA QUE SIRVA PARA OTRO ARTEFACTO. REVISE LOS CÓDIGOS DE CONSTRUCCIÓN LOCALES Y LAS INSTRUCCIONES DEL FABRICANTE PARA VER LAS PRECAUCIONES NECESARIAS PARA PASAR POR UNA PARED O TECHO COMBUSTIBLES.

MANTENGA LAS PUERTAS DE VISUALIZACIÓN Y DE ELIMINACIÓN DE CENIZAS BIEN CERRADAS DURANTE EL FUNCIONAMIENTO. REVISE Y LIMPIE EL SISTEMA DE VENTILACIÓN DE ESCAPE DE MANERA FRECUENTE Y SEGÚN EL MANUAL DEL FABRICANTE. CLASIFICACIÓN DE ENTRADA DE 0 a 1,9 kg POR HORA. ALEJE EL CABLE DE ALIMENTACIÓN DE CORRIENTE DE LA UNIDAD.

PRECAUCIÓN: LAS PIEZAS MÓVILES PUEDEN PROVOCAR LESIONES. NO LO HAGA FUNCIONAR CON LA TAPA ABIERTA.
PELIGRO: RIESGO DE DESCARGA ELÉCTRICA. DESCONECTE LA CORRIENTE ANTES DE REALIZAR MANTENIMIENTO.

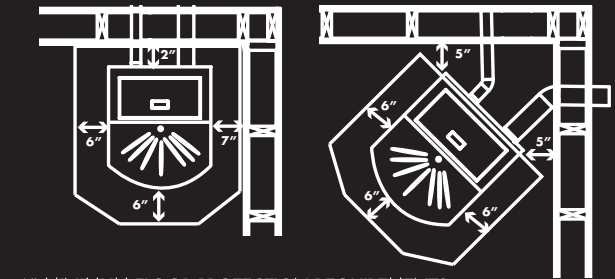
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS
DÉGAGEMENTS MINIMUM JUSQU'ÀUX MATÉRIEAUX COMBUSTIBLES
DISTANCIAS MÍNIMAS PARA MATERIALES COMBUSTIBLES

MOBILE HOME OR RESIDENTIAL INSTALL
INTALLATION EN MAISON MOBILE OU RÉSIDENTIELLE
INSTALACIÓN RESIDENCIAL O EN CASA MÓVIL

SIDEWALL TO STOVE 7" STOVE CORNER TO BACKWALL TO STOVE 2" DIAGONAL WALL 5"

MUR LATÉRAL À POÊLE 17,8 CM COIN DU POÊLE À MUR ARRIÈRE À POÊLE 5,1 CM MUR DIAGONAL 12,7 CM

PARED LATERAL A LA ESTUFA 17,8 CM ESQUINA DE LA ESTUFA A PARED TRASERA A LA ESTUFA 5,1 CM LA PARED DIAGONAL 12,7 CM



6" MINIMUM FLOOR PROTECTION REQUIREMENTS, PROTECTION DE PLANCHER MINIMALE REQUISE 15 CM, REQUISITOS DE PROTECCIÓN DEL PISO DE 15 CM COMO MÍNIMO



A Division of Ardisam, Inc.
1730 Industrial Avenue
Cumberland, WI 54829

**DATE OF MANUFACTURE
DATE DE FABRICATION
FECHA DE FABRICACIÓN**

[Empty box for date of manufacture]



CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 92435

Customer Information

Customer: Intertek
Address : 8431 Murphy Drive
Middleton WI 53562



Customer PO #: Verbal - Brian Brunson

Calibration Procedure Information

Procedure ID: GTP TMASS-LAM

Revision #: 11

Revision Date: 6/18/2019

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10062	Graftel	9202	5-Channel Temperature Sensor	8/6/2024
10074	Meriam	50MJ10-14	Laminar Flowmeter	11/21/2021
10075	Meriam	50MJ10-9	Laminar Flowmeter	11/26/2021
10128	Furness	FCO352	Diff Pressure	5/7/2022
60030	Paroscientific	760-100A	Pressure, 100 psia	5/20/2022
T1830482	Vaisala	HMW95D	RH/Temp. Logger	12/22/2021
1A01JMGKP36	Graftel	N/A	Digital Barometer	12/22/2021
50789	Paroscientific	760-100A	Pressure Gauge	8/17/2022

