

Certificate of Conformity

Emissions – Pellet burning heater

EPA 40 CFR Part 60-2015, ASTM E2779-10, ASTM E2515-11, CSA B415.1-2010

Certificate number: WHI19 – 208507009

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

Organization:

Company Name: England's Stove Works, Inc.

Address: 589 S. Five Forks Road

City, State: Monroe, VA

Zip Code: 24574

Country: USA

Product: 25-PDVC, 25-PDVC 55-SHP10, 55-SHP10L 55-TRP10

Maximum Output: 15,000 Btu/hour

Weighted Average Emissions Rate: 1.430 g/hr

Weighted Average Efficiency: 68.4%

Test Fuel Type: Premium Grade Wood Pellets

Compliance: Certified to comply with 2020 particulate emissions standard.

Report Number: 103843101MID-001

Certification body: Intertek Testing Services NA, Inc.

Initial registration: May 21, 2019

Date of expiry: NA

Issue status: 1

Charles Meyers
Certification Manager



5/21/2019

Name

Signature

Date

www.intertek.com

Registered address:

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

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.

ENGLAND STOVE WORKS, INC. TEST REPORT

SCOPE OF WORK

EPA EMISSIONS TESTING FOR MODEL 25-PDVC

REPORT NUMBER

103834101MID-001R1

TEST DATE(S)

03/18/19 THROUGH 03/19/19

ISSUE DATE

03/25/19

[REVISED DATE]

05/21/19

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TEST REPORT FOR ENGLAND STOVE WORKS, INC.

Report No.: 103834101MID-001R1

Date: 05/21/19

REPORT ISSUED TO

ENGLAND STOVE WORKS, INC.

589 South Five Forks Road

Monroe, VA 24574-2821

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by England Stove Works, Inc., 589 South Five Forks Road, Monroe VA, 24574-2821 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 E2515-11- Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel, ASTM E2779-10 - Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters, and CSA B415.1-10 - Performance Testing of Solid-Fuel-Burning Heating Appliances on their Model 25-PDVC, 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:

Particulate Emissions: 1.430 g/hr

Carbon Monoxide Emissions: 0.00 g/min

Heating Efficiency: 68.4 % (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:		SIGNATURE:	
DATE:	05/21/19	DATE:	05/21/19

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

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

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

SECTION 4

MATERIAL SOURCE

A sample was submitted to Intertek directly from the client. The sample was not independently selected for testing. The test unit was received at Intertek in Middleton, WI on 3/14/19 and was shipped via the client. The unit was assigned sample ID # MID1903141256-001. 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.

Following assembly, the unit was placed on the test stand. Prior to beginning the emissions tests, the manufacturer operated the unit for a minimum of 10 hours at high-to-medium burn rates to break in the stove. This break-in period was witnessed by England Stove Works, Inc. staff and a signed document is included in the final report. The unit was found to be operating satisfactory during this break-in. The 10 plus hours of pre-burning were conducted on 3/12/19 and 3/13/19. 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 3/18/19 the unit was set-up for testing.

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SECTION 5 EQUIPMENT

Equipment	INV Number	Calibration Due	MU
Platform Scale	008	4/10/19	$\pm 27g$
Balance	713	4/10/19	$\pm 0.47mg$
Data Logger	986	4/10/19	$\pm 0.33^{\circ}F$
Scale	1134	4/10/19	$\pm 27g$
Timer	1212	4/4/19	$\pm 0.3 \text{ sec}$
Timer	1213	4/4/19	$\pm 0.3 \text{ sec}$
Flow Meter	1413	7/18/19	$\pm 17mL/min$
Flow Meter	1414	7/18/19	$\pm 17mL/min$
Barometer	1420	4/12/19	$\pm 0.24^{\circ}F, 1.7\%RH,$ 0.011 in Hg
DGM	1210	6/27/19	$\pm 0.00284 \text{ ft}^3$

SECTION 6 LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Ken Slater	Intertek B&C
John Wray	England Stoves

SECTION 7 TEST PROCEDURE

On 3/18/19, the unit was tested for EPA emissions. For pellet stoves, the test was conducted in accordance with ASTM E2779-10. 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 manufactured by Marthwood. The pellets have a measured heating value of 8528 Btu/hr (19836 kJ/kg) and a moisture content of 5.04% on a dry basis and 4.79% 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

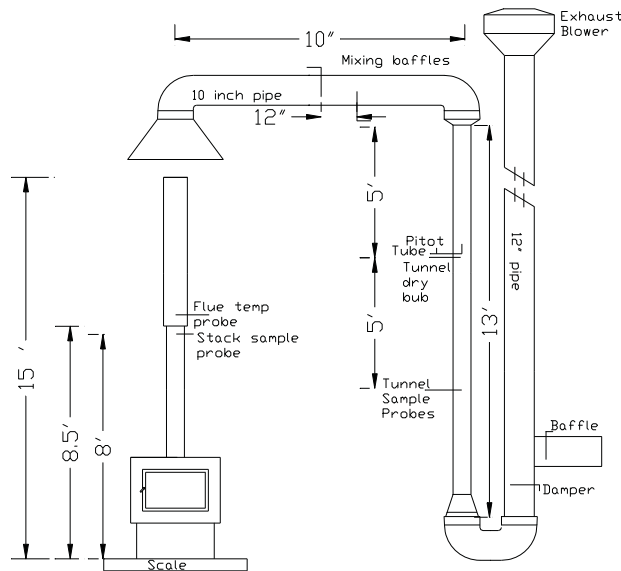


FIGURE 1

FIGURE 2 – STACK GAS SAMPLE TRAIN

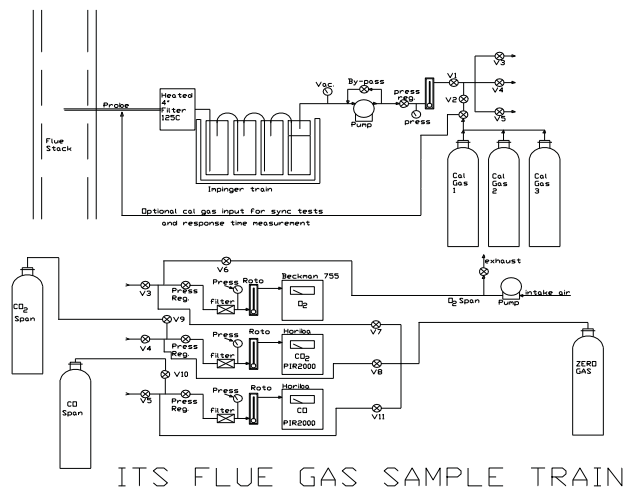


FIGURE 2

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FIGURE 3 – DILUTION TUNNEL SAMPLE SYSTEMS

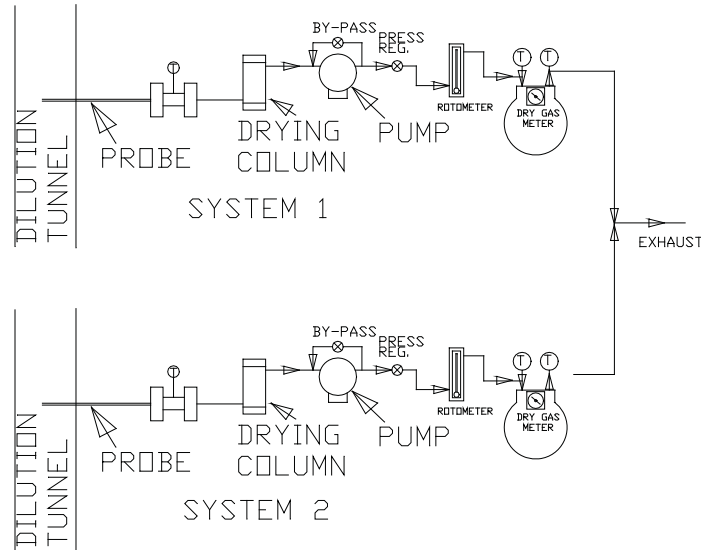


Figure 3

SAMPLING METHODS

PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515-2011. This method uses two identical sampling systems with Gelman A/E 61631 binder free, 47-mm diameter filters. The dryers used in the sample systems are filled with “Drierite” before each test run. In order to measure first-hour emissions rates the a 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 analyzed individually to determine the first hour and total emissions rate.

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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.

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.

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TEST METHOD PROCEDURES**LEAK CHECK PROCEDURES**

Before and after each test, each sample train is tested for leaks. Leakage rates are measured and must not exceed 0.02 CFM or 4% of the sampling rate. Leak checks are performed checking the entire sampling train, not just the dry gas meters. Pre-test and post-test leak checks are conducted with a vacuum of 10 inches of mercury. Vacuum is monitored during each test and the highest vacuum reached is then used for the post test vacuum value. If leakage limits are not met, the test run is rejected. During, these tests the vacuum was typically less than 2 inches of mercury. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

TUNNEL VELOCITY/FLOW MEASUREMENT

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

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

PM SAMPLING PROPORTIONALITY

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

DEVIATIONS FROM STANDARD METHOD:**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).

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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.**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, and PM_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.

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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), and

PM_H = average particulate emissions in accordance with unit of average heat output over the full integrated test run, g/MJ (lb/MMBtu).

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

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

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.

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

dscm/min (dscf/min).

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

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

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

where:

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

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

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.

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

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

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

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

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

Y = Dry gas meter calibration factor.

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

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

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

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

where:

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

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

θ = Total sampling time, min.

10 = ten min, length of first sampling period.

13.6 = Specific gravity of mercury.

100 = Conversion to percent.

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

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

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GENERAL FORMULA – ASTM E2515

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

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,

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_{E_T}

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

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

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

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

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

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

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

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Thus the result in this example would be:
ET = 13.00g ± 0.44 g at a 95% confidence level.

EFFICIENCY – CSA B415.1

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

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

Where:

Δh = change in enthalpy, kJ/kg

Δt = temperature rise, °C

1.006 = specific heat of air, kJ/kg °C

1.84 = specific heat of water vapor, kJ/kg °C

x = humidity ratio, kg/kg

The equivalent duct diameter shall be calculated as follows:

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

Where:

ED = equivalent duct diameter

H = duct height, m

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

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

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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)

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)

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

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

Where:

 E_d = total heat output of the appliance over the test period, kJ/kg I = input energy (fuel calorific value as-fired times weight of fuel charge), kJ/kg (Btu/lb)**SECTION 9****TEST SPECIMEN DESCRIPTION**

The model 25-PDVC Pellet Fuel Room Heater is constructed of sheet steel. The outer dimensions are 24-inches deep, 28.25-inches high, and 23-inches wide. The unit has a door located on the front with a viewing glass.

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

RUN #1 (3/18/19): The test for pellet heaters is a continuous test with three separate burn rates. At 7:45am the unit was started and operated for a minimum of 1 hour for the pretest operation. At 8:47am the unit was set to the maximum feed rate (level 9) with a burn rate of 1.46 kg/hr, 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 9:47am, the system #3 sampling filter was changed out and the unit was set to $\leq 50\%$ feed rate (level 3) with a burn rate of 0.86 kg/hr. At 11:47am, the heater was changed to the minimum feed rate (level 1). At 12:47pm, testing was stopped due to plugged filters. Unit feed rates will be adjusted and a 2nd test will be conducted. The total burn time was 240 minutes. This test will not be used.

RUN #2 (3/19/19): The test for pellet heaters is a continuous test with three separate burn rates. At 7:36am the unit was started and operated for a minimum of 1 hour for the pretest operation. At 8:37am the unit was set to the maximum feed rate (level 9) with a burn rate of 1.95 kg/hr, 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 9:37am, the system #3 sampling filter was changed out and the unit was set to $\leq 50\%$ feed rate (level 3) with a burn rate of 1.11 kg/hr. At 11:37am, the heater was changed to the minimum feed rate (level 1) with a burn rate of 0.98 kg/hr. At 2:37pm, the test was completed. The total burn time was 360 minutes.

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TABLE 1 – EMISSIONS

RUN#	TEST DATE	BURN RATES (kg/hr)(Dry)		PARTICULATE EMISSION RATE (g/hr)	1 st HOUR EMISSIONS (g)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (%HHV)
		H*	M*				
2	3/18/19	H*	1.84	1.430	1.136	0.000	68.4
		M*	1.05				
		L*	0.93				
		OA*	1.12				

*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)
2	74	68	29.31	29.28	26.0	23.0	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
2	360	21.41	232.15	550.02	82.84	82.75	8.60	8.40

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		
2	1008.83	1009.93	8.68	8.48	1.12	0.027

TABLE 5 - GENERAL SUMMARY OF RESULTS

RUN #	BURN RATE (kg/hr)(dry) (OVERALL)	INITIAL DRAFT (in/H ₂ O)	RUN TIME (min)	AVERAGE DRAFT (in/H ₂ O)
2	1.186	0.032	360	0.029

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TABLE 6 - CSA B415.1 RESULTS

BURN RATE (kg/hr)(dry)	CO EMISSIONS (g/min)	HEATING EFFICIENCY (% HHV)	HEAT OUTPUT (Btu/hr)
HIGH – 1.84	0.00	75.5	26,179
MEDIUM – 1.05	0.00	64.2	12,691
LOW – 0.93	0.00	63.9	11,220
OVERALL – 1.12	0.00	68.4	14,463

**SECTION 11
CONCLUSION**

This test demonstrates that the model 25-PDVC is an affected facility under the definition given in the regulation. The emission rate of 1.430 g/hr meets the EPA requirements for the Step 2 limits.

Similar models 25-PDVCH, 55-SHP10, 55-SHP10L and 55-TRP10 are identical to the model 25-PDVC, therefore are deemed to be compliant with these requirements as well.

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SECTION 12 PHOTOGRAPHS

Photo # 1 Emissions test



Photo No. 2
EPA Security Wrap





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SECTION 13

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	05/21/19	N/A	Original Report Issue
1	5/21/19	19	Added similar models 25-PDVCH and 55-SHP10L.

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

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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.

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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.

Manufacturer: England Stoves

Model: 25-PDVC

Job: G103843101

Run: #1

Sample ID #: MID 1903141256-001

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Date 3/14/19

Tech [Signature]

Emissions Testing Initial Stove Check Out

Date received: 3/14/19

Carrier: _____

Shipping damage? No Yes

Describe damage: _____

If damaged, repairable? No Yes

Repairs affected by: _____ Date: _____

Client notified about irreparable damage by: _____ Date: _____

Disposition: _____

Safety Certified by: _____ Safety Control# _____

Overall Unit Dimensions: High 28.25" Wide 23" Deep 24"

Comments: _____

Initialed: _____

Manufacturer: England Stoves

Model: 25-PDVC

Date: 3/14/19

Job: G103843101

Run: #1

Tech: [Signature]

Sample ID #: MHD

EMISSIONS TESTING UNIT PREPARATION

Unit description (check all that apply)

- Stove
- Top Vent
- Manual Draft
- Insert
- Rear Vent
- Bimetal Spring
- Catalytic
- Grate
- Remote Thermostat
- Non-catalytic
- Ashpan
- Blower or Fans
- Other:

- Unit received with all parts: Yes No
- Manual: Yes No
- Drawings: Yes No
- Specifications: Yes No

Materials of construction: _____

Air introduction: _____

Control mechanism: _____

Unit net weight with all components: 255 lbs. 116 Kg.

Thermocouples attached: _____ Attached by: _____ (attach T/C map)

Unit conditioned prior to test

- 10 hours at medium burn rate (non-catalytic) (attach burn log)
- 50 hours at medium burn rate (attach burn log)

Date started: _____

Date completed: _____

Catalyst manufacturer: _____

Serial number: _____ Dimensions: _____ Cell size: _____ cells/in.²

Unit ready for testing (date): 3/18/19 Initialed: _____

Manufacturer: England Stoves

Model: 25-PDVC

run 2 of 2
Date: 3/14/19

Job: G103843101

Run: #1

Tech: [Signature]

Sample ID #: MID

PELLET MOISTURE SHEET
OVEN DRY METHOD

DATE	TIME	TARE WEIGHT OF VESSEL	GROSS WEIGHT VESSEL AND PELLETS	NET WEIGHT OF PELLETS
3/13/19	8:00a	0.26	1.62	1.26
3/14/19	7:45a	0.26	1.57	1.21
3/15/19	9:00a	0.26	1.57	1.21

MOISTURE CONTENT OF PELLETS

WET BASIS: (M_w) 4.13 %

DRY BASIS: (M_d) 3.96 %

CALCULATIONS:

$$M_w = \frac{M_o}{W_o}$$

$$M_d = \frac{M_o}{W_i}$$

WHERE:

- M_d = MOISTURE CONTENT ON THE DRY BASIS
- M_w = WEIGHT OF MOISTURE REMOVED IN THE OVEN
- M_o = MOISTURE CONTENT ON THE WET BASIS
- W_o = WEIGHT OF OVEN DRY WOOD
- W_i = INITIAL WEIGHT OF WOOD INCLUDING MOISTURE

$$4.13 = \frac{0.05}{1.21}$$

$$3.96 = \frac{0.05}{1.26}$$

Manufacturer: England Stoves
 Job #G103843101
 Sample ID: MID1903141256-001

Model: 25-PDVC
 Run #2

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 Date 3/19/19
 Tech *[Signature]*

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) _____ (inches Hg.) Static pressure (P_s) .382 (inches w.c.)
 Inside diameter: Port A _____ in. Port B _____ in. Tunnel cross sectional area: _____ Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δv (inches H ₂ O)	Tunnel Temperature (°F)	$\sqrt{\Delta p}$
A-Centroid	3.00	.103		
B-Centroid	3.00	.104		
A-1	0.50	.066		
A-2	1.50	.096		
A-3	4.50	.091		
A-4	5.50	.074		
B-1	0.50	.081		
B-2	1.50	.091		
B-3	4.50	.086		
B-4	5.50	.066		
		AVERAGE		

Adjustment factor application

Pitot correction .9077

Where:
 C_p = Pitot tube coefficient = 0.99 for standard gages
 Δv = manometer reading (inches H₂O)
 T_s = average absolute dilution tunnel temperature (°F + 460)
 P_s = absolute dilution tunnel gas pressure or $P_{bar} - P_s$

$$P_s = \text{static pressure} \quad \frac{\text{inches H}_2\text{O}}{13.6}$$

$$V_s = K_p C_p F_A (\sqrt{\Delta v})_{AVG} \sqrt{\frac{T_s}{P_s M_s}} \quad V_s = K_p C_p (\sqrt{\Delta v})_{avg} \sqrt{\frac{T_s}{P_s M_s}} \quad F_T = \frac{(\sqrt{\Delta v})_{avg}}{(\sqrt{\Delta v})_{centroid}}$$

$M_s = 28.96$, wet molecular weight of stack gas (alternatively, it may be measured) Adjustment factor for alternative Pitot tube placement
 $K_p = 0.449$ Pitot tube constant, (conversion factor for English units)

$(\sqrt{\Delta v})_{avg}$ = Average of the square roots of the velocity heads (Δv) measured at each traverse point
 $(\sqrt{\Delta v})_{centroid}$ = Average of the square roots of the velocity heads measured at the tunnel centroid (inches of H₂O)

Manufacturer: England Stoves
 Job #G103843101
 Sample ID: MID1903141256-001

Model : 25-PDVC
 Run #2

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 Date 3/19/19
 Tech *[Signature]*

Pre/Post Checks

	Pre-Test	Post-Test	
Facility Conditions:			
Air Velocity.....	0 fpm	0 fpm	
Smoke Capture Check.....	✓	✓	
Wood Heater Conditions:			
Date Wood Heater Stack Cleaned.....	3-15-19		
Date Dilution Tunnel Cleaned.....	3-15-19		
Induced Draft Check.....	✓	✓	
Tunnel Velocity.....	0	.104	
Pitot Leak Check:			
Side A.....	✓	✓	
Side B.....	✓	✓	
Temperature System:			
Ambient (65°-90°F).....		✓	
Proportional Checks:			
CO Analyzer Drift Check.....		✓	
CO ₂ Analyzer Check.....		✓	
O ₂ Analyzer Check.....		✓	
Thermocouple check.....		✓	
Sampling Train ID Numbers:			
	Train 1	Train 2	Train 3
Probe.....	4	5	6
Filter Front.....	7	9	11
Filter Back.....	8	10	12
Filter Thermocouple.....			
Filter 5G-3 (<90°F).....			



Manufacturer: England Stoves
 Job #G103843101
 Sample ID: MID1903141256-001

Model: 25-PDVC
 Run #2

Page 6 of 12
 Date 3/19/19
 Tech *[Signature]*

Pre-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform	25.00	lbs., Class F	25.00	lbs.
Wood	10.00	lbs., Class F	10.00	lbs.
Analytical	100.000	mg, Class S	100.000	mg.

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE 50%-150% of dry fiber 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%

Manufacturer: England Stoves
 Job #G103843101
 Sample ID: MHD1907141256-001

Model: 25-PDVC
 Run #2

Page 7 of 12
 Date 3/19/19
 Tech *[Signature]*

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	SAMPLE 1		SAMPLE 2		SAMPLE 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-test	Post Test
Vacuum (inches Hg.)	10"	10"	10"	10"	10"	10"
Final 1 minute DGM (ft ³)	0	0	0	0	564.003	574.125
Initial 1 minute DGM (ft ³)	0	0	0	0	564.003	574.125
Change (C) (ft ³)	0	0	0	0	0	0
Allowable leakage .04 x Sample rate or .02cfm	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
Check OK	✓	✓	✓	✓	✓	✓

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	10"	10"
Rotameter Reading (mm)	0	0
Flow Rate (CFM)	0	0
Allowable (.04 x Sample Rate)		
Check OK	✓	✓

Manufacturer: England Stoves
 Job #G103843101
 Sample ID: AHD1903141256-001

Model: 25-PDVC
 Run #2

Page 8 of 12
 Date 3/19/19
 Tech *[Signature]*

CONTINUOUS ANALYZERS

Pre-Test - (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
CO ₂	<i>0</i>	0	<i>24.91</i>	24.88	<i>11.93</i>	11.99
CO	<i>0</i>	0	<i>8.96</i>	8.976	<i>3.97</i>	4.001
O ₂	<i>0</i>	0	<i>20.95</i>	20.95	<i>9.98</i>	10.01
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Span Drift	Cal. Drift	OK?	Not OK*
CO ₂	<i>0.00</i>	<i>24.81</i>	<i>11.92</i>	<i>0</i>	<i>.10</i>	<i>.01</i>	<i>✓</i>	
CO	<i>-0.08</i>	<i>8.58</i>	<i>3.71</i>	<i>.08</i>	<i>.38</i>	<i>.26</i>	<i>✓</i>	
O ₂	<i>0.00</i>	<i>20.99</i>	<i>10.01</i>	<i>0</i>	<i>.04</i>	<i>.03</i>	<i>✓</i>	

* Greater than ± 5% of the range used.

