



**OMNI-Test Laboratories, Inc.**

EPA Standard of Performance for New Residential Wood Heaters

# **Certification Test Report**

## **Non-Confidential Business Information (Non-CBI)**

**Manufacturer:** Sherwood Industries  
**Heater Type:** Pellet-Fired, Freestanding  
**Model Series:** Mini Series

**Models:** Mini, GF40, P3

**Prepared for:** Sherwood Industries  
6782 Oldfield Road  
Saanichton, British Columbia V8M 2A3  
Canada

**Prepared by:** OMNI-Test Laboratories, Inc.  
13327 NE Airport Way  
Portland, OR 97230  
(503) 643-3788

**Test Period:** February 12, 2018

**Report Date:** September 24, 2018

**Report Number:** 0268PM026E

*All data and information contained in this report are confidential and proprietary to Sherwood Industries. Its significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations, or surveys made. The contents of this report cannot be copied or quoted, except in full, without specific, written authorization from Sherwood Industries and OMNI-Test Laboratories, Inc. No use of the OMNI-Test Laboratories, Inc. name, logo, or registered mark (O-TL) is permitted, except as expressly authorized by OMNI-Test Laboratories, Inc. in writing.*

## **AUTHORIZED SIGNATORIES**

This report has been reviewed and approved by the following authorized signatories:

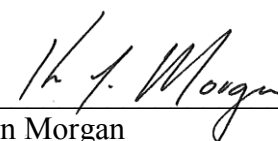
### **Evaluator:**



---

Aaron Kravitz  
OMNI-Test Laboratories, Inc.

### **QA Review:**



---

Ken Morgan  
OMNI-Test Laboratories, Inc.

9/24/2018  
Issue Date

## TABLE OF CONTENTS

PREFACE .....	(3 pages)
<b>Section 1 –Appliance, Testing, &amp; Results .....</b>	<b>4</b>
1.1 Appliance Description .....	5
1.2 Procedures & Results Summary .....	7
1.3 Summary Tables .....	9
Table 1 – Particulate Emissions .....	9
Table 2 – Efficiency and CO .....	9
Table 3 – Test Facility Conditions .....	10
Table 4 – Fuel Measurement Summary .....	10
Table 5 – Dilution Tunnel and Flue Gas Measurements .....	11
Table 6 – Heater Configuration .....	11
<b>Section 2 – Test Data.....</b>	<b>12</b>
2.1 Test Data by Run .....	13
2.2 Sample Analysis & Tares.....	36
<b>Section 3 –Laboratory Quality Assurance.....</b>	<b>39</b>
3.1 Quality Assurance/Quality Control.....	44
3.2 Calibration Data .....	46
3.3 Example Calculations .....	63
<b>Appendix A – Labeling &amp; Owner's Manal</b>	

# **Section 1**

## **Appliance, Testing, & Results**

- 1.1 - Appliance Description
- 1.2 – Procedures and Results Summary
- 1.3 - Summary Tables



## 1.1 - Appliance Description

**Appliance Manufacturer:** Sherwood Industries

**Pellet Stove Model Line:** Mini Series

**Model Names:** Mini, GF40, P3

**Model Similarity:** The sample unit tested is a model Mini. The GF40 and P3 models feature lightly altered outside cladding for marketing designation. All critical components, air flow pathways, and K List items (aside from overall stove dimensions) are identical between the three versions.

**Type:** Freestanding, air-circulating type, pellet-fired room heater.

The Mini Series' principle elements include a fuel hopper, grey cast iron firebox chamber, ductile iron burn pot, and electrical fuel feed, combustion air, and convection air supply systems. The frame of the unit is constructed of mild steel, as is the outer fascia and door.

Combustion products are routed out of the firebox chamber via a baffle-type heat exchanger through a 3-inch diameter flue outlet located on the rear of the unit.

Fuel is supplied from the hopper to the burn pot via a screw-type auger. Fuel supply rate is varied by cycling the auger motor as needed.

Ashes fall through the burn pot into a removable ash drawer located at the bottom of the unit. The drawer is accessed through the front firebox door, which also features a 14" x 9.5" glass panel.

The electrical systems are regulated by a user-operated control board featuring up/down buttons to achieve desired heat output. The unit can also be controlled by an external thermostat system.

More detailed information is shown in the manufacturer's design drawings, Appendix C of this report. This information is considered confidential business information (CBI) by the manufacturer and is not included in the non-CBI version of this report.

**Appliance Photographs**  
**Mini Series**  
**Test Date: 2/12/2018**



**Mini Series Front**



**Mini Series Back**



**Mini Series Left**



**Mini Series Right**

## 1.2 - Procedures and Results Summary

### INTRODUCTION

Sherwood Industries retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the Mini Series. The Mini Series is a freestanding or insert style pellet-burning residential heating appliance.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in at the *OMNI*'s testing facility on February 5, 2018. It was assigned and labeled with *OMNI* ID #2292. *OMNI* representative Aaron Kravitz conducted the certification testing and completed all testing by February 12, 2018.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this section. The results in this report are limited to the item(s) submitted.

### SUMMARY OF RESULTS

The average particulate emission rate over the complete, integrated test run was measured to be 0.48 g/hr.

The average particulate emission factor for the complete, integrated test run was measured to be 0.65 g/dry kg of fuel.

The average thermal efficiency for the complete, integrated test run was measured to be 66.2%.

The particulate emission rate calculated from the one-hour filter was 0.73 g/hr.

The proportionality results and sample train agreement for the test run was acceptable. Quality check results for each test run are presented in Section 3 of this report.

## 1.2 - Procedures and Results Summary

### TESTING PROCEDURE

The Mini Series was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters using ASTM E2515 and ASTM E2779. The fuel used for certification testing was Lignetics brand densified wood pellet fuel; this fuel was graded as Premium by the Pellet Fuels Institute and was produced at registered mill # 03208. Particulate emissions were measured using dual sampling trains consisting of two sets of filters (front and back).

The unit was installed and adjusted in accordance with the manufacturer's instructions, adjusting an air inlet slide to achieve a static pressure of 0.13 inches of water after 30 minutes at maximum burn rate. This slide was fixed in place throughout the integrated test run

The results of the integrated test run indicate an average particulate emission rate of 0.48 g/hr. The Mini Series results are within the emission limit of 2.0 g/hr for affected appliances manufactured on or after May 15, 2020 or sold at retail after December 31, 2020.

The model Mini Series was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10. The heater has a demonstrated an average thermal efficiency of 66.2%. The calculated CO emission rate was 0.08 g/min.

Upon completion of emissions certification testing, the sample unit was sealed and will be stored by the manufacturer in accordance with the requirements of the CFR.



**Mini Series – Sealed Test Unit**

## 1.3 - Summary Tables

**Table 1 – Particulate Emissions**

	<b>One-Hour Filter</b>	<b>Integrated Total</b>
<b>Emission Rate</b> (g/hr)	0.76	0.48
<b>Emission Factor</b> (g/dry kg)	0.53	0.65

**Table 2 – Efficiency and CO**

	<b>Burn Rate Segment</b>			<b>Integrated Total</b>
	<b>Maximum</b>	<b>Medium</b>	<b>Minimum</b>	
<b>Time</b> (minutes)	62	121	180	363
<b>Burn Rate</b> (dry kg/hr)	1.43	0.69	0.51	0.73
<b>Heat Input Rate</b> (BTU/hr, HHV)	27,767	13,414	9,837	14,092
<b>Heat Output Rate</b> (BTU/hr, HHV)	19,996	8,097	6,447	9,330
<b>Efficiency</b> (%, HHV)	72.0%	60.4%	65.5%	66.2%
<b>Efficiency</b> (%, LHV)	76.9%	64.5%	70.0%	70.7%
<b>CO Emission Rate</b> (g/min)	0.03	0.10	0.08	0.08

## 1.3 - Summary Tables

**Table 3 – Test Facility Conditions**

	<b>Initial</b>	<b>Middle</b>	<b>Final</b>
<b>Room Temperature</b> (°F)	70	72	71
<b>Barometric Pressure</b> (in Hg)	30.34	30.34	30.34
<b>Air Velocity</b> (ft/min)	< 50	< 50	< 50
<b>Induced Draft</b> (in H <sub>2</sub> O)	0	0	0

**Table 4 – Fuel Measurement Summary**

	<b>Pretest</b>	<b>Burn Rate Segment</b>			<b>Integrated Total</b>
		<b>Maximum</b>	<b>Medium</b>	<b>Minimum</b>	
<b>Time</b> (min)	74	62	121	180	363
<b>Burn Rate</b> (dry kg/hr)	3.34	1.43	0.69	0.51	0.73
<b>Consumed Fuel</b> (lbs)	8.8	3.5	3.3	3.6	10.4
<b>Moisture Content</b> (dry basis %)	7.10				

## 1.3 - Summary Tables

**Table 5 – Dilution Tunnel and Flue Gas Measurements**

	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
<b>Flue Draft</b> (in H <sub>2</sub> O)	-0.035	-0.027	-0.021	-0.025
<b>Tunnel Velocity</b> (ft/sec)	13.36	13.24	13.17	13.22
<b>Tunnel Flow Rate</b> (dscf/min)	-	-	-	148.9
<b>Tunnel Temperature</b> (°F)	100	90	84	89

**Table 6 – Heater Configuration**

	Pretest	Burn Rate Segment		
		Maximum	Medium	Minimum
<b>Heat Output Setting</b>	5 (max)	5 (max)	2	1 (min)

## **Section 2**

### **Test Data**

2.1 Test Data by Run

2.2 Sample Analysis & Tares



## **2.1 - Test Data by Run**

### **Run 1 Notes & Results**

## Pellet Heater Conditioning Data - ASTM E2779

Manufacturer: Sherwood  
 Model: Mini FS  
 Tracking No.: 2292  
 Project No.: 0268PF026E  
 Test Date: Jan 2018  
 Operation Category: II-III

Elapsed Time (hours)	Scale Reading (lbs)	Stack (°F)
0	253.0	281
1	250.0	287
2	248.7	331
3	247.4	293
4	242.2	303
5	237.0	300
6	235.5	300
7	233.5	299
8	227.7	306
9	225.4	309
10	223.3	302
11	220.7	300
12	217.6	308
13	215.9	302
14	251.9	350
15	248.5	341
16	243.7	337
17	239.0	342
18	236.1	349
19	232.0	352
20	229.8	348
21	223.8	347
22	219.4	344
23	217.1	305
24	256.2	305
25	249.5	338
26	245.5	334
27	243.0	335
28	237.8	304
29	235.6	312
30	232.6	317
31	231.4	318
32	225.9	312
33	253.4	291
34	252.0	303
35	247.0	308
36	246.3	313
37	242.0	309
38	238.8	306
39	237.2	309
40	236.7	313
41	228.6	308
42	225.7	308
43	223.7	309
44	219.8	307
45	218.5	307
46	252.6	319
47	251.0	328
48	248.8	312
49	246.3	299
50	245.3	303

# Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Sherwood  
 Model: Mini FS  
 Tracking No.: 2292  
 Project No.: 0268PF026E  
 Test Date: 2/12/2018

PB Length: 74 min  
 Recording Interval: 1 min

Averages:			334	70	0	3	0
Elapsed Time (min)	Scale Reading	Weight Change	Stack (F)	Ambient (F)	Draft (H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
0	35.0	-	172	70	0.00	0.00	0.00
1	35.0	0	198	70	-0.01	0.00	0.00
2	35.0	0	204	70	-0.01	0.00	0.00
3	34.9	-0.1	211	70	-0.01	0.00	0.00
4	34.9	0	233	70	-0.02	0.00	0.00
5	34.8	-0.1	255	69	-0.02	0.00	0.00
6	34.7	-0.1	272	69	-0.02	0.00	0.00
7	34.7	0	281	70	-0.02	0.00	0.00
8	34.6	-0.1	290	69	-0.02	0.00	0.00
9	34.5	-0.1	301	70	-0.02	0.00	0.00
10	34.5	0	305	70	-0.02	0.00	0.00
11	34.4	-0.1	312	70	-0.03	0.00	0.00
12	34.4	0	317	70	-0.03	0.00	0.00
13	34.3	-0.1	327	70	-0.03	0.00	0.00
14	34.3	0	337	70	-0.03	0.00	0.00
15	34.2	-0.1	341	70	-0.03	0.00	0.00
16	34.3	0.1	342	70	-0.03	0.00	0.00
17	34.2	-0.1	333	70	-0.03	0.00	0.00
18	34.2	0	326	70	-0.03	0.00	0.00
19	34.1	-0.1	323	70	-0.03	0.00	0.00
20	34.0	-0.1	324	70	-0.03	0.00	0.00
21	34.0	0	324	70	-0.03	4.62	0.00
22	33.9	-0.1	325	70	-0.03	5.51	0.00
23	33.9	0	326	70	-0.03	5.67	0.00
24	33.8	-0.1	328	70	-0.03	5.62	0.00
25	33.8	0	329	71	-0.03	0.00	0.00
26	33.7	-0.1	331	71	-0.03	1.02	0.00
27	33.6	-0.1	333	70	-0.03	5.95	0.00
28	33.6	0	338	71	-0.03	4.85	0.00
29	33.5	-0.1	341	71	-0.03	0.29	0.00
30	33.5	0	344	70	-0.03	0.22	0.00
31	33.4	-0.1	346	70	-0.03	0.24	0.00
32	33.3	-0.1	347	70	-0.03	0.44	0.00
33	33.3	0	347	71	-0.03	0.00	0.00
34	33.2	-0.1	347	70	-0.03	3.29	0.52
35	33.2	0	347	71	-0.03	16.01	4.99
36	33.1	-0.1	352	71	-0.03	6.54	0.06
37	33.1	0	352	70	-0.03	1.00	0.09
38	33.0	-0.1	351	70	-0.03	0.97	0.09
39	33.0	0	352	71	-0.03	4.98	0.01
40	32.9	-0.1	353	70	-0.03	5.58	0.01
41	32.9	0	354	71	-0.04	6.16	0.01
42	32.8	-0.1	355	71	-0.03	5.78	0.01
43	32.8	0	354	70	-0.03	4.85	0.01
44	32.7	-0.1	355	70	-0.04	5.09	0.01
45	32.7	0	356	71	-0.03	6.32	0.01
46	32.6	-0.1	356	71	-0.03	5.97	0.00
47	32.5	-0.1	356	71	-0.03	5.25	0.01
48	32.5	0	356	71	-0.04	5.64	0.01
49	32.5	0	354	70	-0.04	3.85	0.01
50	32.4	-0.1	355	71	-0.03	5.49	0.01
51	32.3	-0.1	356	71	-0.03	5.74	0.00
52	32.3	0	357	71	-0.03	5.20	0.00
53	32.2	-0.1	356	71	-0.03	4.61	0.01
54	32.2	0	357	71	-0.03	6.15	0.01
55	32.1	-0.1	358	71	-0.03	6.26	0.00
56	32.0	-0.1	359	71	-0.04	5.77	0.01
57	32.0	0	359	71	-0.03	5.65	0.00
58	31.9	-0.1	362	71	-0.03	5.88	0.01
59	31.9	0	365	71	-0.03	7.14	0.00
60	31.8	-0.1	364	71	-0.04	5.10	0.01
61	31.8	0	364	71	-0.04	5.05	0.01
62	31.7	-0.1	364	71	-0.04	4.63	0.01

63	31.6	-0.1	364	71	-0.04	5.28	0.01
64	31.6	0	362	71	-0.04	5.25	0.01
65	31.5	-0.1	365	71	-0.04	5.94	0.01
66	31.5	0	363	71	-0.03	4.82	0.01
67	31.4	-0.1	363	71	-0.04	4.96	0.01
68	31.4	0	364	71	-0.04	6.17	0.01
69	31.3	-0.1	365	71	-0.04	5.51	0.01
70	31.2	-0.1	365	71	-0.04	5.96	0.01
71	31.2	0	365	71	-0.03	5.45	0.01
72	31.1	-0.1	365	71	-0.04	5.24	0.01
73	31.1	0	366	71	-0.04	6.02	0.00
74	31.0	-0.1	366	71	-0.04	6.29	0.00

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>		13.43		ft/sec		V <sub>scent</sub>		15.16	
						ft/sec		F <sub>p</sub>	
								0.886	

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
0	0.000	0.000			0.03	74	-0.03	0.35	74	0.8	100	0.050	97	98	10.4	-0.1	366	71	70	71	-0.035	6.17	0.00481
1	0.153	0.153	0.15	0.15	1.34	74	2.01	1.12	74	1.2	100	0.050	103	103	10.3	0	366	72	70	71	-0.034	5.34	0.00449
2	0.315	0.315	0.16	0.16	1.34	74	2.02	1.11	74	1.2	100	0.050	103	103	10.2	-0.1	365	72	71	71	-0.035	4.58	0.00896
3	0.477	0.477	0.16	0.16	1.34	74	2.01	1.11	74	1.2	99	0.050	103	103	10.2	0	364	72	71	71	-0.036	4.77	0.00734
4	0.639	0.638	0.16	0.16	1.34	74	2.01	1.10	74	1.2	100	0.050	103	103	10.2	0	364	72	71	71	-0.034	5.26	0.00578
5	0.802	0.799	0.16	0.16	1.34	74	2.01	1.10	74	1.2	100	0.050	103	103	10.1	-0.1	365	72	71	71	-0.035	5.47	0.00598
6	0.963	0.961	0.16	0.16	1.32	74	2	1.10	74	1.2	100	0.050	102	103	10.1	0	366	72	71	71	-0.035	6.41	0.00478
7	1.124	1.122	0.16	0.16	1.33	75	2	1.09	74	1.2	100	0.050	102	103	10.0	-0.1	365	73	71	71	-0.035	4.77	0.00737
8	1.286	1.282	0.16	0.16	1.33	75	1.99	1.09	74	1.2	100	0.050	102	102	10.0	0	367	73	71	71	-0.035	6.3	0.00585
9	1.447	1.443	0.16	0.16	1.33	75	2	1.09	74	1.2	100	0.050	102	103	9.9	-0.1	366	73	71	71	-0.034	5.21	0.00461
10	1.609	1.605	0.16	0.16	1.32	75	2	1.09	74	1.2	100	0.050	102	103	9.8	-0.1	366	73	71	71	-0.036	5.66	0.00552
11	1.770	1.765	0.16	0.16	1.32	75	1.99	1.09	74	1.2	100	0.050	102	102	9.8	0	367	73	71	71	-0.035	6.17	0.00491
12	1.931	1.926	0.16	0.16	1.32	75	2	1.09	75	1.2	100	0.050	102	102	9.7	-0.1	366	73	71	71	-0.035	4.94	0.0065
13	2.091	2.087	0.16	0.16	1.32	75	2	1.08	75	1.2	100	0.050	101	102	9.7	0	365	73	73	71	-0.036	4.85	0.00812
14	2.253	2.247	0.16	0.16	1.32	75	1.99	1.08	75	1.2	100	0.050	102	102	9.6	-0.1	364	73	73	71	-0.035	5.42	0.00446
15	2.414	2.407	0.16	0.16	1.31	76	1.99	1.08	75	1.2	100	0.050	102	102	9.6	0	365	73	73	71	-0.035	5.73	0.00595
16	2.575	2.568	0.16	0.16	1.31	76	1.99	1.08	75	1.2	100	0.050	102	102	9.5	-0.1	366	73	73	71	-0.035	5.95	0.00381
17	2.735	2.728	0.16	0.16	1.31	76	1.99	1.07	75	1.2	100	0.050	101	102	9.5	0	367	73	73	71	-0.035	5.49	0.00491
18	2.896	2.888	0.16	0.16	1.32	76	1.99	1.08	75	1.2	100	0.050	102	102	9.4	-0.1	366	74	73	71	-0.035	5.56	0.00416
19	3.058	3.048	0.16	0.16	1.31	76	1.99	1.08	76	1.2	100	0.050	102	102	9.3	-0.1	367	74	73	71	-0.035	6.36	0.00481
20	3.219	3.209	0.16	0.16	1.30	76	1.98	1.08	76	1.2	100	0.050	102	102	9.3	0	367	74	73	71	-0.036	5.68	0.00455
21	3.379	3.368	0.16	0.16	1.31	77	1.99	1.08	76	1.2	100	0.050	101	101	9.2	-0.1	369	74	74	71	-0.036	6.75	0.00426
22	3.540	3.529	0.16	0.16	1.31	77	1.99	1.08	76	1.2	100	0.050	101	102	9.2	0	369	74	74	71	-0.035	5.49	0.00656
23	3.701	3.689	0.16	0.16	1.31	77	2	1.07	76	1.2	100	0.050	101	102	9.1	-0.1	369	74	74	71	-0.035	5.58	0.00614
24	3.862	3.849	0.16	0.16	1.30	77	1.99	1.07	76	1.2	100	0.050	101	102	9.1	0	369	74	74	71	-0.035	5.38	0.00605
25	4.022	4.009	0.16	0.16	1.31	77	1.99	1.07	77	1.2	100	0.050	101	101	9.0	-0.1	370	74	74	71	-0.035	5.91	0.00526
26	4.183	4.169	0.16	0.16	1.31	77	2	1.07	77	1.2	100	0.050	101	101	8.9	-0.1	370	74	74	71	-0.036	5.95	0.00504
27	4.344	4.329	0.16	0.16	1.31	77	2	1.07	77	1.2	100	0.050	101	101	8.9	0	370	74	74	71	-0.036	5.66	0.00485
28	4.506	4.489	0.16	0.16	1.30	78	2	1.07	77	1.2	100	0.050	102	101	8.8	-0.1	371	74	74	71	-0.035	5.95	0.00449
29	4.666	4.649	0.16	0.16	1.30	78	1.99	1.07	77	1.2	100	0.050	101	101	8.8	0	372	74	74	71	-0.036	5.77	0.00458
30	4.827	4.809	0.16	0.16	1.30	78	2	1.07	77	1.2	100	0.050	101	101	8.7	-0.1	372	74	74	71	-0.036	6.17	0.00533
31	4.987	4.968	0.16	0.16	1.30	78	2.01	1.07	78	1.2	100	0.050	101	101	8.6	-0.1	372	74	74	71	-0.036	6.05	0.00426
32	5.149	5.129	0.16	0.16	1.31	78	1.99	1.07	78	1.2	100	0.050	102	102	8.6	0	372	74	74	71	-0.036	5.68	0.00523
33	5.310	5.288	0.16	0.16	1.31	78	2	1.07	78	1.2	100	0.050	101	101	8.5	-0.1	373	75	74	71	-0.036	6.68	0.00452
34	5.470	5.448	0.16	0.16	1.30	78	2	1.07	78	1.2	101	0.050	101	101	8.5	0	373	75	74	71	-0.036	6.23	0.00614

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>			13.43			ft/sec			
V <sub>scnt</sub>			15.16			ft/sec			
F <sub>p</sub>			0.886						