Sensor Information

Manufacturer: Sierra Description: Mass Flow Meter Method Used: Laminar
 Model #: M50L-AL-DD-2-PV2-V1-5PC Rated Accuracy: ± 1 % of Full Scale Accuracy Specified By: Sierra
 Instrument ID#: 1413 Range: 0 to 10 slpm Condition: Functional
 Serial #: 189158

Comments: Calibration Date: 08/20/2021
Calibration Due: 02/20/2022

The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2017, ANSI/NC SL Z540-I-1994 and ISO 9001. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

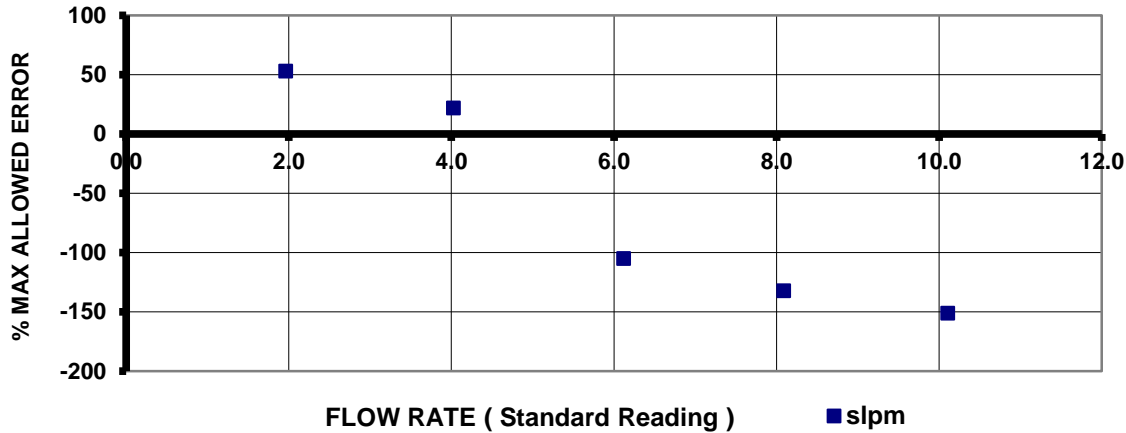
Performed By: L. Chan Date: 8/20/2021
Lap Chan
Calibration Technician

Approved By: Scott Pickett Date: 8/20/2021
Scott Pickett
Vice President, Lab Services

**ATTACHMENT TO CALIBRATION CERTIFICATE 92435
AS FOUND DATA
Page 2 of 3**

Reading From Standard, slpm	Lower Limit of Meter Reading, slpm	Measured Reading From Meter, slpm	Upper Limit of Meter Reading, slpm	Error, slpm	Measurement Uncertainty (k=2) slpm	CMC (k=2) slpm	STATUS
1.964	1.864	2.017	2.064	0.053	0.010	0.010	Pass
4.026	3.926	4.048	4.126	0.022	0.020	0.020	Pass
6.118	6.018	6.013	6.218	-0.105	0.031	0.031	Fail
8.089	7.989	7.957	8.189	-0.132	0.040	0.040	Fail
10.104	10.004	9.953	10.204	-0.151	0.051	0.051	Fail

ERROR CHART (Inlet Pressure = 10 psig)



Instrument Specifications		
Meter's Calibrated Fluid:	Air	
Test Fluid:	Air	
Meter's Standard Pressure:	14.7	psia
Meter's Standard Temperature:	70	°F
Lower Range:	0	slpm
Upper Range:	10	slpm
Resolution:	0.001	
Rated Accuracy:	1.0	% of Full Scale
Laboratory Ambient Conditions		
Pressure:	14.36	psia
Humidity:	53.47	%RH
Temperature:	70.05	°F



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FLOW - TEMPERATURE - HUMIDITY - PRESSURE - DESIGN - CONSULTING - ENGINEERING