Manufacturer: England Stoves
Job #G103843101
Sample ID: MID1903141256-001

Model: 25-PDVC
Run #2

Page 9 of 12
Date 3/19/19
Tech *[Signature]*

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2	System 3
Final (ft ³)	85.38	85.39	574.107
Initial (ft ³)	0	0	564.003

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	29.31	29.28
Dry Bulb (°F)	68.9	74.0
Humidity (%)	26%	23%



Manufacturer: England Stoves
 Job #G103843101
 Sample ID: MID1903141256-001

Model: 25-PDVC
 Run #2

Page 10 of 12
 Date 3/19/19
 Tech *[Signature]*

RELAYING #	REAL TIME	ELAPSED TIME	DRUM 1	BOYCOUNTER 1	DRUM 2	BOYCOUNTER 2	DRUM 3	BOYCOUNTER 3	DRAFT	MAX DRUM PRESSURE
0	8:37	0					564.003			
1		0					565.430			
2		30					567.330			
3		30					569.020			
4		0					570.700			
5		30					572.380			
6		0					574.107			
7		30								
8		0								
9		0								
10		00								
11		10								
12		10								
13		10								
14		10								
15		10								
16		10								
17		10								
18		10								
19		10								
20		20								
21		20								
22		20								
23		20								
24		20								
25		20								
26		20								
27		20								
28		20								
29		20								
30		30								
31		30								
32		30								
33		30								
34		30								
35		30								

Manufacturer: England Stoves
Job #G103843101
Sample ID: MID1903141256-001

Model: 25-PDVC
Run #2

Page 11 of 12
Date 3/19/19
Tech

COMMENTS

7:36 AM PROTEST STARTED

8:37 AM TEST STARTED
UNIT SET TO Level 9 (HIGH)

9:37 AM UNIT ADJUSTED TO Level 3 (MED)
Probe #3 turned off.

11:37 AM UNIT ADJUSTED TO Level 1 (LOW)

2:37 PM - TEST COMPLETED



Manufacturer: GILGALAND SDXC
 Job # C10384701

Model: D-701e
 Run #2

Page 12 of 12
 Date: 3-19-19
 Tech: [Signature]

DILUTION TUNNEL PARTICULATE SAMPLER DATA
 FILTER TYPE: Calmar #Flon AF


Pre-test Weight Record		SYSTEM 1			SYSTEM 2			SYSTEM 3			Temp	Humidity
Date	Time	Probe & Housing Number	Front Filter + gasket Number	Back Filter + gasket Number	Probe & Housing Number	Front Filter + gasket Number	Back Filter + gasket Number	Probe & Housing Number	Front Filter + gasket Number	Back Filter + gasket Number		
3-18-19	10:00A	87 9255	18531	18617	91 0040	18595	18445	91 020	18144	18139	66.3	23%
3-19-19	7:30A	89 9253	18530	18615	91 0038	18594	18445	91 5325	18143	18539	67.8	25%
		Total:	3.7145		Total:	3.7039		Total:	3.6982			

Post-test Weight Record		SYSTEM 1		SYSTEM 2		SYSTEM 3		Temp	Humidity
Date	Time	Probe & Housing Number	Combined Filter/gasket Number	Probe & Housing Number	Combined Filter/gasket Number	Probe & Housing Number	Combined Filter/gasket Number		
3-19-19	2:27	89 9263	3.7233	91.0039	3.7133	91.5327	3.7008	73.7	23
3-20-19	7:11	89 9263	3.7227	91.0038	3.7125	91.5325	3.6998	68.7	26
3-21-19	6:43	89 9269	3.7225	91.0038	3.7123	91.5325	3.6998	67.0	29

Dry Down Weight

Date	Time	P1	F1	P2	F2	P3	F3	Grfr	UMASS
3-19-19	2:39	1.0	8.8	.01	9.4	.02	2.6	1.616	
3-20-19	7:11	1.0	8.2	0	8.6	0	1.6	1.497	
3-21-19	6:43	1.6	8.0	0	8.4	0	1.6	1.43	

(e) 8.58

	CLIENT: England Stoves	PERFORMED BY: Ken Slater
	PROJECT #: G103843101	REVIEWED BY:
	PRODUCT: Pellet Room Heater	MODEL: 25-PDVC
SAMPLE ID #: MID1902131240-002		DATE: 3/19/2019
STANDARD(S): CSA B415.1		LOCATION: Middleton, WI
EQUIPMENT		
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
CONDITIONING		
SAMPLE CONDITIONING (IF APPLICABLE):		
AMBIENT TEMPERATURE:		

Run: 2
 Test Duration: 60
 Output Category: High

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.5%	81.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	76%	81.7%


Output Rate (kJ/h)	27,597	26,179	(Btu/h)
Burn Rate (kg/h)	1.84	4.05	(lb/h)
Input (kJ/h)	36,571	34,692	(Btu/h)

Test Load Weight (dry kg)	1.84	4.05	dry lb
MC wet (%)	5.56		
MC dry (%)	5.89		
Particulate (g)	8.58		
CO (g)	0		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.31	0.00
g/kg Dry Fuel	4.67	0.00
g/h	8.58	0.00
lb/MM Btu Output	0.72	0.00

0.000

Air/Fuel Ratio (A/F)	15.80
-----------------------------	-------

	CLIENT: England Stoves	PERFORMED BY: Ken Slater
	PROJECT #: G103843101	REVIEWED BY:
	PRODUCT: Pellet Room Heater	MODEL: 25-PDVC
SAMPLE ID #: MID1902131240-002		DATE: 3/19/2019
STANDARD(S): CSA B415.1		LOCATION: Middleton, WI
EQUIPMENT		
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
CONDITIONING		
SAMPLE CONDITIONING (IF APPLICABLE):		
AMBIENT TEMPERATURE:		

Run: 2
Test Duration: 120
Output Category: Medium

Test Results in Accordance with CSA B415.1-09


	HHV Basis	LHV Basis
Overall Efficiency	64.2%	69.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	65%	69.5%

Output Rate (kJ/h)	13,379	12,691	(Btu/h)
Burn Rate (kg/h)	1.05	2.31	(lb/h)
Input (kJ/h)	20,831	19,760	(Btu/h)

Test Load Weight (dry kg)	2.09	4.62	dry lb
MC wet (%)	5.56		
MC dry (%)	5.89		
Particulate (g)	8.58		
CO (g)	0		
Test Duration (h)	2.00		

Emissions	Particulate	CO	
g/MJ Output	0.32	0.00	
g/kg Dry Fuel	4.10	0.00	
g/h	4.29	0.00	0.000
lb/MM Btu Output	0.75	0.00	

Air/Fuel Ratio (A/F)	32.81
-----------------------------	-------

	CLIENT: England Stoves	PERFORMED BY: Ken Slater
	PROJECT #: G103843101	REVIEWED BY:
	PRODUCT: Pellet Room Heater	MODEL: 25-PDVC
SAMPLE ID #: MID1902131240-002		DATE: 3/19/2019
STANDARD(S): CSA B415.1		LOCATION: Middleton, WI
EQUIPMENT		
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
CONDITIONING		
SAMPLE CONDITIONING (IF APPLICABLE):		
AMBIENT TEMPERATURE:		

Run: 2
 Test Duration: 180
 Output Category: Low

Test Results in Accordance with CSA B415.1-09


	HHV Basis	LHV Basis
Overall Efficiency	63.9%	68.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	64%	69.2%

Output Rate (kJ/h)	11,828	11,220	(Btu/h)
Burn Rate (kg/h)	0.93	2.05	(lb/h)
Input (kJ/h)	18,504	17,553	(Btu/h)

Test Load Weight (dry kg)	2.79	6.15	dry lb
MC wet (%)	5.56		
MC dry (%)	5.89		
Particulate (g)	8.58		
CO (g)	0		
Test Duration (h)	3.00		

Emissions	Particulate	CO	
g/MJ Output	0.24	0.00	
g/kg Dry Fuel	3.07	0.00	
g/h	2.86	0.00	0.000
lb/MM Btu Output	0.56	0.00	

Air/Fuel Ratio (A/F)	39.35
-----------------------------	-------

	CLIENT: England Stoves	PERFORMED BY: Ken Slater
	PROJECT #: G103843101	REVIEWED BY:
	PRODUCT: Pellet Room Heater	MODEL: 25-PDVC
SAMPLE ID #: MID1902131240-002		DATE: 3/19/2019
STANDARD(S): CSA B415.1		LOCATION: Middleton, WI
EQUIPMENT		
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
ASSET # - DESCRIPTION:		CALIBRATION DUE:
CONDITIONING		
SAMPLE CONDITIONING (IF APPLICABLE):		
AMBIENT TEMPERATURE:		

Run: 2
 Test Duration: 360
 Output Category: Overall

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	68.4%	73.7%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	69%	74.0%

Output Rate (kJ/h)	15,247	14,463	(Btu/h)
Burn Rate (kg/h)	1.12	2.47	(lb/h)
Input (kJ/h)	22,291	21,145	(Btu/h)

Test Load Weight (dry kg)	6.73	14.82	dry lb
MC wet (%)	5.56		
MC dry (%)	5.89		
Particulate (g)	8.58		
CO (g)	0		
Test Duration (h)	6.00		

Emissions	Particulate	CO	
g/MJ Output	0.09	0.00	
g/kg Dry Fuel	1.28	0.00	
g/h	1.43	0.00	0.000
lb/MM Btu Output	0.22	0.00	

Air/Fuel Ratio (A/F)	29.98
-----------------------------	-------

Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number:

ID Number: 008



Description: SCALE
Manufacturer: GSE
Model Number: 450
Serial Number: 101722
Technician: ARMIN AHMETOVIC
On-Site Calibration:
Comments:

Calibration Date: 10/10/2018
Calibration Due: 04/10/2019
Procedure: TMI-SCALES
Rev: 5/13/2014
Temperature: 68 F
Humidity: 33 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCCL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
DLOG-4	EXTECH	42270	3/5/2018	3/5/2019
RFD-500LBSET	RICE LAKE	500LBS	5/24/2018	6/30/2019



Technical Maintenance, Inc.

3248 FOREST VIEW ROAD, ROCKFORD, IL 61109

Phone: 779-774-3877 Fax 779-774-3884

www.tmicalibration.com



AC-2000.03

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit	ADJ/FIL
Dist Test Center	25.00	24.90	25.10	25.00	25.00	0.00	In	
Dist Test RP	25.00	24.90	25.10	25.00	25.00	0.00	In	
Dist Test BR	25.00	24.90	25.10	25.00	25.00	0.00	In	
Dist Test LF	25.00	24.90	25.10	25.00	25.00	0.00	In	
Dist Test LR	25.00	24.90	25.10	25.00	25.00	0.00	In	
Weight Accuracy	25.00	24.90	25.10	25.00	25.00	0.00	In	
Weight Accuracy	50.00	49.90	50.10	50.00	50.00	0.00	In	
Weight Accuracy	75.00	74.90	75.10	74.99	74.99	0.00	In	
Weight Accuracy	100.00	99.90	100.10	100.00	100.00	0.00	In	



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Customer: INTERTEK MIDDLETON

8431 MURPHY DR.

MIDDLETON, WI, 53562

608-824-7422

P.O. Number:

ID Number: 713



Description: SCALE
 Manufacturer: OHAUS
 Model Number: E12140
 Serial Number: B258010639
 Technician: ARMIN AHMETOVIC

Calibration Date: 10/10/2018
 Calibration Due: 04/10/2019
 Procedure: TMI-SCALES
 Rev: 5/13/2014

Temperature: 68 F
 Humidity: 33 % RH

As Found Condition: IN TOLERANCE

Calibration Results: IN TOLERANCE

On-Site Calibration:

Comments:

Limiting Attribute

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCCL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
DLOG-4	EXTECH	42270	3/5/2018	3/5/2018
RFD-WT-1	RICE LAKE	RFD-WT-1	5/8/2018	5/8/2020



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AC-2000-03

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit ADJ/FAL
Dist Test Center	10.0000	9.9999	10.0100	10.0005	10.0005	0.00047	Grams
Dist Test BP	10.0000	9.9999	10.0100	10.0002	10.0002	0.00047	Grams
Dist Test BP	10.0000	9.9999	10.0100	10.0002	10.0002	0.00047	Grams
Dist Test LF	10.0000	9.9999	10.0100	10.0005	10.0005	0.00047	Grams
Dist Test LR	10.0000	9.9999	10.0100	10.0005	10.0005	0.00047	Grams
Weight Accuracy	10.0000	9.9999	10.0100	10.0002	10.0002	0.00047	Grams
Weight Accuracy	50.0000	49.9999	50.0100	50.0016	50.0016	0.00047	Grams
Weight Accuracy	100.0000	99.9999	100.0100	100.0018	100.0018	0.00047	Grams
Weight Accuracy	150.0000	149.9999	150.0100	150.0020	150.0020	0.00047	Grams
Weight Accuracy	200.0000	199.9999	200.0100	200.0038	200.0038	0.00047	Grams



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AC-2088.03

Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number:

ID Number: 986



Description: DATA ACQUISITION SYSTEM
Manufacturer: OMEGA
Model Number: OMB-DAQ-56
Serial Number: NSN
Technician: PERRY MURBARGER

Calibration Date: 10/10/2018
Calibration Due: 04/10/2019
Procedure: OMEGA OM-DAQ-USB-2401
Rev: 1/12/2012

Temperature: 75.5 F
Humidity: 71.7 % RH

As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:

Comments:

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/INCISL 2540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
0515114046	OMEGA	OM-73	2/1/2018	2/1/2019
RFD7526A-150	FLUKE	7526A-150	8/4/2017	10/20/2018



Technical Maintenance, Inc.

3248 FOREST VIEW ROAD, ROCKFORD, IL 61109

Phone: 779-774-3877 Fax 779-774-3884

www.tmicalibration.com



AC-2000.03

Certificate of Calibration**Data Sheet**

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit	ADJ/FAL
Thermocouple Accuracy (K Type) Input 1	1000.0	998.2	1001.8	999.8	999.8	0.33	°F	
Thermocouple Accuracy (K Type) Input 2	1000.0	998.2	1001.8	1000.1	1000.1	0.33	°F	
Thermocouple Accuracy (K Type) Input 3	1000.0	998.2	1001.8	1000.6	1000.6	0.33	°F	
Thermocouple Accuracy (K Type) Input 4	1000.0	998.2	1001.8	1000.2	1000.2	0.33	°F	
Thermocouple Accuracy (K Type) Input 5	1000.0	998.2	1001.8	999.7	999.7	0.33	°F	
Thermocouple Accuracy (K Type) Input 6	1000.0	998.2	1001.8	1000.0	1000.0	0.33	°F	
Thermocouple Accuracy (K Type) Input 7	1000.0	998.2	1001.8	1000.3	1000.3	0.33	°F	
Thermocouple Accuracy (K Type) Input 8	1000.0	998.2	1001.8	1000.6	1000.6	0.33	°F	
Thermocouple Accuracy (T Type) Input 9	1000.0	998.2	1001.8	999.8	999.8	0.33	°F	
Thermocouple Accuracy (T Type) Input 10	1000.0	998.2	1001.8	1000.2	1000.2	0.33	°F	
Thermocouple Accuracy (T Type) Input 11	1000.0	998.2	1001.8	999.9	999.9	0.33	°F	
Thermocouple Accuracy (T Type) Input 12	1000.0	998.2	1001.8	1000.5	1000.5	0.33	°F	
Thermocouple Accuracy (K Type) Input 13	1000.0	998.2	1001.8	1000.6	1000.6	0.33	°F	
Thermocouple Accuracy (K Type) Input 14	1000.0	998.2	1001.8	999.7	999.7	0.33	°F	
Thermocouple Accuracy (K Type) Input 15	1000.0	998.2	1001.8	1000.3	1000.3	0.33	°F	
Thermocouple Accuracy (K Type) Input 16	1000.0	998.2	1001.8	1000.6	1000.6	0.33	°F	
Thermocouple Accuracy (K Type) Input 17	1000.0	998.2	1001.8	1000.8	1000.8	0.33	°F	
Thermocouple Accuracy (K Type) Input 18	1000.0	998.2	1001.8	1000.4	1000.4	0.33	°F	
Thermocouple Accuracy (K Type) Input 19	1000.0	998.2	1001.8	1000.6	1000.6	0.33	°F	
Thermocouple Accuracy (K Type) Input 20	1000.0	998.2	1001.8	1000.7	1000.7	0.33	°F	
Thermocouple Accuracy (K Type) Input 21	1000.0	998.2	1001.8	999.6	999.6	0.33	°F	
Thermocouple Accuracy (K Type) Input 22	1000.0	998.2	1001.8	1000.0	1000.0	0.33	°F	
Thermocouple Accuracy (K Type) Input 23	1000.0	998.2	1001.8	1000.3	1000.3	0.33	°F	
Thermocouple Accuracy (K Type) Input 24	1000.0	998.2	1001.8	1000.2	1000.2	0.33	°F	
Voltage Accuracy 1	10.0	9.5	10.5	10.1	10.1	0.0009	V	
Voltage Accuracy 2	10.0	9.5	10.5	10.1	10.1	0.0009	V	
Voltage Accuracy 3	10.0	9.5	10.5	10.0	10.0	0.0009	V	
Voltage Accuracy 4	10.0	9.5	10.5	10.1	10.1	0.0009	V	
Voltage Accuracy 5	10.0	9.5	10.5	10.0	10.0	0.0009	V	
Voltage Accuracy 6	10.0	9.5	10.5	9.9	9.9	0.0009	V	


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AC-2080.03

Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number:

ID Number: 1134



Description: SCALE
Manufacturer: RICE LAKE
Model Number: 520-1A
Serial Number: 1494600044
Technician: ARMIN AHMETOVIC
On-Site Calibration:
Comments:

Calibration Date: 10/10/2018
Calibration Due: 04/10/2019
Procedure: TMI-SCALES
Rev: 5/13/2014
Temperature: 68 F
Humidity: 33 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
DLOG-4	EXTECH	42270	3/5/2018	3/5/2019
RFD-500LBSET	RICE LAKE	500LBS	5/24/2018	6/30/2019



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AC-2000-03

Certificate of Calibration**Data Sheet**

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit AD/EAR
Weight Accuracy	100.0	99.4	100.6	99.9	99.9	0.06	g
Weight Accuracy	200.0	199.4	200.6	199.4	199.4	0.06	g
Weight Accuracy	300.0	299.4	300.6	299.5	299.5	0.06	g
Weight Accuracy	400.0	399.4	400.6	399.5	399.5	0.06	g
Weight Accuracy	500.0	499.4	500.6	499.4	499.4	0.06	g
Weight Accuracy	1000.0	999.4	1000.6	999.4	999.4	0.06	g
Dist Test 80"	100.0	99.4	100.6	99.9	99.9	0.06	g
Dist Test 17"	100.0	99.4	100.6	99.9	99.9	0.06	g
Dist Test 99"	100.0	99.4	100.6	99.9	99.9	0.06	g
Dist Test 148"	100.0	99.4	100.6	99.9	99.9	0.06	g
Dist Test Center	100.0	99.4	100.6	99.9	99.9	0.06	g



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AC-2000-03

Customer: INTERTEK MIDDLETON
 8431 MURPHY DR.
 MIDDLETON, WI, 53562
 608-824-7422

P.O. Number:
ID Number: 001212

Description: TIMER
 Manufacturer: COLE PARMER
 Model Number: 94440-10
 Serial Number: NSN
 Technician: ARMIN AHMETOVIC

Calibration Date: 04/04/2018
 Calibration Due: 04/04/2019
 Procedure: NIST SP 900-12
 Rev: 1/1/2009

Temperature: 68 F
 Humidity: 40 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:

Comments:

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values of an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.