\*H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
35	5.631	5.609	0.16	0.16	1.31	79	2	1.07	78	1.2	100	0.050	101	102	8.4	-0.1	373	75	74	71	-0.036	5.35	0.00718
36	5.792	5.768	0.16	0.16	1.31	79	2	1.07	78	1.2	100	0.050	101	101	8.3	-0.1	373	75	74	71	-0.035	5.75	0.00556
37	5.954	5.928	0.16	0.16	1.30	79	2.01	1.07	78	1.2	100	0.050	102	101	8.3	0	371	75	74	71	-0.035	4.72	0.00656
38	6.115	6.088	0.16	0.16	1.30	79	2	1.07	78	1.2	100	0.050	101	101	8.2	-0.1	371	75	74	71	-0.035	5.47	0.00543
39	6.276	6.248	0.16	0.16	1.30	79	2	1.07	79	1.2	100	0.050	101	101	8.2	0	371	75	74	71	-0.035	6.51	0.00471
40	6.436	6.408	0.16	0.16	1.30	79	2	1.07	79	1.2	100	0.050	100	101	8.1	-0.1	371	75	74	72	-0.035	5.24	0.00647
41	6.597	6.568	0.16	0.16	1.31	79	2	1.07	79	1.2	100	0.050	101	101	8.1	0	370	75	74	72	-0.035	4.59	0.00669
42	6.759	6.727	0.16	0.16	1.30	79	2	1.07	79	1.2	100	0.050	102	100	8.0	-0.1	370	75	74	71	-0.036	5.72	0.00465
43	6.920	6.887	0.16	0.16	1.30	80	2	1.07	79	1.2	100	0.050	101	101	8.0	0	369	75	74	71	-0.035	5.93	0.00452
44	7.081	7.048	0.16	0.16	1.31	80	2.01	1.07	79	1.3	100	0.050	101	102	7.9	-0.1	368	75	74	71	-0.035	5.25	0.00481
45	7.242	7.207	0.16	0.16	1.30	80	2.01	1.07	79	1.2	100	0.050	101	100	7.9	0	368	75	75	71	-0.036	4.86	0.00621
46	7.403	7.367	0.16	0.16	1.30	80	2.01	1.07	79	1.3	100	0.050	101	101	7.8	-0.1	369	75	75	71	-0.036	5.1	0.00604
47	7.565	7.527	0.16	0.16	1.30	80	2.01	1.06	80	1.2	100	0.050	102	101	7.7	-0.1	369	75	75	71	-0.035	6.46	0.00494
48	7.725	7.687	0.16	0.16	1.29	80	2.01	1.06	80	1.3	100	0.050	100	101	7.7	0	369	75	75	71	-0.036	5.75	0.00439
49	7.886	7.846	0.16	0.16	1.30	80	2.01	1.06	80	1.3	101	0.050	101	100	7.6	-0.1	369	75	75	72	-0.036	6.08	0.00461
50	8.047	8.007	0.16	0.16	1.30	80	2.01	1.06	80	1.3	100	0.050	101	101	7.6	0	369	75	75	72	-0.035	5.34	0.00572
51	8.209	8.166	0.16	0.16	1.29	80	2.02	1.06	80	1.3	100	0.050	102	100	7.5	-0.1	370	75	75	72	-0.035	5.58	0.00669
52	8.370	8.325	0.16	0.16	1.30	80	2.02	1.07	80	1.3	100	0.050	101	100	7.5	0	368	75	75	71	-0.035	5.31	0.0054
53	8.531	8.486	0.16	0.16	1.30	80	2.03	1.06	80	1.3	101	0.050	101	102	7.4	-0.1	368	75	75	71	-0.035	5.56	0.00562
54	8.692	8.645	0.16	0.16	1.30	81	2.02	1.06	80	1.3	100	0.050	101	100	7.4	0	369	75	75	71	-0.036	6.41	0.00439
55	8.853	8.805	0.16	0.16	1.30	81	2.02	1.06	80	1.3	100	0.050	101	101	7.3	-0.1	369	75	75	71	-0.036	5	0.0053
56	9.015	8.965	0.16	0.16	1.30	81	2.02	1.06	80	1.3	100	0.050	101	101	7.2	-0.1	369	75	75	71	-0.036	5.62	0.00471
57	9.176	9.125	0.16	0.16	1.29	81	2.02	1.06	80	1.3	100	0.050	101	101	7.2	0	370	75	75	71	-0.036	6.43	0.00468
58	9.337	9.284	0.16	0.16	1.30	81	2.03	1.06	81	1.3	100	0.050	101	100	7.1	-0.1	369	75	75	71	-0.035	5.71	0.0053
59	9.498	9.445	0.16	0.16	1.30	81	2.03	1.06	81	1.3	100	0.050	101	101	7.1	0	370	75	75	72	-0.036	5.56	0.00507
60	9.659	9.604	0.16	0.16	1.30	81	2.02	1.08	81	1.3	100	0.050	101	100	7.0	-0.1	369	75	75	72	-0.036	5.04	0.0053
61	9.823	9.765	0.16	0.16	1.30	81	2.02	1.08	81	1.3	101	0.050	103	101	7.0	0	370	75	75	72	-0.036	5.93	0.00478
62	9.985	9.927	0.16	0.16	1.30	81	2.01	1.08	81	1.3	99	0.050	101	102	6.9	-0.1	365	75	75	72	-0.036	6.94	0.00536
63	10.146	10.088	0.16	0.16	1.30	81	2.01	1.08	81	1.3	99	0.050	101	101	6.9	0	360	75	75	72	-0.035	3.98	0.01281
64	10.307	10.249	0.16	0.16	1.31	81	2.01	1.08	81	1.3	98	0.050	101	101	6.8	-0.1	356	75	75	72	-0.035	3.36	0.00575
65	10.469	10.410	0.16	0.16	1.30	81	2.01	1.08	81	1.3	98	0.050	101	101	6.8	0	351	75	75	72	-0.034	2.52	0.01412
66	10.631	10.572	0.16	0.16	1.30	81	2.02	1.07	81	1.3	98	0.050	101	102	6.8	0	350	75	75	72	-0.034	3.67	0.0099
67	10.793	10.732	0.16	0.16	1.30	81	2.02	1.07	81	1.3	98	0.050	101	100	6.8	0	346	75	75	72	-0.033	2.9	0.0089
68	10.954	10.894	0.16	0.16	1.30	82	2.02	1.08	81	1.3	98	0.050	100	102	6.7	-0.1	344	75	75	72	-0.034	2.2	0.03534
69	11.115	11.056	0.16	0.16	1.30	82	2.01	1.07	81	1.3	97	0.050	100	102	6.7	0	342	75	75	72	-0.032	3.81	0.00384

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub> 13.43			V <sub>scent</sub> 15.16			F <sub>p</sub> 0.886			

\*H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
70	11.277	11.216	0.16	0.16	1.30	82	2.01	1.07	81	1.3	97	0.050	101	100	6.7	0	338	75	75	72	-0.032	2.48	0.00712
71	11.439	11.377	0.16	0.16	1.31	82	2.02	1.07	81	1.3	97	0.050	101	101	6.6	-0.1	336	75	75	72	-0.031	2.32	0.00822
72	11.601	11.538	0.16	0.16	1.30	82	2.01	1.08	81	1.3	97	0.050	101	101	6.6	0	333	75	75	72	-0.031	3.08	0.0064
73	11.762	11.700	0.16	0.16	1.29	82	2.02	1.08	81	1.3	97	0.050	100	102	6.6	0	329	75	75	72	-0.031	2.5	0.01511
74	11.924	11.860	0.16	0.16	1.30	82	2.01	1.07	81	1.3	97	0.050	101	100	6.6	0	328	75	75	72	-0.031	2.93	0.01188
75	12.085	12.021	0.16	0.16	1.30	82	2.02	1.08	82	1.3	96	0.050	100	101	6.5	-0.1	324	75	75	72	-0.030	2.32	0.00575
76	12.247	12.184	0.16	0.16	1.30	82	2.01	1.07	82	1.3	96	0.050	101	102	6.5	0	321	75	75	72	-0.029	1.94	0.01882
77	12.409	12.344	0.16	0.16	1.30	82	2.02	1.07	82	1.3	96	0.050	101	100	6.5	0	320	75	75	72	-0.029	2.92	0.01012
78	12.571	12.505	0.16	0.16	1.29	82	2.02	1.08	82	1.3	96	0.050	101	101	6.5	0	316	75	75	72	-0.029	2.26	0.00815
79	12.732	12.666	0.16	0.16	1.30	82	2.02	1.08	82	1.3	96	0.050	100	101	6.4	-0.1	316	75	75	72	-0.030	3.06	0.0054
80	12.893	12.828	0.16	0.16	1.31	82	2.02	1.08	82	1.3	96	0.050	100	101	6.4	0	312	75	75	72	-0.029	2.72	0.00565
81	13.055	12.988	0.16	0.16	1.30	82	2.02	1.07	82	1.3	96	0.050	101	100	6.4	0	312	75	75	72	-0.029	2.47	0.01686
82	13.217	13.150	0.16	0.16	1.29	82	2.02	1.08	82	1.3	95	0.050	101	101	6.3	-0.1	310	75	75	72	-0.028	3.11	0.00472
83	13.379	13.311	0.16	0.16	1.30	82	2.02	1.07	82	1.3	95	0.050	101	101	6.3	0	307	75	75	72	-0.028	2.05	0.01778
84	13.540	13.472	0.16	0.16	1.29	82	2.02	1.07	82	1.3	95	0.050	100	101	6.3	0	308	75	75	72	-0.028	3.28	0.00699
85	13.702	13.633	0.16	0.16	1.30	82	2.02	1.08	82	1.3	95	0.050	101	101	6.3	0	308	75	75	72	-0.028	3.49	0.00481
86	13.864	13.794	0.16	0.16	1.30	82	2.02	1.07	82	1.3	95	0.050	101	101	6.2	-0.1	305	75	75	72	-0.028	2.45	0.01849
87	14.026	13.956	0.16	0.16	1.30	82	2.02	1.08	82	1.3	95	0.050	101	101	6.2	0	305	75	75	72	-0.027	3.77	0.00695
88	14.188	14.116	0.16	0.16	1.30	82	2.02	1.07	82	1.3	95	0.050	101	100	6.2	0	300	75	75	72	-0.027	1.39	0.07226
89	14.349	14.277	0.16	0.16	1.29	82	2.02	1.08	82	1.3	94	0.050	100	101	6.2	0	300	75	75	72	-0.027	2.42	0.01087
90	14.511	14.439	0.16	0.16	1.30	83	2.02	1.07	82	1.3	94	0.050	100	101	6.1	-0.1	299	75	75	71	-0.027	2.68	0.00608
91	14.672	14.600	0.16	0.16	1.30	83	2.02	1.07	82	1.3	94	0.050	100	101	6.1	0	296	75	75	72	-0.026	2.88	0.00906
92	14.834	14.761	0.16	0.16	1.30	83	2.03	1.07	82	1.3	94	0.050	100	101	6.1	0	296	75	75	72	-0.027	2.25	0.01535
93	14.996	14.922	0.16	0.16	1.30	83	2.03	1.08	82	1.3	93	0.050	100	100	6.1	0	292	75	74	72	-0.026	2.42	0.01626
94	15.158	15.084	0.16	0.16	1.29	83	2.03	1.07	82	1.3	93	0.050	100	101	6.0	-0.1	292	75	74	71	-0.026	2.36	0.02984
95	15.319	15.245	0.16	0.16	1.30	83	2.03	1.07	82	1.3	93	0.050	100	100	6.0	0	292	75	74	71	-0.026	3.32	0.00452
96	15.481	15.405	0.16	0.16	1.30	83	2.03	1.08	82	1.3	93	0.050	100	100	6.0	0	290	75	74	72	-0.026	1.98	0.02931
97	15.642	15.567	0.16	0.16	1.30	83	2.03	1.07	82	1.3	92	0.050	100	101	6.0	0	290	74	74	71	-0.026	2.77	0.0091
98	15.805	15.728	0.16	0.16	1.30	83	2.02	1.07	82	1.3	92	0.050	101	100	5.9	-0.1	288	74	74	71	-0.026	2.79	0.00696
99	15.967	15.889	0.16	0.16	1.29	83	2.03	1.07	82	1.3	92	0.050	100	100	5.9	0	290	74	74	71	-0.026	2.81	0.00786
100	16.128	16.050	0.16	0.16	1.30	83	2.03	1.08	82	1.3	91	0.050	100	100	5.9	0	289	74	74	71	-0.026	2.76	0.00679
101	16.290	16.212	0.16	0.16	1.30	83	2.02	1.07	82	1.3	91	0.050	100	101	5.9	0	287	74	74	71	-0.026	2.37	0.00786
102	16.451	16.372	0.16	0.16	1.30	83	2.02	1.07	82	1.3	90	0.050	99	100	5.8	-0.1	288	74	74	71	-0.027	3.21	0.00723
103	16.613	16.533	0.16	0.16	1.31	83	2.02	1.08	82	1.3	90	0.050	100	100	5.8	0	287	74	74	72	-0.026	2.96	0.00458
104	16.776	16.694	0.16	0.16	1.30	83	2.03	1.08	82	1.3	90	0.050	101	100	5.8	0	287	74	74	71	-0.026	3.14	0.01298

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	<u>0.026</u>	<u>0.046</u>	<u>0.050</u>	<u>0.032</u>	<u>0.028</u>	<u>0.046</u>	<u>0.046</u>	<u>0.034</u>	<u>0.050</u>
Temp:	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
V <sub>strav</sub>		<u>13.43</u>		ft/sec		V <sub>scent</sub>		<u>15.16</u>	
						ft/sec		F <sub>p</sub>	
								<u>0.886</u>	

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
105	16.938	16.856	0.16	0.16	1.30	83	2.03	1.08	82	1.3	90	0.050	100	101	5.7	-0.1	283	74	74	72	-0.026	1.63	0.0266
106	17.099	17.017	0.16	0.16	1.30	83	2.03	1.07	82	1.3	90	0.050	99	100	5.7	0	285	74	74	71	-0.026	2.84	0.00617
107	17.260	17.178	0.16	0.16	1.30	83	2.03	1.08	82	1.3	90	0.050	99	100	5.7	0	284	74	74	70	-0.026	2.32	0.00663
108	17.422	17.340	0.16	0.16	1.30	83	2.03	1.07	82	1.3	89	0.050	100	101	5.7	0	285	74	73	71	-0.026	2.45	0.01467
109	17.585	17.501	0.16	0.16	1.30	83	2.03	1.07	82	1.3	89	0.050	101	100	5.6	-0.1	285	74	73	71	-0.026	2.75	0.00982
110	17.747	17.662	0.16	0.16	1.30	83	2.02	1.08	82	1.3	90	0.050	100	100	5.6	0	287	74	73	71	-0.026	3.23	0.00585
111	17.909	17.823	0.16	0.16	1.29	83	2.02	1.08	82	1.3	89	0.050	100	100	5.6	0	284	74	73	71	-0.026	2.11	0.01464
112	18.070	17.985	0.16	0.16	1.31	83	2.03	1.07	82	1.3	89	0.050	99	101	5.6	0	286	74	73	71	-0.026	3.49	0.00559
113	18.232	18.145	0.16	0.16	1.30	83	2.02	1.07	82	1.3	89	0.050	100	99	5.5	-0.1	282	73	73	71	-0.026	1.98	0.02189
114	18.394	18.306	0.16	0.16	1.31	83	2.03	1.07	82	1.3	89	0.050	100	100	5.5	0	282	73	73	71	-0.026	1.73	0.03502
115	18.557	18.468	0.16	0.16	1.30	83	2.04	1.08	82	1.3	89	0.050	101	101	5.5	0	284	73	73	71	-0.026	2.97	0.00621
116	18.718	18.629	0.16	0.16	1.30	83	2.03	1.07	82	1.3	89	0.050	99	100	5.5	0	284	73	73	70	-0.026	2.61	0.00731
117	18.880	18.790	0.16	0.16	1.30	83	2.02	1.07	82	1.3	89	0.050	100	100	5.4	-0.1	285	73	73	70	-0.026	2.86	0.00753
118	19.041	18.951	0.16	0.16	1.31	83	2.02	1.07	82	1.3	89	0.050	99	100	5.4	0	284	73	73	71	-0.026	2.72	0.00543
119	19.203	19.113	0.16	0.16	1.30	83	2.03	1.07	82	1.3	89	0.050	100	101	5.4	0	283	73	73	71	-0.026	1.98	0.03097
120	19.366	19.274	0.16	0.16	1.31	83	2.03	1.07	82	1.3	89	0.050	101	100	5.3	-0.1	287	73	72	70	-0.026	4.1	0.00407
121	19.528	19.435	0.16	0.16	1.30	83	2.04	1.08	82	1.3	89	0.050	100	100	5.3	0	287	73	72	70	-0.026	2.82	0.00822
122	19.690	19.596	0.16	0.16	1.29	83	2.03	1.07	82	1.3	89	0.050	100	100	5.3	0	286	73	72	70	-0.026	2.59	0.01208
123	19.851	19.758	0.16	0.16	1.30	82	2.03	1.08	82	1.3	88	0.050	99	101	5.3	0	284	73	72	70	-0.025	2.54	0.01051
124	20.013	19.918	0.16	0.16	1.31	82	2.03	1.07	82	1.3	88	0.050	100	99	5.2	-0.1	280	73	72	69	-0.025	1.92	0.02727
125	20.175	20.079	0.16	0.16	1.31	82	2.04	1.08	82	1.3	88	0.050	100	100	5.2	0	282	73	72	69	-0.027	2.32	0.02413
126	20.338	20.241	0.16	0.16	1.30	82	2.03	1.07	82	1.3	88	0.050	101	101	5.2	0	284	72	72	69	-0.025	3.54	0.0041
127	20.499	20.402	0.16	0.16	1.30	82	2.04	1.07	82	1.3	88	0.050	99	100	5.2	0	284	72	72	70	-0.026	2.72	0.01074
128	20.661	20.563	0.16	0.16	1.30	82	2.04	1.07	82	1.3	88	0.050	100	100	5.1	-0.1	287	72	72	69	-0.026	3.9	0.0054
129	20.823	20.724	0.16	0.16	1.30	82	2.03	1.07	82	1.3	88	0.050	100	100	5.1	0	283	72	72	69	-0.026	2.07	0.02067
130	20.984	20.886	0.16	0.16	1.30	82	2.03	1.07	82	1.3	88	0.050	99	101	5.1	0	283	72	72	69	-0.026	2.33	0.01934
131	21.146	21.046	0.16	0.16	1.31	82	2.03	1.07	82	1.3	87	0.050	100	99	5.0	-0.1	283	72	72	69	-0.026	3.42	0.00679
132	21.309	21.207	0.16	0.16	1.30	82	2.03	1.07	82	1.3	87	0.050	101	100	5.0	0	283	72	72	69	-0.027	2.33	0.01321
133	21.471	21.369	0.16	0.16	1.30	82	2.04	1.07	82	1.3	88	0.050	100	101	5.0	0	286	72	72	70	-0.026	3.48	0.00893
134	21.632	21.530	0.16	0.16	1.30	82	2.03	1.07	82	1.3	87	0.050	99	100	5.0	0	284	72	72	69	-0.026	2.59	0.01181
135	21.794	21.691	0.16	0.16	1.31	82	2.03	1.08	82	1.3	88	0.050	100	100	4.9	-0.1	285	72	72	70	-0.026	2.66	0.00912
136	21.955	21.852	0.16	0.16	1.31	82	2.03	1.07	82	1.3	87	0.050	99	100	4.9	0	285	72	71	70	-0.027	3.3	0.00588
137	22.118	22.014	0.16	0.16	1.30	82	2.03	1.07	82	1.3	87	0.050	101	101	4.9	0	282	72	71	69	-0.027	2.16	0.02148
138	22.280	22.174	0.16	0.16	1.30	82	2.04	1.07	82	1.3	87	0.050	100	99	4.9	0	283	72	71	69	-0.027	2.14	0.01831
139	22.442	22.335	0.16	0.16	1.30	82	2.03	1.08	82	1.3	87	0.050	100	100	4.8	-0.1	283	72	71	68	-0.027	2.99	0.01084



## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>			V <sub>scnt</sub>			F <sub>p</sub>			
13.43			15.16			0.886			

\*H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
140	22.603	22.496	0.16	0.16	1.30	82	2.03	1.07	82	1.3	87	0.050	99	100	4.8	0	284	72	71	69	-0.027	2.62	0.00637
141	22.765	22.658	0.16	0.16	1.31	82	2.04	1.07	82	1.3	87	0.050	100	101	4.8	0	285	72	71	69	-0.026	3.73	0.00507
142	22.927	22.818	0.16	0.16	1.30	82	2.03	1.07	81	1.3	87	0.050	100	99	4.8	0	281	72	71	69	-0.026	1.81	0.05255
143	23.090	22.979	0.16	0.16	1.30	82	2.04	1.07	81	1.3	87	0.050	101	100	4.7	-0.1	285	71	71	69	-0.027	3.64	0.00614
144	23.251	23.141	0.16	0.16	1.30	82	2.04	1.07	81	1.3	87	0.050	99	101	4.7	0	283	71	71	68	-0.026	2.53	0.01599
145	23.413	23.301	0.16	0.16	1.30	82	2.04	1.07	81	1.3	87	0.050	100	99	4.7	0	284	71	71	68	-0.027	2.96	0.011
146	23.574	23.462	0.16	0.16	1.31	82	2.03	1.07	81	1.3	87	0.050	99	100	4.6	-0.1	285	71	71	69	-0.026	3.18	0.00494
147	23.736	23.623	0.16	0.16	1.31	82	2.03	1.07	81	1.3	87	0.050	100	100	4.6	0	284	71	71	69	-0.027	2.48	0.01194
148	23.899	23.784	0.16	0.16	1.31	82	2.04	1.07	81	1.3	87	0.050	101	100	4.6	0	287	71	71	68	-0.027	3.52	0.00682
149	24.060	23.945	0.16	0.16	1.30	81	2.04	1.07	81	1.3	87	0.050	100	100	4.6	0	281	71	71	69	-0.026	1.95	0.0218
150	24.222	24.105	0.16	0.16	1.30	81	2.03	1.07	81	1.3	87	0.050	100	99	4.5	-0.1	279	71	71	68	-0.026	1.32	0.07326
151	24.384	24.267	0.16	0.16	1.30	81	2.04	1.07	81	1.3	87	0.050	100	101	4.5	0	284	71	71	68	-0.027	3.53	0.00523
152	24.545	24.427	0.16	0.16	1.30	81	2.03	1.07	81	1.3	86	0.050	99	99	4.5	0	282	71	71	68	-0.026	2.74	0.01094
153	24.707	24.588	0.16	0.16	1.31	81	2.03	1.07	81	1.3	86	0.050	100	100	4.4	-0.1	283	71	71	69	-0.027	2.3	0.017
154	24.870	24.750	0.16	0.16	1.30	81	2.03	1.07	81	1.3	87	0.050	101	101	4.4	0	285	71	71	68	-0.026	3.95	0.00613
155	25.031	24.910	0.16	0.16	1.30	81	2.03	1.06	81	1.3	86	0.050	99	99	4.4	0	281	71	71	68	-0.026	1.97	0.02459
156	25.192	25.071	0.16	0.16	1.30	81	2.04	1.07	81	1.3	87	0.050	100	100	4.4	0	282	71	71	68	-0.027	2.61	0.01408
157	25.354	25.231	0.16	0.16	1.30	81	2.03	1.07	81	1.3	86	0.050	100	99	4.3	-0.1	279	71	71	68	-0.026	2.52	0.00721
158	25.516	25.393	0.16	0.16	1.30	81	2.04	1.07	81	1.3	86	0.050	100	101	4.3	0	278	71	70	68	-0.026	1.94	0.02329
159	25.678	25.553	0.16	0.16	1.30	81	2.03	1.07	81	1.3	86	0.050	100	99	4.3	0	280	71	70	68	-0.027	3.01	0.00491
160	25.840	25.714	0.16	0.16	1.30	81	2.04	1.07	81	1.3	86	0.050	100	100	4.3	0	280	71	70	68	-0.025	2.64	0.01246
161	26.002	25.875	0.16	0.16	1.29	81	2.04	1.07	81	1.3	87	0.050	100	100	4.2	-0.1	281	71	70	68	-0.027	2.97	0.00799
162	26.163	26.036	0.16	0.16	1.31	81	2.04	1.07	81	1.3	87	0.050	100	100	4.2	0	280	71	70	68	-0.026	2.28	0.01188
163	26.325	26.196	0.16	0.16	1.30	81	2.05	1.07	81	1.3	86	0.050	100	99	4.2	0	280	71	70	68	-0.027	2.45	0.0112
164	26.486	26.357	0.16	0.16	1.31	81	2.04	1.07	81	1.3	86	0.050	99	100	4.1	-0.1	280	71	70	68	-0.026	2.55	0.0074
165	26.648	26.518	0.16	0.16	1.30	81	2.04	1.06	81	1.3	86	0.050	100	100	4.1	0	278	71	70	68	-0.026	1.96	0.01467
166	26.810	26.678	0.16	0.16	1.29	81	2.04	1.07	81	1.3	86	0.050	100	99	4.1	0	279	70	70	69	-0.026	2.95	0.00455
167	26.971	26.839	0.16	0.16	1.30	81	2.04	1.06	81	1.3	86	0.050	99	100	4.1	0	275	70	70	68	-0.026	1.94	0.02009
168	27.133	27.000	0.16	0.16	1.30	81	2.04	1.07	81	1.3	86	0.050	100	100	4.1	0	277	70	70	68	-0.026	2.55	0.01214
169	27.294	27.160	0.16	0.16	1.30	81	2.05	1.06	81	1.3	86	0.050	99	99	4.0	-0.1	279	70	70	68	-0.027	2.73	0.00562
170	27.457	27.320	0.16	0.16	1.30	81	2.04	1.07	80	1.3	86	0.050	101	100	4.0	0	279	70	70	68	-0.028	2.75	0.00488
171	27.618	27.482	0.16	0.16	1.29	81	2.05	1.07	80	1.3	86	0.050	99	101	4.0	0	281	70	70	68	-0.026	3.23	0.0041
172	27.779	27.642	0.16	0.16	1.30	81	2.04	1.06	80	1.3	85	0.050	99	99	3.9	-0.1	276	70	70	68	-0.026	1.36	0.07713
173	27.940	27.802	0.16	0.16	1.30	81	2.05	1.07	80	1.3	86	0.050	99	100	3.9	0	279	70	70	68	-0.026	2.83	0.00585
174	28.102	27.963	0.16	0.16	1.30	80	2.05	1.07	80	1.3	86	0.050	100	100	3.9	0	280	70	70	68	-0.026	3.14	0.0065

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>			13.43			ft/sec			
V <sub>scnt</sub>			15.16			ft/sec			
F <sub>p</sub>			0.886						