NIST Traceable Calibration Data Sheet

95 Chancellor Dr., Roselle, IL 60172

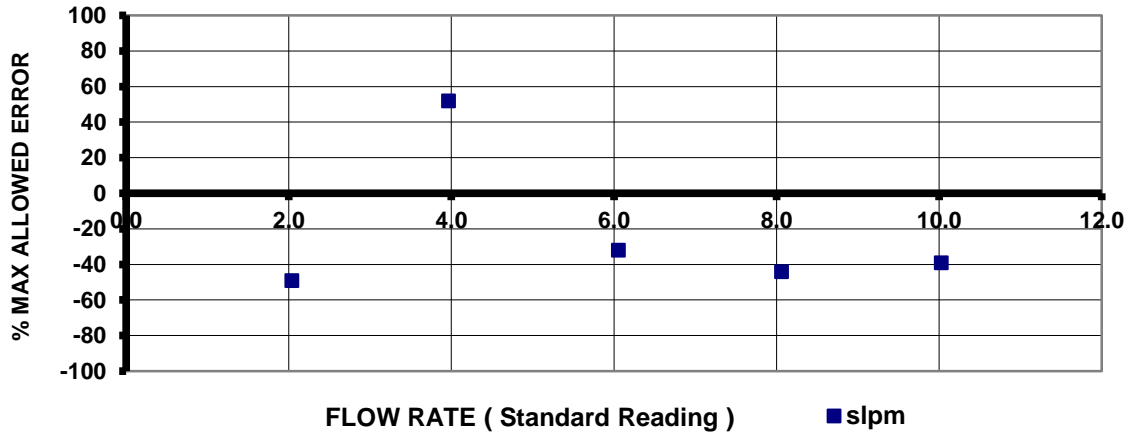
Phone: 847-364-2600

Fax: 847-364-3899

ATTACHMENT TO CALIBRATION CERTIFICATE 92435
AS LEFT DATA
 Page 3 of 3

Reading From Standard, slpm	Lower Limit of Meter Reading, slpm	Measured Reading From Meter, slpm	Upper Limit of Meter Reading, slpm	Error, slpm	Measurement Uncertainty (k=2) slpm	CMC (k=2) slpm	STATUS
2.037	1.937	1.988	2.137	-0.049	0.010	0.010	Pass
3.964	3.864	4.016	4.064	0.052	0.020	0.020	Pass
6.053	5.953	6.021	6.153	-0.032	0.030	0.030	Pass
8.061	7.961	8.017	8.161	-0.044	0.040	0.040	Pass
10.026	9.926	9.987	10.126	-0.039	0.050	0.050	Pass

ERROR CHART (Inlet Pressure = 10 psig)



Instrument Specifications		
Meter's Calibrated Fluid:	Air	
Test Fluid:	Air	
Meter's Standard Pressure:	14.7	psia
Meter's Standard Temperature:	70	°F
Lower Range:	0	slpm
Upper Range:	10	slpm
Resolution:	0.001	
Rated Accuracy:	1.0	% of Full Scale
Laboratory Ambient Conditions		
Pressure:	14.36	psia
Humidity:	53.61	%RH
Temperature:	70.05	°F



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NIST Traceable Calibration Data Sheet

95 Chancellor Dr., Roselle, IL 60172

Phone: 847-364-2600

Fax: 847-364-3899



CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 92434

Customer Information

Customer: Intertek
Address : 8431 Murphy Drive
Middleton WI 53562



Customer PO #: Verbal - Brian Brunson

Calibration Procedure Information

Procedure ID: GTP TMASS-LAM Revision #: 11 Revision Date: 6/18/2019

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10062	Graftel	9202	5-Channel Temperature Sensor	8/6/2024
10074	Meriam	50MJ10-14	Laminar Flowmeter	11/21/2021
10075	Meriam	50MJ10-9	Laminar Flowmeter	11/26/2021
10128	Furness	FCO352	Diff Pressure	5/7/2022
60030	Paroscientific	760-100A	Pressure, 100 psia	5/20/2022
T1830482	Vaisala	HMW95D	RH/Temp. Logger	12/22/2021
1A01JMGKP36	Graftel	N/A	Digital Barometer	12/22/2021
50789	Paroscientific	760-100A	Pressure Gauge	8/17/2022