B. SCHICKOWSKI, BRANCH MANAGER



Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
0515114048	OMEGA	OM-73	2/1/2018	2/1/2019
RFD806	HEWLETT PACKARD	53181A	5/9/2017	5/9/2018



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AC-2096.01

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit ADMEAS
Time Accuracy	60	59	61	60	60	0.3	sec
Time Accuracy	300	299	301	300	300	0.3	sec
Time Accuracy	1800	1799	1801	1800	1800	0.3	sec



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Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number:
ID Number: 001213

Description: TIMER
Manufacturer: COLE PARMER
Model Number: 94440-10
Serial Number: NSN
Technician: ARMIN AHMETOVIC

Calibration Date: 04/04/2018
Calibration Due: 04/04/2019
Procedure: NIST SP 980-12
Rev: 1/1/2009
Temperature: 68 F
Humidity: 40 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration
Comments:

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of $k=2$. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not covered by TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
0515114046	OMEGA	OM-73	2/1/2018	2/1/2019
RFD800	HEWLETT PACKARD	53181A	5/9/2017	5/9/2018



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AC-2010-03

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit ADJ/FAL
Time Accuracy	60	59	61	60	60	0.3	sec
Time Accuracy	300	299	301	300	300	0.3	sec
Time Accuracy	1800	1799	1801	1800	1800	0.3	sec



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AC-3080-03

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number: ONSITE

ID Number: 001420



Description: THERMAL HYGROMETER
Manufacturer: CONTROL COMPANY
Model Number: 68000-49
Serial Number: 150610334
Technician: ARMIN AHMETOVIC

Calibration Date: 10/12/2018
Calibration Due: 04/12/2019
Procedure: TMI-M-HYGROTHERMOGRAPHS
Rev: 2/23/2011
Temperature: 68 F
Humidity: 33 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:

Comments:

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of $k=2$. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCCL Z340-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

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Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

B. SCHICKOWSKI, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
0515114048	OMEGA	OM-73	2/1/2018	2/1/2019
RFD805	THUNDER SCIENTIFIC	1200	7/30/2018	7/30/2019



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Certificate of Calibration**Data Sheet**

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit ADJ/CAL
Temperature Accuracy	60.0	60.3	60.7	60.3	60.3	0.24	°F
Temperature Accuracy	70.0	69.3	70.7	70.4	70.4	0.24	°F
Temperature Accuracy	80.0	79.3	80.7	80.4	80.4	0.24	°F
Humidity Accuracy	33	30	36	34	34	1.7	%RH
Humidity Accuracy	50	47	53	51	51	1.7	%RH
Humidity Accuracy	75	72	78	76	76	1.7	%RH



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AC-2000.03



Intertek

Model 25-PDVC 55-SHP10 55-TRP10
 25-PDVCH 55-SHP10L

Pellet Fuel Room Heater; Free Standing Model Also For Use In Mobile Homes
 Certified to UL 1482-11 /ASTM E 1509-12 / ULC S627-00, CSA B415.1-2010
 EPA Test Method ASTM 2779-10, ASTM 2515-2011

W/N# xxxxx

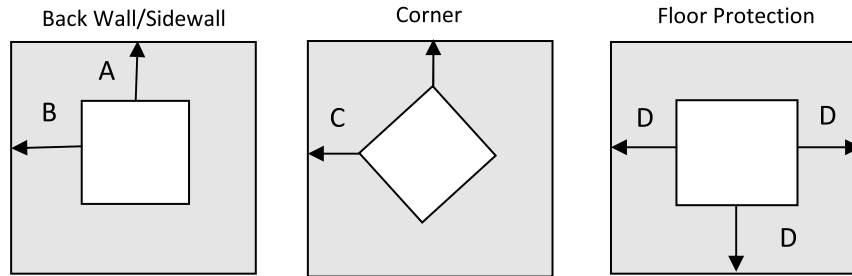
Manufactured by:
 England's Stove Works, Inc.
 589 S. Five Forks Rd.
 Monroe, VA 24574

Manufacture Date	
Serial Number	

PREVENT HOUSE FIRES

- Install and Use Only In Accordance with the Owner's Manual Provided with This Appliance.
- Contact Local Building or Fire Officials about Restrictions and Installation Inspections in Your Area.
- For Use with Wood Pellet Fuel Only, ¼ inch in Diameter.
- Do Not Connect This Unit to a Chimney Flue Serving Another Appliance.
- Keep Viewing and Ash Removal Doors Tightly Closed During Operation.
- Input Rating – 4.05 lbs/hr
- Emission value – 1.43 grams/hr
- U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using pellet fuel.
- U.S. Test Standard: US EPA 40 CFR Part 60, Subpart 60.536
- Use only Approved type L or P Pellet Vent Pipe.
- Inspect and Clean Exhaust Venting System Frequently.

FREESTANDING INSTALLATION REQUIREMENTS – Refer to local codes and the chimney manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling. Place on non-combustible floor protection, which extends 6-inches to the front and 6-inches on each side of the fuel opening. See owner's manual for additional clearance information.



A = 3 inches (76.2mm) B = 6 inches (152.4mm)
 C = 6 inches (152.4mm) D = 6 inches (152.4mm)

ELECTRICAL RATING: 6.0 A, 115 V, 60 HZ. ROUTE THE POWER CORD SO THAT IT DOES NOT COME INTO CONTACT WITH ANY HOT SURFACES ON THE UNIT AND DOES NOT CROSS IN FRONT OF THE UNIT.

Refer to Intertek's Directory of Building Products (<https://bpdirectory.intertek.com>) for detailed information.

CAUTION – Moving Parts May Cause Injury. Do Not Operate Unit With Panels Removed.

CAUTION – Hot Parts. Do Not Operate Unit with Panels Removed.

DANGER – Risk of Electric Shock. Disconnect Power Before Servicing Unit.

CAUTION – 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.

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.



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

INSTALLATION & OPERATION MANUAL



Pellet Stove MODELS 25-PDVC / 55-SHP10 / 55-TRP10

Manufactured By:
England's Stove Works, Inc.
PO Box 206
Monroe, VA 24574
Rev. 7/2017



www.heatredefined.com
Parts: (800) 516-3636
Support: (800) 245-6489



SAVE THESE INSTRUCTIONS



Welcome!

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INSTALLATION & OPERATION MANUAL

MODEL NUMBERS: 25-PDVC, 25-PDVCH, 55-SHP10, 55-SHP10L, 55-TRP10

Thank you for purchasing this product from a fine line of heating equipment. We wish you many years of safe heating pleasure with your new heating appliance.

Save These Instructions.

IMPORTANT: IF YOU HAVE A PROBLEM WITH THIS UNIT DO NOT RETURN IT TO THE DEALER. CONTACT TECHNICAL SUPPORT @ 1-800-245-6489.

Mobile Home Use:

These freestanding pellet units are approved for mobile home or doublewide installation with outside combustion air hook-up. See "Flue System" section of manual.

Mobile home installation should be in accordance with the Manufactured Home and Safety Standard (HUD), CFR 3280, Part 24.

WARNING: Do Not Install in Sleeping Room

CAUTION: The structural integrity of the mobile home floor, wall and ceiling/roof must be maintained.

Please Note the Following Precautionary Statements:

NOTE: WE DO NOT RECOMMEND PELLETT STOVES AS YOUR ONLY SOURCE OF HEAT.

England's Stove Works highly recommends the use of smoke detectors and Carbon Monoxide detectors with any hearth product, including this unit. Follow all manufacturer's instructions when using smoke or Carbon Monoxide detectors.

This unit is meant to operate only with door closed. Smoke spillage and an inefficient, lazy burn will result from attempting to operate the stove with the door open. In addition, using fuel other than wood pellets can create an unsafe situation and can also generate excess carbon monoxide. Carbon monoxide is an odorless, colorless gas which can be deadly. Be sure to burn only wood pellets. The use of a carbon monoxide detector is strongly recommended.

CAUTION: Please read this entire manual before installation and use of this pellet fuel burning room heater.



Keep children, furniture, fixtures, and all combustible materials away from any heating appliance. Refer to this owner's manual for all clearances to combustible materials.

WARNING: USE OF OUTSIDE AIR IS MANDATORY WITH THIS UNIT.

**DO NOT OPERATE UNIT WITH HOPPER OPEN. LID MUST BE SHUT AND TIGHTLY SECURED.
*DO NOT OPERATE WITH DOOR OPEN***

SAFETY NOTICE

FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH. FOR YOUR SAFETY AND PROTECTION, FOLLOW ALL THE INSTALLATION INSTRUCTIONS. CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS FOR RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS (INCLUDING PERMITS) IN YOUR AREA.

Questions? Need Parts or Options? www.HeatRedefined.com

SPECIFICATIONS

Heating Specifications

- Approximate Pellet Burn Rate**0.93 to 1.84 kg/hr (2.05 to 4.05 lbs/hr)
- Maximum Burn Time**20 hours
- Approximate Square Footage Heated***up 2,000 sq. ft.
- Hopper Capacity (fuel).....40 pounds

EPA and Safety Compliance Specifications

- EPA Compliance Status Certified to comply with 2020 particulate emission standards using pellet fuel.
- U.S. Test Standard: US EPA 40 CFR Part 60, Subpart 60.536
- Particulate Emissions 1.430 grams/hr
- CO Emissions 0.000 grams/hr
- Efficiency..... 68.4 % (HHV)
- BTU rating 26,179 BTU/hr
- Tested To UL 1482-00, ASTM E 1509, ULC/ORD-C1482-M1990 & ULC S627-00

Notes for this unit: Product may vary slightly from diagram. Clearances are the minimum for **this unit** and may need to be increased in the rear to have proper vent clearances. **Follow all venting manufacturer clearances and local codes.**

*- As tested per ASTM 2779-10

** - Heat output, burn rate and maximum burn time are heavily dependent on the type of pellets burned in the stove; as such, these numbers may vary.

*** - The maximum heating capacity of this unit can vary greatly based on climate, construction style, insulation and a myriad of other factors. Use this information in conjunction with a BTU loss calculation for your home to determine if this unit will be sufficient for your needs.

Thank you for purchasing this fine product from England's Stove Works!

England's Stove Works was started, and is still owned by, a family that believes strongly in a "Do It Yourself" spirit – that's one reason you found this product at your favorite "Do It Yourself" store.

We intentionally design and build our stoves so that any homeowner can maintain his or her unit with basic tools, and we're always more than happy to show you how to do the job as easily and as inexpensively as possible.

From our free, downloadable service sheets; to our Pellet Service Video; to our new "wizard-style," click-through Troubleshooting guide on our web site, we have always tried to help our customers stay "heat-ready," especially when oil and electricity prices continue to skyrocket.

Please look at our vast Help section on our web site and call our Technical Support department at (800) 245-6489 if you need any help with your unit. We are nearly always able to help "walk you through" any repairs, problems or questions you may have.

PLEASE NOTE: While information obtained on our web site and through our 800 number is always free of charge, there will be a service charge incurred with any "on-site" repairs or maintenance that we may arrange.

Wishing you years of efficient, quality and "comfy" heating,
England's Stove Works
Technical Support Department

www.HeatRedefined.com

(800) 245-6489

CAUTION: Stove is heavy.

In addition, when handling any sheet metal products, be aware that there may be sharp edges or burrs. Although we make every effort to eliminate any sharp edges, please use caution when handling any metal parts. Remember to disconnect (unplug) the stove from the power source and allow it to completely cool down before performing any maintenance.

This manual is available for free download on the manufacturer's web site. It is a copyrighted document and resale is strictly prohibited. The manufacturer may update this manual occasionally and cannot be responsible for problems including injuries or damages resulting from the use of information found in any manual from unauthorized sources.

PLEASE NOTE: If you purchased this model from certain stores, their model number may end in "L" "LC" "H" "CT", etc. This manual does apply to those models as well.

BEFORE RE-STARTING YOUR UNIT

Every time before pressing “ON” to start your unit – Be sure to remove all ashes (burnt or partially burnt) from your burn pot area! Wearing protective gloves and with the unit cool, remove the Wear Plate and dump the ashes, ensuring that the air holes are clear from debris. Also be sure to follow all other maintenance instructions as outlined in your Owner’s Manual and the Instructional DVD included with the unit. Failure to remove ashes from this area before each burn can cause smoke-back and serious damage to your stove, and can void your warranty. We will not be held responsible for poorly maintained units, including excess ash in the burn pot area.

Burn Safe and Burn Clean –
Clean the burn pot area daily!



A NOTE ON COLD AIR RETURNS AND CENTRAL FURNACES

Some homes, including the modern, air-tight homes that are well-insulated, create a negative draft that could cause smoke to be released from your unit, especially if it is too close to your home’s Central Furnace. If you install your stove in the same room as the Cold Air Return from your home’s Central Furnace, you must place your stove at least 20 feet (20’) from the Cold Air Return. We recommend you open an outside window slightly, and never close the door that leads from this room to the rest of your home.

IN THE EVENT OF SMOKE-BACK

1. If you see smoke coming out of your unit into the room *due to a power failure*,
DO NOT OPEN THE HOPPER OR DOOR TO YOUR UNIT!! **Remain calm.**
DO NOT UNPLUG UNIT!! Open the nearest outside door and windows and wait for all signs of smoke to clear (at least one hour, although the smoke should dissipate quickly once the door and windows are opened). When power is restored, press the ON button to restart your unit, and let the unit run for at least 30 minutes.
-- If you see any further signs of smoke-back, press the OFF button and call Technical Support at (800) 245-6489 before restarting your unit, as damage could have occurred due to the power failure.
-- If you see **no** more signs of smoke-back, press the OFF button and wait for your unit to completely shut down and cool down, then clean the burn pot area before restarting your unit (see “Before Re-Starting Your Unit,” above).
2. If you see smoke coming out of your unit into the room and *the power has **not** failed*,
DO NOT OPEN THE HOPPER OR DOOR TO YOUR UNIT!! **Remain calm.**
DO NOT UNPLUG UNIT!! Immediately press the OFF button, open the nearest outside door and windows and wait for all signs of smoke to clear (at least one hour, although the smoke should dissipate quickly once the door and windows are opened). Do NOT restart your unit before calling Technical Support at (800) 245-6489.
Please call Technical Support at (800) 245-6489 with any questions. England’s Stove Works, Inc.

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IMPORTANT! READ AND FOLLOW ALL INSTALLATION AND MAINTENANCE INSTRUCTIONS, INCLUDING CLEANING THE UNIT AS SPECIFIED, AND REPLACING GASKETS ANNUALLY, AND PARTS AS NEEDED. ENGLAND’S STOVE WORKS IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY INCURRED DUE TO NEGLIGENCE, OR DUE TO UNSAFE INSTALLATION OR USAGE OF THIS PRODUCT. CALL TECHNICAL SUPPORT WITH ANY QUESTIONS.

IMPORTANT INFORMATION

1. Check local installation codes for your area. Call your Homeowner's Insurance representative for inspection of your stove's installation.
2. Read and comply with the instructions in this manual.
3. This unit should be tested (dry run) before loading pellets for 20 minutes. The stove should automatically shut itself off after the 20-minute dry run.
4. **Your stove is designed to burn Wood Pellets only.** Burning pea coal, cherry pits, or anything other than wood pellets will void your warranty. Pellets with high ash content will burn dirty and require the unit to be cleaned more often. This unit is designed for use with ¼" diameter pellet fuel. Using pellets longer than 2" can bind the auger and require frequent manual removal.
5. Be sure your pellets are not damp or wet. Keep sawdust out of the unit.
6. Use three-inch (3") U.L.-approved (ULC if Canada) PELLET VENT TWIST-LOCK PIPE when installing this stove and follow the manufacturer's specifications for installation and clearances (we highly recommend Dura-Vent pellet twist-lock pipe) (**AC-3000 kit, AC-33000 if Canada**). For installations over 4000 ft. above sea level the exhaust should be vented with 4" pellet vent pipe (**AC-3100 kit, AC-33100 if Canada**). Even though this pipe interlocks, it is a good idea to seal all connections with high temperature silicone (**AC-RTV3**). Use at least three screws to secure the pipe to this unit's exhaust blower. Also, if you do not use U.L.-approved twist-lock pellet pipe, be sure to use U.L.-approved Pellet Vent pipe, and fasten each joint of the pipe with at least three screws (ULC-approved if Canada).

Outside combustion air is mandatory for these units to work properly. Make this connection using a 1 7/8" I.D. metal pipe (steel, aluminum or copper) and coupler. Be sure to secure the pipe to the unit with a clamp or aluminum tape. The outside end should be covered (screened) to prevent any foreign matter from entering the system. Try to keep the number of bends in this pipe to a minimum. Our Part Number PU-OAK (Outside Air Kit with flex pipe) can be used.

NOTE: If an older unit, measure the opening to determine what size pipe to use.

NOTE: If the total run of the intake air connection exceeds 6', use 3" metal pipe and coupler instead.

7. Regularly inspect the burn pot area and, if any crust forms, remove it with a poker.
8. The ash in the burn pot should be removed regularly, depending on your burn rate. The area to the right and left of the burn pot is for ash storage; keep the air holes in the burn pot clean for a more efficient burn. Check your exhaust system frequently. Refer to "Ash Removal and Disposal" section.
9. Keep pellets and all other combustible materials a safe distance from the unit.
10. This unit will require floor protection if installed on a combustible surface. The minimum floor protector should give at least one inch (1") of protection at the rear, four inches (4") on each side, and six inches (6") minimum in the front of the unit.
11. Horizontal runs should not exceed four feet (4') with a maximum vertical flue height of thirty five feet (35'). At fifteen feet (15'), the pipe should be increased to four inch (4") pellet vent pipe.
12. This unit should be turned off and allowed to cool prior to cleaning. Any ashes should be kept in an airtight metal container and not disposed of until they are completely cooled.
13. Read the instructions thoroughly, including instructions concerning the digital control board, and save them for future reference.

14. Do not allow paint, chemicals or construction dust on or near your unit. Do not allow liquid or ANY foreign materials on or inside your unit. Shut your unit down and cover it when painting, construction or similar activity is taking place. Wipe and clean your unit after any construction is done in your home, or if any foreign material gets on or inside your unit. You may also need to remove the rear and side cover plates to your unit (unplug unit first) and vacuum and clean the motors and inside of your unit.
15. Improper gasket maintenance, including failure to replace gaskets, can cause air leaks resulting in smoke-backs. See Gaskets section of this manual, page 19.
16. Remember that, as with any appliance, there is user responsibility involved, including installation, operation and maintenance of this product. Be sure to check local codes, and call Technical Support at (800) 245-6489 if you have any questions.
17. **Be sure to follow the directions of all manufacturers of third party products that you use, including exhaust pipe, etc. Never use gasoline, lantern fuel, charcoal lighter fluid, diesel fuel or any other flammable liquid to start the fire. If you manually start your unit, recommended fire starter materials are: Wax-impregnated wood chips, cardboard cubes or firestarter chips designed for pellet stoves (see section on Manually Starting Unit). Follow any manufacturer's directions for these products, and NEVER place any firestarter on any hot surface or hot coals. Never apply any firestarter products of any kind to a hot surface or hot coals.**
18. **Basement Installation:** We recommend basement installation be performed only by a professional installer. For basement installations, a 3" (three inch) pipe and coupler must be used for Outside Combustion Air, and a minimum clearance of 3' (three feet) must be maintained from the ground to the pellet vent exhaust pipe outside the dwelling. Keep in mind that each elbow used reduces draft by 15%; it is good practice to add 3' (three feet) of vertical rise for each elbow used. Example: After the 2nd elbow used, have 6' (six feet) of vertical rise before terminating your vent pipe.

UNIT PREPARATION

1. Attach the spring handle to the door by turning it counterclockwise.
Important: Also check hopper latches – must be tight so that the top is sealed to prevent back-burn.
2. Test your 110-volt outlet for current and then plug in the unit. **(We highly recommend a surge protector for our pellet unit, as the control panel is electronic).**
3. It is important to note that this stove is equipped with a dual auger system. The top auger runs intermittently and drops pellets to the bottom auger; the bottom auger runs constantly and simply pushes the pellets forward to the burn pot. The control board ("Heat Range") setting determines the top auger feed rate.
4. The stove has a digital read-out control board and is started by pressing the "ON" touch pad. This will start the upper auger, bottom auger and exhaust blower. The room air blower will start later as the stove reaches the pre-set blower temperature (see "Control Board" section for further explanation).
5. Check to be sure both augers and the exhaust blower are operating before connecting the unit to the flue system. Be sure to "dry run" your unit for 20 minutes before connecting it to the flue (it should stop automatically after 20 minutes).

IMPORTANT NOTICE: This unit must be properly installed to prevent the possibility of a house fire or “smoke-back.” The instructions must be strictly adhered to. Do not use makeshift methods or material which may compromise the installation. Your unit requires periodic maintenance and cleaning (refer to manual). Failure to maintain your unit may lead to a variety of problems, including but not limited to smoke spillage into the home. England’s will not be liable for consequential or indirect damages to property or persons resulting from the use of this product.

FLUE SYSTEM

Caution: Follow the pipe manufacturer’s installation instructions and directions for passing through combustible walls and ceilings. *Be sure to check local codes in your area.*

NOTE: See the installation drawing later in this manual (Illustration 1).

This unit is equipped with a negative draft system that pulls combustion air through the burn pot and pushes the exhaust air out of the dwelling. If this unit is connected to the flue system other than the way explained in this manual, it will not function properly.

For any of these installations, keep in mind that each elbow used reduces draft by 15%; it is good practice to add 3’ (three feet) of vertical rise for each elbow used. Example: After the 2nd elbow used, have 6’ (six feet) of vertical rise before terminating your vent pipe.

Pellet Vent Pipe

The UL approved (ULC if Canada) pellet vent pipe that we recommend is a twist lock system; however, it is still recommended that high temperature silicone (**AC-RTV3**) be used at each joint. England’s Stove Works recommends the use of Dura-Vent® twist-lock pipe (**AC-3000 kit, AC-33000 if Canada**) - if you use other pipe, consult your local building codes and/or building inspectors, and secure each joint with at least three screws—see Important Information, above. Do not use “B” vent gas pipe or galvanized pipe with this unit. The pellet pipe is designed to disassemble for cleaning and should be checked several times during the burning season — pellet vent pipe is not furnished with the unit and must be purchased separately. For installations over 4000 ft. above sea level the exhaust should be vented with 4” pellet vent pipe (**AC-3100 kit, AC-33100 if Canada**). **Do not install a flue damper of any kind in this system, and do not connect this unit to a flue system serving another heating appliance.**

Through the Wall

To vent the unit through the wall, connect the pipe adapter to the exhaust motor adapter. If the exhaust adapter is at least eighteen inches (18”) above ground level, a straight section of pellet pipe can be used to initially pass through the wall (see **Illustration 1**). Your dealer or our factory should be able to provide you with a kit that will handle most of this installation, which will include a wall thimble that will allow the proper clearances through a combustible wall. Once outside the structure, a three-inch (3”) clearance should be maintained to the outside wall and a clean out tee should be placed on the pipe that extends through the wall. We require a minimum of three feet (3’) of vertical pipe with a 90-degree turn away from the house. At this point, a one-foot (1’) section and horizontal cap will complete the installation (see **Illustration 1**).