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
175	28.265	28.124	0.16	0.16	1.30	80	2.05	1.06	80	1.3	86	0.050	101	100	3.9	0	277	70	70	67	-0.026	1.57	0.06381
176	28.426	28.284	0.16	0.16	1.29	80	2.05	1.07	80	1.3	86	0.050	100	100	3.8	-0.1	280	70	70	68	-0.027	3.31	0.00591
177	28.587	28.444	0.16	0.16	1.30	80	2.04	1.07	80	1.3	86	0.050	100	100	3.8	0	284	70	70	68	-0.028	3.82	0.00478
178	28.748	28.605	0.16	0.16	1.31	80	2.05	1.07	80	1.3	86	0.050	100	100	3.8	0	282	70	70	68	-0.026	2.16	0.02513
179	28.910	28.765	0.16	0.16	1.30	80	2.04	1.07	80	1.3	85	0.050	100	99	3.7	-0.1	281	70	70	67	-0.026	2.6	0.00608
180	29.072	28.925	0.16	0.16	1.30	80	2.04	1.06	80	1.3	85	0.050	100	99	3.7	0	275	70	70	68	-0.027	1.33	0.05012
181	29.233	29.087	0.16	0.16	1.29	80	2.04	1.07	80	1.3	86	0.050	100	101	3.7	0	280	70	70	68	-0.026	2.82	0.0112
182	29.395	29.246	0.16	0.16	1.30	80	2.05	1.06	80	1.3	86	0.050	100	99	3.7	0	280	70	70	68	-0.026	3.14	0.00465
183	29.556	29.407	0.16	0.16	1.30	80	2.05	1.06	80	1.3	86	0.050	100	100	3.6	-0.1	278	70	70	68	-0.026	2.01	0.01668
184	29.717	29.568	0.16	0.16	1.30	80	2.04	1.06	80	1.3	86	0.050	100	100	3.6	0	278	70	70	68	-0.026	2.48	0.0054
185	29.879	29.728	0.16	0.16	1.30	80	2.05	1.06	80	1.3	84	0.050	100	99	3.6	0	268	70	70	68	-0.028	2.48	0.00734
186	30.041	29.888	0.16	0.16	1.30	80	2.05	1.07	80	1.3	84	0.050	100	99	3.6	0	261	70	70	69	-0.027	2.28	0.00731
187	30.202	30.049	0.16	0.16	1.30	80	2.05	1.06	80	1.3	84	0.050	99	100	3.5	-0.1	258	70	70	69	-0.025	2.88	0.01016
188	30.363	30.209	0.16	0.16	1.30	80	2.05	1.06	80	1.3	83	0.050	99	99	3.5	0	255	70	70	69	-0.025	3	0.00481
189	30.524	30.369	0.16	0.16	1.30	80	2.04	1.07	80	1.3	82	0.050	99	99	3.5	0	246	70	70	69	-0.025	1.8	0.02987
190	30.687	30.530	0.16	0.16	1.30	80	2.04	1.06	80	1.3	82	0.050	101	100	3.5	0	242	70	70	69	-0.024	2.62	0.00753
191	30.848	30.690	0.16	0.16	1.29	80	2.04	1.06	80	1.3	81	0.050	99	99	3.5	0	237	70	70	69	-0.024	2.94	0.00426
192	31.009	30.849	0.16	0.16	1.29	80	2.04	1.06	80	1.3	81	0.050	99	98	3.5	0	233	70	70	69	-0.023	3.4	0.00553
193	31.170	31.010	0.16	0.16	1.30	80	2.05	1.06	80	1.3	80	0.050	99	100	3.4	-0.1	229	70	70	69	-0.023	1.23	0.08661
194	31.331	31.170	0.16	0.16	1.30	80	2.06	1.06	80	1.3	81	0.050	99	99	3.4	0	232	70	70	69	-0.022	1.92	0.01966
195	31.493	31.330	0.16	0.16	1.29	80	2.06	1.06	80	1.3	81	0.050	100	99	3.4	0	233	70	70	69	-0.022	2.99	0.0041
196	31.654	31.490	0.16	0.16	1.29	80	2.05	1.06	80	1.3	81	0.050	99	99	3.4	0	232	70	70	69	-0.022	2.56	0.00938
197	31.815	31.651	0.16	0.16	1.30	80	2.05	1.05	80	1.3	81	0.050	99	100	3.4	0	231	70	70	69	-0.023	3.6	0.00572
198	31.976	31.810	0.16	0.16	1.30	80	2.05	1.06	80	1.3	81	0.050	99	98	3.3	-0.1	231	70	70	69	-0.021	2.55	0.00903
199	32.137	31.970	0.16	0.16	1.30	80	2.05	1.06	80	1.3	82	0.050	99	99	3.3	0	235	70	70	69	-0.022	2.41	0.00879
200	32.299	32.131	0.16	0.16	1.30	80	2.05	1.05	80	1.3	82	0.050	100	100	3.3	0	237	70	70	69	-0.022	2.26	0.01509
201	32.460	32.290	0.16	0.16	1.29	80	2.06	1.06	80	1.4	82	0.050	99	99	3.3	0	238	70	70	69	-0.023	2.47	0.00815
202	32.621	32.450	0.16	0.16	1.29	80	2.06	1.06	80	1.3	82	0.050	99	99	3.3	0	238	70	70	69	-0.022	2.54	0.0065
203	32.781	32.610	0.16	0.16	1.29	80	2.05	1.06	80	1.3	83	0.050	99	99	3.2	-0.1	240	70	70	69	-0.023	2.98	0.00465
204	32.943	32.770	0.16	0.16	1.30	80	2.06	1.06	80	1.3	82	0.050	100	99	3.2	0	237	70	70	69	-0.022	1.55	0.05038
205	33.104	32.929	0.16	0.16	1.29	80	2.06	1.06	80	1.3	83	0.050	99	99	3.2	0	240	70	70	69	-0.023	2.88	0.00643
206	33.265	33.090	0.16	0.16	1.29	80	2.06	1.06	80	1.3	82	0.050	99	100	3.2	0	233	70	70	69	-0.022	1.94	0.00715
207	33.426	33.249	0.16	0.16	1.30	80	2.05	1.06	80	1.3	82	0.050	99	99	3.2	0	229	70	70	69	-0.021	1.68	0.01656
208	33.586	33.409	0.16	0.16	1.29	80	2.06	1.06	80	1.3	82	0.050	99	99	3.1	-0.1	230	70	70	69	-0.021	2.56	0.00504
209	33.748	33.569	0.16	0.16	1.29	80	2.06	1.05	80	1.3	82	0.050	100	99	3.1	0	231	70	70	69	-0.021	2.96	0.0112

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>		13.43		ft/sec		V <sub>scent</sub>		15.16	
						ft/sec		F <sub>p</sub>	
								0.886	

°H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
210	33.909	33.728	0.16	0.16	1.29	80	2.06	1.05	80	1.4	82	0.050	99	99	3.1	0	229	70	70	69	-0.021	2.09	0.01145
211	34.069	33.888	0.16	0.16	1.29	80	2.07	1.06	80	1.3	82	0.050	99	99	3.1	0	232	70	70	69	-0.021	2.55	0.00552
212	34.230	34.048	0.16	0.16	1.29	80	2.05	1.06	80	1.4	83	0.050	99	99	3.0	-0.1	235	70	70	70	-0.022	3.92	0.00526
213	34.391	34.207	0.16	0.16	1.29	80	2.06	1.05	80	1.3	82	0.050	99	99	3.0	0	232	71	70	70	-0.021	2.02	0.00873
214	34.553	34.367	0.16	0.16	1.29	80	2.07	1.05	80	1.3	82	0.050	100	99	3.0	0	229	71	70	70	-0.021	1.29	0.05149
215	34.713	34.527	0.16	0.16	1.28	80	2.07	1.04	80	1.3	83	0.050	99	99	3.0	0	230	71	70	69	-0.020	2.32	0.00582
216	34.874	34.686	0.16	0.16	1.28	80	2.07	1.06	80	1.4	83	0.050	99	99	3.0	0	230	71	71	70	-0.021	2.18	0.00867
217	35.034	34.846	0.16	0.16	1.29	80	2.06	1.05	80	1.3	83	0.050	99	99	3.0	0	232	71	71	70	-0.021	3.41	0.00514
218	35.196	35.005	0.16	0.16	1.29	80	2.06	1.05	80	1.4	82	0.050	100	99	2.9	-0.1	229	71	71	70	-0.021	2.62	0.02335
219	35.357	35.164	0.16	0.16	1.28	80	2.06	1.06	80	1.4	83	0.050	99	99	2.9	0	229	71	71	70	-0.021	2.13	0.00922
220	35.517	35.325	0.16	0.16	1.29	80	2.06	1.05	80	1.4	83	0.050	99	100	2.9	0	230	71	71	70	-0.021	2.88	0.00416
221	35.677	35.484	0.16	0.16	1.29	80	2.06	1.04	80	1.4	83	0.050	99	99	2.9	0	232	71	71	70	-0.020	3.02	0.00565
222	35.838	35.643	0.16	0.16	1.29	81	2.07	1.06	80	1.4	83	0.050	99	99	2.9	0	232	71	71	70	-0.021	2.72	0.00507
223	35.999	35.803	0.16	0.16	1.28	81	2.06	1.05	80	1.4	83	0.050	99	99	2.8	-0.1	230	71	71	70	-0.021	2.29	0.00562
224	36.160	35.962	0.16	0.16	1.28	81	2.07	1.05	80	1.4	83	0.050	99	99	2.8	0	231	71	71	70	-0.021	2.18	0.00966
225	36.320	36.121	0.16	0.16	1.29	81	2.06	1.05	80	1.4	83	0.050	99	99	2.8	0	230	71	71	70	-0.020	1.75	0.01282
226	36.481	36.281	0.16	0.16	1.29	81	2.07	1.05	80	1.4	83	0.050	99	99	2.8	0	231	71	71	70	-0.020	2.42	0.00676
227	36.642	36.440	0.16	0.16	1.28	81	2.06	1.05	80	1.4	83	0.050	99	99	2.8	0	229	71	71	70	-0.020	1.61	0.02912
228	36.803	36.599	0.16	0.16	1.28	81	2.06	1.05	80	1.4	83	0.050	99	99	2.7	-0.1	229	71	71	70	-0.020	2.19	0.01838
229	36.963	36.759	0.16	0.16	1.28	81	2.07	1.05	80	1.4	84	0.050	99	99	2.7	0	232	71	71	70	-0.021	2.78	0.00478
230	37.123	36.917	0.16	0.16	1.29	81	2.06	1.05	80	1.4	83	0.050	99	98	2.7	0	233	71	71	70	-0.021	3.91	0.00461
231	37.285	37.077	0.16	0.16	1.28	81	2.07	1.05	80	1.4	83	0.050	100	99	2.7	0	231	71	71	70	-0.020	2.32	0.00898
232	37.445	37.236	0.16	0.16	1.27	81	2.07	1.05	80	1.4	83	0.050	99	99	2.7	0	231	71	71	70	-0.020	2.07	0.00903
233	37.605	37.395	0.16	0.16	1.28	81	2.08	1.05	81	1.4	83	0.050	99	98	2.6	-0.1	231	71	71	70	-0.021	2.68	0.00452
234	37.765	37.555	0.16	0.16	1.29	81	2.07	1.04	81	1.4	84	0.050	99	99	2.6	0	232	71	71	69	-0.021	2.26	0.0041
235	37.926	37.713	0.16	0.16	1.29	81	2.07	1.05	81	1.4	84	0.050	99	98	2.6	0	228	71	71	69	-0.020	1.63	0.01901
236	38.087	37.872	0.16	0.16	1.28	81	2.08	1.05	81	1.4	84	0.050	99	99	2.6	0	229	71	71	69	-0.021	1.98	0.017
237	38.247	38.032	0.16	0.16	1.28	81	2.08	1.04	81	1.4	84	0.050	99	99	2.6	0	228	71	71	70	-0.020	1.87	0.00552
238	38.408	38.191	0.16	0.16	1.29	81	2.08	1.05	81	1.4	84	0.050	99	99	2.6	0	227	71	71	70	-0.019	2.68	0.0041
239	38.569	38.350	0.16	0.16	1.29	81	2.08	1.05	81	1.4	84	0.050	99	99	2.5	-0.1	223	71	71	70	-0.020	1.03	0.05488
240	38.730	38.510	0.16	0.16	1.29	81	2.08	1.05	81	1.4	83	0.050	99	99	2.5	0	223	71	71	70	-0.020	2.6	0.00523
241	38.890	38.668	0.16	0.16	1.28	81	2.08	1.04	81	1.4	84	0.050	99	98	2.5	0	228	71	71	70	-0.020	3.47	0.00562
242	39.050	38.828	0.16	0.16	1.28	81	2.07	1.05	81	1.4	84	0.050	99	99	2.5	0	227	71	71	70	-0.020	2.13	0.01446
243	39.211	38.987	0.16	0.16	1.29	81	2.07	1.04	81	1.4	83	0.050	99	98	2.5	0	222	71	71	70	-0.019	1.54	0.05187
244	39.372	39.145	0.16	0.16	1.28	81	2.07	1.05	81	1.4	83	0.050	99	98	2.4	-0.1	223	71	71	70	-0.020	2.74	0.02184

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>		13.43		ft/sec		V <sub>scnt</sub>		15.16	
						ft/sec		F <sub>p</sub>	
								0.886	

°H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
245	39.533	39.305	0.16	0.16	1.27	81	2.07	1.05	81	1.4	83	0.050	99	99	2.4	0	226	71	71	70	-0.020	3.52	0.00329
246	39.693	39.464	0.16	0.16	1.28	81	2.08	1.04	81	1.4	84	0.050	99	99	2.4	0	227	71	71	70	-0.021	2.23	0.00601
247	39.853	39.623	0.16	0.16	1.28	81	2.08	1.05	81	1.4	84	0.050	99	99	2.4	0	228	71	71	70	-0.020	3.23	0.00611
248	40.014	39.782	0.16	0.16	1.28	81	2.08	1.04	81	1.4	84	0.050	99	99	2.3	-0.1	231	71	71	70	-0.020	3.25	0.00475
249	40.175	39.941	0.16	0.16	1.28	81	2.07	1.04	81	1.4	84	0.050	99	99	2.3	0	230	71	71	70	-0.020	2.73	0.00595
250	40.335	40.099	0.16	0.16	1.28	81	2.08	1.05	81	1.4	84	0.050	99	98	2.3	0	228	71	71	70	-0.020	1.57	0.05134
251	40.495	40.259	0.16	0.16	1.28	81	2.08	1.04	81	1.4	84	0.050	99	99	2.3	0	228	71	71	70	-0.020	2.47	0.00575
252	40.658	40.419	0.16	0.16	1.34	81	2.09	1.08	81	1.4	83	0.050	100	99	2.3	0	224	71	71	70	-0.020	2.09	0.00491
253	40.822	40.580	0.16	0.16	1.31	81	2.09	1.08	81	1.4	83	0.050	101	100	2.2	-0.1	218	71	71	70	-0.020	1.59	0.01602
254	40.984	40.743	0.16	0.16	1.31	81	2.1	1.08	81	1.4	83	0.050	100	101	2.2	0	219	71	71	70	-0.020	2.34	0.00977
255	41.146	40.904	0.16	0.16	1.30	81	2.1	1.07	81	1.4	83	0.050	100	100	2.2	0	218	71	71	70	-0.019	2.86	0.00595
256	41.308	41.065	0.16	0.16	1.31	81	2.1	1.08	81	1.4	83	0.050	100	100	2.2	0	219	71	71	70	-0.019	1.96	0.00498
257	41.469	41.227	0.16	0.16	1.31	81	2.1	1.07	81	1.4	83	0.050	99	100	2.2	0	223	72	71	70	-0.019	2.74	0.00734
258	41.631	41.389	0.16	0.16	1.31	81	2.1	1.08	81	1.4	83	0.050	100	100	2.2	0	225	71	71	70	-0.020	3.27	0.00578
259	41.794	41.550	0.16	0.16	1.30	81	2.1	1.08	81	1.4	83	0.050	100	100	2.1	-0.1	226	71	71	70	-0.020	3.39	0.00712
260	41.956	41.711	0.16	0.16	1.31	81	2.1	1.08	81	1.4	84	0.050	100	100	2.1	0	231	72	71	70	-0.021	3.57	0.00491
261	42.118	41.873	0.16	0.16	1.30	81	2.1	1.08	81	1.4	84	0.050	100	100	2.1	0	233	72	71	71	-0.021	2.6	0.00766
262	42.280	42.035	0.16	0.16	1.30	81	2.1	1.08	81	1.4	85	0.050	100	101	2.1	0	235	72	71	70	-0.020	2.07	0.0111
263	42.442	42.196	0.16	0.16	1.31	81	2.1	1.08	81	1.4	85	0.050	100	100	2.0	-0.1	235	72	72	70	-0.021	2.07	0.00983
264	42.604	42.357	0.16	0.16	1.31	81	2.1	1.08	81	1.4	85	0.050	100	100	2.0	0	237	72	72	71	-0.020	2.22	0.01066
265	42.767	42.519	0.16	0.16	1.31	81	2.1	1.08	81	1.4	85	0.050	101	101	2.0	0	237	72	72	70	-0.020	1.97	0.00763
266	42.928	42.680	0.16	0.16	1.30	81	2.11	1.08	81	1.4	85	0.050	99	100	2.0	0	238	72	72	70	-0.020	2.79	0.00432
267	43.090	42.841	0.16	0.16	1.30	81	2.1	1.08	81	1.4	85	0.050	100	100	2.0	0	237	72	72	70	-0.021	2.13	0.01077
268	43.252	43.002	0.16	0.16	1.30	81	2.11	1.08	81	1.4	85	0.050	100	100	1.9	-0.1	237	72	72	70	-0.021	1.96	0.01214
269	43.414	43.164	0.16	0.16	1.31	82	2.1	1.08	81	1.4	85	0.050	100	101	1.9	0	237	72	72	70	-0.021	2.43	0.00595
270	43.576	43.325	0.16	0.16	1.31	82	2.11	1.07	81	1.4	85	0.050	100	100	1.9	0	238	72	72	70	-0.021	2.77	0.00348
271	43.739	43.486	0.16	0.16	1.31	82	2.11	1.08	81	1.4	86	0.050	101	100	1.9	0	239	72	72	70	-0.021	2.07	0.01059
272	43.900	43.647	0.16	0.16	1.30	82	2.1	1.08	81	1.4	86	0.050	99	100	1.8	-0.1	239	72	72	70	-0.021	3.43	0.00365
273	44.062	43.809	0.16	0.16	1.31	82	2.11	1.08	81	1.4	86	0.050	100	101	1.8	0	241	72	72	70	-0.021	2.07	0.0414
274	44.223	43.970	0.16	0.16	1.31	82	2.11	1.07	81	1.4	86	0.050	99	100	1.8	0	241	72	72	70	-0.021	2.16	0.00809
275	44.385	44.131	0.16	0.16	1.31	82	2.1	1.08	81	1.4	86	0.050	100	100	1.8	0	239	72	72	71	-0.020	2	0.01045
276	44.548	44.293	0.16	0.16	1.30	82	2.11	1.07	81	1.4	86	0.050	101	101	1.8	0	240	72	72	71	-0.021	2.64	0.0112
277	44.710	44.454	0.16	0.16	1.31	82	2.11	1.07	81	1.4	86	0.050	100	100	1.7	-0.1	240	72	72	71	-0.021	1.92	0.01249
278	44.872	44.614	0.16	0.16	1.30	82	2.11	1.08	81	1.4	86	0.050	100	99	1.7	0	237	72	72	71	-0.020	1.32	0.03266
279	45.034	44.775	0.16	0.16	1.30	82	2.11	1.07	81	1.4	86	0.050	100	100	1.7	0	240	72	72	71	-0.021	2.35	0.00604

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	<u>0.026</u>	<u>0.046</u>	<u>0.050</u>	<u>0.032</u>	<u>0.028</u>	<u>0.046</u>	<u>0.046</u>	<u>0.034</u>	<u>0.050</u>
Temp:	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
V <sub>strav</sub>		<u>13.43</u>		ft/sec		V <sub>scent</sub>		<u>15.16</u>	
						ft/sec		F <sub>p</sub>	
								<u>0.886</u>	

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
280	45.195	44.937	0.16	0.16	1.31	82	2.11	1.07	81	1.4	86	0.050	99	101	1.7	0	240	72	72	71	-0.021	1.91	0.01201
281	45.357	45.098	0.16	0.16	1.31	82	2.1	1.07	81	1.4	86	0.050	100	100	1.7	0	236	72	72	71	-0.020	1.58	0.03177
282	45.520	45.259	0.16	0.16	1.30	82	2.12	1.07	81	1.4	86	0.050	101	100	1.7	0	233	72	72	71	-0.019	0.97	0
283	45.682	45.421	0.16	0.16	1.30	82	2.12	1.08	81	1.4	86	0.050	100	101	1.6	-0.1	234	72	72	71	-0.021	2.56	0.00653
284	45.843	45.581	0.16	0.16	1.30	82	2.11	1.07	82	1.4	86	0.050	99	99	1.6	0	235	72	72	70	-0.019	3.03	0.00335
285	46.005	45.742	0.16	0.16	1.30	82	2.11	1.07	82	1.4	86	0.050	100	100	1.6	0	233	72	72	71	-0.020	1.53	0.02518
286	46.167	45.903	0.16	0.16	1.30	82	2.11	1.07	81	1.4	86	0.050	100	100	1.6	0	234	72	72	71	-0.021	2.22	0.00783
287	46.329	46.065	0.16	0.16	1.31	82	2.12	1.07	82	1.4	86	0.050	100	100	1.6	0	234	72	72	70	-0.021	2.07	0.00723
288	46.491	46.225	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	100	99	1.5	-0.1	237	72	72	71	-0.020	2.55	0.00426
289	46.653	46.386	0.16	0.16	1.29	82	2.12	1.07	82	1.4	86	0.050	100	100	1.5	0	239	72	72	70	-0.021	2.86	0.00621
290	46.814	46.547	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	99	100	1.5	0	237	72	72	71	-0.021	2.35	0.0052
291	46.976	46.708	0.16	0.16	1.30	82	2.11	1.06	82	1.4	86	0.050	100	100	1.5	0	239	72	72	71	-0.021	2.86	0.00676
292	47.138	46.868	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	100	99	1.4	-0.1	238	72	72	71	-0.021	2.35	0.00977
293	47.300	47.029	0.16	0.16	1.30	82	2.11	1.07	82	1.4	86	0.050	100	100	1.4	0	237	72	72	70	-0.020	2.07	0.01279
294	47.462	47.190	0.16	0.16	1.29	82	2.11	1.07	82	1.4	86	0.050	100	100	1.4	0	237	72	72	71	-0.021	1.8	0.00909
295	47.623	47.351	0.16	0.16	1.30	82	2.11	1.06	82	1.4	86	0.050	99	100	1.4	0	240	72	72	71	-0.021	3.28	0.00365
296	47.785	47.512	0.16	0.16	1.31	82	2.11	1.07	82	1.4	86	0.050	100	100	1.4	0	238	72	72	71	-0.021	2.11	0.01062
297	47.947	47.673	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	100	100	1.3	-0.1	236	72	72	71	-0.020	1.26	0.05637
298	48.109	47.833	0.16	0.16	1.30	82	2.11	1.07	82	1.4	86	0.050	100	99	1.3	0	242	72	72	71	-0.020	3.91	0.00306
299	48.271	47.994	0.16	0.16	1.30	82	2.11	1.07	82	1.4	86	0.050	100	100	1.3	0	238	72	72	71	-0.020	1.56	0.02999
300	48.433	48.155	0.16	0.16	1.29	82	2.12	1.07	82	1.4	86	0.050	100	100	1.3	0	238	72	72	71	-0.021	1.53	0.03725
301	48.594	48.316	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	99	100	1.2	-0.1	239	72	72	71	-0.020	2.58	0.00471
302	48.755	48.476	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	99	99	1.2	0	238	72	72	71	-0.021	2.17	0.00708
303	48.917	48.637	0.16	0.16	1.31	82	2.12	1.07	82	1.4	86	0.050	100	100	1.2	0	231	73	72	71	-0.020	1.02	0.05656
304	49.080	48.798	0.16	0.16	1.29	82	2.13	1.07	82	1.5	86	0.050	101	100	1.2	0	233	73	72	71	-0.020	1.67	0.02293
305	49.242	48.959	0.16	0.16	1.30	82	2.13	1.07	82	1.5	86	0.050	100	100	1.2	0	233	73	72	71	-0.020	1.97	0.01104
306	49.403	49.119	0.16	0.16	1.30	82	2.12	1.07	82	1.5	86	0.050	99	99	1.2	0	234	73	72	71	-0.019	2.7	0.0054
307	49.565	49.281	0.16	0.16	1.30	82	2.13	1.07	82	1.4	86	0.050	100	100	1.2	0	229	73	72	71	-0.019	1.16	0.06393
308	49.726	49.441	0.16	0.16	1.30	82	2.13	1.06	82	1.4	86	0.050	99	99	1.1	-0.1	233	73	72	71	-0.020	2.98	0.00647
309	49.889	49.601	0.16	0.16	1.30	82	2.13	1.07	82	1.4	86	0.050	101	99	1.1	0	235	73	72	71	-0.019	2.29	0.01694
310	50.051	49.762	0.16	0.16	1.30	82	2.12	1.07	82	1.5	86	0.050	100	100	1.1	0	236	73	72	71	-0.020	2.86	0.00691
311	50.212	49.923	0.16	0.16	1.29	82	2.13	1.06	82	1.5	86	0.050	99	100	1.1	0	234	73	72	71	-0.020	1.96	0.00786
312	50.374	50.084	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	100	100	1.0	-0.1	232	73	72	71	-0.020	2.16	0.00685
313	50.535	50.244	0.16	0.16	1.30	82	2.12	1.07	82	1.4	86	0.050	99	99	1.0	0	232	73	72	71	-0.019	2.69	0.00332
314	50.697	50.406	0.16	0.16	1.30	82	2.13	1.06	82	1.5	86	0.050	100	100	1.0	0	230	73	72	71	-0.019	1.63	0.02445

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft<sup>2</sup>  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>		13.43		ft/sec		V <sub>scent</sub>		15.16	
						ft/sec		F <sub>p</sub>	
								0.886	