Sensor Information

Manufacturer: Sierra Description: Mass Flow Meter Method Used: Laminar
Model #: M50L-AL-DD-2-PV2-V1-5PC Rated Accuracy: ± 1 % of Full Scale Accuracy Specified By: Sierra
Instrument ID#: 1414 Range: 0 to 10 slpm Condition: Functional
Serial #: 189157

Comments: Calibration Date: 08/20/2021
Calibration Due: 02/20/2022

The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2017, ANSI/NCCL Z540-I-1994 and ISO 9001. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

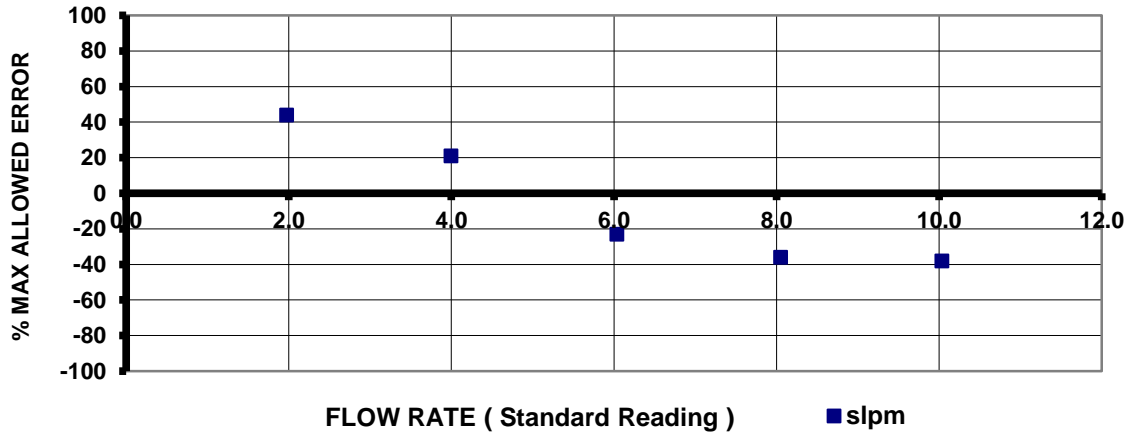
Performed By: L. Chan Date: 8/20/2021
 Lap Chan
 Calibration Technician

Approved By: S. Pickett Date: 8/20/2021
 Scott Pickett
 Vice President, Lab Services

ATTACHMENT TO CALIBRATION CERTIFICATE 92434
AS FOUND / AS LEFT DATA
 Page 2 of 2

Reading From Standard, slpm	Lower Limit of Meter Reading, slpm	Measured Reading From Meter, slpm	Upper Limit of Meter Reading, slpm	Error, slpm	Measurement Uncertainty (k=2) slpm	CMC (k=2) slpm	STATUS
1.975	1.875	2.019	2.075	0.044	0.010	0.010	Pass
3.996	3.896	4.017	4.096	0.021	0.020	0.020	Pass
6.034	5.934	6.011	6.134	-0.023	0.030	0.030	Pass
8.049	7.949	8.013	8.149	-0.036	0.040	0.040	Pass
10.032	9.932	9.994	10.132	-0.038	0.050	0.050	Pass

ERROR CHART (Inlet Pressure = 10 psig)



Instrument Specifications		
Meter's Calibrated Fluid:	Air	
Test Fluid:	Air	
Meter's Standard Pressure:	14.7	psia
Meter's Standard Temperature:	70	°F
Lower Range:	0	slpm
Upper Range:	10	slpm
Resolution:	0.001	
Rated Accuracy:	1.0	% of Full Scale
Laboratory Ambient Conditions		
Pressure:	14.37	psia
Humidity:	53.48	%RH
Temperature:	70.02	°F



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NIST Traceable Calibration Data Sheet