A wall strap should be placed just below the last 90-degree section to make the system more stable. If you live in an area that has heavy snowfall, it is recommended the installation be taller than three feet (3’) to get above the snowdrift line.

The same type installation can be used if your stove is below ground level by adding the clean-out section and vertical pipe inside until ground level is reached. However, we recommend basement installation be performed only by a professional installer. For basement installations, a 3” (three inch) pipe and coupler must be used for Outside Combustion Air, and a minimum clearance of 3’ (three feet) must be maintained outside the dwelling from the ground to the Pellet Vent Exhaust Pipe. We require a three foot (3’) minimum vertical rise on the inside or the outside of the dwelling.

The through-the-wall installation is the least expensive and simplest installation. In a through-the-wall installation you should be mindful of the snowdrift line, as well as dead grass and leaves. We recommend a three foot (3') minimum vertical rise on the inside or the outside of the dwelling.

Through the Ceiling

When venting the stove through the ceiling, the pipe is connected the same as through the wall, except the clean out tee is always on the inside of the house, and a 3" adapter is added before the clean-out tee. You must use the proper ceiling support flanges and roof flashing supplied by the pipe manufacturer -- follow the pipe manufacturer's directions and **Illustration 1** in this manual. It is important to note that if your vertical runs of pipe are more than fifteen feet (15'), the pellet vent pipe should be increased to four inches (4") in diameter. Do not exceed four feet (4') of pipe on a horizontal run, and do attempt to use the least number of elbows in the flue system. If an offset is used it is better to install a 45-degree elbow whenever possible. *NOTE: Installing elbows may inhibit your draft by up to 15% per elbow.*

Existing Flue System

If you are replacing a wood stove with a pellet unit the chimney or pipe should be thoroughly cleaned before proceeding with the installation. If connecting this stove to a factory built chimney, it may **ONLY** be a 6" flue, UL103 HT venting system (ULC S629 if Canada). Connection to any other factory built chimney may result in a poorly operating or dangerous stove installation. When connecting to an existing masonry chimney, the cross-sectional area of the flue must be considered. A chimney with a flue larger than 6" round (28.27 sq. in.) may require relining with an approved pellet stove chimney lining system. Make sure the chimney meets the minimum standards listed in NFPA 211 (A chimney professional can confirm this upon inspection).

Outside Air (Outside Combustion Air Intake)

Outside air is mandatory for this unit to operate properly. This unit has been designed and tested with this connection, because so many homes are airtight and there is not adequate combustion air available inside the dwelling. The air intake pipe is located on the bottom side of the burn pot (from the rear) and measures 1 1/2" inside diameter (I.D.). The connection can be made with a metal 1 7/8" I.D. coupler and pipe (see "Important Information" section of manual), and should exit through the wall. Be sure to secure the pipe to the unit with a clamp or aluminum tape. The outside end of the pipe should be covered (screened) to prevent foreign matter from entering the system. Our Outside Air Kit (Part Number PU-OAK) can be used. If the unit is located below ground level, you will need to run the pipe up and then outside the dwelling. *NOTE: If the total run of the connection exceeds 6', if more than 2 elbows are used, or if a basement installation, use 3" metal pipe (and coupler) instead.* Note: If an older unit, measure the opening to determine what size pipe to use or couple to.

Mobile Home Installation

Secure the heater to the floor using the two holes in the pedestal. If the unit is on a combustible surface, you will need to drill matching holes in the floor protection that you choose (see Floor Protection section). Do not disturb the structural integrity of the home, be sure the unit is permanently electrically grounded to the chassis of your home and remember that outside combustion air is mandatory. The wood stove **MUST** be secured to the floor of the mobile home using lag bolts and the holes provided in the bottom of the unit for this purpose. Use a #8 copper wire to ground stove to frame of mobile home.

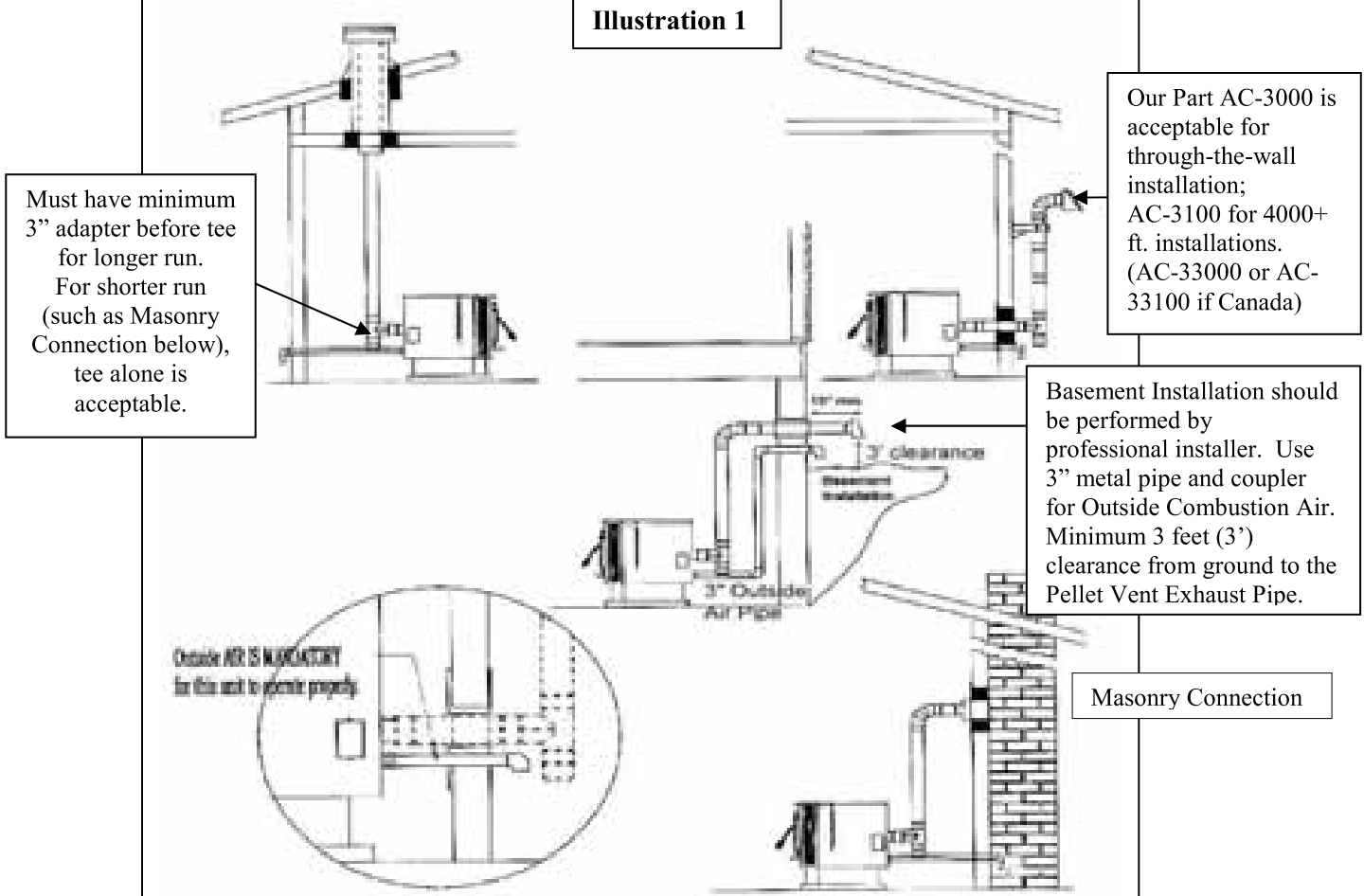
WARNING: DO NOT INSTALL IN SLEEPING ROOM
CAUTION: THE STRUCTURAL INTEGRITY OF THE MANUFACTURED HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED.

IMPROPER INSTALLATION: The manufacturer will not be held responsible for damage caused by the malfunction of a stove due to improper venting or installation.
Call 800-245-6489 and/or consult a professional installer if you have any questions.
IMPORTANT: Improper hook-up (too much pipe, too many elbows, etc.) will cause the unit not to operate. Call Technical Support (800-245-6489) if you have questions about your hook-up or if your unit will not operate.

Freestanding Pellet Installation

Caution: Follow the pipe manufacturer's installation instructions and directions for passing through combustible walls and ceilings. Check local codes in your area.

Illustration 1



1. If 3" flue pipe exceeds 15' in length, increase to 4" flue pipe for remaining flue connections.
2. Total flue length should not exceed 35'.
3. Horizontal run not to exceed 4'.
4. Floor protector must extend 6" from front of unit, 4" from sides and 1" from rear.
5. If the total run of outside air connection exceeds 6', if more than 2 elbows are used, or if a basement install, use 3" metal pipe (and coupler) instead.
6. **Outside Air is mandatory for proper safe operation.**

WARNING - INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

Floor Protection

If your floor is constructed of a non-combustible material such as brick or concrete, there is no need for floor protection. If the floor is constructed of a combustible material such as hardwood, linoleum, or carpet, then you will be required to use floor protection between the unit and the combustible. The protection should be U.L. approved or equivalent (ULC if Canada) and must be large enough to provide a minimum of one inch (1.0") behind, four inches (4.0") on both sides of the stove and at least six inches (6.0") in the front of the unit. This floor protection is intended as spark and ember protection only, therefore it need only be noncombustible (there is no required R value).

NOTE: Canada requires 450 mm floor protection in front and 200 mm to the sides & rear.

Wall Protection

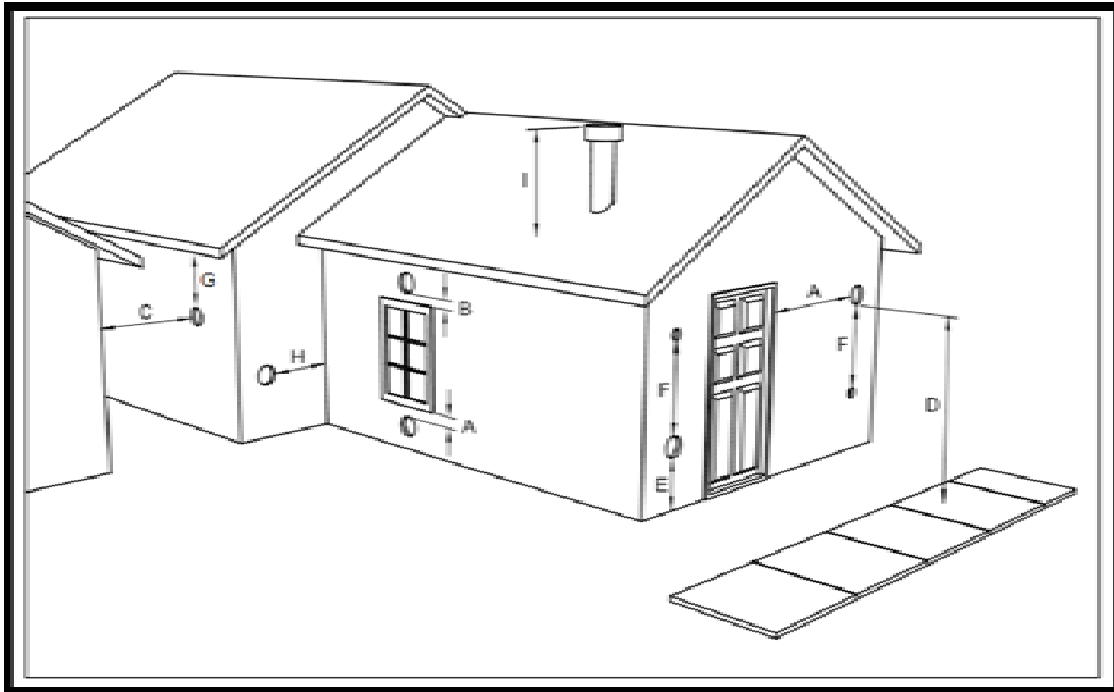
From the rear and the sides of this stove only six inches (6") of clearance is required to paneling, wallpaper or drywall. The pellet vent pipe usually requires the standard three inches (3") of clearance, or as recommended by the manufacturer. Normally additional wall protection is not required with this type unit.

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VENT TERMINATION CLEARANCES

- A) MIN. 4-FT CLEARANCE BELOW OR BESIDE ANY DOOR OR WINDOW THAT OPENS.
- B) MIN. 1-FT CLEARANCE ABOVE ANY DOOR OR WINDOW THAT OPENS.
- C) MIN. 2-FT CLEARANCE FROM ANY ADJACENT BUILDING.
- D) MIN. 7-FT CLEARANCE FROM ANY GRADE WHEN ADJACENT TO PUBLIC WALKWAYS.
- E) MIN. 2-FT CLEARANCE ABOVE ANY GRASS, PLANTS, OR OTHER COMBUSTIBLE MATERIALS.
- F) MIN. 3-FT CLEARANCE FROM A FORCED AIR INTAKE OF ANY APPLIANCE.
- G) MIN. 2-FT CLEARANCE BELOW EAVES OR OVERHANG.
- H) MIN. 1-FT CLEARANCE HORIZONTALLY FROM COMBUSTIBLE WALL.
- I) VENTS INSTALLED WITH MECHANICAL EXHAUSTERS SHALL TERMINATE NOT LESS THAN 12 IN. (305MM) ABOVE THE HIGHEST POINT WHERE THEY PASS THROUGH THE ROOF SURFACE.



Notes on termination of Pellet Vent Pipe from NFPA 211 (2006 ed.) Section 10.4 Termination: 10.4.5
(See also “FLUE SYSTEM” section of manual AND additional notes above):

- Not less than three (3) feet above any forced air inlet located within ten (10) feet.
- Not less than four (4) feet below, four (4) feet horizontally from, or one (1) foot above any door, window or gravity air inlet into any building.
- Not less than two (2) feet from an adjacent building, and not less than seven (7) feet above grade where located adjacent to public walkways.

The exhaust exit shall be arranged so that the flue gases are not directed so that it will affect people, overheat combustible structures, or enter buildings. Forced draft systems and all parts of induced draft systems under positive pressure during operation shall be installed gastight or to prevent leakage of combustion products into a building. Through-the-wall vents shall not terminate over public walkways, or where condensate or vapor could create hazards or a nuisance.

Be sure to follow local codes and all manufacturer's instructions (including exhaust pipe).

Consult a professional installer and/or call Technical Support if you have any questions.

OPERATING INSTRUCTIONS

CAUTION: DO NOT OPERATE WITH THE DOOR OPEN.

If door is left open (approximately) two minutes, unit will stop feeding and fire will go out.
Do not burn trash (paper bags, etc.) in this unit.

This stove has an induced draft system and is designed to operate continuously, as frequent shutdown is not required. The digital control board operates the unit with a time delay-relay system; this system controls the top auger feed rate by operating for a predetermined number of seconds while the bottom auger runs constantly. The setting of the “**Heat Range**” touch pad will control the heat output and the amount of pellets the unit will burn (see “Control Board” section and **Illustration 3**). Note: This stove is using solid fuel and will not restart automatically.

* **NOTE:** Blower Speed will automatically be adjusted to the desired Heat Range that you select.

Horizontal Feed System

This unit has a top and a bottom auger that are separated by four inches (4”); a 1-RPM motor drives each auger. The top auger intermittently drops pellets to the bottom auger tube, and the bottom auger pushes the pellets forward to the burn pot. This helps prevent build-up of fuel in the bottom auger tube. As pellets enter the burn pot the combustion air is drawn across the fuel.

START- UP PROCEDURE

Caution - Never use gasoline, lantern fuel, charcoal lighter fluid, diesel fuel, or any other flammable liquid to start the fire.

1. Be sure the hopper is clean and free from foreign materials. Be sure there is current at your outlet (we do recommend a surge protector with our unit).
2. **Before your first fire dry run your unit (with no pellets in the hopper) for 20 minutes.** Press the “ON” button to begin the dry run. After the 20 minute dry run, the control board will return to “OFF.” An error code will appear in the Heat Range and the Blower Speed windows as “E-2,” which means the unit failed to start normally. After this code is received and you are sure the unit is working properly, fill the hopper with wood pellets. Do not allow any part of the bag or any foreign material in the hopper, as this may jam the augers. Ensure that all pellet matter is cleared from the hopper lid gasket, make sure the hopper lid latches and the door of the unit are securely closed and press the “ON” button; this will clear the error code and restart your unit.

Automatic Start-Up

When the “ON” button is pressed from a cold start, the unit is in “Start-Up” (after 3 seconds, there will be an “S U” in the Heat Range and Blower Speed windows to verify this). While in this mode, the unit has a preset heat range and will remain in this mode for 20 minutes to prevent the unit from over-firing. During this start-up period you can set the Control Board at the setting you desire; after the start-up is complete, the unit will operate at the user setting.

Manually Starting Your Unit

In the event the Auto-Start does not initiate, you may manually start your unit. To manually start your unit, first clean any pellets out of the burn pot (to prevent over-feeding). Place a handful of new pellets in the burn pot, then spread a small amount of pellet fire starter over the pellets and ignite them. After the pellets ignite, close the door to your unit and press the “ON” button (if the door is closed before the pellets fully ignite, the Exhaust Blower could put out the fire). Recommended fire starter materials: Wax-impregnated wood chips, cardboard cubes or firestarter chips designed for pellet stoves. Follow any manufacturer’s directions for these products, and NEVER place any firestarter on any hot surface or hot coals. Never use gasoline, lantern fuel, kerosene, charcoal lighter fluid, diesel fuel or any other flammable liquid to start the

fire. Do not use the manual startup method if the igniter is working. NEVER place firestarter near the igniter.

If you have continued problems with the Auto-Start Igniter, call Technical Support.

E-Codes

“E-Codes,” or Error Codes, are codes that will appear in the Heat Range and Blower Speed windows of the Control Board if your unit experiences problems. If you receive any of these codes, first attempt to reset your unit by pressing the “ON” button (only once). If the unit continues to display any E-Code(s), please contact Technical Support at (800) 245-6489 before further attempting to restart your unit.

1. E-1 = Vacuum Loss
 2. E-2 = Fail to Start
 3. E-3 = Over Temperature Limit
- NOTE: “E-0” indicates “No Error”

First Fire: Adjust the “Heat Range” to a “5” setting and allow the stove to burn in this manner for *at least three (3) hours*. This will allow the unit to “cure out” as the paint and the oils from the manufacturing process burn off. We recommend you open doors and windows in your dwelling during this process.

Subsequent Cold Starts: In a cold start situation, the unit should be operated at a “5” setting until the room air blower begins to operate.

NOTE: The start-up cycle for this unit with the Auto-Start Igniter is 13 minutes. Press the “ON” button only once on start-up. Pressing the “ON” button a second time during the start-up cycle will cause the start-up cycle to begin again.

IMPORTANT: If the unit fails to start properly, or does not properly complete the Shut-Down procedure, **open the closest outside door and a window to eliminate the home’s natural draft BEFORE opening the stove’s door or hopper lid.** This will allow any smoke to exit through the external air hook-up instead of spilling into the home.

SHUT-DOWN PROCEDURE

WARNING: NEVER SHUT DOWN THIS UNIT BY UNPLUGGING IT FROM THE POWER SOURCE.

Refer to the following instructions:

Press the “OFF” touch pad to put the stove in the “Shut-Down” mode. There will be an “S D” in the Heat Range and Blower Speed windows while the unit is shutting down to verify this. At this time the red light above the “OFF” pad will illuminate. When the “OFF” pad is touched the top auger will instantly stop feeding pellets to the bottom auger tube, but the room air blower, exhaust blower and bottom auger will continue to operate. When the internal temperature drops to 95 degrees the room air blower will cease to operate, and when the internal temperature drops to 90 degrees the bottom auger and exhaust blower will stop. The red light will then shut off and the entire stove will be shut down. The hotter the unit is operating, the longer it will take for the stove to complete the Shut-Down cycle.

Note: The unit will exit the Shut-Down cycle if you press any buttons during Shut-Down.

Note: If the room temperature stays above 70 degrees the stove will remain in the Shut Down mode for 60 minutes, regardless of the temperature reading at the heat sensor. If the stove stays on longer than 60 minutes the unit will automatically turn off.

DAILY OPERATION

Refueling the Unit

Always press the “OFF” touch pad before refueling. This unit has a 40-lb. hopper, and should be refilled when the hopper level drops to three or four inches.

Do not install or operate this unit outside, in a greenhouse, or in any area that is high in moisture.

Note: The hopper lid will be warm; therefore, you should always use some type of hand protection. NEVER place your hand near the auger while the stove is operating.

Note: Always ensure that all pellet matter is cleared from the hopper lid gasket before closing. Be sure to close and latch hopper **securely** before re-firing. Do not operate this unit with the hopper lid open or unsecured.

Power Outage

If the power to the unit is interrupted for approximately three minutes or less, the unit will resume operation when power is restored according to the following table:

Unit's State Before Power Loss	State When Power Returns
ON	Start-Up
Start-Up	Start-Up
Shut-Down	Shut-Down
OFF	OFF

If the power is interrupted for more than (approximately) three minutes, the unit will be “OFF” when power returns.

Important: Do NOT open the hopper lid or the door to the unit during power outage. Open the closest outside door and a window to eliminate the home's natural draft. Wait for power to be restored and then press the “ON” button to re-start the unit, if necessary.

We highly recommend the use of a surge protector with your unit, as power surges and failures can affect the operation of any electrical appliance.

We do not recommend leaving home with the stove on the higher heat ranges; it is recommended that the stove be left on the lower heat ranges (Heat Range setting 1 or 2).

NOTE: Remember: **1)** It is **very** important for the unit to be vented properly (see instructions on Outside Air), as the natural draft is needed to clear the smoke from the stove. **2)** Do not open the hopper lid (or the unit's door). This may cause fire to burn in the hopper.