°H<sub>2</sub>O

°F

Elapsed Time (min)	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
	Gas Meter 1 (ft <sup>3</sup> )	Gas Meter 2 (ft <sup>3</sup> )	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H <sub>2</sub> O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H <sub>2</sub> O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H <sub>2</sub> O)	CO <sub>2</sub> (%)	CO (%)
315	50.859	50.566	0.16	0.16	1.30	82	2.13	1.06	82	1.5	86	0.050	100	99	1.0	0	231	73	73	71	-0.019	1.91	0.00864
316	51.021	50.726	0.16	0.16	1.29	82	2.13	1.07	82	1.5	86	0.050	100	99	1.0	0	234	73	72	71	-0.019	3.12	0.00355
317	51.182	50.887	0.16	0.16	1.30	82	2.13	1.06	82	1.5	85	0.050	99	100	1.0	0	228	73	72	71	-0.020	1.61	0.02892
318	51.343	51.048	0.16	0.16	1.30	82	2.13	1.06	82	1.4	85	0.050	99	100	0.9	-0.1	226	73	73	71	-0.019	2.53	0.0041
319	51.505	51.208	0.16	0.16	1.30	82	2.13	1.07	82	1.4	85	0.050	100	99	0.9	0	227	73	72	71	-0.019	2.95	0.00407
320	51.668	51.369	0.16	0.16	1.30	82	2.13	1.07	82	1.5	85	0.050	100	100	0.9	0	228	73	73	71	-0.020	2.51	0.0092
321	51.829	51.529	0.16	0.16	1.29	83	2.13	1.06	82	1.5	85	0.050	99	99	0.9	0	225	73	73	71	-0.020	2.16	0.00819
322	51.990	51.689	0.16	0.16	1.29	83	2.13	1.06	82	1.5	85	0.050	99	99	0.8	-0.1	228	73	73	71	-0.019	2.78	0.00591
323	52.152	51.850	0.16	0.16	1.30	83	2.14	1.06	82	1.5	85	0.050	100	100	0.8	0	229	73	73	71	-0.019	1.82	0.01431
324	52.313	52.011	0.16	0.16	1.30	83	2.13	1.06	82	1.5	85	0.050	99	100	0.8	0	227	73	73	71	-0.020	1.92	0.01111
325	52.476	52.171	0.16	0.16	1.30	83	2.13	1.06	82	1.5	85	0.050	100	99	0.8	0	225	73	73	71	-0.019	2.53	0.00446
326	52.635	52.328	0.16	0.16	1.29	83	2.13	1.06	82	1.5	85	0.050	98	97	0.8	0	229	73	73	71	-0.020	3.05	0.00592
327	52.796	52.489	0.16	0.16	1.30	83	2.14	1.06	82	1.5	85	0.050	99	100	0.7	-0.1	229	73	73	71	-0.020	2.46	0.00715
328	52.957	52.649	0.16	0.16	1.30	83	2.13	1.06	82	1.5	85	0.050	99	99	0.7	0	229	73	73	71	-0.019	2.71	0.00452
329	53.119	52.809	0.16	0.16	1.30	83	2.14	1.06	82	1.5	86	0.050	100	99	0.7	0	232	73	73	71	-0.020	3.01	0.00397
330	53.281	52.970	0.16	0.16	1.29	83	2.13	1.06	82	1.5	85	0.050	100	100	0.7	0	228	73	73	71	-0.020	2.18	0.00552
331	53.443	53.130	0.16	0.16	1.29	83	2.14	1.06	82	1.5	85	0.050	100	99	0.7	0	230	73	73	71	-0.021	2.11	0.02272
332	53.604	53.291	0.16	0.16	1.29	83	2.14	1.06	82	1.5	85	0.050	99	100	0.6	-0.1	229	73	73	71	-0.020	2.48	0.00546
333	53.765	53.452	0.16	0.16	1.30	83	2.13	1.06	82	1.5	85	0.050	99	100	0.6	0	229	73	73	71	-0.020	1.84	0.01636
334	53.926	53.611	0.16	0.16	1.30	83	2.13	1.06	82	1.5	85	0.050	99	98	0.6	0	230	73	73	71	-0.020	3.39	0.00348
335	54.089	53.772	0.16	0.16	1.29	83	2.14	1.06	82	1.5	85	0.050	100	100	0.6	0	228	73	73	71	-0.020	1.78	0.01522
336	54.250	53.932	0.16	0.16	1.29	83	2.14	1.06	82	1.5	86	0.050	99	99	0.6	0	230	73	73	71	-0.020	2.81	0.00365
337	54.411	54.092	0.16	0.16	1.29	83	2.14	1.06	82	1.5	85	0.050	99	99	0.5	-0.1	229	73	73	71	-0.020	2.86	0.00455
338	54.572	54.252	0.16	0.16	1.30	83	2.14	1.06	82	1.5	85	0.050	99	99	0.5	0	228	73	73	71	-0.020	1.92	0.0147
339	54.734	54.413	0.16	0.16	1.29	83	2.15	1.06	82	1.5	85	0.050	100	100	0.5	0	226	73	73	72	-0.019	1.76	0.0124
340	54.896	54.573	0.16	0.16	1.29	83	2.14	1.05	82	1.5	85	0.050	100	99	0.5	0	226	73	73	71	-0.020	2.29	0.00867
341	55.057	54.732	0.16	0.16	1.29	83	2.14	1.06	82	1.5	85	0.050	99	98	0.5	0	228	73	73	71	-0.020	3.03	0.00575
342	55.219	54.893	0.16	0.16	1.29	83	2.15	1.06	82	1.5	84	0.050	100	100	0.4	-0.1	227	73	73	71	-0.020	1.69	0.04231
343	55.380	55.053	0.16	0.16	1.30	83	2.14	1.05	82	1.5	84	0.050	99	99	0.4	0	227	73	73	72	-0.020	2.42	0.0078
344	55.541	55.213	0.16	0.16	1.29	83	2.14	1.06	82	1.5	84	0.050	99	99	0.4	0	230	73	73	72	-0.020	3.47	0.00423
345	55.703	55.373	0.16	0.16	1.30	83	2.14	1.06	82	1.5	84	0.050	100	99	0.4	0	231	73	73	71	-0.021	2.81	0.00585
346	55.865	55.533	0.16	0.16	1.28	83	2.14	1.06	82	1.5	84	0.050	100	99	0.4	0	231	73	73	72	-0.020	2.81	0.00306
347	56.025	55.693	0.16	0.16	1.29	83	2.14	1.06	83	1.5	84	0.050	98	99	0.3	-0.1	234	73	73	72	-0.021	2.52	0.0054
348	56.186	55.853	0.16	0.16	1.30	83	2.15	1.06	83	1.5	84	0.050	99	99	0.3	0	235	73	73	72	-0.022	3.24	0.00335
349	56.348	56.013	0.16	0.16	1.29	83	2.15	1.05	83	1.5	83	0.050	99	99	0.3	0	235	73	73	71	-0.021	2.8	0.00426

## Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Sherwood High Burn End Time: 62  
 Model: Mini FS Medium Burn End Time: 183  
 Tracking No.: 2292 Total Sampling Time: 363 min  
 Project No.: 0268PF026E Recording Interval: 1 min  
 Test Date: 12-Feb-18  
 Beginning Clock Time: 10:57 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 0.977 (1) 0.979 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average  
30.34 30.34 30.34 30.34 "Hg

OMNI Equipment Numbers: \_\_\_\_\_

PM Control Modules: 335/336  
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole  
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole  
 Dilution Tunnel H2O: 2.00 percent  
 Dilution Tunnel Static: -0.170 "H2O  
 Tunnel Area: 0.19635 ft2  
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.29 ft/sec.  
 Initial Tunnel Flow: 145.8 scfm  
 Average Tunnel Flow: 149.7 scfm  
 Post-Test Leak Check (1): 0.000 cfm @ -12 in. Hg  
 Post-Test Leak Check (2): 0.000 cfm @ -9 in. Hg  
 Fuel Moisture: 7.10 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.026	0.046	0.050	0.032	0.028	0.046	0.046	0.034	0.050
Temp:	100	100	100	100	100	100	100	100	100
V <sub>strav</sub>		13.43		ft/sec		V <sub>scnt</sub>		15.16	
						F <sub>p</sub>		0.886	

°H<sub>2</sub>O

°F

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (″H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (″H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
350	56.510	56.173	0.16	0.16	1.30	83	2.14	1.06	83	1.5	83	0.050	99	99	0.3	0	233	73	73	71	-0.021	2.58	0.00848
351	56.671	56.333	0.16	0.16	1.29	83	2.14	1.06	83	1.5	83	0.050	99	99	0.2	-0.1	234	73	73	72	-0.022	2.48	0.00687
352	56.832	56.493	0.16	0.16	1.29	83	2.15	1.05	83	1.5	82	0.050	99	99	0.2	0	232	73	73	72	-0.023	2.13	0.00439
353	56.993	56.653	0.16	0.16	1.30	83	2.14	1.05	83	1.5	82	0.050	99	99	0.2	0	228	73	73	71	-0.021	1.59	0.02339
354	57.155	56.813	0.16	0.16	1.29	83	2.14	1.06	83	1.5	81	0.050	99	99	0.2	0	227	73	72	71	-0.022	2.13	0.00841
355	57.317	56.973	0.16	0.16	1.29	83	2.15	1.06	83	1.5	82	0.050	99	99	0.2	0	231	73	72	71	-0.021	2.48	0.00938
356	57.478	57.133	0.16	0.16	1.29	83	2.15	1.06	83	1.5	82	0.050	99	99	0.2	0	232	73	72	71	-0.021	2.41	0.00436
357	57.639	57.293	0.16	0.16	1.29	83	2.15	1.06	83	1.5	81	0.050	99	99	0.1	-0.1	230	73	72	71	-0.021	2.07	0.00845
358	57.801	57.454	0.16	0.16	1.30	83	2.15	1.05	83	1.5	81	0.050	99	99	0.1	0	230	72	72	71	-0.021	2.36	0.00627
359	57.962	57.613	0.16	0.16	1.29	83	2.15	1.06	83	1.5	81	0.050	99	98	0.1	0	231	72	72	70	-0.021	2.79	0.00718
360	58.124	57.773	0.16	0.16	1.29	83	2.15	1.06	83	1.5	81	0.050	99	99	0.1	0	229	72	72	71	-0.021	1.68	0.01749
361	58.286	57.933	0.16	0.16	1.30	83	2.14	1.06	83	1.5	81	0.050	99	99	0.1	0	225	72	72	71	-0.021	1.44	0.01626
362	58.447	58.093	0.16	0.16	1.29	83	2.16	1.05	83	1.5	80	0.050	99	98	0.0	-0.1	223	72	72	71	-0.022	2.2	0.01152
363	58.608	58.253	0.16	0.16	1.29	83	2.16	1.06	83	1.5	80	0.050	99	98	0.0	0	222	72	72	70	-0.020	2.75	0.00498
Avg/Tot	58.608	58.253	0.16	0.16	1.30	81	2.06	1.07	81	1.34	89	0.05	100	100			276	72	72	70	-0.025	3.05	0.01

## Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Sherwood  
 Model: Mini FS  
 Tracking No.: 2292  
 Project No.: 0268PF026E  
 Run #: 1  
 Date: 2/12/18

Equipment Numbers: 23, 283A, 592

## TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D390	112.6	111.8	0.8
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: 0.8

## TRAIN 1 (Remainder of Test)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D413	240.8	238.9	1.9
B. Rear filter catch	Filter	D414			0.0
C. Probe catch*	Probe	17	114560.9	114561	0.0
D. Filter seals catch*	Seals	C	4150.8	4150.5	0.3

Sub-Total Total Particulate, mg: 2.2

Train 1 Aggregate Total Particulate, mg: 3.0

## TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D415	240.0	237	3.0
B. Rear filter catch	Filter	D416			0.0
C. Probe catch*	Probe	27	114273.9	114274	0.0
D. Filter seals catch*	Seals	D	3265.8	3265.8	0.0

Total Particulate, mg: 3.0

## AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter				0.0

Total Particulate, mg: 0.0

\*Particulate catch that results in a negative number, is assumed to be zero for probes and seals, negative numbers for filters are assumed to be part of the seal weight

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg



## Pellet Heater Test Results - ASTM E2779 / ASTM E2515

Manufacturer: Sherwood  
 Model: Mini FS  
 Project No.: 0268PF026E  
 Tracking No.: 2292  
 Run: 1  
 Test Date: 02/12/18

Burn Rate (Composite)	<b>0.73</b> kg/hr dry
Average Tunnel Temperature	89 degrees F
Average Gas Velocity in Dilution Tunnel - vs	13.29 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8979.6 dscf/hour
Average Delta p	0.050 inches H2O
Average Delta H	1.30 inches H2O
Total Time of Test	363 minutes

<b>Burn Rate (High)</b>	<b>1.43</b> kg/hr dry
<b>Burn Rate (Med)</b>	<b>0.69</b> kg/hr dry
	48.3% of High
<b>Burn Rate (Low)</b>	<b>0.51</b> kg/hr dry
	35.4% of High

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	1 <sup>st</sup> HR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	58.608 cubic feet	58.253 cubic feet	9.659 cubic feet
Average Gas Meter Temperature	70 degrees F	81 degrees F	81 degrees F	78 degrees F
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	56.823 dscf	56.601 dscf	9.423 dscf
Total Particulates - m <sub>t</sub>	0 mg	3 mg	3 mg	0.8 mg
Particulate Concentration (dry-standard) - C <sub>p</sub> /C <sub>s</sub>	0.000000 grams/dscf	0.00005 grams/dscf	0.00005 grams/dscf	0.00008 grams/dscf
Total Particulate Emissions - E <sub>T</sub>	0.00 grams	2.87 grams	2.88 grams	0.76 grams
Particulate Emission Rate	0.00 grams/hour	0.47 grams/hour	0.48 grams/hour	0.76 grams/hour
Emissions Factor		0.65 g/kg	0.65 g/kg	0.53 g/kg
Difference from Average Total Particulate Emissions		0.01 grams	0.01 grams	
<b>Dual Train Comparison Results Are Acceptable</b>				

FINAL AVERAGE RESULTS	
<b>Integrated Test Run</b>	
Total Particulate Emissions - E <sub>T</sub>	2.87 grams
Particulate Emission Rate	<b>0.48 grams/hour</b>
Emissions Factor	0.65 grams/kg
<b>First Hour Emissions</b>	
Total Particulate Emissions - E <sub>T</sub>	0.76 grams
Particulate Emission Rate	0.76 grams/hour
Emissions Factor	0.53 grams/kg

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK

# OMNI-Test Laboratories

**Manufacturer:** Sherwood  
**Model:** Mini FS  
**Date:** 02/12/18  
**Run:** 1  
**Control #:** 0268PF026E  
**Test Duration:** 363  
**Output Category:** Integrated

**Technicians:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	66.0%	70.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	66%	70.9%

Output Rate (kJ/h)	9,806	9,302	(Btu/h)
Burn Rate (kg/h)	0.73	1.61	(lb/h)
Input (kJ/h)	14,855	14,092	(Btu/h)

Test Load Weight (dry kg)	4.41	9.71	dry lb
MC wet (%)	6.624959148		
MC dry (%)	7.10		
Particulate (g )	2.87		
CO (g)	29		
Test Duration (h)	6.05		

Emissions	Particulate	CO
g/MJ Output	0.05	0.49
g/kg Dry Fuel	0.65	6.64
g/h	0.48	4.84
lb/MM Btu Output	0.11	1.15

Air/Fuel Ratio (A/F)	40.02
----------------------	-------

VERSION:

2.2

12/14/2009

# OMNI-Test Laboratories

**Manufacturer:** Sherwood  
**Model:** Mini FS  
**Date:** 02/12/18  
**Run:** 1  
**Control #:** 0268PF026E  
**Test Duration:** 62  
**Output Category:** Maximum

**Technicians:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	71.9%	76.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	72%	77.2%

Output Rate (kJ/h)	21,031	19,950	(Btu/h)
Burn Rate (kg/h)	1.43	3.16	(lb/h)
Input (kJ/h)	29,271	27,767	(Btu/h)

Test Load Weight (dry kg)	1.48	3.27	dry lb
MC wet (%)	6.624959148		
MC dry (%)	7.10		
Particulate (g )	0		
CO (g)	2		
Test Duration (h)	1.03		

Emissions	Particulate	CO
g/MJ Output	0.00	0.08
g/kg Dry Fuel	0.00	1.21
g/h	0.00	1.73
lb/MM Btu Output	0.00	0.19

Air/Fuel Ratio (A/F)	21.63
----------------------	-------

VERSION:

2.2

12/14/2009

# OMNI-Test Laboratories

**Manufacturer:** Sherwood  
**Model:** Mini FS  
**Date:** 02/12/18  
**Run:** 1  
**Control #:** 0268PF026E  
**Test Duration:** 121  
**Output Category:** Medium

**Technicians:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	60.1%	64.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	60%	64.6%

Output Rate (kJ/h)	8,502	8,065	(Btu/h)
Burn Rate (kg/h)	0.69	1.53	(lb/h)
Input (kJ/h)	14,141	13,414	(Btu/h)

Test Load Weight (dry kg)	1.40	3.08	dry lb
MC wet (%)	6.624959148		
MC dry (%)	7.10		
Particulate (g )	0		
CO (g)	12		
Test Duration (h)	2.02		

Emissions	Particulate	CO
g/MJ Output	0.00	0.72
g/kg Dry Fuel	0.00	8.83
g/h	0.00	6.12
lb/MM Btu Output	0.00	1.67

Air/Fuel Ratio (A/F)	44.79
----------------------	-------

VERSION:

2.2

12/14/2009

# OMNI-Test Laboratories

**Manufacturer:** Sherwood  
**Model:** Mini FS  
**Date:** 02/12/18  
**Run:** 1  
**Control #:** 0268PF026E  
**Test Duration:** 180  
**Output Category:** Minimum

**Technicians:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	65.3%	69.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	66%	70.2%

Output Rate (kJ/h)	6,775	6,427	(Btu/h)
Burn Rate (kg/h)	0.51	1.12	(lb/h)
Input (kJ/h)	10,370	9,837	(Btu/h)

Test Load Weight (dry kg)	1.53	3.36	dry lb
MC wet (%)	6.624959148		
MC dry (%)	7.10		
Particulate (g )	0		
CO (g)	14		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.00	0.71
g/kg Dry Fuel	0.00	9.48
g/h	0.00	4.82
lb/MM Btu Output	0.00	1.65

Air/Fuel Ratio (A/F)	51.25
----------------------	-------

VERSION:

2.2

12/14/2009

## Pellet Heater Certification Run Sheets

Client: Sherwood Project Number: 0264PF626E Run Number: 1  
 Model: Mini PS Tracking Number: 1292 Date: 2/12/18  
 Test Crew: A. Krawitz  
 OMNI Equipment ID numbers: 335, 336

## ASTM E2779 Run Notes

## Air Control Settings

High Burn Rate Target: 100%Settings: BR setting 5Medium Burn Rate Target: <50%Settings: BR setting 2Low Burn Rate Target: MinimumSettings: BR setting 1Additional Settings  
Notes:

Per mfg.'s instructions, adjusted slide damper to 0.12" H<sub>2</sub>O - used this setting for entire test


Pellet Moisture Content: TBDPellet Specifications: Lignetics Prem. Mill #03208Pellet Analysis Notes: TBD

## Preburn Notes

Time	Notes
0:30:00	Set slide damper
74:00	AB End

## Test Notes

Time	Notes
60:00	Changed Filter A
61:00 - 62:00	Reduced to Med
182:00 - 183:00	Reduced to low
713:00	Test End

Technician Signature: Date: 2/12/18

## Pellet Heater Certification Run Sheets

Client: Shenandoah Project Number: 0268PF026E Run Number: 1  
 Model: Mini PS Tracking Number: 2292 Date: 2/12/18  
 Test Crew: A. Kowitz  
 OMNI Equipment ID numbers: 132, 410, 444, 185, 209, 559

## ASTM E2515 Sampling Information

Test Location: E1 Test Start Time: 10:57

Span Gas Concentrations: 16.03 / 5.000 / 901

Test Run Validation Checks	Pre Test	Post Test
Zero Stack Gas Leakage	✓	✓
Zero Pitot Line Leakage	✓	✓
Zero Induced Draft	✓	
100% Smoke Capture	✓	

Test Run Validation Measurements	Pre Test		Post Test	
Scale Audit (lbs)	10.0		10.0	
CO <sub>2</sub> % (Zero/Span)	0.06	16.03	0.02	16.032
CO % (Zero/Span)	0.000	5.000	0.000	4.977
CO ppm (Zero/Span)	0	901	0	893
Sample A Leakage (cfm)	0		0 @ -12" H <sub>g</sub>	
Sample B Leakage (cfm)	0		0 @ -9" H <sub>g</sub>	
Room Air Velocity (ft/min)	< 50		< 50	
Barometric Pressure (" Hg)	30.34		30.34	

## Last Cleaning Dates

Flue Pipe	2/9/18
Dilution Tunnel	2/2/18
Sample Dryers	2/12/18

## Dilution Tunnel Traverse

Traverse Point	1	2	Center	3	4	5	6	Center	7	8
Δp (" H <sub>2</sub> O)	0.026	0.046	0.050	0.050	0.032	0.028	0.046	N/A	0.046	0.034
T (°F)	100									

Technician Signature: Date: 2/12/18

## **2.2 - Sample Analysis & Tares**

Analysis Worksheets  
Tared Filter, Probe, and O-Ring Data  
Pellet Fuel Label  
Pellet Fuel Analysis Report



## Pellet Heater Certification Run Sheets

Client: Sherwood Project Number: 0218 PF026E Run Number: 1  
 Model: Mini ES Tracking Number: 2202 Date: 2/12/18  
 Test Crew: A. Krawitz  
 OMNI Equipment ID numbers: 283A, 392, 637

## ASTM E2515 Lab Sheet

Assembled By:

A. Krawitz

Date/Time in Dessicator:

2/12/18 17:30

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date: <u>2/15/18</u>	Date: <u>2/24/18</u>	Date:	Date:	Date:
Time: <u>11:30</u>	Time: <u>13:00</u>	Time:	Time:	Time:
R/H %: <u>8.7</u>	R/H %: <u>12.4</u>	R/H %:	R/H %:	R/H %:
Temp (F): <u>46 70.1</u>	Temp (F): <u>71.7</u>	Temp (F):	Temp (F):	Temp (F):
Audit 1: <u>200.0</u>	Audit 1: <u>199.9</u>	Audit 1:	Audit 1:	Audit 1:
Audit 2: <u>1999.4</u>	Audit 2: <u>1999.8</u>	Audit 2:	Audit 2:	Audit 2:
Audit 3: <u>19997.9</u>	Audit 3: <u>99997.9</u>	Audit 3:	Audit 3:	Audit 3:
Initials: <u>A</u>	Initials: <u>A</u>	Initials:	Initials:	Initials:

Train	Item	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A	Front Filter (60 min)	<u>D3a0</u>	<u>111.8</u>	<u>112.5</u>	<u>112.6</u>			
A	Front Filter (Remainder)	<u>D413</u>	<u>238.9</u>	<u>241.0</u>	<u>240.8</u> <del><u>241.0</u></del>			
A	Rear Filter	<u>D414</u> ↗						
A	Probe	<u>17</u>	<u>114561.0</u>	<u>114560.8</u>	<u>114560.9</u>			
A	O-Ring Set	<u>C*</u>	<u>4150.5</u>	<u>4150.8</u>	<u>4150.8</u>			
B	Front Filter	<u>D415</u>	<u>237.0</u>	<u>240.1</u>	<u>240.0</u>			
B	Rear Filter	<u>D416</u> ↗						
B	Probe	<u>27</u>	<u>114274.0</u>	<u>114273.9</u>	<u>114273.9</u>			
B	O-Ring Set	<u>D*</u>	<u>3265.8</u>	<u>3266.0</u>	<u>3265.8</u>			
BG	Filter							

\* Outside of numbering convention - see tare sheet

Technician Signature: Date: 2/24/18

Audit Weight ID #/Mass: 283A / 700.0

Evaluator signature: \_\_\_\_\_



Thermohygrometer ID #: 592

Audit Weight ID #/Mass: 283A / 100g

[illegible]

Final Technician Signature: \_\_\_\_\_  
Control No. P-SFDP-0001.xls, Effective date: 9/9/2015

Date: 6/19/18

Evaluator signature: J. P. Meyer

Tare Sheet: (check one)

Probes ☒

47mm Filters \_\_\_\_\_

100mm Filters \_\_\_\_\_

O-Ring Pair \_\_\_\_\_

Prepared By: BD AOWBalance ID #: OMNI-00637Thermohygrometer ID #: OMNI-00592Audit Weight ID #/Mass: OMNI-00283A / 100 g

Placed in Dessicator:	Date: <u>1/3/18</u>	Date: <u>1/4/18</u>	Date: <u>1/5/18</u>	Date: <u>1/10/18</u>	Date Used	Project Number	Run No.
	Time: <u>0840</u>	Time: <u>0829</u>	Time: <u>0916</u>	Time: <u>0820</u>			
Date: <u>Dec 2017</u>	RH %: <u>10.2</u>	RH %: <u>18.4</u>	RH %: <u>27.5</u>	RH %: <u>6.7</u>			
Time: <u>-</u>	T (°F): <u>71.1</u>	T (°F): <u>69.6</u>	T (°F): <u>70.5</u>	T (°F): <u>68.9</u>			
ID #	Audit: <u>99.9980</u>	Audit: <u>99.9980</u>	Audit: <u>99.9980</u>	Audit: <u>99.9980</u>			
<u>27</u>	<u>114273.4</u>	<u>114274.1</u>	<u>114275.0</u>	<u>114275.0</u>	<u>2/12/18</u>	<u>0268PF021E</u>	<u>1</u>
<div> <div>Initials: <u>BA</u></div> <div>Initials: <u>BA</u></div> <div>Initials: <u>BA</u></div> <div>Initials: <u>BA</u></div> </div>							

Final Technician Signature: BA

Control No. P-SFDP-0002.xls, Effective date: 2/1/2017

Date: 1/10/18

40 of 155

Evaluator signature: BA

Tare Sheet: (check one)      Probes\_\_\_\_\_      47mm Filters\_\_\_\_✓\_\_\_\_      100mm Filters\_\_\_\_\_      O-Ring Pair\_\_\_\_\_

Prepared By: A. Krasich Balance ID #: 637 Thermohygrometer ID #: 562 Audit Weight ID #/Mass: 283A / 200 mg

Placed in  
Dessicator:  
Date: 1/17/18  
Time: 13:30

Date: 1/19/18  
Time: 1000  
RH %: 12.0  
T (°F): 73.7  
Audit: 200.0

Date: 1/19/18  
Time: 1600  
RH %: 14.2  
T (°F): 74.7  
Audit: 200.0

Date: 2/8/18  
Time: 1500  
RH %: 12.9  
T (°F): 21.0  
Audit: 200.0

Date: 2/2/18  
Time: 0930  
RH %: 10.5  
T (°F): 66.9  
Audit: 740.6

Date Used

Project Number

Run No.