95 Chancellor Dr., Roselle, IL 60172

Phone: 847-364-2600

Fax: 847-364-3899



CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 92433

Customer Information

Customer: Intertek
 Address : 8431 Murphy Drive
 Middleton WI 53562



Customer PO #: Verbal - Brian Brunson

Calibration Procedure Information

Procedure ID: GTP TMASS-LAM Revision #: 11 Revision Date: 6/18/2019

Calibration Standards Information

<u>Graftel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10062	Graftel	9202	5-Channel Temperature Sensor	8/6/2024
10074	Meriam	50MJ10-14	Laminar Flowmeter	11/21/2021
10075	Meriam	50MJ10-9	Laminar Flowmeter	11/26/2021
10128	Furness	FCO352	Diff Pressure	5/7/2022
60030	Paroscientific	760-100A	Pressure, 100 psia	5/20/2022
T1830482	Vaisala	HMW95D	RH/Temp. Logger	12/22/2021
1A01JMGKP36	Graftel	N/A	Digital Barometer	12/22/2021
50789	Paroscientific	760-100A	Pressure Gauge	8/17/2022

Sensor Information

Manufacturer: Sierra Description: Mass Flow Meter Method Used: Laminar
 Model #: M50L-AL-DD-2-PV2-V1-5PC Rated Accuracy: ± 1 % of Full Scale Accuracy Specified By: Sierra
 Instrument ID#: 001519 Range: 0 to 10 slpm Condition: Functional
 Serial #: 231326
 Comments: Calibration Date: 08/20/2021
 Calibration Due: 02/20/2022

The calibrations within the certificate/report are traceable through NIST or another National Metrology Institute to the International System of Units (SI). The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2017, ANSI/NCSL Z540-I-1994 and ISO 9001. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

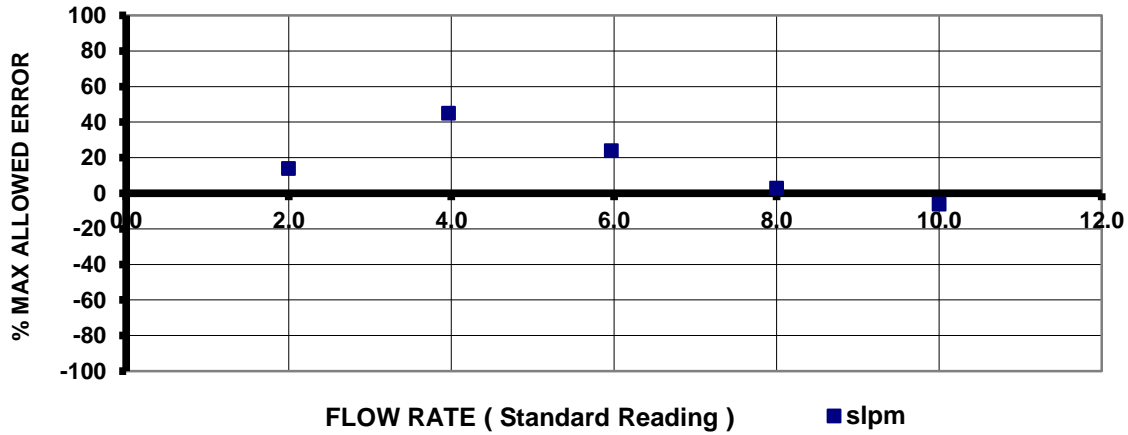
Performed By: L. Chan Date: 8/20/2021
 Lap Chan
 Calibration Technician

Approved By: Scott Pickett Date: 8/20/2021
 Scott Pickett
 Vice President, Lab Services

ATTACHMENT TO CALIBRATION CERTIFICATE 92433
AS FOUND / AS LEFT DATA
 Page 2 of 2

Reading From Standard, slpm	Lower Limit of Meter Reading, slpm	Measured Reading From Meter, slpm	Upper Limit of Meter Reading, slpm	Error, slpm	Measurement Uncertainty (k=2) slpm	CMC (k=2) slpm	STATUS
1.998	1.898	2.012	2.098	0.014	0.010	0.010	Pass
3.966	3.866	4.011	4.066	0.045	0.020	0.020	Pass
5.967	5.867	5.991	6.067	0.024	0.030	0.030	Pass
8.002	7.902	8.005	8.102	0.003	0.040	0.040	Pass
9.999	9.899	9.993	10.099	-0.006	0.050	0.050	Pass

ERROR CHART (Inlet Pressure = 10 psig)