Fuel Outage

If the unit should run out of pellets, simply reload the hopper and press the “ON” button (only once) to re-start the unit. If the unit runs without pellets, after one hour the unit will shut down.

NOTE: Even if flames are visible inside the fire box always press the “ON” button to ensure that your unit will restart.

Combustion Blower Failure

If the Combustion (exhaust) Blower should fail on this unit, a Vacuum Shut-Down Switch will automatically stop the stove. This will shut your unit completely off, and there will be an “E-1” code in the Heat Range and Blower Speed windows on the Control Board. At this point you will need to contact Technical Support at (800) 245-6489.

NOTE: It is **very** important for the unit to be vented properly (see instructions on Outside Air), as the natural draft is needed to clear the smoke from the stove.

As with any maintenance concerning this unit, be sure the unit is “OFF” and has completed the Shut-Down cycle **BEFORE** beginning. Be aware that metal parts in the firebox can remain **HOT** long after the fire has gone out and **EVEN** after the Shut-Down cycle is complete. Always use extreme caution when handling potentially hot stove parts, even if you think they should be cold.

NOTE: The instructions below concerning the cleaning of the burn pot and wear plate area are **especially important** to the function of your stove. Failure to follow them regularly can result in burn-back and can damage your unit and/or void your warranty.

ASH REMOVAL AND DISPOSAL

IMPORTANT: While the amount of ash generated by this unit is not excessive compared to log-burning woodstoves, keeping the unit clean and free of ash is essential for peak performance. Too much ash build-up hampers airflow and reduces the unit’s efficiency, and can cause smoke-back. Follow these directions at least as frequently as the schedule below, or more often if needed.

****Failure to properly clean your stove can cause poor performance and possibly a burn back!****

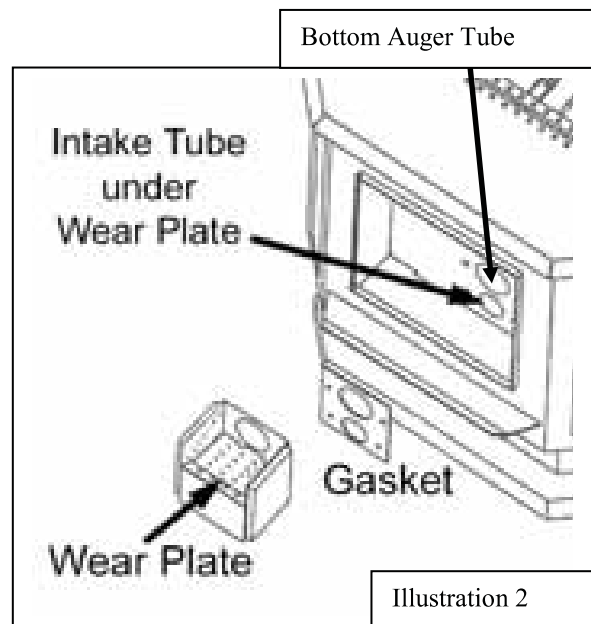
Daily Ash Maintenance

Press the “OFF” touch pad and allow the stove to burn for five (5) minutes prior to opening the door. A long-handled screwdriver or long-handled putty knife can be used to scrape off any build-up or crust in the burn pot area. This can then be pushed to the left or right into the ash storage area.

Semi-Weekly Ash Removal

Twice each week: Shut the unit down by pressing the “OFF” pad and allowing the unit to go through the complete Shut-Down cycle. Allow the unit to completely cool down and then remove the ashes with a scoop. The ashes should be placed in a non-combustible container with an airtight lid and should always be placed on a non-combustible surface or on the ground until completely cooled and free of hot cinders.

Once the ash is removed, the burn pot should be given a thorough inspection. Remove and clean the burn pot wear plate (refer to the exploded diagram in the rear of this manual – **Illustration 6**, and the close-up diagram shown here), and remove any ash build-up in the area below the wear plate. Also, be sure there are no ashes or obstructions in the tube under the wear plate. Check for any build-up in the front of the burn area. Clean out all air holes (if necessary a 1/8” drill bit can be used) --these air holes should be kept clean, as they supply combustion air under and around the pellet fuel. The burn pot assembly should also be thoroughly cleaned, including the burn box. When replacing the wear plate, ensure that it lies flat in the firebox and no gaps (from ash residue) are under it.



IMPORTANT: Ash build-up under the wear plate can cause the unit to malfunction.

Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have been thoroughly cooled.

CLEANING THE UNIT AS SPECIFIED, AND REPLACING GASKETS ANNUALLY, AND PARTS AS NEEDED. ENGLAND’S STOVE WORKS IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY INCURRED DUE TO NEGLIGENCE, OR DUE TO UNSAFE INSTALLATION OR USAGE OF THIS PRODUCT. CALL TECHNICAL SUPPORT WITH ANY QUESTIONS.

Monthly Ash Removal

The large baffle plate (12" x 13") that rests above and behind the burn pot (refer to the exploded diagram in the rear of this manual – **Illustration 6**) should be removed monthly. This can be done by lifting up the plate and pulling it out. The area behind the plate should then be cleaned thoroughly, and the plate placed back in the original position.

Use a screwdriver or chisel and break any creosote build-up in the front of the unit, where the pellets are fed into the burn pot from the Bottom Auger Tube (see **Illustration 2**). Moisture in the pellets and resulting build-up in this area can cause the bottom auger to “squeal” or squeak.

Also inspect your flue pipes, and remove ash buildup from the clean-out tee.

Carbon Removal: During normal operation carbon from the combustion of pellet fuel will tend to build up on the tip of the auger, on the wear plate and sides of the fire pot, and in the mouth of the feed tube. It is essential that this residue be removed to ensure trouble free operation of the unit. The frequency with which this carbon must be removed varies with brands of pellets, depending on moisture content, wood type, foreign material (dirt, etc.) in pellets, and other factors.

To remove this carbon, simply scrape it off using the blade of a flat tipped screwdriver or similar instrument; also, to remove it from the feed tube, scrape as much as can be easily reached, then insert an emery board (fingernail file made from a popsicle stick and sandpaper) between the feed auger and the feed tube and sand out any residue not removed from scraping alone. Clearing this carbon residue from the feed tube is essential for proper operation of the feed auger, which is designed to float freely in the feed tube allowing smooth fuel flow, a lesser possibility of a jam, and a quieter unit.

Annual Cleaning

The stove and the flue system should be given a complete cleaning at the end of the heating season. Remove the burn pot assembly, clean it thoroughly, and re-install it (refer to **Illustration 6**); this will require new gasket for the burn pot. Be sure to tighten the set screws when you replace them, but do not over-tighten. In addition to the cleaning mentioned for semi-weekly and monthly, the Combustion (exhaust) Blower should be removed annually and the blower tube vacuumed of any ash build-up. *Note:* There is a Combustion Motor Gasket (Part **PU-CBMG**), which allows you to remove the motor from the Combustion Blower housing, clean your stove, and replace the motor and gasket without having to remove the entire Combustion Blower. However, if you must remove or replace the entire Combustion Blower, a new blower flange gasket (Part # **PU-CBMG**) should be added between the blower flange and the steel exhaust tube.

Since the convection (room air) blower does not handle any by-products of combustion, it does not require serious cleaning like the exhaust blower. However, dust from the home and other debris in the air can accumulate on the blades of the convection blower. The convection blower is located on the side of the stove opposite the combustion blower, and should be removed for cleaning. Any dust that has built up on the fan blades can usually be easily removed with a vacuum or a soft paint brush.

Soot and Fly Ash: Formation and Need for Removal

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 that which 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 every year to determine if cleaning is necessary.

MAINTENANCE

CAUTION: UNPLUG THE UNIT PRIOR TO ANY SERVICE WORK!

SEE EXPLODED DIAGRAM (ILLUSTRATION 6) FOR PARTS REFERENCE

Parts Orders: (800) 516-3636 www.HeatRedefined.com Questions: (800) 245-6489

NOTE: Visit our web site for downloadable maintenance sheets and/or a service video that details and illustrates the following maintenance tasks.

Rear Panel Removal

WARNING: To perform any maintenance inside the rear of the unit, the stove must be out (no fire), cooled down and unplugged. Electrical shock can occur if the unit is not unplugged from power.

To remove the rear panel, simply loosen the eight (8) screws (size 5/16") and flex the panel. The panel should come off without fully removing the screws.

Instructions for maintenance and part replacement procedures can be found on:

www.HeatRedefined.com

Auger Motors

The Auger Motor and gearbox are one complete assembly (Part # **PU-047040**), and can be removed by disconnecting the power leads and loosening the (⁵/₁₆" head) set bolt in front of the assembly. This bolt tightens down *on the flat side of the gear shaft* and locks the gear shaft and auger shaft together – once the bolt is loosened, the entire assembly will slide from the locking collar. There are two motor assemblies on the unit, and both rest on a shelf when not in operation. When replacing a motor, the assembly should always be placed to rest on this shelf prior to starting the unit.

Auger Bearings and Auger Shafts

The auger bearings (Part # **PU-UCF204-12**) are a sealed unit and do not require lubrication. To replace the Top Auger, all the fuel must be removed from the hopper as well as from the Top Auger assembly. Once this is done, the four bolts that hold in the bearing can be removed, followed by the complete auger assembly. Loosen the two (2) set screws with a 1/8" Allen wrench, which will disconnect the bearing from the shaft (the bearing assembly and auger assembly can be replaced by reversing this procedure). When placing the auger assemblies in the unit, always tighten the four bolts in a diagonal pattern to ensure the bearings and shafts are aligned properly.

NOTE: Follow the same procedure to work on the bottom auger, with the exception that the pellets do not have to be removed from the hopper.

Convection Blower

The Convection (room air) Blower (Part # **PU-4C442**) is located on the left side of the unit and can be removed by disconnecting the power leads and removing the four mounting screws. Once this is done, the blower will slide out of the stove. This procedure can be reversed to install a new blower.

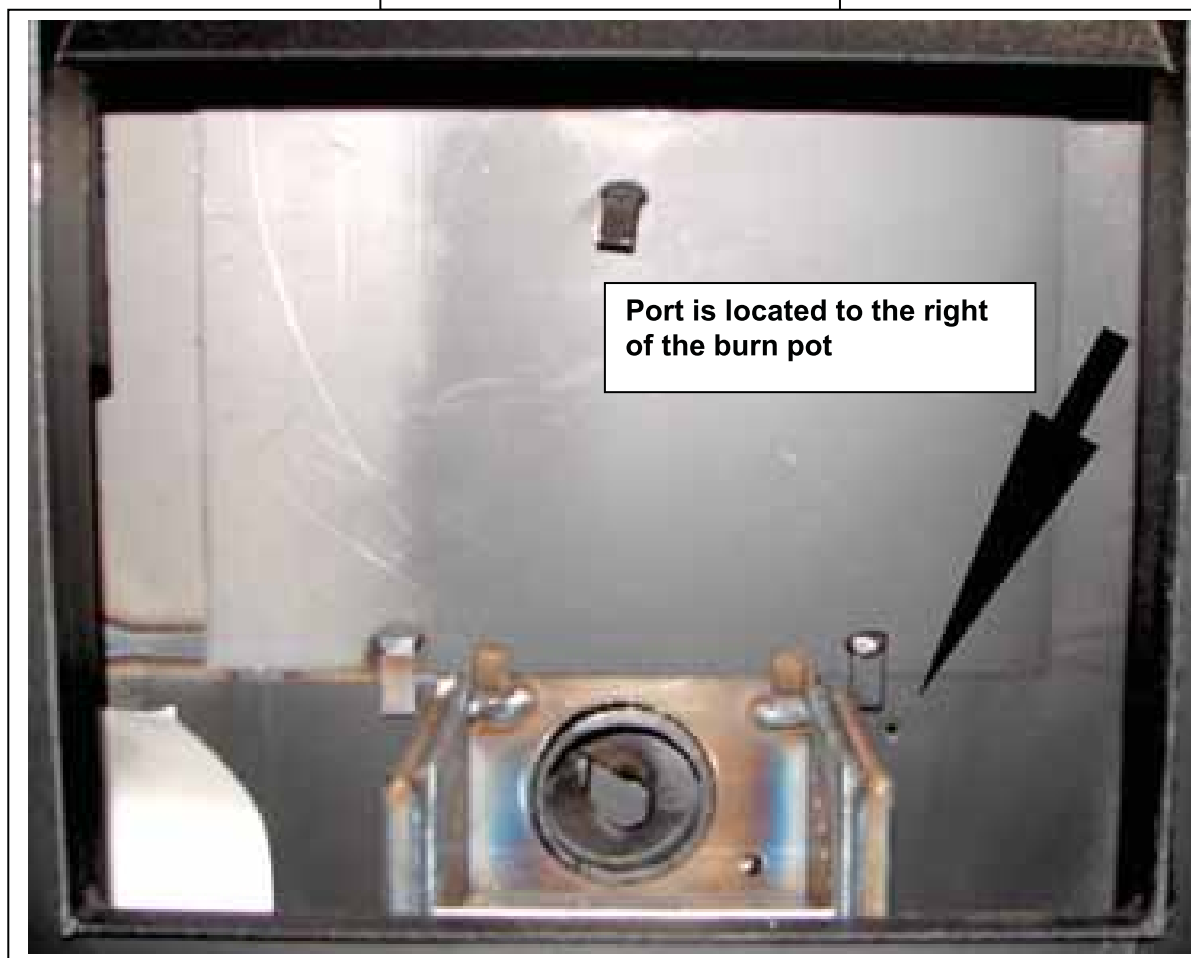
Combustion Blower

To replace the Combustion (exhaust) Blower (Part # **PU-076002B**), the power leads and the pellet vent pipe must be disconnected. Next, remove the screws that hold the blower to the steel exhaust tube and slide the blower from the stove. *Note:* There is a Combustion Motor Gasket (Part # **PU-CBMG**), which allows you to remove the motor from the Combustion Blower housing, clean your stove, and replace the motor and gasket without having to remove the entire Combustion Blower. If cleaning your blower, the blower impeller, blower tube and steel blower exhaust tube on the unit should be brushed and vacuumed. However, if you must remove or replace the entire Combustion Blower, a new blower flange gasket (Part # **PU-CBMG**) should be added between the blower flange and the steel exhaust tube.

Vacuum Switch

This unit is equipped with Vacuum Shut Down Switches (Part # **PU-VS** and **CU-VS**), which help control various functions of the unit. If an operational error occurs in the unit, a switch will either stop the top (feed) auger or shut the unit off; if the unit turns off an E-1 Code (error code) will appear in the Heat Range and Blower Speed windows of the Control Board. Situations which could cause this include power failure, Combustion Blower failure, improper flue installation, a blocked flue (from rodents, nests, etc.), or "dirty burning" from burning improper fuel (see "Important Information" at the beginning of the manual).

"Door Ajar" Vacuum Switch Port



NOTE: The "door ajar" vacuum switch port must be kept clean, or the top auger will cease to function. Locate the port hole to the right of the burn pot and, with the stove unplugged and cooled down, use a brush or pipe cleaner (not a vacuum) to keep this port clear of ash or other debris (see picture).

Hopper Lid Safety Switch

This unit is equipped with a hopper lid safety switch (Part # **AC-HLSB**) which is directly connected to the top auger motor. In the event the hopper lid is left open while the stove is in operation, the hopper lid switch will prevent the top auger from turning. This is to prevent byproducts of combustion from entering the home through the open hopper lid and also to simply prevent operation with the hopper lid open.

Improper hopper lid safety switch operation will result in a top auger that will not turn and therefore a stove that will not burn. NEVER place your hand or any object near the auger while the stove is connected to power.

Gaskets

IMPORTANT: IMPROPER GASKET MAINTENANCE, INCLUDING FAILURE TO REPLACE GASKETS, CAN CAUSE AIR LEAKS RESULTING IN SMOKE-BACKS. CHECK GASKETS OFTEN FOR AIRTIGHT SEAL AND REPLACE AS NECESSARY. IT IS MANDATORY TO REPLACE GASKETS ANNUALLY.

This unit comes with a 3/4" rope gasket around the door that should be replaced annually. To replace the *door gasket* (Part # **AC-DGKC**), the old gasket must first be removed entirely — prior to adding the new adhesive, you may have to scrape the old cement from the door channel. Once the cement and gasket have been added, the door should be closed and latched for twenty-four hours to allow the cement to harden.

If you are replacing the *window gasket* (Part # **AC-GGK**), the new gasket will already have adhesive on one side. Remove the paper on the adhesive side and place the gasket around the outside edge of the glass by forming a "U" with your fingers and placing the gasket around the glass.

It is important to change the hopper lid gasket if it shows any wear. Be sure to replace the hopper lid gasket annually, or sooner if necessary.

Note: There is a Combustion Motor Gasket (Part # **PU-CBMG**), which allows you to remove the motor from the Combustion Blower housing, clean your stove, and replace the motor and gasket without having to remove the entire Combustion Blower. However, if you must remove or replace the entire Combustion Blower, a new blower flange gasket (Part # **PU-CBMG**) should be added between the blower flange and the steel exhaust tube.

Finish

This new unit has been painted with High-Temperature Paint that should retain its original look for years. If the unit should get wet and rust spots appear, the spots can be sanded with plain steel wool and repainted. We recommend this paint, as others may not adhere to the surface or withstand the high temperatures.

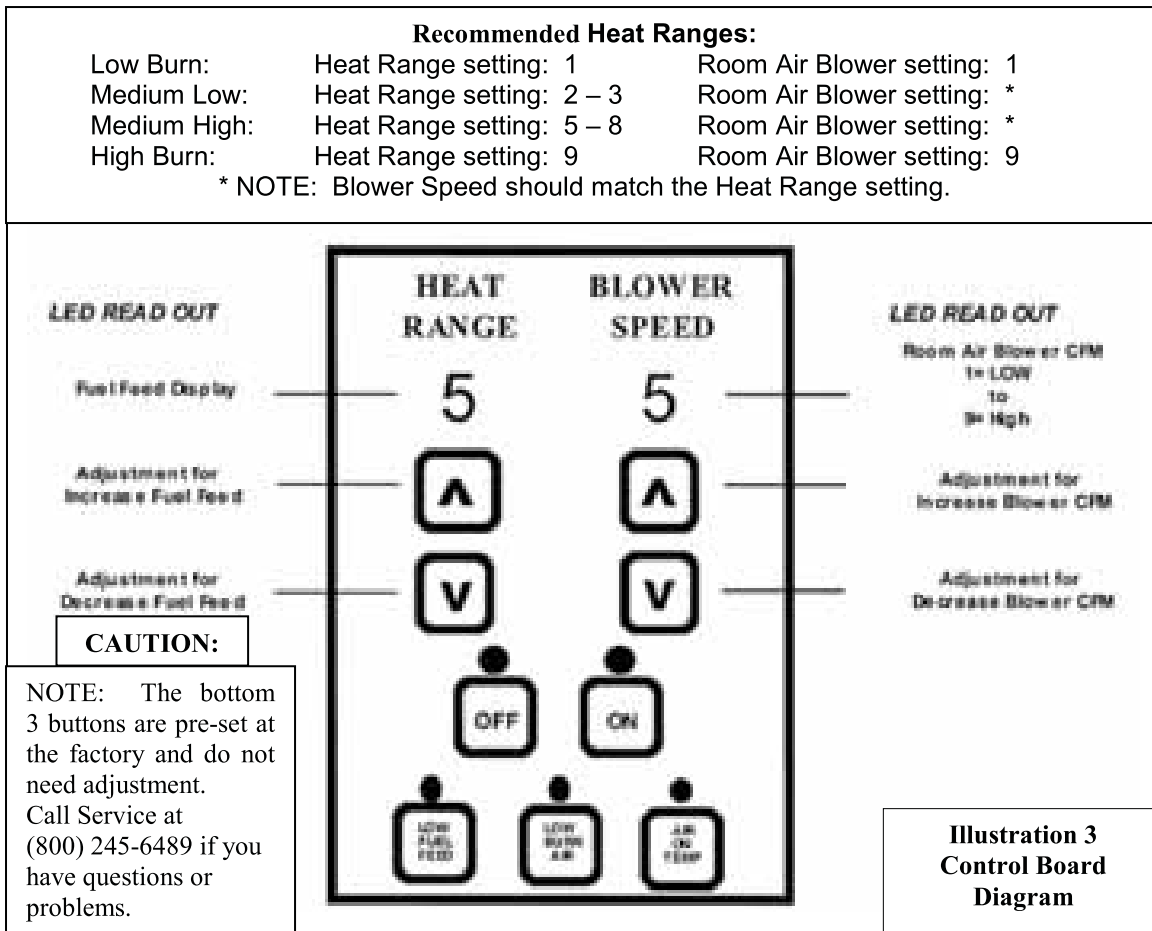
Glass

This unit has a 9" x 9" ceramic glass (Part # **AC-G9**, comes with gasket) in the viewing door. Surface scratches are acceptable and normal, but if this glass becomes cracked in any area, the unit should be shut down and the window replaced with this high-temperature ceramic glass.

Control Board

The Control Board (Part # **PU-CB20**) is a digital read-out board. This board offers a wide variety of settings to operate the unit. This part can be removed from the unit by loosening the two outside screws and pulling the board back to the inside of the stove. The rear access panel should be removed prior to removing the control board. A 6-amp “quick-blow” fuse (Part # **PU-CBF6**) is used on this Control Board.

NOTE: The bottom three control buttons are preset at the factory and should *not* require any changes. See “Operating Instructions” and “Daily Operation” section of the manual for instructions on other Control Board settings.