D 413/14

234.0

238.9

2/12/18

0268 DF026F

0415/16

237.0

237.0

1

Initials:

Initials:

Initials:

Initials:

Final Technician Signature: \_\_\_\_\_  
Control No. P-SFDP-0002.xls, Effective date: 2/1/2017

Date: 1/12/18

Evaluator signature: Th. J. Meijer





**PFI Densified Fuel Grade: Premium**  
**Mill Registration # 03208**  
**Grade Requirements:**

Bulk Density	40–48 lbs/ft <sup>3</sup>
Diameter:	.230–.285 in/5.84–7.25 mm
Durability:	≥96.5
Fines:	≤0.50%
Ash Content (as received):	≤1%
Length:	≤1% >1.5 in.
Moisture:	≤8.0%
Chlorides:	≤300 ppm

**Manufacturers Guaranteed Analysis:**

Type of Material:	Softwood
Additives:	None
Minimum Higher Heating Value (as received):	8000 BTU/lb
Other Manufacturers Guarantees:	



For more information, please visit the PFI website at [www.pelletheat.org](http://www.pelletheat.org)



Twin Ports Testing, Inc.  
 1301 North 3rd Street  
 Superior, WI 54880  
 p: 715-392-7114  
 p: 800-373-2562  
 f: 715-392-7163  
 www.twinportstesting.com

**Report No:** USR:W217-0492-01  
**Issue No:** 1

## Analytical Test Report

**Client:** OMNI-TEST LABORATORIES INC.  
 13327 NE Airport Way  
 Portland, OR 97230  
**Attention:** Sebastian Button  
**PO No:**

Signed:

*Katy Mickelson*

Katy Mickelson  
 Senior Chemist

Date of Issue: 6/6/2017

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

### Sample Details

**Sample Log No:** W217-0492-01  
**Sample Designation:** HHT - E2  
**Sample Recognized As:** Wood Pellets

**Sample Date:**  
**Sample Time:**  
**Arrival Date:** 6/1/2017

### Test Results

	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		6.62
Ash	ASTM D1102	wt. %	0.22	0.21
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3172	wt. %		
Sulfur	ASTM D4239	wt. %	0.004	0.004
SO <sub>2</sub>	Calculated	lb/mmbtu		0.009
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	19.08	17.65
Net Cal. Value at Const. Pressure	ISO 1928	J/g	19079	17655
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20398	19048
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8770	8190

Carbon	ASTM D5373	wt. %	51.45	48.05
Hydrogen*	ASTM D5373	wt. %	6.06	5.66
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.19
Oxygen*	ASTM D3176	wt. %	> 42.05	> 39.27

\*Note: As received values do not include hydrogen and oxygen in the total moisture.

Chlorine	ASTM D6721	mg/kg
Fluorine	ASTM D3761	mg/kg
Mercury	ASTM D6722	mg/kg

Bulk Density	ASTM E873	lbs/ft <sup>3</sup>	
Fines (Less than 1/8")	TPT CH-P-06	wt. %	
Durability Index	Kansas State	PDI	
Sample Above 1.50"	TPT CH-P-06	wt. %	
Maximum Length (Single Pellet)	TPT CH-P-06	inch	
Diameter, Range	TPT CH-P-05	inch	to
Diameter, Average	TPT CH-P-05	inch	
Stated Bag Weight	TPT CH-P-01	lbs	
Actual Bag Weight	TPT CH-P-01	lbs	

### Comments

## **Section 3**

### **Laboratory Quality Assurance**

- 3.1 - Quality Assurance/Quality Control
- 3.2 - Calibration Data
- 3.3 - Example Calculations



### 3.1 - Quality Assurance/Quality Control

OMNI follows the guidelines of ISO/IEC 17025, “General Requirements for the Competence of Testing and Calibration Laboratories,” and the quality assurance/quality control (QA/QC) procedures found in OMNI’s Quality Assurance Manual.

OMNI’s scope of accreditation includes, but is not limited to, the following:

- ANSI (American National Standards Institute) for certification of product to safety standards.
- To perform product safety testing by the International Accreditation Service, Inc. (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- To perform product safety testing as a “Certification Organization” by the Standards Council of Canada (SCC).
- Serving as a testing laboratory for the certification of wood heaters by the U.S. Environmental Protection Agency.

This report is issued within the scope of OMNI’s accreditation. Accreditation certificates are available upon request.

The manufacturing facilities and quality control system for the production of the Mini Series at Sherwood Industries were evaluated to determine if sufficient to maintain conformance with OMNI’s requirements for product certification. OMNI has concluded that the manufacturing facilities, processes, and quality control system are adequate to produce the appliance congruous with the standards and model codes to which it was evaluated.

This report shall not be reproduced, except in full, without the written approval of OMNI-Test Laboratories, Inc.

## 3.2 - Calibration Data

Equipment for ASTM E2515, ASTM E2779, & EPA Method 28R

ID #	Lab Name/Purpose	Log Name	Attachment Type
132	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate
185	Platform Scale	Weight Indicator, Model WI-127	Calibration Certificate
209	Barometer	Barometer – Princo	Equipment Record
283A	Audit Weights	Troemner 21pc Msas Set	Calibration Certificate
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
410	Microtector	Dwyer Microtector	Calibration Certificate
559	Vaneometer	Dwyer Vaneometer	Equipment Record
592	Thermohygrometer	Omega Digital Thermohygrometer	Calibration Log
594	Combustion Gas Analyzer	CAI Gas Analyzer	See Run Sheet
637	Milligram Balance	Analytical Balance - Mettler - Toledo	Calibration Certificate

## SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 132

ID Number: 132

Standard Calibration Weight: 274

ID Number: 274

Scale Used: +85 K 288

ID Number: +85 K 288

Date: 2-07-08

By: K. Morgan

Standard Weight (A) (Lb.)	Weight Verified (B) (Lb.)	Difference (A - B)	% Error
10.0	10.0	0	0

\*Acceptable tolerance is 1%.

*This calibration is traceable to NIST using calibrated standard weights.*

Technician signature: K. Morgan Date: 2-07-08

## SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 pounds

ID Number: OMNI-00132

Standard Calibration Weight: 10 pounds

ID Number: OMNI-00255

Scale Used: MTW-150K

ID Number: OMNI-00353

Date: 2/23/2018 By: B. Davis

Standard Weight (A) (Lb.)	Weight Verified (B) (Lb.)	Difference (A - B)	% Error
10.0	10.0	0.0	0

\*Acceptable tolerance is 1%.

*This calibration is traceable to NIST using calibrated standard weights.*

Technician signature:  Date: 2/23/18



# QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS  
2340 SE 11<sup>TH</sup> Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293  
(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com



OMNI-Test Laboratories, Inc.  
13327 NE Airport Way  
Portland, OR 97230

Report Number: OMNE0321676171004

## **A2LA ACCREDITED** **CERTIFICATE OF CALIBRATION WITH DATA**

### INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Weigh-Tronix	WI-127 1000x0.1lb	21676	185	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
lbs	0.1	QC033	10/4/17	10/11/16	10/2018

### FUNCTIONAL CHECKS

SHIFT TEST		LINEARITY		REPEATABILITY		ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:	
500	0.5	HB44	HB44	200	0.2	
As-Found:		As-Found:		As-Found:		
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	
As-Left:		As-Left:		As-Left:		Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/>  Temperature: 21.0°C
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	

### CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.0	1000.0	0.12
700	700.0	700.0	0.12
500	500.0	500.0	0.08
200	200.0	200.0	0.08
100	100.0	100.0	0.05
50	50.0	50.0	0.05

### CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	11/4/15	11/2017	20152112

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

Report prepared/reviewed by: ②

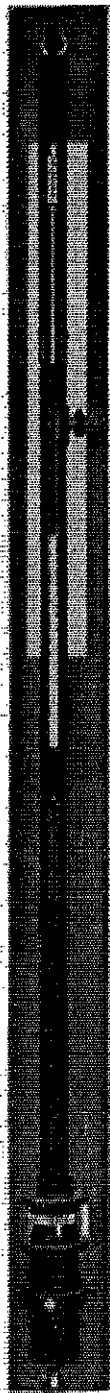
Date: 10-4-17

Technician: D. Oudeans

Signature: [Signature]

THIS CERTIFICATE SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE APPROVAL OF QUALITY CONTROL SERVICES, INC.

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy.



453  
National  
Weather  
Service  
Type

OMNI 00209

Instruction Booklet

for use with

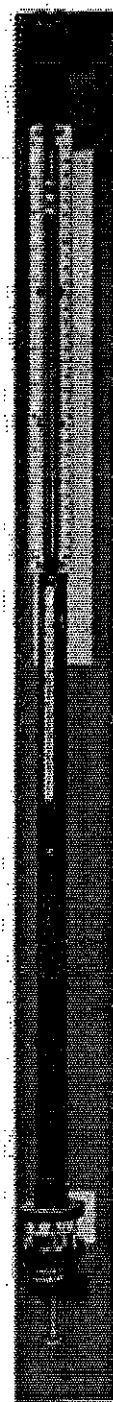
**PRINCO**

Fortin type mercurial  
Barometers

*Manufactured by*

PRINCO INSTRUMENTS, INC.  
1020 Industrial Blvd.  
Southampton, Pa. 18966-4095  
U.S.A.

Phone: 215 355-1500  
Fax: 215 355-7766



463  
NOVA™  
Economy  
Model

*JJ Calibrations, Inc.*

Manufacturer: Troemner Inc.  
Model: 1mg-100g (Class F)  
Nomenclature: Mass Set, 21 Pc.  
Serial: 47883

Certificate #: 543402  
Date: 09Oct2013  
Technician: 34  
Expiration Interval: 60 Months

[illegible]

# Thermal Metering System Calibration

## Y Factor

Manufacturer: APEX  
 Model: XC-60-EP  
 Serial Number: 606001  
 OMNI Tracking No.: OMNI-00335  
 Calibrated Orifice: ☐ Yes

**Average Gas Meter y Factor**  
**0.977**

**Orifice Meter dH@**  
**N/A**

Calibration Date: 01/17/18  
 Calibrated by: B. Davis  
 Calibration Frequency: Six months  
 Next Calibration Due: 7/18/2018  
 Instrument Range: 1.000 cfm  
 Standard Temp.: 68 °F  
 Standard Press.: 29.92 "Hg  
 Barometric Press., Pb: 29.94 "Hg  
 Signature/Date: B. Davis 1/18/2018

1/19/2018

### Previous Calibration Comparison

Date	7/18/2017	Acceptable Deviation (5%)	Deviation
y Factor	0.981	0.04905	0.004
Acceptance	Acceptable		

### Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.005
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

### Reference Standard \*

Standard	Model	Standard Test Meter
Calibrator	S/N	OMNI-00001
	Calib. Date	30-Oct-17
	Calib. Value	0.9977 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	2.30	1.38	1.00
Initial Reference Meter	198.1	203.7	214.2
Final Reference Meter	203.602	208.8	222.5
Initial DGM	0	0	0
Final DGM	5.65	5.298	8.67
Temp. Ref. Meter (°F), Tr	68.1	68.1	68.0
Temperature DGM (°F), Td	77.0	78.0	80.0
Time (min)	26.5	31.8	43.5
Net Volume Ref. Meter, Vr	5.502	5.100	8.300
Net Volume DGM, Vd	5.65	5.298	8.67
Gas Meter y Factor =	0.982	0.975	0.974
Gas Meter y Factor Deviation (from avg.)	0.005	0.002	0.003
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|
- \*\* 2.  $y = [V_r \times (y \text{ factor (ref)}) \times (P_b + (P_r / 13.6)) \times (T_d + 460)] / [V_d \times (P_b + (P_d / 13.6)) \times (T_r + 460)]$
- \*\* 3.  $dH@ = 0.0317 \times P_d / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^2$

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

\*\* Equations come from EPA Method 5


The uncertainty of measurement is  $\pm 0.14 \text{ ft}^3/\text{min}$ . This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.



**DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET**Instrument to be calibrated: Pressure TransducerMaximum Range: 0-2" WC ID Number: OMNI-00335Calibration Instrument: Digital Manometer ID Number: OMNI-00395Date: 1/17/2018 By: B. Davis**This form is to be used only in conjunction with Standard Procedure C-SPC.**

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0 - 0.4	0.08	0.067	0.013	0.65
20-40% Max. Range 0.4 - 0.8	0.64	0.638	0.002	0.10
40-60% Max. Range 0.8 - 1.2	1.00	1.012	0.012	0.60
60-80% Max. Range 1.2 - 1.6	1.40	1.432	0.032	1.6
80-100% Max. Range 1.6 - 2.0	1.85	1.895	0.045	2.25

\*Acceptable tolerance is 4%.

The uncertainty of measurement is  $\pm 0.4$ " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.Technician signature:  Date: 1/18/2018Reviewed by:  Date: 1/19/2018

Temperature Calibration EPA Method 28R, ASTM 2515							
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:	
E1		National Instruments Logger				00335, 00336	
REFERENCE METER EQUIPMENT NUMBER: 00373					Calibration Due Date: <del>7</del> /17/18		
CALIBRATION PERFORMED BY:			DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:
B. Davis			1/17/2018		68		29.87
Input Temperature (F)	Ambient	Meter A					FB Interior
			Meter B	Filter A	Filter B	Tunnel	
0	1	0	0	1	0	0	0
100	101	100	100	100	100	100	100
300	300	300	300	300	300	300	299
500	500	500	500	500	500	500	499
700	700	700	700	700	700	700	699
1000	1000	1000	1000	1000	1000	1000	1000

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	-1	-1	0	0	0	0
100	100	100	100	99	99	100	100	100	100
300	300	299	299	299	299	300	300	300	299
500	499	499	499	499	499	500	500	500	500
700	699	699	699	699	699	700	700	700	700
1000	1000	999	1000	1000	999	1000	1000	1000	1000

1500  
2000

1500  
1999

Technician signature: B.D. Date: 1/17/2018

Reviewed By: [Signature] Date: 1/19/2018

# Thermal Metering System Calibration

## Y Factor

Manufacturer: APEX  
 Model: XC-60-EP  
 Serial Number: 606002  
 OMNI Tracking No.: OMNI-00336  
 Calibrated Orifice: ☐ Yes

**Average Gas Meter y Factor**  
**0.979**

**Orifice Meter dH@**  
**N/A**

Calibration Date: 01/17/18  
 Calibrated by: B. Davis  
 Calibration Frequency: Six months  
 Next Calibration Due: 1/18/2018  
 Instrument Range: 1.000 cfm  
 Standard Temp.: 68 °F  
 Standard Press.: 29.92 "Hg  
 Barometric Press., Pb: 29.94 "Hg  
 Signature/Date: [Signature] 1/17/2018

1/19/2017

### Previous Calibration Comparison

Date	7/18/2017	Acceptable Deviation (5%)	Deviation
y Factor	0.984	0.0492	0.005
Acceptance	Acceptable		

### Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.003
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *			
Standard	Model	Standard Test Meter	
Calibrator	S/N	OMNI-00001	
	Calib. Date	30-Oct-17	
	Calib. Value	0.9977	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.95	1.20	0.80
Initial Reference Meter	223.4	231.9	238
Final Reference Meter	231.7	237.9	243.503
Initial DGM	0	0	0
Final DGM	8.517	6.215	5.713
Temp. Ref. Meter (°F), Tr	68.0	69.1	68.6
Temperature DGM (°F), Td	76.0	78.0	79.0
Time (min)	39.8	36.5	37.0
Net Volume Ref. Meter, Vr	8.300	6.000	5.503
Net Volume DGM, Vd	8.517	6.215	5.713
Gas Meter y Factor =	0.982	0.977	0.978
Gas Meter y Factor Deviation (from avg.)	0.003	0.002	0.001
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|
- \*\* 2.  $y = [V_r \times (y \text{ factor (ref)}) \times (P_b + (P_r / 13.6)) \times (T_d + 460)] / [V_d \times (P_b + (P_d / 13.6)) \times (T_r + 460)]$
- \*\* 3.  $dH@ = 0.0317 \times P_d / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r^2$

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

\*\* Equations come from EPA Method 5

The uncertainty of measurement is  $\pm 0.14 \text{ ft}^3/\text{min}$ . This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

**DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET**Instrument to be calibrated: Pressure TransducerMaximum Range: 0-2" WC ID Number: OMNI-00336Calibration Instrument: Digital Manometer ID Number: OMNI-00395Date: 1/17/2018 By: B. Davis**This form is to be used only in conjunction with Standard Procedure C-SPC.**

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0 - 0.4	0.35	0.362	0.012	0.6
20-40% Max. Range 0.4 - 0.8	0.65	0.672	0.022	1.1
40-60% Max. Range 0.8 - 1.2	1.00	1.024	0.024	1.2
60-80% Max. Range 1.2 - 1.6	1.30	1.340	0.040	2.0
80-100% Max. Range 1.6 - 2.0	1.70	1.749	0.049	2.45

\*Acceptable tolerance is 4%.

The uncertainty of measurement is  $\pm 0.4$ " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.Technician signature:  Date: 1/18/2018Reviewed by:  Date: 1/19/2018

Temperature Calibration EPA Method 28R, ASTM 2515							
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:	
E1		National Instruments Logger				00335, 00336	
REFERENCE METER EQUIPMENT NUMBER: 00373					Calibration Due Date: <del>7</del> /17/18		
CALIBRATION PERFORMED BY:			DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:
B. Davis			1/17/2018		68		29.87
Input Temperature (F)	Ambient	Meter A					FB Interior
			Meter B	Filter A	Filter B	Tunnel	
0	1	0	0	1	0	0	0
100	101	100	100	100	100	100	100
300	300	300	300	300	300	300	299
500	500	500	500	500	500	500	499
700	700	700	700	700	700	700	699
1000	1000	1000	1000	1000	1000	1000	1000

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	-1	-1	0	0	0	0
100	100	100	100	99	99	100	100	100	100
300	300	299	299	299	299	300	300	300	299
500	499	499	499	499	499	500	500	500	500
700	699	699	699	699	699	700	700	700	700
1000	1000	999	1000	1000	999	1000	1000	1000	1000

1500  
2000

1500  
1999

Technician signature: B.D. Date: 1/17/2018

Reviewed By: [Signature] Date: 1/19/2018

# Certificate of Calibration

Certificate Number: **659360**



**JJ Calibrations, Inc.**

7007 SE Lake Rd  
Portland, OR 97267-2105  
Phone 503.786.3005  
FAX 503.786.2994

**Omni-Test Laboratories**  
13327 NE Airport Way  
Portland, OR 97230

PO: **170149**

Order Date: **09/22/2017**

Authorized By: **N/A**



Calibrated on: **10/11/2017**

\*Recommended Due: **10/11/2018**

Environment: **19 °C 52 % RH**

\* As Received: **Limited**

\* As Returned: **Limited**

Action Taken: **Calibrated**

Technician: **34**

Property #: **OMNI-00410**

User: **N/A**

Department: **N/A**

Make: **Dwyer**

Model: **1430**

Serial #: **OMNI-00410**

Description: **Microtector**

Procedure: **SEND TO VENDOR**

Accuracy: **±0.00025" WC**

Remarks: \* Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit.  
Uncertainties include the effects of the unit.

**Limited Calibration (est.2016) - Calibrated micrometer head only.**

## Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
541A	Select	E8FED2	8 Piece Gage Block Set	12/14/2017	635720
103A	Brown & Sharpe	598-81-14	Gage Block Set, 81 pc.	03/16/2019	643452
368A	Rutland	2225-7081	81 Piece Gage Block Set	06/01/2018	649394

## Parameter

## Measurement Data

Measurement Description	Range Unit	Reference	Min	Max	Error	UUT	Uncertainty
<b>Before/After</b>							Accredited = ✓
<b>Length</b>	Inch	0.1300	0.129	0.131	0.000	0.130 Inch	1.1E-03 ✓
	Inch	0.3850	0.384	0.386	0.000	0.385 Inch	1.1E-03 ✓
	Inch	0.6150	0.614	0.616	0.000	0.615 Inch	1.1E-03 ✓
	Inch	0.8700	0.869	0.871	0.000	0.870 Inch	1.1E-03 ✓
	Inch	1.0000	0.999	1.001	0.000	1.000 Inch	1.1E-03 ✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCCL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.

JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

  
Reviewer

3 Issued 10/13/2017

Rev # 15

  
Inspector

## Vaneometer Air Velocity Meter OMNI-00559

59 of 155

OMNI Track #	OMNI-00594			
Equipment Name/Description	CAI ZRE-4 Gas Analyzer			
Equipment S/N:	N5F0112			
Comments	CO2, O2, and dual range CO gas analyzer.			
Status	Active, calibrate prior to use.			
Part #	ZRE-4			
Reference Standard:	<input type="checkbox"/>	YES	<input checked="" type="checkbox"/> X	NO <input type="checkbox"/> (Check 'X' for answer)
Location of Equipment:	Portable gas cart.			
Calibration Vendor	OMNI in house			
Type of Calibration	Calibrate Prior to use.			
Calibration Period (Months)	N/A			
Date of Last Calibration	N/A			
Date of Next Calibration	N/A			

Do the following:

- 1) Complete Calibration documentation
- 2) Complete top half of this form
- 3) Attach appropriate calibration forms and save in following location  
\\omni-serv\Test Equipment\Equipment\OMNI-XXXXX - Equipment Name
- 4) Repopulate database with updated information
- 5) Print, laminate and adhere calibration tag to equipment

Verify before use OMNI-00594 Gas Analyzer
---

Verify before use OMNI-00594 Gas Analyzer
---



# Certificate of Calibration

Certificate Number: **655889**

**Omni-Test Laboratories**  
13327 NE Airport Way  
Portland, OR 97230



**JJ Calibrations, Inc.**

7007 SE Lake Rd  
Portland, OR 97267-2105  
Phone 503.786.3005  
FAX 503.786.2994

OnSite

PO: 170142

Order Date: 08/07/2017

Authorized By: N/A



0723.01  
Calibration

Property #: OMNI-00637

User: N/A

Department: N/A

Make: Mettler Toledo

Model: MS104TS/00

Serial #: B729400181

Description: Scale, Analytical, 120g

Procedure: DCN 500887

Accuracy:  $\pm 0.0005g$

Calibrated on: 08/07/2017

\*Recommended Due: 02/07/2018

Environment: 22 °C 45 % RH

\* As Received: Within Tolerance

\* As Returned: Within Tolerance

Action Taken: Calibrated

Technician: 34

Remarks: \* Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

## Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
256A	Rice Lake	W0133K	Mass Set	10/28/2017	616126

## Parameter

## Measurement Data

Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After Force							Accredited = ✓
	g	10.00000	9.9995	10.0005	0.0001	10.0001 g	5.7E-04 ✓
	g	30.00000	29.9995	30.0005	0.0001	30.0001 g	5.7E-04 ✓
	g	60.00000	59.9995	60.0005	0.0003	60.0003 g	5.7E-04 ✓
	g	90.00000	89.9995	90.0005	0.0002	90.0002 g	5.7E-04 ✓
	g	120.00000	119.9995	120.0005	0.0003	120.0003 g	5.7E-04 ✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCCL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.

JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

3 Issued 08/14/2017

Rev # 15

Inspector

# Certificate of Calibration

Certificate Number: **668066**

**Omni-Test Laboratories**  
13327 NE Airport Way  
Portland, OR 97230



**JJ Calibrations, Inc.**  
7007 SE Lake Rd  
Portland, OR 97267-2105  
Phone 503.786.3005  
FAX 503.786.2994

OnSite

PO: **180161**

Order Date: **02/06/2018**

Authorized By: **N/A**



0723.01

Calibration

Calibrated on: **02/06/2018**

\*Recommended Due: **08/06/2018**

Environment: **20 °C 53 % RH**

\* As Received: **Within Tolerance**

\* As Returned: **Within Tolerance**

Action Taken: **Calibrated**

Technician: **111**

Property #: **OMNI-00637**

User: **N/A**

Department: **N/A**

Make: **Mettler Toledo**

Model: **MS104TS/00**

Serial #: **B729400181**

Description: **Analytical Scale, 120g**

Procedure: **DCN 500887**

Accuracy: **±0.0005g**

Remarks: \* Many factors may cause the unit to drift out of calibration before the recommended due date. Any reported error is the absolute value between the reference and the unit. Uncertainties include the effects of the unit.

## Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
503A	Rice Lake	1mg-200g (Class 0)	Mass Set,	04/20/2018	642578

## Parameter

## Measurement Data

Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
<b>Before/After</b>							Accredited = ✓
<b>Force</b>							
	g	10.00000	9.9995	10.0005	0.0001	10.0001 g	5.7E-04 ✓
	g	30.00000	29.9995	30.0005	0.0003	30.0003 g	5.7E-04 ✓
	g	60.00000	59.9995	60.0005	0.0001	60.0001 g	5.7E-04 ✓
	g	90.00000	89.9995	90.0005	0.0001	89.9999 g	5.7E-04 ✓
	g	120.00000	119.9995	120.0005	0.0002	119.9998 g	5.7E-04 ✓

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.

JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

3 Issued

Rev # 15

Inspector

## **3.3 - Example Calculations**

## Equations and Sample Calculations – ASTM E2779 & E2515

Manufacturer:	Sherwood
Model:	Mini FS
Run:	1
Category:	[Integrated]

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

$M_{Bdb}$  – Weight of test fuel burned during test run, dry basis, kg

$M_{BSidb}$  – Weight of test fuel burned during test run segment  $i$ , dry basis, kg

BR – Average dry burn rate over full integrated test run, kg/hr

$BR_{Si}$  – Average dry burn rate over test run segment  $i$ , kg/hr

$V_s$  – Average gas velocity Dry burn rate, kg/hr

$Q_{sd}$  – Average gas flow rate Total particulate matter collected, mg

$V_{m(std)}$  – Volume of Gas S Volume of gas sampled corrected to standard conditions, dscf

$m_n$  – Total Particulate Mass Average dilution tunnel gas velocity, ft/sec

$C_s$  - Concentration of particulate Particulate concentration, g/dscf

$E_T$  – Total Particulate Error Dilution tunnel gas flow rate, dscf/min

PR - Proportional Rate Variable Particulate emission rate, lbs/hr

$PM_R$  – Average particulate Total particulate emissions, grams

$PM_F$  – Average particulate Average fuel load moisture content, %

**M<sub>Bdb</sub> – Weight of test fuel burned during test run, dry basis, kg**

ASTM E2779 equation (1)

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

Where,

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

M<sub>Swb</sub> = weight of test fuel in hopper at start of test run, wet basis, kg

M<sub>Ewb</sub> = weight of test fuel in hopper at end of test run, wet basis, kg

Sample Calculation:

7.1 %

M<sub>Swb</sub> = 10.4 lbs

M<sub>Ewb</sub> = 0.0 lbs

0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(10.4 \times 0.4536) - (0.0 \times 0.4536)] (100/(100 + 7.095))$$

$$M_{Bdb} = 4.4 \text{ kg}$$

**$M_{BSidb}$  – Weight of test fuel burned during test run segment  $i$ , dry basis, kg**  
 ASTM E2779 equation (2)

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

Where,

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

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

Sample Calculation (from medium burn rate segment):

$$FM = 7.1 \%$$

$$M_{SSiwb} = 6.9 \text{ lbs}$$

$$M_{ESiwb} = 3.6 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(6.9 \times 0.4536) - (3.6 \times 0.4536)] (100/(100 + 7))$$

$$M_{BSidb} = 1.4 \text{ kg}$$

**BR – Average dry burn rate over full integrated test run, kg/hr**

ASTM E2779 equation (3)

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

Where,

$\theta$  = Total length of full integrated test run, min

Sample Calculation:

$$M_{Bdb} = 4.40 \quad \text{kg}$$

$$\theta = 363 \quad \text{min}$$

$$BR = \frac{60 \times 4.4}{363}$$

$$BR = \mathbf{0.73} \quad \text{kg/hr}$$

**BR<sub>Si</sub> – Average dry burn rate over test run segment *i*, kg/hr**  
 ASTM E2779 equation (4)

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

Where,

$$\theta_{Si} = \text{Total length of test run segment } i, \text{ min}$$

Sample Calculation (from medium burn rate segment):

$$M_{BSidb} = 1.40 \text{ kg}$$

$$\theta = 121 \text{ min}$$

$$BR = \frac{60 \times 1.4}{121}$$

$$BR = 0.69 \text{ kg/hr}$$



**V<sub>s</sub> – Average gas velocity in the dilution tunnel, ft/sec**

ASTM E2515 equations (9)

$$V_s = F_p \times K_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_s}{P_s \times M_s}}$$

Where:

- $F_p$  = Adjustment factor for center of tunnel pitot tube placement,  $F_p = \frac{V_{strav}}{V_{scent}}$ , ASTM E2515 Equation (1)
- $V_{scent}$  = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec
- $V_{strav}$  = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec
- $K_p$  = Pitot tube constant, 85.49
- $C_p$  = Pitot tube coefficient: 0.99, unitless
- $\Delta P^*$  = Velocity pressure in the dilution tunnel, in H<sub>2</sub>O
- $T_s$  = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- $P_s$  = Absolute average gas static pressure in dilution tunnel, =  $P_{bar} + P_g$ , in Hg
- $P_{bar}$  = Barometric pressure at test site, in. Hg
- $P_g$  = Static pressure of tunnel, in. H<sub>2</sub>O; (in Hg = in H<sub>2</sub>O/13.6)
- $M_s$  = \*\*The dilution tunnel wet molecular weight;  $M_s = 28.78$  assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$F_p = \frac{13.43}{15.16} = 0.886$$

$$V_s = 0.886 \times 85.49 \times 0.99 \times 0.224 \times \left( \frac{88.7 + 460}{\left( 30.34 + \frac{-0.17}{13.6} \right) \times 28.78} \right)^{1/2}$$

$$V_s = \mathbf{13.29 \text{ ft/s}}$$

\*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

\*\*The ASTM test standard mistakenly identifies  $M_s$  as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

**Q<sub>sd</sub> – Average gas flow rate in dilution tunnel, dscf/hr**

ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_s} \times \frac{P_s}{P_{std}}$$

Where:

- 3600 = Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
- B<sub>ws</sub> = Water vapor in gas stream, proportion by volume; assume 2%
- A = Cross sectional area of dilution tunnel, ft<sup>2</sup>
- T<sub>std</sub> = Standard absolute temperature, 528 °R
- P<sub>s</sub> = Absolute average gas static pressure in dilution tunnel, = P<sub>bar</sub> + P<sub>g</sub>, in Hg
- T<sub>s</sub> = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P<sub>std</sub> = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 13.29 \times 0.196 \times \frac{528}{88.7 + 460} \times \frac{30.3 + \frac{-0.17}{13.6}}{29.92}$$

$$Q_{sd} = \mathbf{8979.6 \text{ dscf/hr}}$$

**$V_{m(std)}$  – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf**

ASTM E2515 equation (6)

$$V_{m(std)} = K_1 \times V_m \times Y \times \frac{P_{bar} + \left( \frac{\Delta H}{13.6} \right)}{T_m}$$

Where:

$K_1$	=	17.64 °R/in. Hg
$V_m$	=	Volume of gas sample measured at the dry gas meter, dcf
$Y$	=	Dry gas meter calibration factor, dimensionless
$P_{bar}$	=	Barometric pressure at the testing site, in. Hg
$\Delta H$	=	Average pressure differential across the orifice meter, in. H <sub>2</sub> O
$T_m$	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 58.608 \times 0.977 \times \frac{\left( 30.34 + \frac{1.30}{13.6} \right)}{\left( 81.0 + 460 \right)}$$

$$V_{m(std)} = \mathbf{56.823} \text{ dscf}$$

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 58.253 \times 0.979 \times \frac{\left( 30.34 + \frac{1.07}{13.6} \right)}{\left( 80.6 + 460 \right)}$$

$$V_{m(std)} = \mathbf{56.601} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 0 \times \frac{\left( 30.34 + \frac{0.00}{13.6} \right)}{\left( 70.3 + 460 \right)}$$

$$V_{m(std)} = \mathbf{0.000} \text{ dscf}$$

**$m_n$  – Total Particulate Matter Collected, mg**

ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

$m_p$  = mass of particulate matter from probe, mg

$m_f$  = mass of particulate matter from filters, mg

$m_g$  = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train 1 (first hour):

$$m_n = 0.0 + 0.8 + 0.0$$

$$m_n = 0.8 \text{ mg}$$

Using equation for Train 1 (remainder):

$$m_n = 0.0 + 1.9 + 0.3$$

$$m_n = 2.2 \text{ mg}$$

Train 1 Aggregate = **3.0 mg**

Using equation for Train 2:

$$m_n = 0.0 + 3.0 + 0.0$$

$$m_n = \mathbf{3.0 \text{ mg}}$$

**C<sub>s</sub> - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dsc**  
 ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K<sub>2</sub> = Constant, 0.001 g/mg

m<sub>n</sub> = Total mass of particulate matter collected in the sampling train, mg

V<sub>m(std)</sub> = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{3.0}{56.82}$$

$$C_s = \mathbf{0.00005} \text{ g/dscf}$$

For Train 2

$$C_s = 0.001 \times \frac{3.0}{56.60}$$

$$C_s = \mathbf{0.00005} \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{0.00}$$

$$C_r = \mathbf{0.000000} \text{ g/dscf}$$

**E<sub>T</sub> – Total Particulate Emissions, g**

ASTM E2515 equation (15)

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

Where:

C <sub>s</sub>	=	Concentration of particulate matter in tunnel gas, g/dscf
C <sub>r</sub>	=	Concentration particulate matter room air, g/dscf
Q <sub>std</sub>	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

$$E_T = ( \underline{0.000053} - 0.000000 ) \times \underline{8979.6} \times \underline{363} / 60$$

$$E_T = \underline{2.87} \text{ g}$$

For Train 2

$$E_T = ( \underline{0.000053} - 0.000000 ) \times \underline{8979.6} \times \underline{363} / 60$$

$$E_T = \underline{2.88} \text{ g}$$

Average

$$E = \underline{2.87} \text{ g}$$

Total emission values shall not differ by more than 7.5% from the total average emissions

$$7.5\% \text{ of the average} = \underline{0.22}$$

$$\text{Train 1 difference} = \underline{0.01}$$

$$\text{Train 2 difference} = \underline{0.01}$$

# PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[ \frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

$\theta$  = Total sampling time, min

$\theta_i$  = Length of recording interval, min

$V_{mi}$  = Volume of gas sample measured by the dry gas meter during the "ith" time interval, dcf

$V_m$  = Volume of gas sample as measured by dry gas meter, dcf

$V_{si}$  = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec

$V_s$  = Average gas velocity in the dilution tunnel, ft/sec

$T_{mi}$  = Absolute average dry gas meter temperature during the "ith" time interval, °R

$T_m$  = Absolute average dry gas meter temperature, °R

$T_{si}$  = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, °R

$T_s$  = Absolute average gas temperature in the dilution tunnel, °R

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left( \frac{363 \times 0.153 \times 13.29 \times (100.0 + 460) \times (81.0 + 460)}{1 \times 58.61 \times 13.43 \times (88.7 + 460) \times (74.0 + 460)} \right) \times 100$$

$$PR = \underline{97} \%$$

**PM<sub>R</sub> – Average particulate emissions for full integrated test run, g/hr**  
ASTM E2779 equation (5)

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

Where,

$E_T$  = Total particulate emissions, grams

$\theta$  = Total length of full integrated test run, min

Sample Calculation:

$$E_T (\text{Dual train average}) = 2.87 \text{ g}$$

$$\theta = 363 \text{ min}$$

$$PM_R = 60 \times ( 2.87 / 363 )$$

$$PM_R = 0.48 \text{ g/hr}$$



**PM<sub>F</sub> – Average particulate emission factor for full integrated test run, g/dry kg of fuel burned**  
ASTM E2779 equation (6)

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

Where,

$E_T$  = Total particulate emissions, grams

$M_{Bdb}$  = Weight of test fuel burned during test run, dry basis, kg

Sample Calculation:

$$E_T (\text{Dual train average}) = 2.87 \text{ g}$$

$$M_{Bdb} = 4.40 \text{ kg}$$

$$PM_F = 2.87 / 4.40 )$$

$$PM_F = 0.65 \text{ g/kg}$$

## **Appendix B – K-List Drawings**

# **Appendix A – Labeling & Owner’s Manual**



ENVIRO MODEL / MODELE : **MINI**

Listed Room Heater, Pelletized Fuel Type (Appareil de chauffage à granules certifié)  
Suitable For Mobile Home Installation (Accepté pour l'installation dans une maison mobile, test)  
Conforms to (conforme à): ASTM E1509-12 Certified to (agréé): ULC S627-00

This pellet appliance has been tested and listed for use in manufactured homes in accordance with Oregon Administration Rules 814-23-900 through 814-23-909. Install and use only in accordance with the Manufacture's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspection in your area. Do not connect this unit to a chimney flue serving another appliance. See local building codes and manufacturers instructions for precautions required for passing a chimney through a combustible wall or ceiling. Electrical rating: 120 volts, 60 hz, 4.1 Amps. Route cord away from the heater.

Cet appareil de boulette a été teste et repertoire pour une utilisation dans les maisons pre fabriquées conformément aux reglements l'Administration d'Oregon Gouverne, 814-33-900 à 814-23-909. Installer et utiliser uniquement conformément aux instructions d'installtion et d'utilisation du fabricant. Contacter les autories locales de la construction ou de la protection incendie pour vous informer sur les restrictions et l'inspection d'installation dans votre region. Ne branchez pas cette unité sur un conduit de cheminée utilise pour un utre appereil. Consultez les codes de construction locaux et les instructions du fabricant pour les précautions necessaires pur faire passer une cheminée a travers un mur ou un plafold combustible. Le classement électrique : 120 volts, 60 hz, 4.1 Amplis. Maintenez le fil a l'ecart de l'appereil de chauffage.

For Use With Only Pelletized Wood fuels. Operate only with viewing door and ash removal door closed. Only replace glass with ceramic glass. Components required for installation: a 3 inch (75 mm) or 4inch (100 mm) listed PL vent, complete with components. Hearth mount installations; a listed single wall chimney liner may be used. Inspect and clean Exhaust Venting system frequently.

Pour l'usage avec les combustibles sous forme de boulets uniquement. Fonctionner seulement avec la vue de porte et la porte d'enlèvement de cendre ont fermé. Seulement remplacer le verre avec le verre de ceramique. Les composants ont exigé pour l'installation: 3 pouce (75 mm) ou 4 pouce (100 mm) a énuméré le conduit de PL complète avec les composants. Les installations de mont de foyer ; un paquebot de cheminée de mur de seul énuméré peut être utilisé.

This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards. Under specific test conditions this heater has been shown to have a particulate emission level of .48 g/hr. Ce poêle à granulés besoins inspection périodique et la réparation pour un fonctionnement correct. Consultez le manuel d'owner's pour plus d'informations. Il est contre les règlements fédéraux pour exploiter cette pastille chauffe d'une manière incompatible avec les instructions de fonctionnement dans le manuel d'owner's. Ce poêle répond aux normes limites d'émission de l'Environmental Protection Agency des États-Unis 2020. Dans des conditions de test spécifiques, ce poêle a été montré pour avoir un niveau d'émission de particules de .48g / h.

**DO NOT REMOVE THIS LABEL**  
**N'ENLEVEZ PAS CETTE ETIQUETTE**

OUTPUT Rating: 6,500 to 19,500 BTU/Hr (1.9 to 5.7 kWh)

**LIGHTING INSTRUCTIONS:**  
- Press and release the on / off button  
- Once fire has started, set the heat output to the desired setting.  
**TO TURN THE UNIT OFF:**  
- Push the on / off button  
(Refer to owners manual for detailed instructions)

**INSTRUCTIONS POUR L'ALLUMAGE:**  
- Presse et relaease le sur / de bouton.  
- Une fois le feu a commence, a regle le production de chaleur au montage desire.  
**POUR ETEINDRE L'UNITE:**  
- Appuyer le sur / de bouton  
(Referez-vous au guide de l'utilisateur pou un mode d'emploi detaille.)

**CAUTION:**  
**Hot while operating.**  
**Do not touch, severe burns may result. Keep children, clothing, furniture, gasoline or other flammable vapors away.**



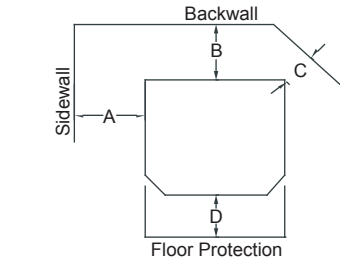
See installation and operating instructions accompanying appliance.

**ATTENTION:**  
**Très chaud quand allumé. Ne touchez pas, les brûlures sévères peuvent résulter. Tenez loin des enfants, des vêtements, des meubles, de l'essence ou d'autres fluides produisant des vapeurs inflammables.**  
Consultez le manuel avec les instructions d'installation et d'opération.

ALCOVE  
Largeur Minimum Width 36" (915 mm)  
Hauteur Minimum Height 48" (1220 mm)  
Profondeur Minimum Depth 30" (760 mm)



MANUFACTURED BY / FABRIQUE PAR:  
SHERWOOD INDUSTRIES LTD.  
VICTORIA BC CANADA



0268PF026E



**Intertek**  
**4001609**

Certified for use in Canada & USA  
Certifié pour installation au  
Canada et aux Etats-Unis.

**DATE OF MANUFACTURE / DATE DE FABRICATION:**  
J F M A M J J A S O N D 2018 2019 2020  
80 of 135



GREENFIRE MODEL / MODELE : **GF40**

Listed Room Heater, Pelletized Fuel Type (Appareil de chauffage à granules certifié)  
Suitable For Mobile Home Installation (Accepté pour l'installation dans une maison mobile, test)  
Conforms to (conforme à): ASTM E1509-12 Certified to (agréé): ULC S627-00

This pellet appliance has been tested and listed for use in manufactured homes in accordance with Oregon Administration Rules 814-23-900 through 814-23-909. Install and use only in accordance with the Manufacturer's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspection in your area. Do not connect this unit to a chimney flue serving another appliance. See local building codes and manufacturers instructions for precautions required for passing a chimney through a combustible wall or ceiling. Electrical rating: 120 volts, 60 hz, 4.1 Amps. Route cord away from the heater.  
Cet appareil de boulette a été teste et repertoire pour une utilisation dans les maisons pre fabriquées conformément aux reglements l'Administration d'Oregon Gouverne, 814-33-900 à 814-23-909. Installer et ulitiser uniquement conformément aux instructions d'installtion et d'utilisation du fabricant. Contacter les autories locales de la construction ou de la protection incendie pour vous informer sur les restrictions et l'inspection d'installtion dans votre region. Ne branchez pas cette unité sur un conduit de cheminée utilise pour un utre appereil. Consultez les codes de construction locaux et les instructions du fabricant pour les précautions necessaires pur faire passer une cheminée a travers un mur ou un plafold combustible. Le classement électrique : 120 volts, 60 hz, 4.1 Ampls. Maintenez le fil a l'ecart de l'appereil de chauffage.

For Use With Only Pelletized Wood fuels. Operate only with viewing door and ash removal door closed. Only replace glass with ceramic glass. Components required for installation: a 3 inch (75 mm) or 4inch (100 mm) listed PL vent, complete with components. Hearth mount installations; a listed single wall chimney liner may be used. Inspect and clean Exhaust Venting system frequently.  
Pour l'usage avec les combustibles sous forme de boulets uniquement. Fonctionner seulement avec la vue de porte et la porte d'enlèvement de cendre ont fermé. Seulement remplacer le verre avec le verre de ceramique. Les composants ont exigé pour l'installation: 3 pouce (75 mm) ou 4 pouce (100 mm) a énuméré le conduit de PL complète avec les composants. Les installations de mont de foyer ; un paquebot de cheminée de mur de seul énuméré peut être utilisé.  
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards. Under specific test conditions this heater has been shown to have a particulate emission level of .48 g/hr. Ce poêle à granulés besoins inspection périodique et la réparation pour un fonctionnement correct. Consultez le manuel d'owner's pour plus d'informations. Il est contre les règlements fédéraux pour exploiter cette pastille chauffe d'une manière incompatible avec les instructions de fonctionnement dans le manuel d'owner's. Ce poêle répond aux normes limites d'émission de l'Environmental Protection Agency des États-Unis 2020. Dans des conditions de test spécifiques, ce poêle a été montré pour avoir un niveau d'émission de particules de .48 g / h.

**DO NOT REMOVE THIS LABEL**  
**N'ENLEVEZ PAS CETTE ETIQUETTE**

OUTPUT Rating: 6,500 to 19,500 BTU/Hr (1.9 to 5.7 kWh)

**LIGHTING INSTRUCTIONS:**  
- Press and release the on / off button  
- Once fire has started, set the heat output to the desired setting.  
**TO TURN THE UNIT OFF:**  
- Push the on / off button  
(Refer to owners manual for detailed instructions)

**INSTRUCTIONS POUR L'ALLUMAGE:**  
- Presse et relaease le sur / de bouton.  
- Une fois le feu a commence, a regle le production de chaleur au montage desire.  
**POUR ETEINDRE L'UNITE:**  
- Appuyer le sur / de bouton  
(Referez-vous au guide de l'utilisateur pou un mode d'emploi detaille.)

**CAUTION:**  
**Hot while operating.**  
**Do not touch, severe burns may result. Keep children, clothing, furniture, gasoline or other flammable vapors away.**

See installation and operating instructions accompanying appliance.



**ATTENTION:**  
**Très chaud quand allumé. Ne touchez pas, les brûlures sévères peuvent résulter. Tenez loin des enfants, des vêtements, des meubles, de l'essence ou d'autres fluides produisant des vapeurs inflammables.**

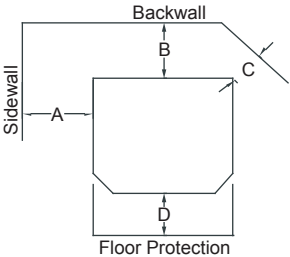
Consultez le manuel avec les instructions d'installation et d'opération.

INSTALLED AS A FREESTANDING STOVE MODEL (FS) /  
A INSTALLE COMME UN MODELE SUR PIED DE POELE

Minimum clearances to combustible materials; conventional or mobile home./ Les dégagements minimums aux matériels combustibles; la maison conventionnelle ou mobile.

- A) Sidewall to unit / De mur lateral à l'unité 8" (200 mm)  
B) Backwall to unit / De mur du fond à l'unité 4" (100 mm)  
C) Corner to unit / Du coin à l'unité 3" ( 75 mm)  
D) Combustible floor must be protected by a non-combustible material extending 6 inches (150 mm) in front of the unit, as shown or use part #50-1219 Hearth Pad - See Owners Manual.  
Le plancher combustible doit être protégé par un matériel incombustible étendant 6 pouces (150 mm) devant l'unité, comme indiquée. Ou la partie d'usage #50-1219 Coussin de Coeur - Consultez le manual.

**ALCOVE**  
Largeur Minimum Width 36" (915 mm)  
Hauteur Minimum Height 48" (1220 mm)  
Profondeur Minimum Depth 30" (760 mm)



Manufactured in Canada for /  
Fabriqué dans le Canada pour:  
FPI Fireplace Products International Ltd.  
Delta, BC, Canada



0268PF026E



**Intertek**  
**4001609**

Certified for use in Canada & USA  
Certifié pour installation au  
Canada et aux Etats-Unis.

DATE OF MANUFACTURE / DATE DE FABRICATION:

J F M A M J J A S O N D 2018 2019 2020

C-15527



ENVIRO MODEL / MODELE : **P3**

Listed Room Heater, Pelletized Fuel Type (Appareil de chauffage à granules certifié)  
Suitable For Mobile Home Installation (Accepté pour l'installation dans une maison mobile, test)  
Conforms to (conforme à): ASTM E1509-12 Certified to (agréé): ULC S627-00

This pellet appliance has been tested and listed for use in manufactured homes in accordance with Oregon Administration Rules 814-23-900 through 814-23-909. Install and use only in accordance with the Manufacture's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspection in your area. Do not connect this unit to a chimney flue serving another appliance. See local building codes and manufacturers instructions for precautions required for passing a chimney through a combustible wall or ceiling. Electrical rating: 120 volts, 60 hz, 4.1 Amps. Route cord away from the heater.  
Cet appareil de boulette a été teste et repertoire pour une utilisation dans les maisons pre fabriquées conformément aux reglements l'Administration d'Oregon Gouverne, 814-33-900 à 814-23-909. Installer et utiliser uniquement conformément aux instructions d'installtion et d'utilisation du fabricant. Contacter les autories locales de la construction ou de la protection incendie pour vous informer sur les restrictions et l'inspection d'installtion dans votre region. Ne branchez pas cette unité sur un conduit de cheminée utilise pour un utre appareil. Consultez les codes de construction locaux et les instructions du fabricant pour les précautions necessaires pur faire passer une cheminée a travers un mur ou un plafold combustible. Le classement électrique : 120 volts, 60 hz, 4.1 Amplis. Maintenez le fil a l'ecart de l'apperreil de chauffage.

For Use With Only Pelletized Wood fuels. Operate only with viewing door and ash removal door closed. Only replace glass with ceramic glass. Components required for installation: a 3 inch (75 mm) or 4inch (100 mm) listed PL vent, complete with components. Hearth mount installations; a listed single wall chimney liner may be used. Inspect and clean Exhaust Venting system frequently.  
Pour l'usage avec les combustibles sous forme de boulets uniquement. Fonctionner seulement avec la vue de porte et la porte d'enlèvement de cendre ont fermé. Seulement remplacer le verre avec le verre de ceramique. Les composants ont exigé pour l'installation: 3 pouce (75 mm) ou 4 pouce (100 mm) a énuméré le conduit de PL complète avec les composants. Les installations de mont de foyer ; un paquebot de cheminée de mur de seul énuméré peut être utilisé.  
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards. Under specific test conditions this heater has been shown to have a particulate emission level of .48 g/hr. Ce poêle à granulés besoins inspection périodique et la réparation pour un fonctionnement correct. Consultez le manuel d'owner's pour plus d'informations. Il est contre les règlements fédéraux pour exploiter cette pastille chauffe d'une manière incompatible avec les instructions de fonctionnement dans le manuel d'owner's. Ce poêle répond aux normes limites d'émission de l'Environmental Protection Agency des États-Unis 2020. Dans des conditions de test spécifiques, ce poêle a été montré pour avoir un niveau d'émission de particules de .48 g / h.

**DO NOT REMOVE THIS LABEL  
N'ENLEVEZ PAS CETTE ETIQUETTE**

OUTPUT Rating: 6,500 to 19,500 BTU/Hr (1.9 to 5.7 kWh)

LIGHTING INSTRUCTIONS:  
- Press and release the on / off button  
- Once fire has started, set the heat output to the desired setting.  
TO TURN THE UNIT OFF:  
- Push the on / off button  
(Refer to owners manual for detailed instructions)

INSTRUCTIONS POUR L'ALLUMAGE:  
- Presse et relaease le sur / de bouton.  
- Une fois le feu a commence, a regle le production de chaleur au montage desire.  
POUR ETEINDRE L'UNITE:  
- Appuyer le sur / de bouton  
(Referez-vous au guide de l'utilisateur pou un mode d'emploi detaille.)

**CAUTION:**  
**Hot while operating.**  
**Do not touch, severe burns may result. Keep children, clothing, furniture, gasoline or other flammable vapors away.**

See installation and operating instructions accompanying appliance.