Instrument Specifications		
Meter's Calibrated Fluid:	Air	
Test Fluid:	Air	
Meter's Standard Pressure:	14.7	psia
Meter's Standard Temperature:	70	°F
Lower Range:	0	slpm
Upper Range:	10	slpm
Resolution:	0.001	
Rated Accuracy:	1.0	% of Full Scale
Laboratory Ambient Conditions		
Pressure:	14.37	psia
Humidity:	54.67	%RH
Temperature:	70.04	°F



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NIST Traceable Calibration Data Sheet

95 Chancellor Dr., Roselle, IL 60172

Phone: 847-364-2600

Fax: 847-364-3899

 Total Quality. Assured.	CLIENT: Ardisam Inc.		PERFORMED BY: Gus Avery	
	PROJECT #: 265391R0		REVIEWED BY: Seth Bailey	
	PRODUCT: Castle Serenity		MODEL: 41278	
SAMPLE ID #: WHI 025429 Serial Number 033991010211029204579			DATE: 12/30/2021 -1/2/2022	
STANDARD(S): ASTM E2779-10		VERSION YEAR: 2017		LOCATION: Cumberland, WI

Conditioning Burn Test Data

Must have a total of at least 50 hours of burn time with the flue temperature above room ambient. Record fuel weight at the beginning of the test and whenever additional fuel is added to unit. Flue and room temperature must be recorded at no greater than 1 hour intervals.

Fuel Type: Pellets (cordwood or pellets)

Pellet Brand: Marth

Run Time (hrs)	Date	Time	Flue Temp	Room Temp	Fuel Added
0.0	12/30/2021	14:30	75.2	69.3	40 lbs
0.5	12/30/2021	15:00	288.7	75.7	
1.0	12/30/2021	15:30	305.6	77.9	
1.5	12/30/2021	16:00	300.4	73.9	
2.0	12/30/2021	16:30	305.6	71.8	
2.5	12/30/2021	17:00	310.6	75.9	
3.0	12/30/2021	17:30	305.1	74.8	
3.5	12/30/2021	18:00	313.7	73.9	
4.0	12/30/2021	18:30	310.3	77.9	
4.5	12/30/2021	19:00	309.0	72.1	
5.0	12/30/2021	19:30	305.2	76.5	
5.5	12/30/2021	20:00	313.7	77.9	
6.0	12/30/2021	20:30	309.9	72.1	
6.5	12/30/2021	21:00	313.3	75.4	
7.0	12/30/2021	21:30	319.8	77.4	
7.5	12/30/2021	22:00	318.7	78.1	
8.0	12/30/2021	22:30	311.9	71.2	
8.5	12/30/2021	23:00	318.0	75.7	
9.0	12/30/2021	23:30	320.7	77.4	
9.5	12/31/2021	0:00	316.8	77.4	
10.0	12/31/2021	0:30	326.1	77.2	
10.5	12/31/2021	1:00	314.6	74.1	
11.0	12/31/2021	1:30	317.5	75.9	
11.5	12/31/2021	2:00	316.0	77.2	
12.0	12/31/2021	2:30	320.4	78.6	
12.5	12/31/2021	3:00	313.5	73.8	
13.0	12/31/2021	3:30	315.3	76.3	
13.5	12/31/2021	4:00	316.0	75.9	
14.0	12/31/2021	4:30	314.2	77.7	
14.5	12/31/2021	5:00	318.9	77.0	
15.0	12/31/2021	5:30	314.4	77.0	
15.5	12/31/2021	6:00	316.6	76.5	
16.0	12/31/2021	6:30	299.8	76.1	
16.5	12/31/2021	10:30	67.6	63.9	40 lbs
17.0	12/31/2021	11:00	281.8	75.0	
17.5	12/31/2021	11:30	305.6	77.2	
18.0	12/31/2021	12:00	307.6	73.4	
18.5	12/31/2021	12:30	314.1	75.4	
19.0	12/31/2021	13:00	314.8	77.9	
19.5	12/31/2021	13:30	303.4	73.0	
20.0	12/31/2021	14:00	307.9	75.2	
20.5	12/31/2021	14:30	310.6	76.8	
21.0	12/31/2021	15:00	315.7	77.4	
21.5	12/31/2021	15:30	308.3	78.1	10 lbs
22.0	12/31/2021	16:00	310.5	77.5	
22.5	12/31/2021	16:30	315.1	78.3	
23.0	12/31/2021	17:00	316.6	74.1	
23.5	12/31/2021	17:30	311.4	75.0	
24.0	12/31/2021	18:00	317.7	75.7	
24.5	12/31/2021	18:30	319.8	76.8	
25.0	12/31/2021	19:00	320.9	77.2	
25.5	12/31/2021	19:30	313.5	75.4	
26.0	12/31/2021	20:00	316.8	75.9	