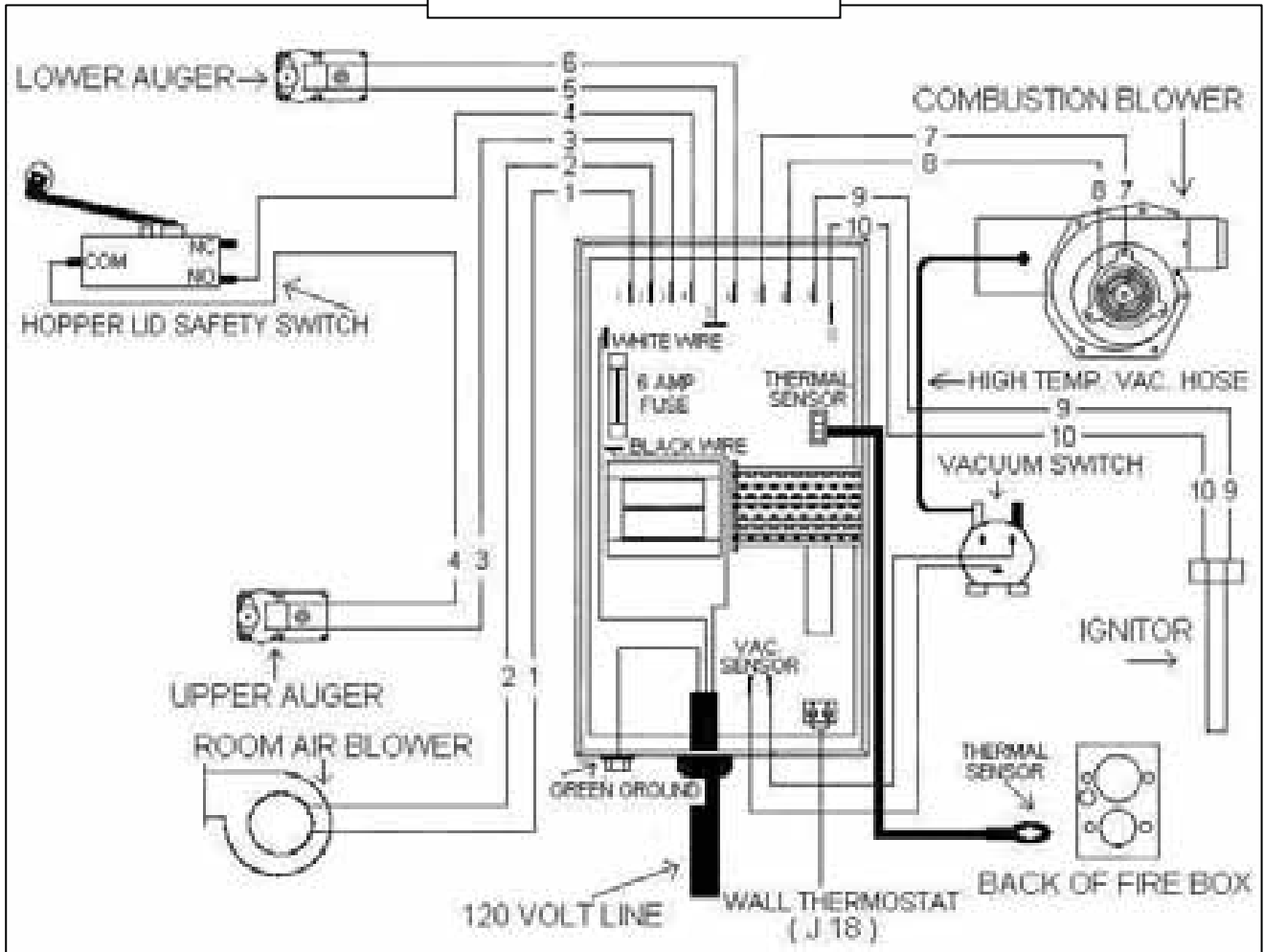


Caution

Should you see any evidence of smoke in the hopper (smoke back), immediately close and latch the hopper lid and door to the unit. Open the nearest windows and door to the outside, then press the OFF button and let the unit cool for at least 3 hours. Do not open the door or hopper lid. This is a maintenance problem that needs to be addressed.

Call Technical Support at (800) 245-6489

**Illustration 4 PU-CB20
Control Board Wiring Diagram**



CAUTION: Moving Parts May Cause Injury.
Do NOT Operate with Panel(s) Off.
DANGER: Parts May Be Hot. Risk of Electric Shock.
Disconnect Power Before Servicing Unit.

IMPORTANT SAFETY NOTE: If the unit or chimney connector pipe “glows” red (or white), the stove is over-fired. This condition could cause a house or chimney fire. Do not operate your unit too hot, or over-firing may result.

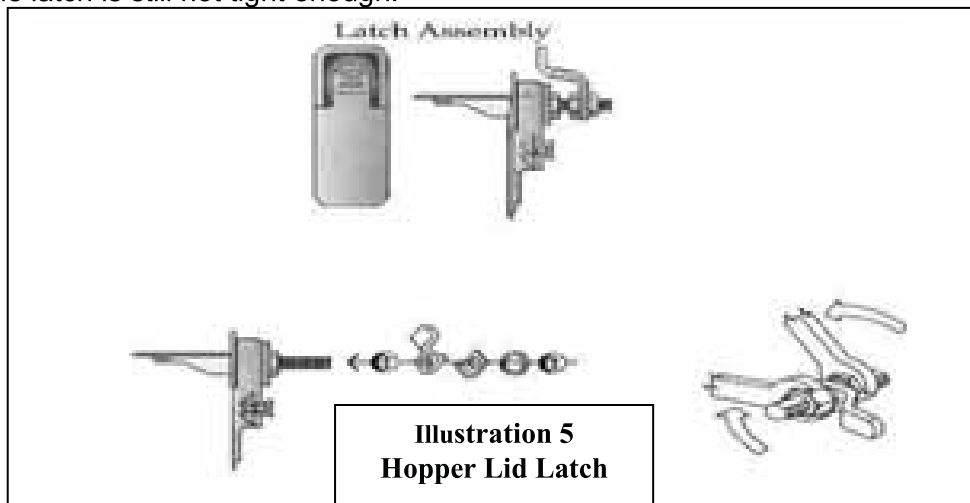
Adjusting Hopper Lid Latches

The seals around the top of the pellet hopper are important to safe and efficient operation of the unit. The latches installed on these units are designed to pull the hopper lid tight against this seal. Over the course of operation as these seals “wear in” and compress, the tension of the latches should be tested periodically, and adjusted if necessary.

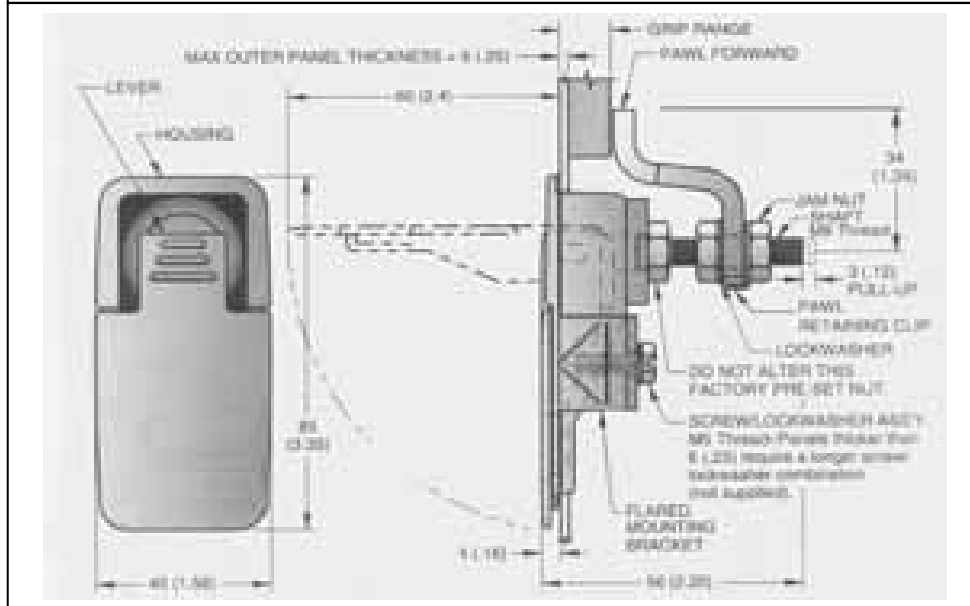
To adjust the lid latches, the following tools will be needed; two ½ inch wrenches, or a ½ inch wrench and a ½ inch socket.

In order to adjust the latch, first (with the unit unplugged and cooled down) open the hopper lid and then lock the latch in its closed position. Then take the ½ inch wrench and loosen the nut closest to the latch. This nut is then adjusted closer to the lid itself to tighten the latch. After adjusting this nut to the desired location, hold this nut in place with the ½ inch wrench, then tighten down the holding nut on the end of the latch shaft with the ½ inch socket or second wrench to hold the latching assembly in place.

After tightening the latches, test the latches for proper tension by locking the lid down and lifting each front corner of the lid. The lid should be firmly held down by the latches. Repeat the same procedure if the latch is still not tight enough.



Important: Hopper Lid Latches must be checked periodically and kept tight so the top is sealed to prevent back-burn.



IMPORTANT! READ AND FOLLOW ALL INSTALLATION AND MAINTENANCE INSTRUCTIONS, INCLUDING CLEANING THE UNIT AS SPECIFIED, AND REPLACING GASKETS ANNUALLY, AND PARTS AS NEEDED. ENGLAND'S STOVE WORKS IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY INCURRED DUE TO NEGLIGENCE, OR DUE TO UNSAFE INSTALLATION OR USAGE OF THIS PRODUCT. CALL TECHNICAL SUPPORT WITH ANY QUESTIONS.

ACCESSORY ITEMS

The following accessories can be added to your unit at anytime after purchase; however, let the unit cool down before adding any accessories.

Thermostat

An external wall thermostat (such as our Part # PU-DTSTAT) can be used on our pellet units, as long as it is a low-voltage type that works with millivolt systems. After unplugging the unit, locate the jumper wire (J-18) on the bottom of the control panel. The two screws should then be loosened and the jumper wire removed from the board. Next, the two thermostat lead wires should be slipped into these openings and the screws tightened; the jumper wire should be saved for future operation without a thermostat.

The unit will operate differently once the wall thermostat is connected – we recommend the Control Board be set at “9” on Heat Range and Blower Speed while using the thermostat. Refer to the section on “Start-up Procedure” for information on cold starts.

AC-103, AC-103BN Lip Trim

There is one piece of J-Channel trim in this kit that snaps onto the ash apron lip of the stove. Match the channel with the correct edge of the ash apron, then remove the protective covering from the trim and force the piece onto the edge. Although it should stay in place, stove cement can be used to secure it if necessary.

AC-106-P, AC-106-PBN Window Trim

Window trim can be attached by using the provided spring clip(s) and some high temperature silicone (optional). Insert the tee end of the spring clip into the channel on the edge of the trim – then, turn the clip and set the other end of the clip into the channel. The spring clip will hold well if it is placed on the top edge of the trim before placing the trim in the window of the stove. Place the top edge with the clip into the window opening, then push the bottom edge of the trim flush with the window. We also suggest that high temperature silicone be used on the corners, to ensure the trim will stay in place.

Accessories can be ordered from the factory at:

(Parts orders ONLY) -- (800) 516-3636, or on our web site: www.HeatRedefined.com.

Questions/Problems: Please call Technical Support at (800) 245-6489.

You may also order parts and options, view frequently asked questions and more,
on our web site: www.HeatRedefined.com

REPLACEMENT PARTS, ACCESSORIES AND OPTIONS

AC-GGK	Glass Gasket Kit (gasket only, no glass)
AC-DGKC	Door Gasket Kit (#2 on diagram)
AC-G9	9" x 9" Glass <i>with</i> Gasket (#3 on diagram)
AC-SH	Brass Door Spring Handle
AC-SHN	Nickel Door Spring Handle
AC-MBSP	Hi-Temperature Black Paint
PU-AMS	Auger Motor Support Gasket
PU-047040	1 RPM Auger Motor Assembly (#18 on diagram)
PU-BP98	Burn Pot Assembly (#'s 5 and 11 on diagram, call if you need only one part of this 2-piece assembly)
PU-076002B	Combustion (Exhaust) Blower (includes 3" adapter) (#'s 8 and 9 on diagram)
PU-4C442	Convection (Room Air) Blower (#13 on diagram)
PU-AF6T	Top Auger Shaft (#14 on diagram)
PU-AF11B	Bottom Auger Shaft (#14 on diagram)
PU-62-40-151-3	Hopper Lid Latch (2002 and later Models; for earlier models order PU-103-50) (#25 on diagram)
PU-UCF204-12	Auger Bearing (#16 on diagram)
PU-2X570	$\frac{3}{4}$ " Locking Collar (#17 on diagram)
PU-CB20	Digital Control Board (#12 on diagram)
CU-VS	Second Vacuum Switch (See wiring diagram pg. 19)
PU-CBMG	Combustion Blower and Motor Gasket (#10 on diagram)
PU-BPG	Burn Pot Gasket (#6 on diagram)
PU-ABGN	Auger Bearing Gasket (#15 on diagram)
PU-HLG	Hopper Lid Gasket (#22 on diagram)
PU-CHA	Cartridge Heater (Igniter) Assembly (#27 on diagram)
PU-CBF6	6 AMP Control Board Fuse
AC-HLSB	Hopper Lid Safety Switch (See wiring diagram pg. 19, 09/2008 and later only)
AC-HP	Hinge Pin rivet for cast door (not shown)

OPTIONS:

PU-OAK	Outside Air Kit
AC-3000	3" Pellet Vent Kit (Through-the-Wall)
AC-3100	4" Pellet Vent Kit (For High Altitudes – 4000+ ft.)
PU-DTSTAT	Wall Thermostat
AC-103	Brass Lip Trim for Ash Apron
AC-103BN	Brushed Nickel Lip Trim for Ash Apron
AC-106-P	Brass Window Trim
AC-106-PBN	Brushed Nickel Window Trim

If you have any questions or problems contact the Technical Support Department:

Technical Support Department
P.O. Box 206
Monroe, VA 24574

service@englanderstoves.com

Parts Orders ONLY: 800-516-3636

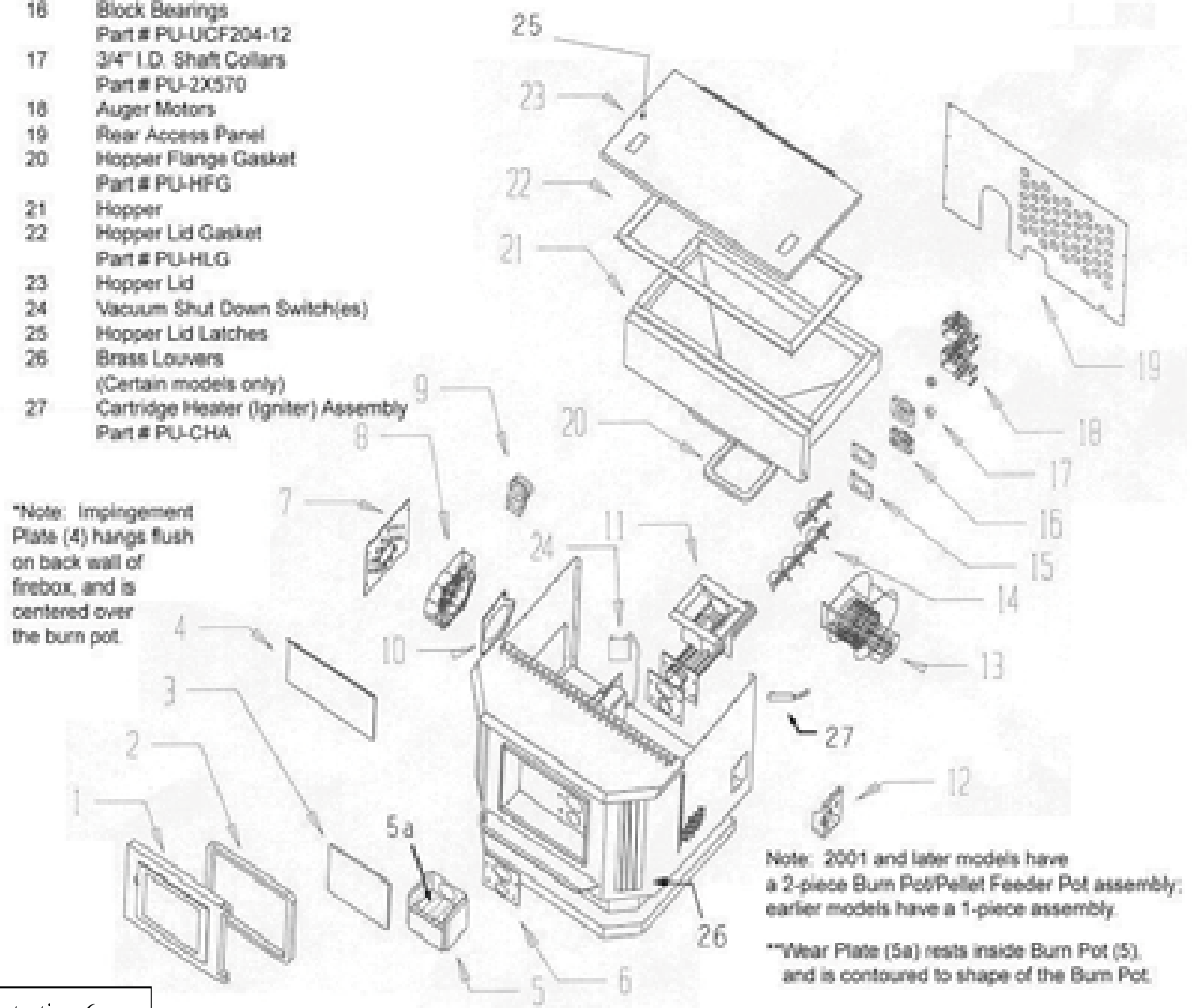
Questions: 800-245-6489 (Fax: 434-929-4810)

You may also order parts and options, view frequently asked questions and more,
on our web site: www.HeatRedefined.com

Pellet Stove – Exploded View Diagram

NUMBER	PART DESCRIPTION
1	Door (Part # CA-19A)
2	Door Gasket (Part # AC-DGKC)
3	Glass with Gasket (Part # AC-G9)
4	Impingement Plate*
5	Burn Pot
5a	Wear Plate for Burn Pot**
6	Burn Pot Gasket
7	Side Access Panel
8	Combustion Blower
9	3" Blower Adapter
10	Gasket for Combustion Blower Part # PU-CBG
11	Pellet Feeder Pot
12	Digital Control Board
13	Convection Blower
14	Augers: (Top Auger and Bottom Auger)
15	Block Bearing Gaskets
16	Block Bearings Part # PU-UCF204-12
17	3/4" I.D. Shaft Collars Part # PU-2X570
18	Auger Motors
19	Rear Access Panel
20	Hopper Flange Gasket Part # PU-HFG
21	Hopper
22	Hopper Lid Gasket Part # PU-HLG
23	Hopper Lid
24	Vacuum Shut Down Switch(es)
25	Hopper Lid Latches
26	Brass Louvers (Certain models only)
27	Cartridge Heater (Igniter) Assembly Part # PU-CHA

NOTE ON PART NUMBERS:
 This diagram is a basic England's Stove Works pellet unit diagram. Your model may vary somewhat. See our online store at www.englishstoves.com or the parts list in your manual for specific part numbers for your model stove. If a part is not listed in the manual or on the website, or if you have questions, call (800) 245-6489.



*Note: Impingement Plate (4) hangs flush on back wall of firebox, and is centered over the burn pot.

Note: 2001 and later models have a 2-piece Burn Pot/Pellet Feeder Pot assembly; earlier models have a 1-piece assembly.
 **Wear Plate (5a) rests inside Burn Pot (5), and is contoured to shape of the Burn Pot.

Illustration 6

Unit Dimensions: 22 5/8" W x 28 1/4" H x 24" D Unit Weight: 290 lbs.
(Approx. 13 1/2" height from floor to center of exhaust)

26
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TROUBLE-SHOOTING GUIDE

WARNING: TO AVOID ELECTRICAL SHOCK ALWAYS *DISCONNECT* THE UNIT FROM THE POWER SOURCE BEFORE ATTEMPTING ANY REPAIR. IF THIS GUIDE DOES NOT CORRECT THE PROBLEM CALL YOUR LOCAL DEALER OR OUR TECHNICAL SUPPORT AT 1-800-245-6489.

<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
1. Auger not turning	<ol style="list-style-type: none"> 1. Loose set screw 2. Bad gear motor 3. Foreign matter in auger 4. Vacuum sensor (Top Auger) 5. Carbon buildup in feed auger tube 	<ol style="list-style-type: none"> 1. Tighten setscrew on collar 2. Replace auger motor 3. Remove pellets and object 4. Check exhaust blower 5. Remove carbon by scraping
2. Smoke smell or dust in house	<ol style="list-style-type: none"> 1. Improper exhaust connection 	<ol style="list-style-type: none"> 1. Check all connections for leaks, especially the exhaust blower connection; Seal with silicone, hose clamp or aluminum tape
3. Room air blower not operating	<ol style="list-style-type: none"> 1. Loose sensor 2. High "ON" temperature 	<ol style="list-style-type: none"> 1. Tighten connection on sensor 2. Adjust temperature lower
4. Exhaust blower not operating (E-1 on Control Board)	<ol style="list-style-type: none"> 1. Loose connection 2. Bad blower 3. Bad vacuum sensor 	<ol style="list-style-type: none"> 1. Check connection at c/board 2. Replace blower 3. Replace vacuum sensor
5. Lazy fire	<ol style="list-style-type: none"> 1. Control board settings 2. Bad exhaust blower 3. Excessive pellet moisture 4. Excessive ash 5. Low quality pellets 	<ol style="list-style-type: none"> 1. Review board settings 2. Replace blower 3. Keep pellets inside 4. Remove baffles; Clean unit 5. Use premium pellets
6. Blown fuse (6 AMP)	<ol style="list-style-type: none"> 1. Power surge 2. Exposed wire 3. Electric motor shorting or bound up 	<ol style="list-style-type: none"> 1. Replace fuse; use surge protector 2. Check for exposed or frayed wire and loose connections 3. Check motors and blowers for obstructions or lock-up
7. High pellet consumption	<ol style="list-style-type: none"> 1. Low quality pellets 2. Board out of adjustment 	<ol style="list-style-type: none"> 1. Use premium fuel 2. Check c/board settings
8. Squeaking noise	<ol style="list-style-type: none"> 1. Build up in tube 2. Improper auger alignment 	<ol style="list-style-type: none"> 1. Remove auger and clean 2. Re-align auger
9. Pinging or rattling noise	<ol style="list-style-type: none"> 1. Foreign material 2. Loose set screw 	<ol style="list-style-type: none"> 1. Check blower for material 2. Check impeller blower screw
10. Unit shuts down in 20 to 30 minutes (E-2 on Control Board)	<ol style="list-style-type: none"> 1. Loose heat sensor 2. Control board settings 3. Failure to start (E-2) 	<ol style="list-style-type: none"> 1. Check stove connection 2. Check settings; always start unit on "5" to "9" setting 3. Check igniter for buildup
11. Unit keeps shutting down ("E" codes on control board)	<ol style="list-style-type: none"> 1. Blocked flue (E-1) 2. Blower failure (E-3) 3. Improper installation* (E-1) 	<ol style="list-style-type: none"> 1. Check for flue blockage (nests, rodents, excess soot, etc.) 2. Check combustion blower wires, then call Technical Support. 3. Check for loose flue/pipe connections. Also be sure to have proper Outside Air hook-up.