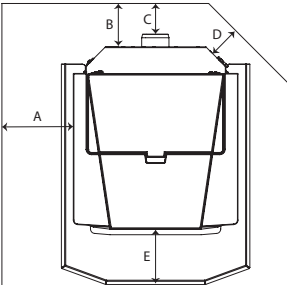
**ATTENTION:**  
**Très chaud quand allumé.**  
**Ne touchez pas, les brûlures sévères peuvent résulter. Tenez loin des enfants, des vêtements, des meubles, de l'essence ou d'autres fluides produisant des vapeurs inflammables.**  
Consultez le manuel avec les instructions d'installation et d'opération.

DATE OF MANUFACTURE / DATE DE FABRICATION:  
J F M A M J J A S O N D 2018 2019 2020

**DO NOT REMOVE THIS LABEL  
/ N'ENLEVEZ PAS CETTE ETIQUETTE**  
**INSTALLED AS A FREESTANDING STOVE MODEL (FS)  
/A INSTALLE COMME UN MODELE SUR PIED DE POELE**

Minimum clearances to combustible materials; conventional or mobile home./ Les dégagements minimums aux matériels combustibles; la maison conventionnelle ou mobile.  
A) Sidewall to unit / De mur lateral à l'unité 8" (200 mm)  
B) to unit / De mur du fond à l'unité 5.5" (140 mm)  
C) Backwall to Chimney Connector / Paroi arrière au connecteur de cheminée 4" (100 mm)  
D) Corner to unit / Du coin à l'unité 3" ( 75 mm)  
E) If supplied Hearth Pad is used no floor protection is required. If unit is installed on a combustible floor and the supplied Hearth Pad is not used the floor must be protected by a certified non-combustible Hearth Pad extending 6 inches (150 mm) in front of the glass. /Si fourni Foyers Pad est utilisé aucune protection de plancher est requise. Si l'appareil est installé sur un plancher combustible et le foyer Pad fourni n'est pas utilisé le sol doit être protégé par une plaque de foyer non combustible certifié s'étendant de 6 pouces (150 mm) à l'avant du verre.

ALCOVE  
Largeur / Width Minimum 36" (915 mm)  
Hauteur / Height Minimum 48" (1220 mm)  
Profondeur / Depth Minimum 30" (760 mm)



MANUFACTURED BY / FABRIQUE PAR:  
SHERWOOD INDUSTRIES LTD.  
VICTORIA BC CANADA

C-15548

0268PF026E

**Intertek**  
**4001609**

Certified for use in Canada & USA  
Certifié pour installation au Canada et aux Etats-Unis.





# MINI

## FREE-STANDING PELLET STOVE

# OWNER'S MANUAL

WARRANTY REGISTRATION  
[enviro.com/warranty](http://enviro.com/warranty)



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



**Intertek**  
**4001609**

**Contact your building or fire officials about restrictions and installation inspection requirements in your area.**

# TABLE OF CONTENTS

---

Introduction.....	3
Rating Label Location.....	3
Safety Warnings And Recommendations.....	3
Pellet Quality.....	6
Emissions and Efficiencies.....	7
Operating Instructions.....	8
Control Board Functions.....	8
Automatic Safety Features of your Pellet Stove.....	8
Operating your Pellet Stove.....	8
Turning your Pellet Stove Off.....	9
Slider/Damper Set-Up.....	10
Guidelines for fine-tuning for fuel quality.....	10
Routine Maintenance and Cleaning.....	11
Installation.....	13
Deciding Where to Locate your Pellet Appliance.....	13
Appliance Dimensions and Specifications.....	13
Removing Pellet Stove From Pallet.....	13
Hearth Pad (50-1219) Installation.....	14
Clearances to Combustibles.....	15
Alcove Clearances.....	15
Vent Termination Requirements.....	16
Outside Fresh-Air Connection.....	17
Exhaust and Intake Locations.....	17
Mobile Home Installation.....	18
Corner Through Wall Installation.....	18
Horizontal Exhaust Through Wall Installation.....	19
Through Wall With Vertical Rise and Horizontal Termination Installation - Freestanding.....	20
Inside Vertical Installations.....	21
Outside Vertical Installations.....	21
Hearth Mount Installation.....	22
Exterior Mounted Exhaust Blower (20-070).....	23
Typical Through Wall With Exterior Blower Kit Installation - Horizontal Termination.....	24
Typical Through Wall With Exterior Blower Kit Installation - Vertical Termination.....	25
Thermostat Installation.....	25
Troubleshooting.....	26
Wiring Diagram.....	29
Parts List.....	30
Parts Diagram - Components.....	32
Parts Diagram - Steel.....	33
Warranty.....	34
Notes.....	35
Installation Data Sheet.....	36



# INTRODUCTION

---

## **RATING LABEL LOCATION:**

---

The rating label is located on the back of the ash pan cover.

## **IMPORTANT SAFETY DATA:**

---

**Please read this entire Owner's Manual before installing or operating your ENVIRO Pellet Stove. Failure to follow these instructions may result in property damage, bodily injury or even death.** Contact your local building or fire official to obtain a permit and any information on installation restrictions and inspection requirements for your area.

To prevent the possibility of a fire, ensure that the appliance is properly installed by adhering to the installation instructions. An ENVIRO dealer will be happy to assist you in obtaining information with regards to your local building codes and installation restrictions.

Be sure to maintain the structural integrity of the home when passing a vent through walls, ceilings, or roofs.

The stove's exhaust system works with negative combustion chamber pressure and a slightly positive chimney pressure. It is very important to ensure that the exhaust system be sealed and airtight. The ash pan and viewing door must be locked securely for proper and safe operation of the pellet stove.

Do not burn with insufficient combustion air. A periodic check is recommended to ensure proper combustion air is admitted to the combustion chamber. Setting the proper combustion air is achieved by adjusting the slider damper located on the left side of the stove.

When installing the stove in a mobile home, it must be electrically grounded to the steel chassis of the home and bolted to the floor. Make sure that the structural integrity of the home is maintained and all construction meets local building codes.

Minor soot or creosote may accumulate when the stove is operated under incorrect conditions such as an extremely rich burn (black tipped, lazy orange flames).

If you have any questions with regard to your stove or the above-mentioned information, please feel free to contact your local dealer for further clarification and comments.

## **SAFETY WARNINGS AND RECOMMENDATIONS:**

---

**Caution: Do not connect to any air distribution duct or system.**

**Do not burn garbage or flammable fluids such as gasoline, naptha or engine oil.**

**DO NOT BURN: treated wood, salt water wood, coal, charcoal, garbage, plastic, solvents, or colored papers. These material contain chlorides which will rapidly corrode and warp metal surfaces which voids warranty.**

**Unit hot while in operation. Keep children, clothing and furniture away. Contact may cause skin burns.**

**Please read this entire Owner's Manual before installing or operating your ENVIRO Pellet Stove. Failure to follow these instructions may result in property damage, bodily injury or even death. Any unauthorized modification of the appliance or use of replacement parts not recommended by the manufacturer is prohibited.**

**Warning:** Parts of the appliance, especially the external surfaces, will be hot to touch when in operation and due care will need to be taken. Never place wood, paper, furniture, drapes or other combustible materials within 80cm (31½") of the front of the unit, 20cm (7⅞") from each side, and 10cm (4") from the back of the unit. Do not let children or pets touch it when it is hot.

# INTRODUCTION

---

To prevent the possibility of a fire, ensure that the appliance is properly installed by adhering to the installation instructions. An ENVIRO dealer will be happy to assist you in obtaining information with regards to your local building codes and installation restrictions.

**FIRE EXTINGUISHER AND SMOKE DETECTION:** All homes with a pellet burning stove should have at least one fire extinguisher in a central location known to all in the household. Smoke detectors and carbon monoxide detectors should be installed and maintained in the room containing the stove. If it sounds the alarm, correct the cause but do not deactivate. You may choose to relocate the smoke detection device within the room; **DO NOT REMOVE THE SMOKE OR CARBON MONOXIDE DETECTORS FROM THE ROOM.**

**CHIMNEY OR RUN AWAY FIRE:** Call local fire department (or dial 911). Close the draft fully. Examine the flue pipes, chimney, attic, and roof of the house, to see if any part has become hot enough to catch fire. If necessary, spray with fire extinguisher or water from the garden hose. **IMPORTANT:** Do not operate the stove again until you are certain the chimney and its lining have not been damaged.

**FUEL:** This pellet stove is designed and approved to only burn wood pellet fuel with up to 3% ash content. Dirty fuel will adversely affect the operation and performance of the unit and may void the warranty. Check with your dealer for fuel recommendations.

DO NOT use this appliance as an incinerator. DO NOT use unsuitable and non recommended fuels, including liquid fuels.

## **THE USE OF CORDWOOD IS PROHIBITED BY LAW.**

**FLAMMABLE LIQUIDS:** **Never** use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in the heater. Keep all such liquids well away from the heater while it is in use.

**SOOT:** Operation of the stove with insufficient combustion air will result in the formation of soot which will collect on the glass, the heat exchanger, the exhaust vent system, and may stain the outside of the house. This is a dangerous situation and is inefficient. Frequently check your stove and adjust the slider/damper as needed to ensure proper combustion. **See: "SLIDER/DAMPER SETTING".**

**CLEANING:** There will be some build up of fly ash and small amounts of creosote in the exhaust. This will vary due to the ash content of the fuel used and the operation of the stove. It is advisable to inspect and clean the exhaust vent semi-annually or every two tons of pellets.

The appliance, flue gas connector and the chimney flue require regular cleaning. Check them for blockage prior to re-lighting after a prolonged shut down period.

**ASHES:** Disposed ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be on a non-combustible floor 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 dispensed, they should be retained in the closed container until all cinders have been thoroughly cooled.

**ELECTRICAL:** **The use of a surge protected power bar is recommended.** The unit must be grounded. The grounded electrical cord should be connected to a standard 110-120 volts, nominal average 2.0 Amps (4.1 Amps peak), 60 hertz electrical outlet and also must be accessible. Ensure the polarity to the outlet, the unit will be plugged into, is correct as incorrect polarity can affect the unit's operation. If this power cord should become damaged, a replacement power cord must be purchased from a qualified ENVIRO dealer. Be careful that the electrical cord is not trapped under the appliance and that it is clear of any hot surfaces or sharp edges. This unit's maximum power requirement is 184 watts (600 watts peak).

# INTRODUCTION

---

When installing the stove in a mobile home, it must be electrically grounded to the steel chassis of the home and bolted to the floor. Make sure that the structural integrity of the home is maintained and all construction meets local building codes.

**GLASS:** Do not abuse the glass by striking or slamming the door. Do not attempt to operate the stove with broken glass. The stove uses ceramic glass. Replacement glass must be purchased from an ENVIRO dealer. Do not attempt to open the door and clean the glass while the unit is in operation or if glass is hot. To clean the glass, use a soft cotton cloth and mild window cleaner, gas or wood stove glass cleaner, or take a damp paper towel and dip into the fly ash. This is a very mild abrasive and will not damage the glass.

**OPERATION:** The door and ash drawer cover must be kept closed securely except during ignition, refuelling and removal of residue material to prevent fume spillage and for proper and safe operation of the pellet stove. Also ensure all gaskets on the door are checked and replaced when necessary.

**IMPORTANT:** The door and ash drawer cover must be kept closed except during ignition, refueling and removal of residue material to prevent fume spillage.

**CAUTION:** When operating during adverse weather, if the unit exhibits dramatic changes in combustion stop using the unit immediately.

**KEEP ASH PAN FREE OF RAW FUEL.** DO NOT PLACE UNBURNED OR NEW PELLET FUEL IN ASH PAN. A fire in the ash pan may occur.

**INSTALLATION:** Contact your local building or fire official to obtain a permit and any information on installation restrictions and inspection requirements for your area. All local regulations, including those referring to national and European Standards need to be complied with when installing this appliance.

Be sure to maintain the structural integrity of your home when passing a vent through walls, ceilings, or roofs. It is recommended that the unit be secured into its position in order to avoid any displacement. This appliance must be installed on a floor with an adequate load bearing capacity. If an existing construction doesn't meet these prerequisite, suitable measures (e.g. load distributing plate) shall be taken to achieve it.

DO NOT INSTALL A FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.  
DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

**FRESH AIR:** Outside Fresh Air connection is optional. Fresh Air must be connected to all units installed in Mobile and "Air Tight Homes" (R2000) or where required by local codes.

Consider all large air moving devices when installing your unit and provide room air accordingly. NOTE: Extractor fans when operating in the same room or space as the appliance, may cause problems. Limited air for combustion may result in poor performance, smoking and other side effects of poor combustion.

The stove's exhaust system works with negative combustion chamber pressure and a slightly positive chimney pressure. It is very important to ensure that the exhaust system be sealed and airtight. The ash pan and viewing door must be locked securely for proper and safe operation of the pellet stove.

Do not burn with insufficient combustion air. A periodic check is recommended to ensure proper combustion air is admitted to the combustion chamber. Setting the proper combustion air is achieved by adjusting the slider damper located on the left side of the stove.

Minor soot or creosote may accumulate when the stove is operated under incorrect conditions such as an extremely rich burn (black tipped, lazy orange flames).

# INTRODUCTION

If you have any questions with regards to your stove or the above-mentioned information, please feel free to contact your local dealer for further clarification and comments.

**SINCE SHERWOOD INDUSTRIES LTD. HAS NO CONTROL OVER THE INSTALLATION OF YOUR STOVE, SHERWOOD INDUSTRIES LTD. GRANTS NO WARRANTY IMPLIED OR STATED FOR THE INSTALLATION OR MAINTENANCE OF YOUR STOVE. THEREFORE, SHERWOOD INDUSTRIES LTD. ASSUMES NO RESPONSIBILITY FOR ANY CONSEQUENTIAL DAMAGE(S).**

## PELLET QUALITY:

**Pellet quality is important, please read the following:**

**Your enviro pellet stove has been designed to burn wood pellets only. Do not use any other type of fuel, as this will void any warranties stated in this manual.**

**The performance of your pellet stove is greatly affected by the type and quality of wood pellets being burned. As the heat output of various quality wood pellets differs, so will the performance and heat output of the pellet stove.**

**CAUTION:** It is important to select and use only pellets that are dry and free of dirt or any impurities such as high salt content. Dirty fuel will adversely affect the operation and performance of the unit and will void the warranty. The Pellet Fuel Industries (P.F.I.) has established standards for wood pellet manufacturers. We recommend the use of pellets that meet or exceed these standards. Ask your dealer for a recommended pellet type.

### P.F.I. PELLET STANDARDS:

Fines (fine particles).....	1% maximum through a 1/8" screen
Bulk Density.....	40 pound per cubic foot minimum
Size.....	1/4" to 5/16" diameter 1/2 – 1 1/2" long maximum
Ash Content.....	1% maximum (Premium grade)
	.....3% maximum (Standard grade)
Moisture Content.....	8% maximum
Heat Content.....	approximately 8200 Btu per pound minimum

**ASH:** The ash content of the fuel and operation of your stove will directly determine the frequency of cleaning. The use of high ash fuels may result in the stove needing to be cleaned daily. A low ash fuel may allow longer intervals between cleaning.

**CLINKERING:** [clinkers are silica (sand) or other impurities in the fuel that will form a hard mass during the burning process]. This hard mass will block the air flow through the Burn Pot Liner and affect the performance of the stove. Any fuel, even approved types, may tend to clinker. Check the Burn-Pot Liner daily to ensure that the holes are not blocked with clinkers. If they become blocked, remove the liner (when the unit is cold) and clean/scrape the clinkers out. Clean the holes with a small pointed object if required. Refer to the section Routine Cleaning and Maintenance.

**PELLET FEED RATES:** Due to different fuel densities and sizes, pellet feed rates may vary. This may require an adjustment to the slider damper setting or to the auger feed trim setting on low.

Since Sherwood Industries Ltd. has no control over the quality of pellets that you use, we assume no liability for your choice in wood pellets.

**Store pellets at least 36" (1 m) away from the pellet stove.**

# EMISSIONS AND EFFICIENCIES

---

## EMISSIONS AND EFFICIENCY - MINI:

---

This manual describes the installation and operation of the Enviro Mini pellet heater. This heater is U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 6,447-19,996 Btu/hr.

**Efficiency:** 66.2% HHV



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

**WARNING:** This wood pellet 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 pellet heater in a manner inconsistent with operating instructions in this manual.

# OPERATING INSTRUCTIONS

## CONTROL BOARD FUNCTIONS:

1. **AUGER LIGHT:** This green light will flash in conjunction with the auger pulse.
2. **MODE LIGHT:** Responsible for signaling the state of the control board. When the light is flashing the stove is in an automatic start mode or the thermostat has control of the unit. When the light is solid, the Heat Level Setting can be altered.
3. **THERMOSTAT SWITCH:** Used to set the unit's controls to one of three mode settings; manual, high/low, or auto/off.
4. **FEED RATE TRIM BUTTON:** Used to change the feed rate trims in ¼ second increments for all feed settings. When this button is pressed, all the light will light up on the Heat Output Indicator except for the one that shows the current setting; the default setting is the number 4 light. To adjust the setting hold the Feed Rate Trim button down and press the Heat Level up or down buttons to adjust the setting.
5. **COMBUSTION BLOWER TRIM BUTTON:** Used to change the Combustion Blower trims in 5 volt increments for all feed settings until it reaches line voltage. When this button is pressed, all the light will light up on the Heat Output Indicator except for the one that shows the current setting; the default setting is the number 2 light. To adjust the setting hold the Combustion Blower Trim button down and press the Heat Level up or down buttons to adjust the setting.
6. **ON/OFF BUTTON:** Used to turn the unit ON and OFF.
7. **ROOM AIR FAN ON/OFF BUTTON:** Used to turn convection fan on or off.
8. **HEAT LEVEL ADJUSTMENT BUTTONS:** When pressed, will change the heat level setting of the unit up or down.
9. **HEAT OUTPUT INDICATOR:** Shows the present heat output setting.

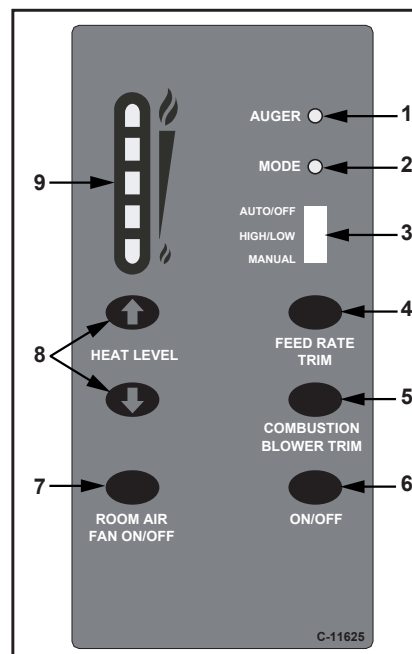


Figure 1: Circuit Board Control Panel Decal.

## AUTOMATIC SAFETY FEATURES OF YOUR PELLET STOVE:

- A. The stove will shut off when the fire goes out and the exhaust temperature drops below 120°F (49°C).
- B. The stove has a high temperature safety switch. If the temperature on the hopper reaches 200°F (93°C), the auger will automatically stop and the stove will shut down when the exhaust temperature cools #4 light flashes. Dealer will have to reset the sensor. If this happens, call your local dealer to reset the 200°F (93°C) high limit switch. **ALSO FIND THE REASONS WHY THE UNIT OVERHEATED.**
- C) The unit is equipped with a vacuum switch to monitor the venting; if it becomes blocked the vacuum switch will turn off the auger and the #2 light on the control board will flash.

## OPERATING YOUR PELLET STOVE:

**PRE-BURN INSTRUCTIONS:** The burn pot liner holes must be clear and the liner installed properly against the ignitor tube for proper operation. Check the hopper for enough pellets to start the unit.

**DO NOT OPERATE THE UNIT WITH THE DOOR OR ASH PAN OPEN.**

**Note:** The thermostat mode can be changed during normal operation.



# OPERATING INSTRUCTIONS

## **MANUAL MODE:**

All control of circuit board function is adjusted at the circuit board.

**To START:** Press the ON / OFF button. The stove will turn on. The system light will flash. The Auger Light will flash with each pulse of the auger (the Auger Feed Rate is pre-programmed during start-up). The Heat Level Indicator will show the Heat Level that the stove will run at after start-up and can be adjusted but the change will not take affect until the start -up has finished.

If this is the first time the unit has been started or the unit has run out of fuel, the auger will need to be primed. This can be done by restarting the unit five (5) minutes into its start-up or by putting a small hand full of pellets into the burnpot.

**To OPERATE:** When a fire has been established, the System Light will turn solid (after approximately 10 - 15 minutes) and the Auger Light will continue to flash to the corresponding Heat Level setting.

The convection blower (room air blower) will turn on. The speed of this blower is controlled by the setting of the heat level output indicator. The convection blower can be turned OFF by depressing the convection blower control button. For the best efficiency the convection blower should be left on at all times.

**HIGH/LOW MODE:** (Requires a thermostat)

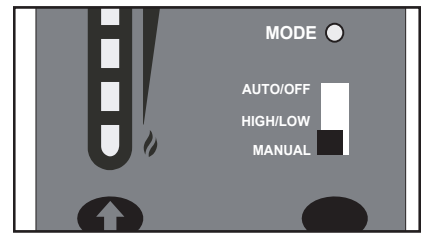
**INITIAL START-UP:** See manual mode above.

**OPERATION:** When the thermostat calls for heat (contacts are closed) the stove settings are adjustable as per Manual Mode. When the thermostat contacts open, the HEAT LEVEL and Fans will drop down to the LOW setting until the thermostat contacts close again. \*The LOW heat setting can be adjusted for different fuel qualities (see "OPERATING INSTRUCTIONS - CONTROL BOARD FUNCTIONS"). The stove will come back to the previous HEAT LEVEL setting when the thermostat contacts close again.

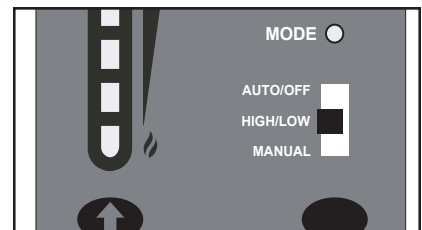
**AUTO/OFF MODE:** (Requires a thermostat)

**INITIAL START-UP:** See manual mode above.

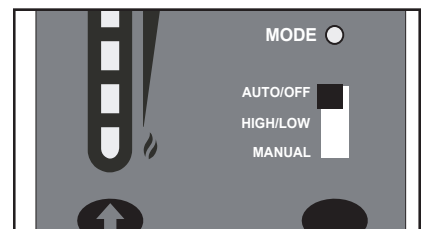
**OPERATION:** When the thermostat contacts close, the unit will light automatically. Once up to temperature, the stove operates the same as in MANUAL. When the thermostat contacts open, the stove's HEAT LEVEL and Fans will drop down to the LOW setting for 30 minutes. If the thermostat contacts close within the 30 minutes, the HEAT LEVEL will return to the previous MANUAL setting. If the thermostat contacts remain open the stove automatically begins its shutdown routine. The ON / OFF button can be presses at any time the the stove will immediately shut down. The stove will re-light when the thermostat contacts close again.



**Figure 2: Thermostat Switch in MANUAL position.**



**Figure 3: Thermostat Switch in HIGH/LOW position.**



**Figure 4: Thermostat Switch in ON/OFF position.**

## **TURNING YOUR PELLET STOVE OFF:**

- **MANUAL and HI / LOW mode:** To turn the unit OFF, simply press the ON / OFF button. This will stop the feed of pellets. The blowers will continue to operate and cool the stove down. When cool enough, the stove will turn off.
- **AUTO / OFF mode:** To turn the unit OFF, turn the thermostat down or off. NOTE: The unit will run on low for three (3) minutes before it turns off.

**DO NOT unplug unit while Combustion fan is operating.  
This may lead to smoke escaping from the stove.**

# OPERATING INSTRUCTIONS

## SLIDER/DAMPER SET-UP:

**THE SLIDER / DAMPER MUST BE SET AT TIME OF INSTALLATION. This is used to regulate the airflow through the pellet stove. Following these steps will minimize visible emissions.**

If, after long periods of burning, the fire builds up and overflows the burn pot or there is a build up of clinkers, this would be a sign that the pellet quality is poor, this requires more primary air, the slider damper must be pulled out to compensate. Pulling the slider damper out gives the fire more air.

The easiest way to make sure that an efficient flame is achieved is to understand the characteristics of the fire.

- A tall, lazy flame with dark orange tips requires more air – Open slider (pull out) slightly.
- A short, brisk flame, like a blowtorch, has too much air – Close slider (push in) slightly.
- If the flame is in the middle of these two characteristics with a bright yellow/orange, active flame with no black tips then the air is set for proper operation, refer to Figure 5.

The combustion exhaust blower is a variable speed blower controlled by the heat output button. This blower will decrease the vacuum pressure inside the stove and as the heat output button is turned down.

### **SPECIAL NOTES:**

Pellet quality is a major factor in how the Pellet stove will operate. If the pellets have a high moisture content or ash content the fire will be less efficient and has a higher possibility of the fire building up and creating clinkers (hard ash build-up).

**IMPORTANT:** Taking a reading of vacuum pressure inside the firebox with a magnehelic gauge should be used to set the slider for best combustion. The slider damper should be set only on a hot stove (operating for thirty (30) minutes or more) by using a Magnahelic Pressure Gauge to measuring the pressure in the firebox. **The best settings are a reading of approximately 0.11 0.12 inches of water column (27.4 - 29.9 Pa) on the high fire setting. Some fuels may require higher or lower settings.** The reading can be taken from the 1/8" (3 mm) hole located on the front of the unit below the ash shelf.

### **GUIDELINES FOR FINE-TUNING FOR FUEL QUALITY:**

Due to fuel quality the slider damper and control board trims may need to be fine-tuned.