26.5	12/31/2021	20:30	316.8	75.9	
27.0	12/31/2021	21:00	310.6	75.4	
27.5	12/31/2021	21:30	317.1	75.0	
28.0	12/31/2021	22:00	317.5	75.6	
28.5	12/31/2021	22:30	310.6	75.4	
29.0	12/31/2021	23:00	320.7	74.1	
29.5	12/31/2021	23:30	315.7	74.1	
30.0	1/1/2022	0:00	315.7	74.5	
30.5	1/1/2022	0:30	323.2	74.1	
31.0	1/1/2022	1:00	320.5	73.9	
31.5	1/1/2022	1:30	314.6	74.3	
32.0	1/1/2022	2:00	314.4	72.7	
32.5	1/1/2022	2:30	311.9	73.2	
33.0	1/1/2022	3:00	311.2	73.9	
33.5	1/1/2022	3:30	314.6	71.8	
34.0	1/1/2022	4:00	311.0	71.8	
34.5	1/1/2022	4:30	315.7	71.6	
35.0	1/1/2022	5:00	316.0	71.2	
35.5	1/1/2022	5:30	311.2	70.0	
36.0	1/1/2022	6:00	306.9	70.3	
36.5	1/1/2022	6:30	308.8	68.4	
37.0	1/1/2022	7:00	305.8	69.1	
37.5	1/1/2022	7:30	308.5	68.5	
38.0	1/1/2022	8:00	304.2	68.5	
38.5	1/1/2022	8:30	289.6	69.4	
39.0	1/1/2022	12:00	79.2	58.8	30 lbs
39.5	1/1/2022	12:30	297.0	64.6	
40.0	1/1/2022	13:00	306.1	65.3	
40.5	1/1/2022	13:30	307.9	66.9	
41.0	1/1/2022	14:00	313.3	69.1	
41.5	1/1/2022	14:30	323.2	70.2	
42.0	1/1/2022	15:00	322.9	70.5	
42.5	1/1/2022	15:30	318.9	70.3	
43.0	1/1/2022	16:00	328.6	70.2	
43.5	1/1/2022	16:30	323.1	72.3	
44.0	1/1/2022	17:00	321.4	69.6	
44.5	1/1/2022	17:30	323.8	70.0	
45.0	1/1/2022	18:00	326.3	69.8	
45.5	1/1/2022	18:30	331.2	70.2	
46.0	1/1/2022	19:00	322.7	70.7	
46.5	1/1/2022	19:30	323.6	68.7	
47.0	1/1/2022	20:00	322.9	69.6	
47.5	1/1/2022	20:30	328.5	68.4	
48.0	1/1/2022	21:00	328.5	67.6	
48.5	1/1/2022	21:30	325.4	67.6	
49.0	1/1/2022	22:00	320.7	66.9	
49.5	1/1/2022	22:30	323.1	66.2	
50.0	1/1/2022	23:00	329.4	65.5	
50.5	1/1/2022	23:30	326.5	65.5	
51.0	1/2/2022	0:00	317.7	65.1	
51.5	1/2/2022	0:30	320.2	65.1	
52.0	1/2/2022	1:00	316.6	65.3	
52.5	1/2/2022	1:30	327.9	64.0	
53.0	1/2/2022	2:00	327.2	64.6	
53.5	1/2/2022	2:30	324.3	65.5	
54.0	1/2/2022	3:00	325.8	63.0	
54.5	1/2/2022	3:30	327.9	64.6	
55.0	1/2/2022	4:00	326.1	64.4	
55.5	1/2/2022	4:30	326.3	64.2	
56.0	1/2/2022	5:00	320.4	64.8	
56.5	1/2/2022	5:30	317.7	66.2	
57.0	1/2/2022	6:00	307.0	64.4	







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