*Improper installation may cause a back draft.

***NOTE: Also check for loose or cracked vacuum hose on vacuum switches (see #24 in Illustration 6).**



Model 25-PDVC 55-SHP10 55-TRP10
 25-PDVCH 55-SHP10L

Pellet Fuel Room Heater; Free Standing Model Also For Use In Mobile Homes
 Certified to UL 1482-11 / ASTM E 1509-12 / ULC S627-00
 EPA Test Method ASTM 2779-10

W/N# XXXXX

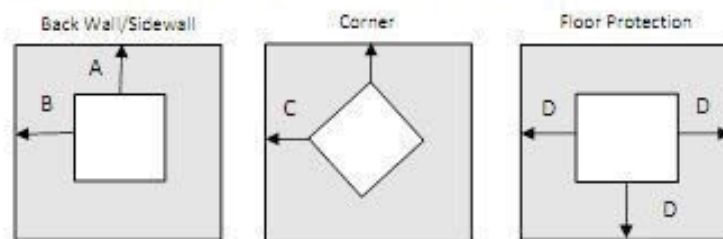
Manufactured by:
 England's Stove Works, Inc.
 589 S. Five Forks Rd.
 Monroe, VA 24574

Manufacture Date	
Serial Number	

PREVENT HOUSE FIRES

- Install and Use Only in Accordance with the Owner's Manual Provided with This Appliance.
- Contact Local Building or Fire Officials about Restrictions and Installation Inspections in Your Area.
- For Use with Wood Pellet Fuel Only, 3/8 inch in Diameter.
- Do Not Connect This Unit to a Chimney Flue Serving Another Appliance.
- Keep Viewing and Ash Removal Doors Tightly Closed During Operation.
- Input Rating – 4.0 lbs/hr
- Emission value – 1.43 grams/hr
- U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards using pellet fuel.
- U.S. Test Standard: US EPA 40 CFR Part 60, Subpart 60.536
- Use only Approved type L or P Pellet Vent Pipe.
- Inspect and Clean Exhaust Venting System Frequently.

FREESTANDING INSTALLATION REQUIREMENTS – Refer to local codes and the chimney manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling. Place on non-combustible floor protection, which extends 6-inches to the front and 6-inches on each side of the fuel opening. See owner's manual for additional clearance information.



A = 3 inches (76.2mm) B = 6 inches (152.4mm)
 C = 6 inches (152.4mm) D = 6 inches (152.4mm)

ELECTRICAL RATING: 6.0 A, 115 V, 60 HZ. ROUTE THE POWER CORD SO THAT IT DOES NOT COME INTO CONTACT WITH ANY HOT SURFACES ON THE UNIT AND DOES NOT CROSS IN FRONT OF THE UNIT.

Refer to Intertek's Directory of Building Products (<https://bpdirectory.intertek.com>) for detailed information.

CAUTION – Moving Parts May Cause Injury. Do Not Operate Unit With Panels Removed.

CAUTION – Hot Parts. Do Not Operate Unit with Panels Removed.

DANGER – Risk of Electric Shock. Disconnect Power Before Servicing Unit.

CAUTION – 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.

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.



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

IMPORTANT! READ AND FOLLOW ALL INSTALLATION AND MAINTENANCE INSTRUCTIONS, INCLUDING CLEANING THE UNIT AS SPECIFIED, AND REPLACING GASKETS ANNUALLY, AND PARTS AS NEEDED. ENGLAND'S STOVE WORKS IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY INCURRED DUE TO NEGLIGENCE, OR DUE TO UNSAFE INSTALLATION OR USAGE OF THIS PRODUCT. CALL TECHNICAL SUPPORT WITH ANY QUESTIONS.

You may write your unit's Manufacture Date and Serial Number in the blank spaces on this sample tag, for future reference. This sample tag also shows the safety info. such as UL/ULC testing standard, etc. for your local officials, or anyone else who may need reference

Have this information on hand if you phone the factory or your dealer regarding this product.

Retain for your files:

Model Number _____

Date of Purchase _____

Date of Manufacture _____ Serial # _____

LIMITED 5 YEAR WARRANTY **FROM THE DATE OF PURCHASE TO THE ORIGINAL OWNER**

The manufacturer extends the following warranties:

Five Year Period:

1. Carbon steel and welded seams in the firebox are covered for 5 years against splitting.
2. The cast iron door and hinges are covered for 5 years against cracking.

One Year Period:

3. Component parts such as the hopper, auger burn pot, baffle plate, auger shafts, auger bearings, and fasteners are covered for 1 year against cracking, breakage and welded seams from separating.
4. Electrical components, accessory items, glass and the painted surface are covered for 1 year from the date of purchase.

Conditions and Exclusions:

Damage from over-firing will void your warranty.

This warranty does not apply if damage occurs because of an accident, improper handling, improper installation, improper operation, abuse, or unauthorized repair made or attempted to be made.

The manufacturer is not liable for indirect, incidental, or consequential damages in connection with the product including any cost or expense providing substitute equipment or service during periods of malfunction or nonuse.

All liability for any consequential damage for breach of any written or implied warranty is disclaimed and excluded. Some states do not allow the exclusion or limitations of incidental or consequential damages, so the above may not apply to you.

Procedure:

Purchaser must give notice of claim of defect within the warranty period and pay transportation to and from a service center designated by the factory. The dealer from which the unit was purchased or the factory, at our option, will perform the warranty service.

Other Rights:

This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state.

NOTE: THIS WARRANTY IS NULL AND VOID IF YOU DO NOT RETURN THE ATTACHED WARRANTY REGISTRATION WITH A COPY OF THE SALES RECEIPT WITHIN 30 DAYS FROM THE DATE OF PURCHASE.

WARRANTY IS NOT TRANSFERABLE

WARRANTY REGISTRATION for England's Stove Works

Purchased by (Name) _____

Address _____

City _____ State _____ Zip _____

Telephone _____

Email Address _____

DEALER INFORMATION

Purchased From (Dealer) _____

Address _____

City _____ State _____ Zip _____

UNIT INFORMATION

(Please be sure to refer to sticker on back of manual or box to complete this section)

Model Number _____ Purchase Date _____

Purchase Price _____

Serial Number _____ Mfg. Date _____

How did you first hear about our product? (please check one)

Word of Mouth Burn Trailer Demonstration Internet

Other: _____

Where did you receive information about our product? (please check one)

Rec'd. info. via phone Dealer (Name of dealer): _____

Internet Other: _____

IMPORTANT NOTICE

**THIS REGISTRATION INFORMATION MUST BE ON FILE FOR THIS WARRANTY TO BE VALID.
PLEASE MAIL THIS INFORMATION WITHIN THIRTY (30) DAYS FROM THE DATE OF PURCHASE.**

Mail To:

England's Stove Works, Inc.
Technical Support Department
P.O. Box 206
Monroe, VA 24574

Or, Fax To:

(434) 929-4810 – 24 hours a day

Or, now available – Go online to complete your Warranty Registration!

Visit www.HeatRedefined.com if you prefer to register online.

PLEASE NOTE:

PELLET - Meets the 2015 U.S. Environmental Protection Agency's wood emission limits for wood heaters sold after May 15, 2015

EPA INFORMATION

The following additions to your owner's manual will enable you to achieve optimal emissions performance from your stove. Important safety tips are also included.

- *Proper Installation* – Please refer to the Installation section of your owner's manual and follow the guidelines listed therein for safety and for optimal emissions performance.

Additional information:

Venting:

Be sure to follow your owner's manual's recommendation for venting, including the proper types of flue systems and pellet vent pipe.

Also note that Outside Air Connection (combustion air) is MANDATORY for proper safe operation, and to achieve optimal emissions performance.

Observe the vent termination clearances specified in your owner's manual, and contact our Technical Support if you have any questions. Phone (800) 245-6489 or email service@englanderstoves.com.

Be certain that all aspects of the venting system are installed to the venting manufacturer's instructions, particularly the required clearances to combustibles.

Your pellet stove operates on a negative draft system, which pulls combustion air through the burn pot and pushes the exhaust air through the vent pipe and out of the building. This unit must be installed in accordance with your owner's manual's detailed descriptions of venting techniques; not installing the stove in accordance with the details listed can result in poor stove performance (including poor emissions), property damage, bodily injury or death. England's Stove Works is not responsible for any damage incurred due to a poor or unsafe installation.

Additional Venting Information

- Do not mix and match components from different pipe manufacturers when assembling your venting system (i.e. Do **NOT** use venting pipe from one manufacturer and a thimble from another).
- We **require** a minimum vertical rise of 36 in. (3 ft.) of pipe to create natural draft in the system, which helps evacuate smoke from the stove in the event of a power failure or combustion blower failure.
- Venting systems 15.0 ft. or shorter may be composed entirely of 3.0 in. pellet pipe; to reduce frictional losses, venting systems longer than 15.0 ft. should be composed of 4.0 in. pellet pipe.
- Do not terminate the venting system directly beneath any combustible structure such as a porch or deck.
- Follow NFPA 211 rules listed below for venting system termination location relative to windows and other openings in the dwelling.
 - NFPA 211 (2006 ed.) Section 10.4 Termination: 10.4.5
 - (1) The exit terminal of a mechanical draft system other than direct vent appliances (sealed combustion system appliances) shall be located in accordance with the following:
 - (a) Not less than 3 ft. (.91 m) above any forced air inlet located within 10 ft. (3.0m).
 - (b) Not less than 4 ft. (1.2 m) below, 4 ft. (1.2 m) horizontally from or 1 ft. (305 mm) above any door, window or gravity air inlet into any building.
 - (c) Not less than 2 ft. (0.61 m) from an adjacent building and not less than 7 ft. (2.1 m) above grade when located adjacent to public walkways.
- Distance between the termination opening and grade should be a minimum of 2 ft. (24 in.) contingent on the grade surface below the termination. When determining the termination height above grade, consider snow drift lines and combustibles such as grass or leaf accumulation. In areas where significant snowfall is possible, the termination height must be sufficiently high to keep the termination free of snow accumulation.
- Do not use makeshift compromises during installation or install any component of the unit or venting system in such a manner that could result in a hazardous installation.
- A chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling.
- Where passage through a wall or partition of combustible material is desired, the installation shall conform to CAN/CSA-B365.

WARNING:

Venting system surfaces get HOT, and can cause burns if touched. Noncombustible shielding or guards may be required.

OUTSIDE AIR HOOK-UP

- The use of outside combustion air is **mandatory** on this pellet stove.
 - The outside air connection pipe protrudes from the lower rear center of the stove; use the included outside air kit to attach your stove to outside combustion air. Instructions and all the parts needed to make the outside air connection to your pellet stove are included with the outside air kit.
 - If it is not feasible to use the included outside air hookup kit in your stove installation, other materials may be used, provided the following rules are followed:
 - The pipe used for outside air hookup must be metal, with a minimum thickness of .0209 in. (25 gauge mild steel) or greater and an inside diameter of approximately 2.0 in.
 - All pipe joints and connections should be sealed with pipe clamps or other mechanical means, to insure a leak free outside air connection.
 - Long runs of pipe and excessive elbows for outside air should be avoided. Due to frictional resistance in pipe, any excessive outside air piping can result in poor stove performance.
 - A screen or other protection device must be fitted over the outside air termination point to prevent rain, debris and nuisance animals from entering the piping system.
 - Increase the outside air pipe size to 3.0 in. diameter pipe if the outside air connection is more than 6 ft. in length, more than two (2) elbows are used or if the stove is installed in a basement.
 - The outside air connection system should be inspected at least annually to be certain it is free from blockage.
- *Operation and Maintenance* – Please refer to the ‘Operation’ (Operating Instructions) and Maintenance (including Ash Removal/Disposal) sections of your owner’s manual and follow the guidelines listed therein for safety *and* for optimal emissions performance.

Additional Information:

Following the instructions in your owner’s manual for Start-Up (lighting a fire) will ensure a proper fire, as well as helping minimize visible emissions.

More:

- *Fuel loading and re-loading:* Practical Tips for Building a Fire – See your owner’s manual for information on loading (and re-loading) your fuel, as well as for fire-starting procedures.
- *Fuel Selection:* Once your appliance is properly installed, be sure to follow your owner’s manual regarding fuel selection and starting and operating your appliance, including the following practical tips that will help you obtain the best efficiency from your stove.

Daily Operation Notes

- Only high quality, ¼" (.25 in.) diameter wood pellets, should be used in this stove. Using low grade wood pellets with high ash content OR wood pellets with a high moisture content can cause the burn pot to fill with ash at a more rapid pace and can cause intervals between periodic maintenance to become significantly shorter. Please read the "Maintenance" section of this manual thoroughly to understand how fuel selection affects stove operation, maintenance and cleaning.
- Variation in the flame height is normal; not all wood pellet fuel is uniform in size, which can affect the way pellets are fed into the burn pot. Although the flame height may increase and decrease during operation, there is no loss of efficiency.
- Always store wood pellet fuel in a dry location; storing wood pellet fuel in a dry location ensures the fuel will remain pelletized and low in moisture content. Also, be certain that all wood pellet fuel is stored at a safe distance from the pellet heater; storing fuel in close proximity to the stove can result in a fire.

This pellet burning room heater is equipped with a specially designed burn pot which comes preinstalled from the factory. This burn pot elevates the burning pellets and delivers air at the precisely-required locations. Pellets must only be burned in the factory burn pot; no modifications should be made to this burn pot and no additional grates or other fire elevators should be used.

- **WHAT FUELS NOT TO USE:**

CAUTION

- **NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IN USE. ADDITIONALLY, NEVER APPLY FIRE-STARTER TO ANY HOT SURFACE OR EMBERS IN THE STOVE. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.**
- **DO NOT BURN FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**
- **DO NOT BURN GARBAGE; LAWN CLIPPINGS OR YARD WASTE; MATERIALS CONTAINING RUBBER, INCLUDING TIRES; MATERIALS CONTAINING PLASTIC; WASTE PETROLEUM PRODUCTS, PAINT OR PAINT THINNERS, OR ASPHALT PRODUCTS; MATERIALS CONTAINING ASBESTOS; CONSTRUCTION OR DEMOLITION DEBRIS; RAILROAD TIES OR PRESSURE-TREATED WOOD; MANURE OR ANIMAL REMAINS; SALT WATER DRIFTWOOD OR OTHER PREVIOUSLY SALT WATER SATURATED MATERIALS; UNSEASONED WOOD; PAPER PRODUCTS, CARDBOARD, PLYWOOD OR PARTICLEBOARD. THE PROHIBITION AGAINST BURNING THESE MATERIALS DOES NOT PROHIBIT THE USE OF FIRESTARTERS MADE FROM PAPER, CARDBOARD, SAWDUST, WAX AND SIMILAR SUBSTANCES FOR THE PURPOSE OF STARTING A FIRE IN AN AFFECTED WOOD HEATER. BURNING THESE MATERIALS MAY RESULT IN RELEASE OF TOXIC FUMES OR RENDER THE HEATER INEFFECTIVE AND CAUSE SMOKE.**

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IMPORTANT! READ AND FOLLOW ALL INSTALLATION AND MAINTENANCE INSTRUCTIONS, INCLUDING CLEANING THE UNIT AS SPECIFIED, AND REPLACING GASKETS ANNUALLY, AND PARTS AS NEEDED. ENGLAND'S STOVE WORKS IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY INCURRED DUE TO NEGLIGENCE, OR DUE TO UNSAFE INSTALLATION OR USAGE OF THIS PRODUCT. CALL TECHNICAL SUPPORT WITH ANY QUESTIONS.

Air Controls: Your pellet stove is equipped with a control board that automatically adjusts the air to fuel ratio for optimum emissions. See your owner's manual for information on operating the control board, and for other operational information on achieving the best burn, including these tips:

The control board on this stove allows the user to adjust the heat output and convection blower speed, and turn the unit on and off.

- The lower buttons on the control board (Low Fuel Feed, Low Burn Air, and Air on Temp) are not meant to be adjusted during normal operation of the unit. These buttons are factory preset and should not be adjusted by the user.
- To energize the unit and initiate a fire, press the "On" button. The LED above the button should turn green and the control board should display "S U" shortly after pressing the button.
- To shut the unit down, press the "Off" button. The LED above the button should turn red and the board should display "S d" shortly after pressing the button. This initiates the shut down sequence, and the stove will remain in shut down mode until it has cooled down.
- To increase the heat output of the stove, press the "Up" heat range button. The number in the heat range display window will increase, signifying that the control board is now adjusting the heat output to your desired level. The blower speed will increase the same amount as the heat range, because the stove is designed to operate with the blower speed greater than or equal to the heat range. Pressing the "Down" arrow will decrease the heat range and blower speed.
- To increase the blower speed without increasing the heat range, press the Blower Speed "Up" arrow until the desired blower speed is shown in the display window. Pressing the "Down" arrow will decrease the blower speed; however, the control board will not allow the blower speed to be set lower than the heat range.

Caution

This unit is meant to operate only with the ash pan and main viewing door closed. Smoke spillage and an inefficient, lazy burn will result from attempting to operate the stove with either door open.

In addition, using fuel other than wood pellets can create an unsafe situation and can also generate excess carbon monoxide. Carbon monoxide is an odorless, colorless gas which can be deadly. Be sure to burn only wood pellets.

The use of a carbon monoxide detector is strongly recommended.

- *ASH REMOVAL* – Follow your Owner’s manual’s instructions regarding removal and disposal of ashes. Also be sure to follow ALL Maintenance requirements as listed.
- *REPLACEMENT of parts that are critical to emissions performance* – Follow your Owner’s manual’s instructions regarding replacement of gaskets and other parts that are critical to emissions performance.

Remember: “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.”

- **Smoke Detectors**

England’s Stove Works, Inc. highly recommends the use of smoke detectors in every room of the house. However, locating a smoke detector directly above this unit can result in nuisance alarms.

- *Compliance:* “This non-catalytic wood heater meets the 2015 U.S. Environmental Protection Agency’s wood emission limits for wood heaters sold after May 15, 2015.”
- *Tamper Warning:* “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.”
- *Warranty:* See your Owner’s manual for a Warranty Registration instruction page, as well as instructions for warranty procedures. For parts, warranty replacement procedures may be found at our parts store site: www.store.heatredefined.com

Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number:

ID Number: 001414



Description: MASS FLOW METER
Manufacturer: SIERRA
Model Number: M5GL-AL-DD-2-PV2-V1-5PC
Serial Number: 189157
Technician: SEAN LEWIS

Calibration Date: 01/18/2019
Calibration Due: 07/18/2019
Procedure: TB 9-6580-293-40
Rev: 2/20/2013

Temperature: 71 F
Humidity: 39 % RH

As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:
Comments:

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCSL Z540-1:1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2017 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

This certificate shall not be reproduced, except in full, without the written permission of Technical Maintenance, Inc.

Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
FL2146	FLUKE	MOLBOX1-A700-A	7/3/2018	7/3/2020
FL6426	DH INSTRUMENTS	1E4-VCR-V-Q	3/8/2018	3/8/2020



Technical Maintenance, Inc.

12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637

Phone: 813-978-3054 Fax 813-978-3758

www.tmicalibration.com



AC-2080

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit	ADUFAS
Flow Accuracy	0.000	-0.300	0.300	0.000	0.000	± 0.83 mL/min	slm	
Flow Accuracy	2.000	1.700	2.300	2.000	2.000	± 5.8 mL/min	slm	
Flow Accuracy	4.000	3.700	4.300	3.988	3.988	± 12 mL/min	slm	
Flow Accuracy	6.000	5.700	6.300	5.988	5.988	± 17 mL/min	slm	
Flow Accuracy	8.000	7.700	8.300	7.930	7.930	± 23 mL/min	slm	
Flow Accuracy	10.000	9.700	10.300	9.930	9.930	± 30 mL/min	slm	



Technical Maintenance, Inc.

12530 TELECOM DRIVE, TEMPLE TERRACE, FL 33637

Phone: 813-978-3054 Fax: 813-978-3758

www.tmicalibration.com



AC-3080

Certificate of Calibration

Customer: INTERTEK MIDDLETON
8431 MURPHY DR.
MIDDLETON, WI, 53562
608-824-7422

P.O. Number: C/C

ID Number: 001413



Description: MASS FLOW METER
Manufacturer: SIERRA
Model Number: M50L-AL-DD-2-PV2-V1-5PC
Serial Number: 189158
Technician: JEFF BAHMANN

Calibration Date: 08/08/2018
Calibration Due: 02/08/2019
Procedure: TB 9-0680-293-40
Rev: 4/28/2011
Temperature: 70 F
Humidity: 53 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

On-Site Calibration:
Comments:

Limiting Attribute: _____

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2005 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration is within the current Scope of Accreditation and complies with the requirements of ISO/IEC 17025:2005 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

This certificate shall not be reproduced, except in full, without the written permission of Technical Maintenance, Inc.

Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

FRANK BAHMANN, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

Asset Number	Manufacturer	Model Number	Date Calibrated	Cal Due
FL2148	FLUKE	MOLBOX1+A700-A	7/3/2018	7/3/2020
FL6426	DH INSTRUMENTS	1E4-VCR-V-Q	3/8/2018	3/8/2020



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Phone: 813-978-3054 Fax 813-978-3758

www.tmicalibration.com



AC-2080

Certificate of Calibration

Data Sheet

Parameter	Nominal	Minimum	Maximum	As Found	As Left	Uncertainty	Unit	ADJ/FAL
Flow Accuracy	0.000	-0.300	0.300	0.000	0.000	0.6 mL/min	slm	
Flow Accuracy	2.000	1.700	2.300	1.998	1.998	5.8 mL/min	slm	
Flow Accuracy	4.000	3.700	4.300	3.999	3.998	12 mL/min	slm	
Flow Accuracy	6.000	5.700	6.300	5.992	5.992	17 mL/min	slm	
Flow Accuracy	8.000	7.700	8.300	7.974	7.974	23 mL/min	slm	
Flow Accuracy	10.000	9.700	10.300	9.969	9.969	29 mL/min	slm	



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Phone: 813-978-3054 Fax 813-978-3758

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AC-3080

This Calibration procedure applies to all Dry Gas Meters in Middleton, Wisconsin Laboratory.

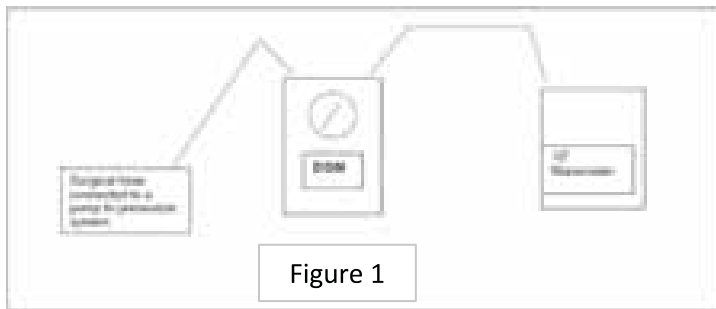
Equipment used: Spirometer

Using the Spirometer: The Spirometer consists of two tanks. The green tank has a U-tube on it to show any pressure (either positive or negative) in the green tank. The sight glass vial with the ruler near it tells what the level of water is in the green tank.

The controls at the Spirometer consist of a water valve and a clamp for the hose. The valve controls the flow of water between the tanks. The clamp controls the up and down movement of the red tank. **NEVER STAND UNDER THE RED TANK WHEN IT IS ELEVATED!!**

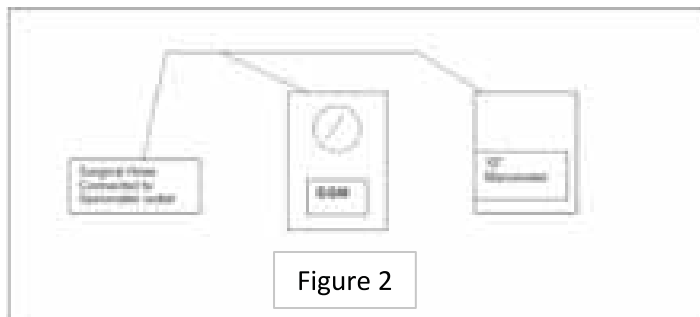
When the Spirometer is not in use most of the water is stored in the red tank on the floor.

1. Connect hoses to Dry Gas Meter (DGM) and manometer as shown in figure 1 for leak test.



2. With spirometer clamped off pressurize the system by blowing into the hose, which is attached to the inlet port of the DGM. When there is 6 to 8 inches of pressure, clamp off the hose you just blew into. The manometer liquid will rise until pressure is equal in the system then stop. If the manometer does not stop rising there is a leak. Repair the leak as necessary and recheck.

3. Connect as in figure 2 for calibration of the meter. In this case, the manometer is used to monitor the pressure at the DGM. A reading of 2.0 in H₂O with the system operating indicates a flow restriction that must be remedied before continuing the calibration.



4. Raise the red tank above the green tank. Plug the manometer on the green tank. (Plugging the manometer hose when transferring water in either direction keeps the fluid in the manometer from being forced either out of the hose or into the green tank.) Using the water valve adjust the water in the green tank just enough to be able to adjust the ruler up or down to zero the ruler with the water level. Set the ruler bottom at the top of the meniscus. Unplug manometer slowly on green tank and using the water valve, toggle on and off until the manometer on the green tank shows no pressure at all. The fluid in the two tubes will be level when there is no pressure in the green tank. Leave the clamp open and reset the ruler if necessary. At this point, clamp open, water off, manometer levels the same and the ruler at the top of the meniscus in the water level vial, you are ready to start sampling.

5. Plug the manometer hose on the green tank. Turn the water valve on (to start water flowing into the green tank). (The sample rate is usually set on a "set up" run, as the first run will not be used in the calibrations.) Enter the initial DGM reading into the spreadsheet. Sample 1 cubic foot as near as possible then pinch off hose leading from the Spirometer (this prevents the DGM from being driven backwards) and quickly go out to the Spirometer and close the water valve. While sampling, include the barometric pressure, Spirometer temperature, meter temperature and meter pressure (from the manometer) into the spreadsheet.

6. Without removing the hose clamp at the meter, lower the red tank and adjust the water in the green tank using the water valve so there is no pressure in the green tank. This requires you to unplug the left manometer hose. Do this with care, as there might be enough pressure to either blow the fluid out of the hose or draw it into the green tank. Adjust the pressure in the constant volume tank (green) using the water valve. Normally you have to add water to the constant volume tank to equalize the pressure but if you go too far, it will be necessary to lower the red tank and allow some water out of the green tank. This takes some practice.

After adjusting the pressure in the green tank to zero using the water valve, measure the amount of water in the green tank with the ruler. (Typically around 22 inches \pm 1 inch) Interpolate this measurement to the nearest 1/32 of an inch and convert to decimal. This figure is used in the Spirometer Calibration program found where these instructions were located. Enter this number into the spreadsheet and the final DGM number after the run.

7. Perform 5 runs to determine an average. Pass/fail criteria is $\pm 1.0\%$ for the measurement of uncertainty. If not passing, adjust and repeat the test.

Following the successful calibration of this piece of equipment a calibration sticker shall be attached to the instrument.

Measurement Uncertainty is calculated using the following formula: $O.M.U. = k \cdot ((A.D.)^2 + (S.D.)^2 + (R.M.U.)^2)^{1/2}$


O.M.U. = Overall Measurement Uncertainty

A.D. = Average Deviation of the percent difference of all measured results compared to the reference value.

S.D. = Standard Deviation of the percent difference of all measured results compared to the reference value.

k = Confidence Factor (2 for 95% confidence)

R.M.U. = Standard Measurement Uncertainty of Reference Measurement Equipment. R.M.U. is considered as the measurement uncertainty as stated on calibration certificates of equipment, or the tolerance listed in the calibration standard of the test equipment

 Total Quality Assured.	8431 Murphy Drive Middleton, WI 53562	Calibration Certificate Number	1210-MID-12-27
		Issue Date	12/27/18

Middleton Laboratory Local Calibration Certificate

Asset Number	1210	Asset Description	Dry Gas Meter
Manufacturer	Rockwell	Model Number	DGM-110
Serial Number	974270	Calibration Date	12/27/2018
Procedure	See Procedure Tab	Calibration Due Date	6/27/2019
Ambient Temperature (°F)	63.4	Calibration Location	Middleton Lab
Relative Humidity (%)	35	As Found Condition	In Tolerance
QA's Name	Christine Schultze	As Left Condition	In Tolerance
QA's Title	Quality Supervisor		
QA's Signature	<i>Christine M Schultze</i>		

Calibration Data Summary

Measurement of Uncertainty (MU)	Maximum	As Found	As Left	Adjusted?
	0.0100	0.0028	0.0028	No

The above results relate only to the equipment calibrated.

This Calibration Certificate shall not be reproduced except in full, without written approval of the laboratory.

End of Calibration Certificate

-18
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Calibration Certificate Number: 1210-MID-12-27-18
 Issue Date: 12/27/18

Middleton Laboratory Local Calibration Data

Asset Number	1210	Asset Description	Dry Gas Meter
Calibration Date	12/27/2018	Performed By	Ken Slater
Calibration Due	6/27/2019	Reviewed By	Brian Ziegler

Reference Equipment

Asset Description - Asset Number	Spirometer - 051	Calibration Due	NA
Asset Description - Asset Number	Hygrometer - 1420	Calibration Due	4/12/2019
Asset Description - Asset Number	Omega Temp Reader - 1312	Calibration Due	1/16/2019
Asset Description - Asset Number	NA	Calibration Due	NA

Barometric Pressure (in Hg)	28.88	Ambient Temp (°F)	63.4	Relative Humidity (%)	35
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As Found Data

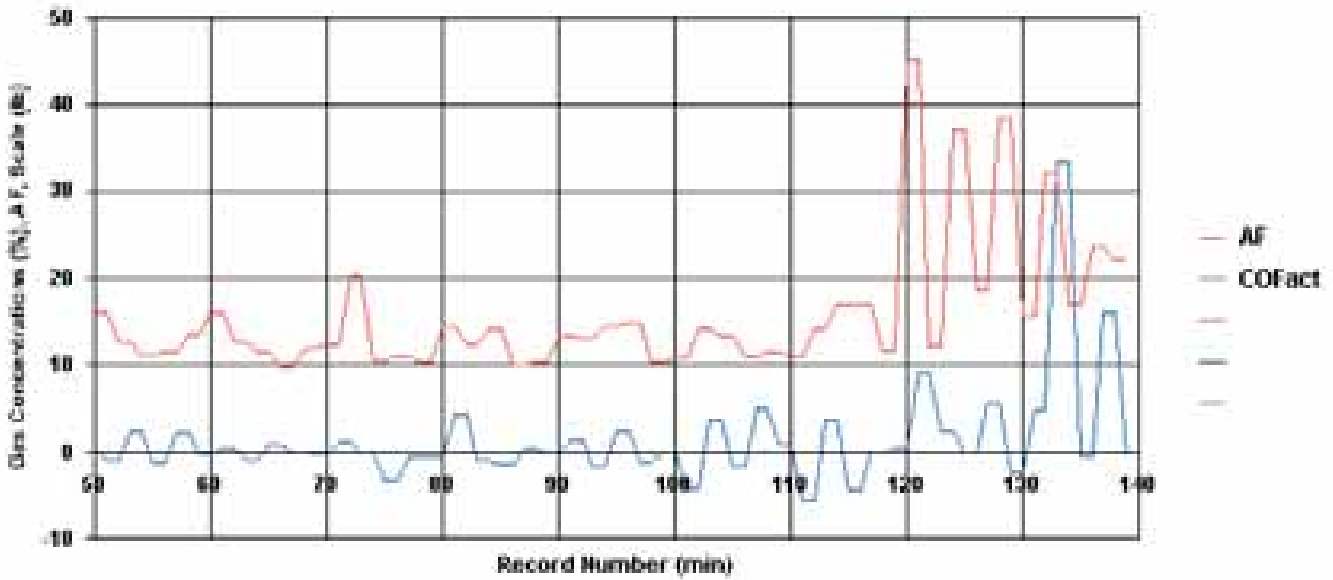
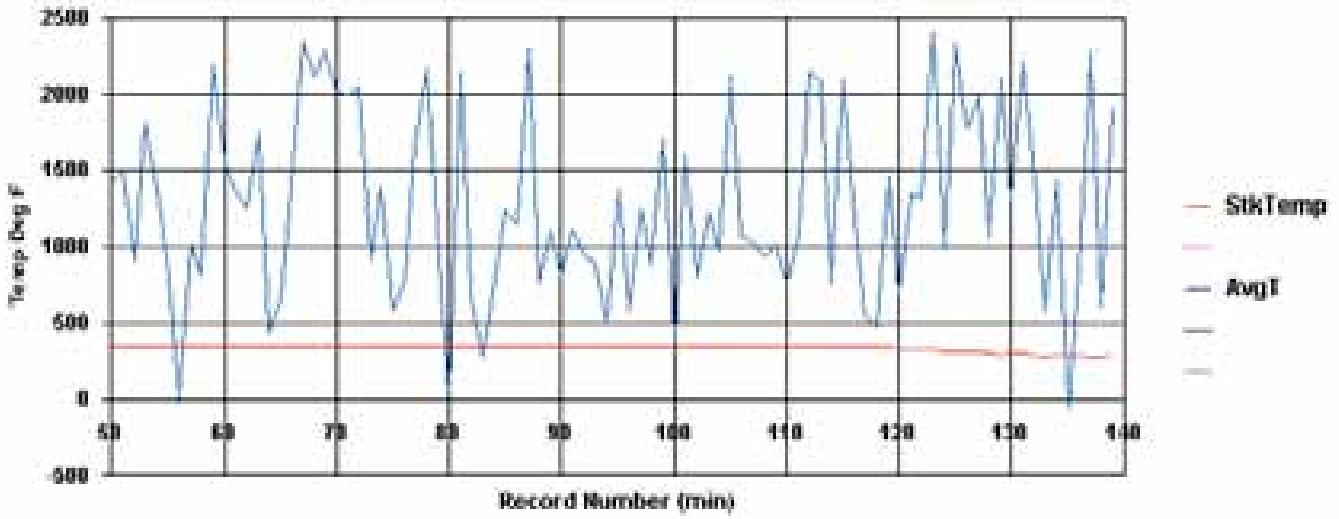
Run Number	Meter Initial	Barometric Pressure (in Hg)	Spirometer Temp (°F)	Vapor Pressure of H2O (Hg)	Meter Temp (°F)	Meter Pressure (in Hg)	Measurement (in)	Spirometer Volume	Meter Final	γ
1	363.115	28.88	69.6	0.7220	69.2	4	22.375	1.0170	364.117	0.98889
2	364.124	28.88	69.3	0.7145	69.3	4	22.75	1.0341	365.146	0.9868
3	365.153	28.88	69.9	0.7295	69.1	4	22.625	1.0284	366.165	0.98905
4	366.165	28.88	69.4	0.7170	69.0	4	22.5625	1.0256	367.174	0.99044
5	367.176	28.88	69.3	0.7145	68.9	4	22.375	1.0170	368.178	0.98916
								1.0244	Ave	0.98887
								0.0074	Std Dev	0.00131
								M of U	0.00284	Pass

As Left Data

Run Number	Meter Initial	Barometric Pressure (in Hg)	Spirometer Temp (°F)	Vapor Pressure of H2O (Hg)	Meter Temp (°F)	Meter Pressure (in Hg)	Measurement (in)	Spirometer Volume	Meter Final	γ
1	363.115	28.88	69.6	0.7220	69.2	4	22.375	1.0170	364.117	0.98889
2	364.124	28.88	69.3	0.7145	69.3	4	22.75	1.0341	365.146	0.9868
3	365.153	28.88	69.9	0.7295	69.1	4	22.625	1.0284	366.165	0.98905
4	366.165	28.88	69.4	0.7170	69.0	4	22.5625	1.0256	367.174	0.99044
5	367.176	28.88	69.3	0.7145	68.9	4	22.375	1.0170	368.178	0.98916
								1.0244	Ave	0.98887
								0.0074	Std Dev	0.00131
								M of U	0.00284	Pass

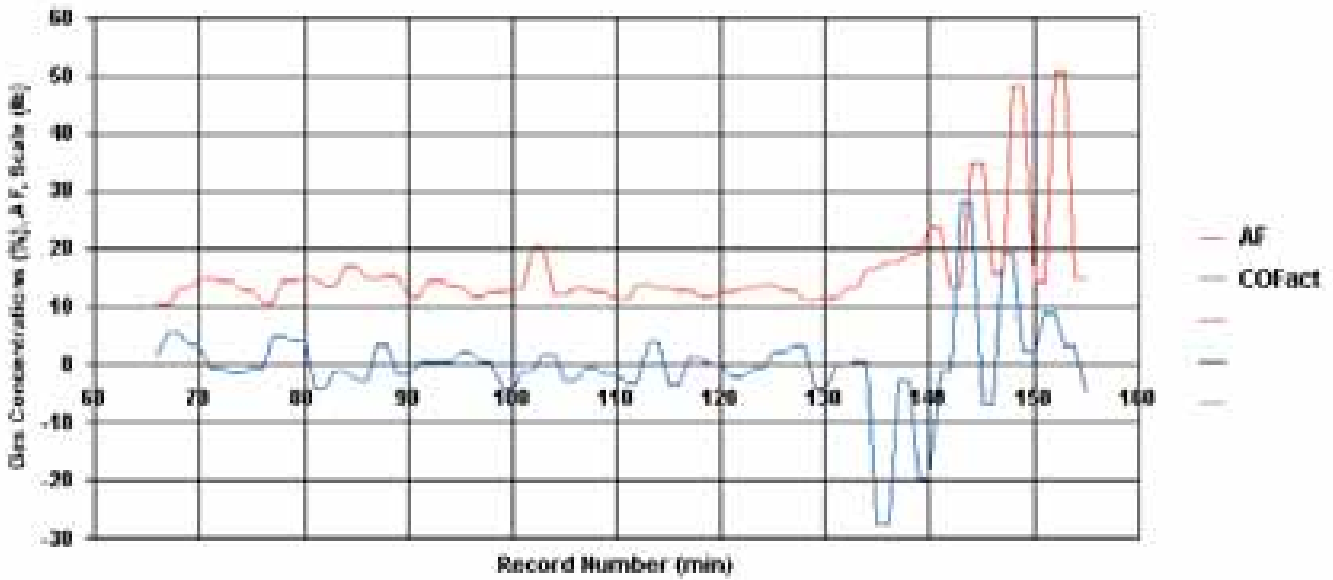
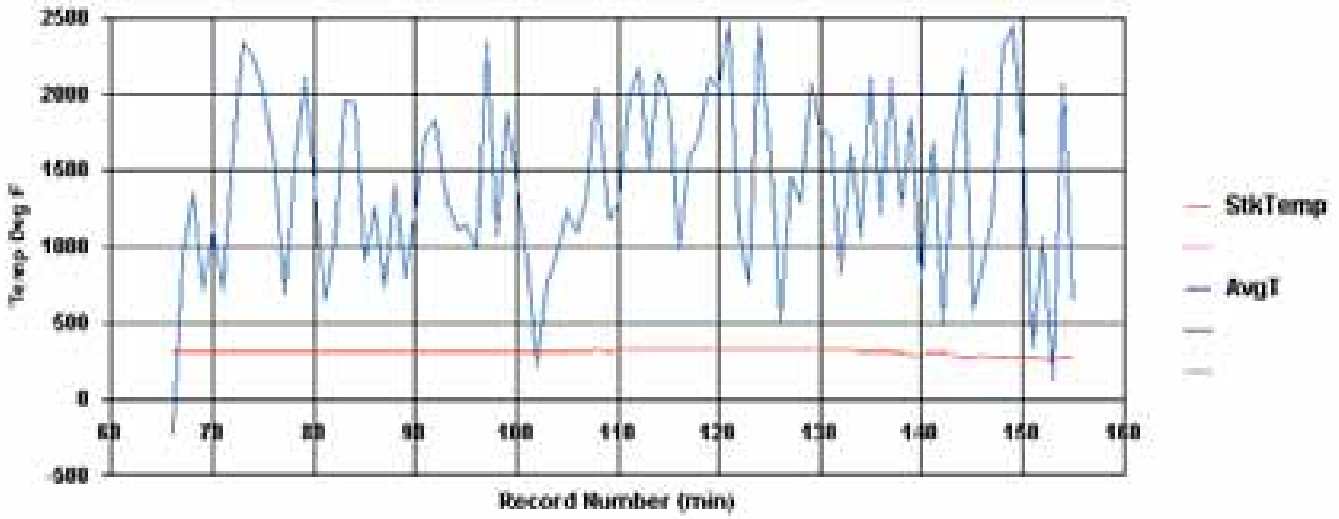
33	0.187	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	0.195	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.203	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	0.211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	0.219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38	0.228	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	0.237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.247	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	0.256	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	0.266	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	0.277	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	0.287	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	0.322	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	0.334	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	0.347	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	0.373	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	0.387	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	0.402	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	0.417	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	0.432	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	0.448	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	0.465	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	0.482	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	0.499	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	0.517	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61	0.536	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	0.555	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
63	0.575	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
64	0.595	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65	0.616	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
66	0.638	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
67	0.661	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
68	0.684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
69	0.707	0.7220	0.7145	0.7295	0.7170	0.7145	0.7220	0.7145	0.7295	0.7170	0.7145
70	0.732	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
71	0.757	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
72	0.783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
73	0.810	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
74	0.838	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75	0.866	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
76	0.896	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

77	0.926	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
78	0.957	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
79	0.989	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80	1.022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
81	1.056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
82	1.091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
83	1.127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
84	1.163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85	1.201	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
86	1.241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
87	1.281	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
88	1.322	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
89	1.364	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90	1.408	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
91	1.453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
92	1.499	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
93	1.546	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
94	1.595	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95	1.645	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
96	1.696	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
97	1.749	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
98	1.803	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
99	1.859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000



Test Start 51 End 411 minutes

Printed by Hearthlab 03/25/19



Test Start 67 End 427 minutes

Printed by Hearthlab 03/25/19

ENGLAND
G103843101
25-PDVC
ASTM E2779
3-19-19
TEST #2
TECH #5