1. If the unit builds up on all settings, the slider damper rod should be pulled out in small increments to give the unit more air.
2. If the unit has excesses ash build-up in the liner on the lower feed settings, the Combustion Blower Trim should be increased one setting at a time until the problem improves (Factory Setting is #2).
3. If the fire is going out on low because the airflow is too great, the Combustion Blower Trim can be lowered to the #1 setting.
4. If the stove has excesses ash build-up in the liner on the higher settings the Feed Rate Trim should be trimmed down a setting at a time until the problem improves (Factory setting is #4).
5. If you need more heat and the fuel has long pellets, the majority are over 1" (2.5cm) in length, the Feed Rate Trim can be moved up to the #5 setting. NOTE: Only do this if the fuel burns without building up.

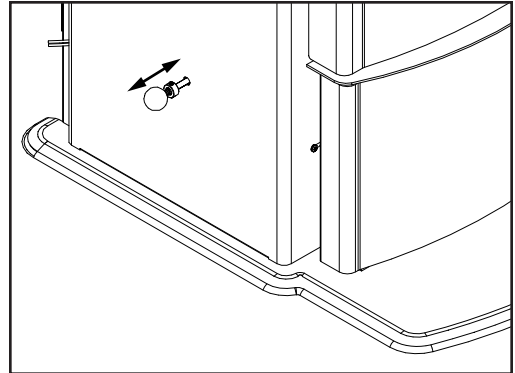


Figure 5: Slider/Damper Adjustment Knob.



Figure 6: Efficient Flame.



## ROUTINE CLEANING AND MAINTENANCE

The following list of components should be inspected and maintained routinely to ensure that the appliance is operating at its' optimum and giving you excellent heat value:

<u>2-3 Days / Weekly</u>	<u>Semi-annually or 2 Tons of Fuel</u>
Burn Pot and Liner	Exhaust Vent
Heat Exchanger Tubes	Air Intake
Ash Pan	Blower Mechanisms
Door Glass	Heat Exchanger Tubes
Inside Firebox	Behind Firebox Liners & Covers
Ash Pan and Door Gaskets	All Hinges
Door Latch	Post Season Clean-up

### TOOLS REQUIRED TO CLEAN UNIT:

Torx T-20 Screwdriver,  $\frac{5}{16}$ " wrench or socket, Brush, Soft Cloth, Vacuum with fine filter bag

### BURNER POT AND LINER (2-3 days)

Every two to three days (when the unit is cold), remove the burn-pot liner from the stove. Using a metal scraper, remove material that has accumulated or is clogging the liner's holes. Then dispose of the scraped ashes from the liner and from inside the burn-pot. Place the burn-pot back into the stove, making sure that the pipes are properly inserted into the burn pot. Place the liner back into the burn-pot, making sure that the ignitor hole in the liner is aligned with the ignitor tube (shown in Figure 7). Push the liner up against the ignitor tube.

If, after long periods of burning, the fire continually builds up and overflows the burn pot or there is a build up of clinkers, this is an indication that the pellet fuel quality is poor, the stove may need cleaning, or the air adjusted. Check the stove for ash build up (clean if required) and adjust the slider / damper to produce the proper clean combustion.

### HEAT EXCHANGER TUBES (2-3 days)

A handle is located in the center of the stove just above the door. This handle is to be pulled up and down a few times (ONLY WHEN THE UNIT IS COLD) in order to clean away any fly ash that may have collected on the heat exchanger tubes. As different types of pellets produce different amounts of ash, cleaning of the tubes should be done on a regular basis to enable the unit to run efficiently.

### ASH PAN AND DOOR GASKETS (weekly)

After extended use the gasketing may come loose. To repair this, glue the gasketing on using high-temperature fiberglass gasket glue available from your local dealer. This is important to maintain an airtight assembly.

### DOOR GLASS CLEANING (2-3 days)

Cleaning of the glass must only be done when stove is cold. Open the door by lifting the handle. The glass can be cleaned by wiping down the outside and inside of the glass with a dry soft cloth.

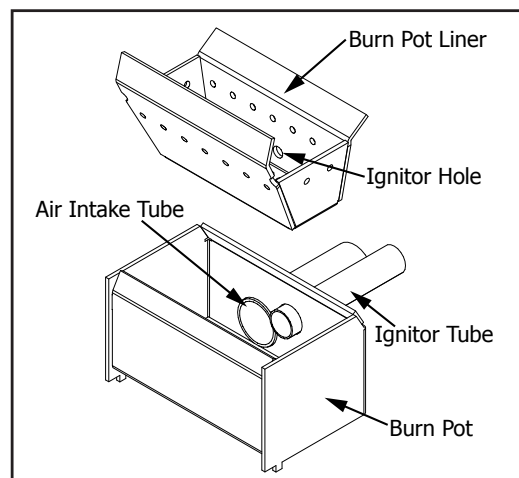


Figure 7: Mini Burn pot and Liner

## ROUTINE CLEANING AND MAINTENANCE

If the glass has build up that can not be removed with only the cloth, clean the glass using paper towel and a gas appliance glass cleaner, this may be purchased through most dealers. If a gas appliance glass cleaner is not available, use a damp paper towel dipped in fly ash to clean the glass. After the glass has been cleaned use the dry soft cloth to wiping down the outside and inside of the glass.

### ASH PAN (weekly)

This part is located under the door. To remove the ash pan, open the cover from the right hand side, and lift the ash pan up and out. Dump the ashes into a metal container stored away from combustibles. Monitor the ash level every week. Remember that different pellet fuels will have different ash contents. Ash content is a good indication of fuel efficiency and quality. Refer to "SAFETY WARNINGS AND RECOMMENDATIONS" for disposal of ashes. Vacuum the inside of the ash pan compartment inside the pedestal including the hole at the top back of the compartment. Replace the ash pan and close pedestal door. **DO NOT PLACE UNBURNED OR RAW PELLET FUEL IN ASH PAN.**

### AIR INTAKE (semi-annually)

Inspect periodically to be sure that it is not clogged with any foreign materials.

### EXHAUST PASSAGES (semi-annually)

To prevent build up of fly-ash all the exhaust passages must be cleaned and vacuumed.

#### Clean behind clean-out covers:

- Open ash box cover.
- Remove ash box.
- Using a  $\frac{5}{16}$ " socket, loosen the six (6) screws in the ash box compartment; four (4) on the back and one (1) on each side (see Figure 9).
- Rotate the back cover counter-clockwise to remove and rotate the side covers to open them.
- Vacuum out all three (3) chambers.
- Close all the clean-out covers and tighten the screws.

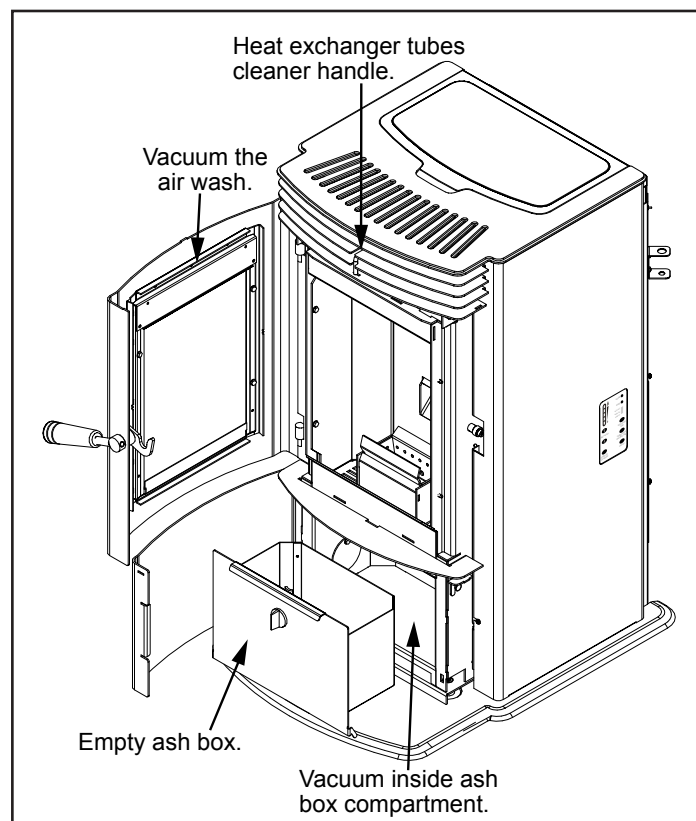


Figure 8: Mini Open

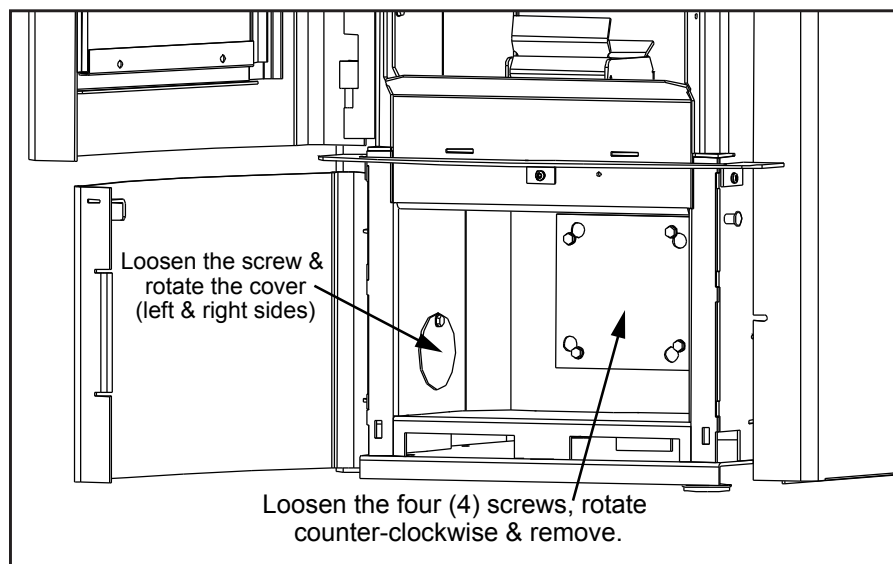


Figure 9: Mini Clean-Out Covers.

# INSTALLATION

## DECIDING WHERE TO LOCATE YOUR PELLET APPLIANCE:

1. Check clearances to combustibles.
2. Do not obtain combustion air from an attic, garage or any unventilated space. Combustion air may be obtained from a ventilated crawlspace.
3. Do not install the stove in a bedroom.
4. You can vent the stove through an exterior wall behind the unit or connect it to an existing masonry or metal wood stove chimney (must be lined if the chimney is over 6" (15 cm) diameter, or over 28 inches<sup>2</sup> (180 cm<sup>2</sup>) cross sectional area). An interior vent can be used with approved pipe passing through the ceiling and roof.
5. Locate the stove in a large and open room that is centrally located in the house. This will optimize heat circulation.
6. The power cord is 8 feet (2.43 m) long and may require a grounded extension cord to reach the nearest electrical outlet.



[www.nficertified.org](http://www.nficertified.org)

We recommend that our pellet hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Pellet Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).



## APPLIANCE DIMENSIONS AND SPECIFICATIONS:

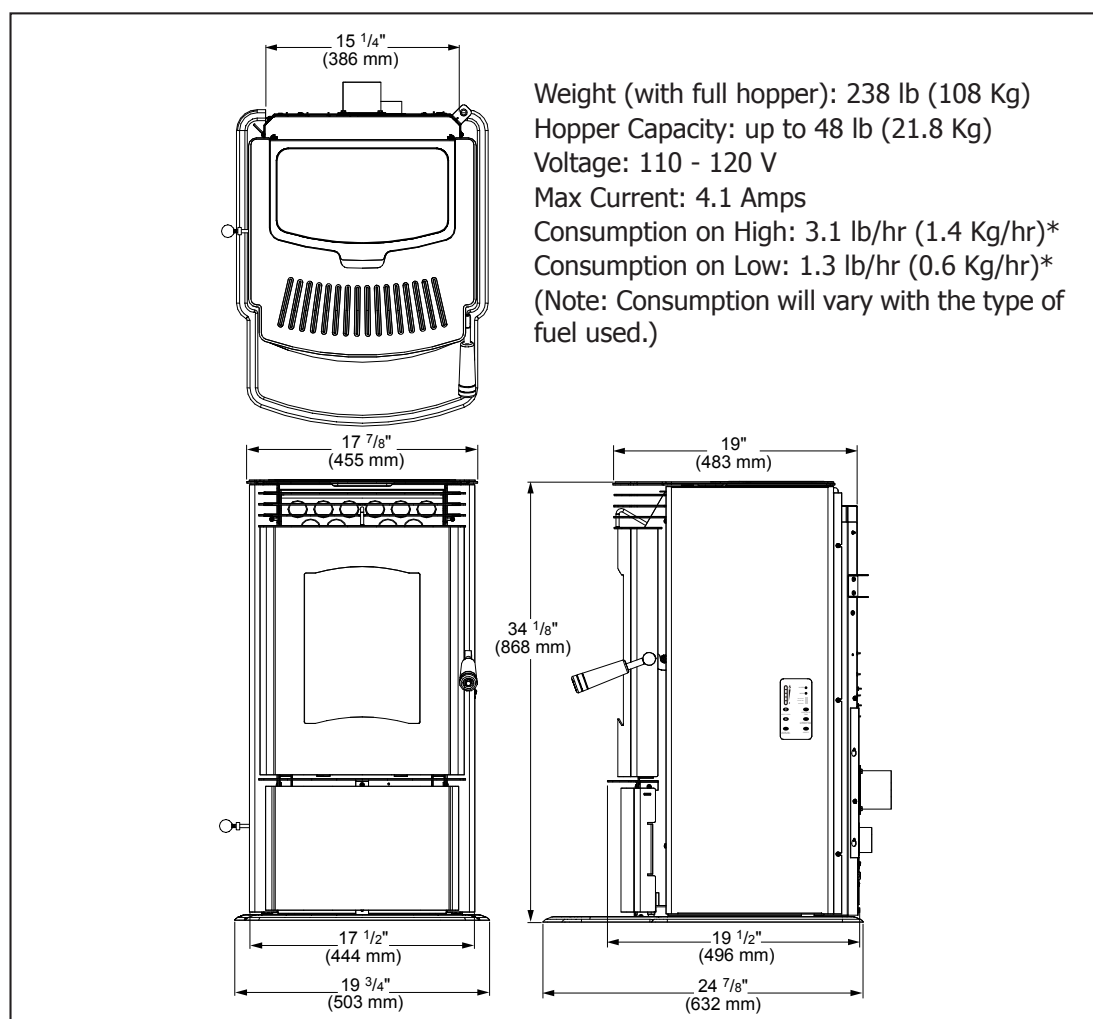


Figure 10: Dimensions of Mini.

# INSTALLATION

## REMOVING PELLET STOVE FROM PALLET AND INSTALLING HEARTH PAD:

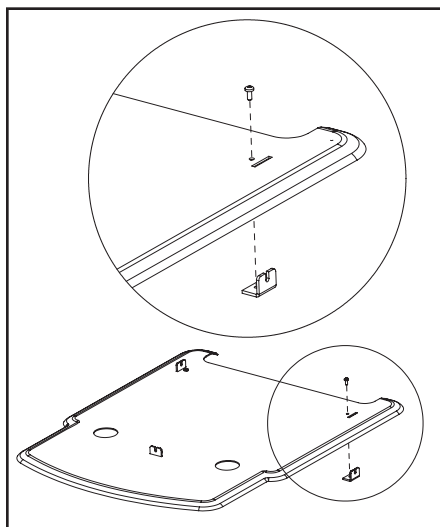


Figure 12: Installing tabs into hearth pad.

### Tool Required:

- T-20 screwdriver
- $\frac{5}{16}$ " socket or flat head screwdriver

### Installation:

1. Slide a hearth pad tab through each of the three (3) slots on the hearth pad so the slotted end is up and secure in place with a T-20 screw through the pad into the tab (refer to Figure 11).
2. Open the ash pan cover from the right then lift the cover up and out to unhook the hinges at the left.
3. Remove the cab sides.
  - a) Ensure the screws behind the ash box (Figure 12) and the three (3) on each side at the back (Figure 13) are loosened.

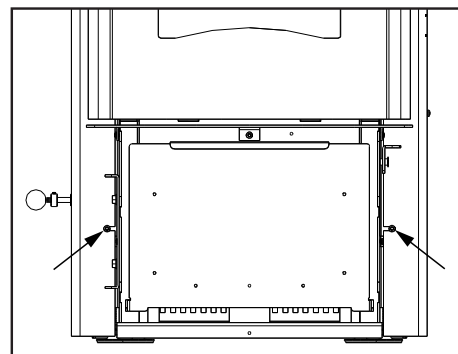


Figure 11: Screw behind ash box.

- b) Remove knob and collar from slider rod.
  - c) Pull the cab sides straight out.
4. Using a  $\frac{5}{16}$ " socket or flat head screwdriver, remove the three (3) wood screws that are holding the bottom of the stove to the pallet. There is one (1) screw behind each side panel and one (1) at the back behind the back grill (refer to Figure 14).
  5. Loosen the three (3) T-20 screws from the base of the unit (see Figure 15).

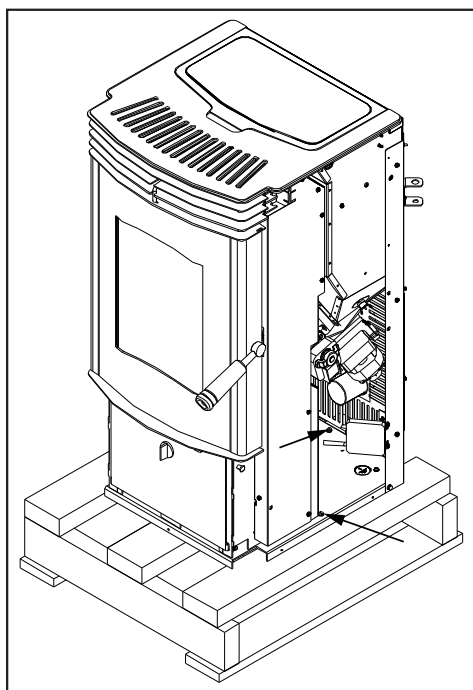


Figure 14: Screws to take out to remove stove from pallet.

6. Either lift the unit up and place it into the hearth pad or carefully place the unit on its back; it can rest on the pallet it was shipped on (allow the pipes to fit through an opening in the pallet).
7. Align the three (3) tabs on the hearth pad to the three (3) screws on the unit, slide together, and tighten the T-20 screws.
8. Adjust the leveling legs to level and support stove.
9. Re-install the cab sides and ash pan cover.

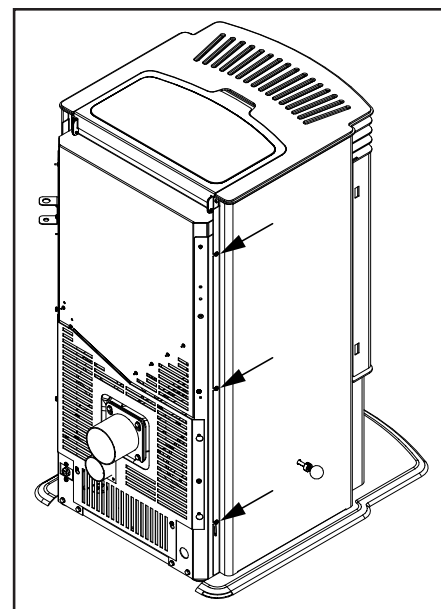


Figure 13: Screws at the back of the cabinet side.

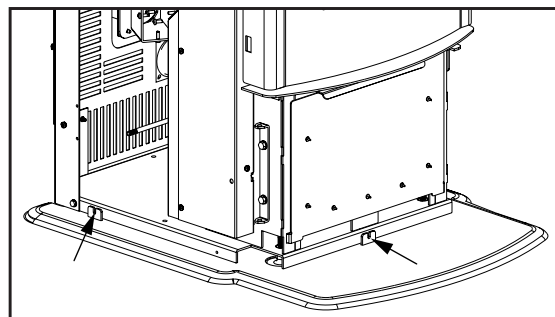


Figure 15: Mini Bern Hearth Pad in Place.

# INSTALLATION

## CLEARANCES TO COMBUSTIBLES:

**IMPORTANT:** Attach the Mini's Hearth Pad when installing the unit on a combustible floor. The supplied hearth pad meet all the requirement of a proper hearth pad. If you do not use the supplied hearth pad a hearth pad must be used when on combustible material.

If the Mini is installed on carpet the use of a solid material must be used under leveling legs.

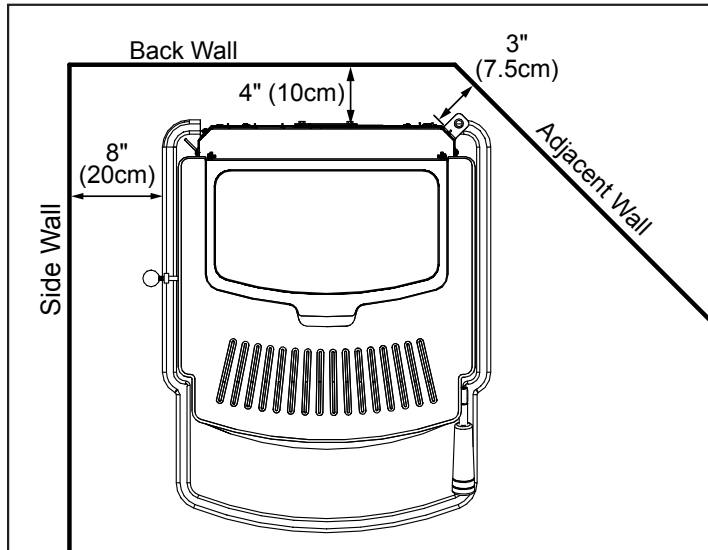


Figure 16: Mini Clearance to Combustibles.

These dimensions are minimum clearances but it is recommended that you ensure sufficient room for servicing, routine cleaning and maintenance.

Side wall to unit	8 inches	(20 cm)
Back wall to unit	4 inches	(10 cm)
Corner to unit	3 inches	(7.5 cm)

## ALCOVE CLEARANCES:

This unit may be installed in an alcove. Maintain these clearances to combustibles.

Minimum Alcove width	36 inches	(91.5 cm)
Minimum Alcove height	48 inches	(122 cm)
Maximum Alcove depth	30 inches	(76 cm)

**Install vent at clearances specified by the vent manufacturer.**

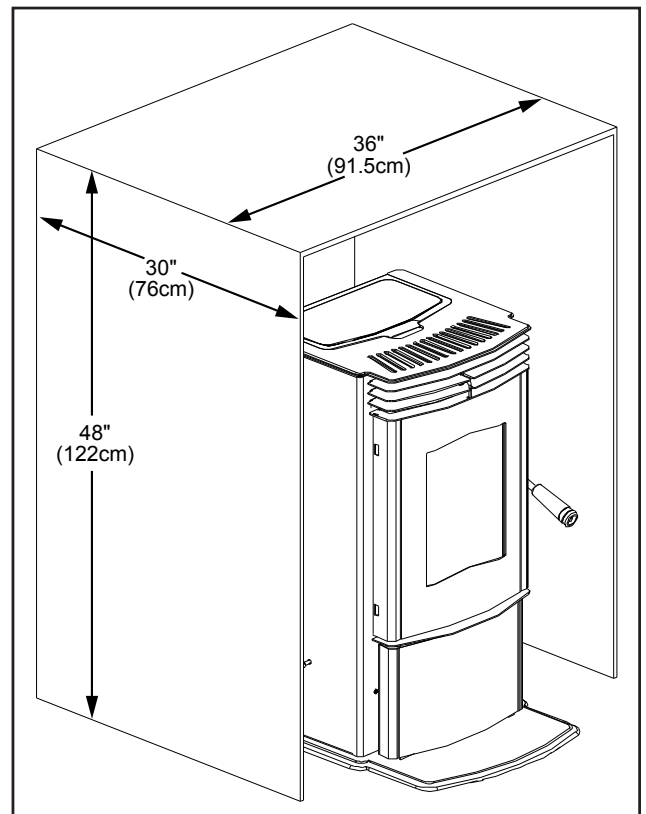


Figure 17: Mini Minimum Alcove Size.

# INSTALLATION

## VENT TERMINATION REQUIREMENTS:

IT IS RECOMMENDED THAT YOUR PELLET STOVE BE INSTALLED BY AN AUTHORIZED DEALER/INSTALLER.

Table 1: Use in conjunction with Figure 18 for allowable exterior vent termination locations.

Letter	Minimum Clearance	Description
A	24 in (61 cm)	Above grass, top of plants, wood, or any other combustible materials.
B	48 in (122 cm)	Beside/below any door or window that may be opened. (18" (46 cm) if outside fresh air installed.)
C	12 in (30 cm)	Above any door or window that may be opened. (9" (23 cm) if outside fresh air installed.)
D	24 in (61 cm)	To any adjacent building, fences and protruding parts of the structure.
E	24 in (61 cm)	Below any eave or roof overhang
F	12 in (30 cm)	To outside corner.
G	12 in (30 cm)	To inside corner, combustible wall (vertical and horizontal terminations).
H	3 ft (91 cm) within a height of 15 ft (4.5 m) above the meter/regulator assembly	To each side of center line extended above natural gas or propane meter/regulator assembly or mechanical vent.
I	3 ft (91 cm)	From any forced air intake of other appliance
J	12 in (30 cm)	Clearance to non-mechanical air supply inlet to building, or the combustion air inlet to any appliance.
K	24 in (61 cm)	Clearance above roof line for vertical terminations.
L	7 ft (2.13 m)	Clearance above paved sidewalk or paved driveway located on public property.

1. Do not terminate the vent in any enclosed or semi-enclosed areas such as a carport, garage, attic, crawlspace, narrow walkway, closely fenced area, under a sundeck or porch, or any location that can build up a concentration of fumes such as stairwells, covered breezeway, etc.

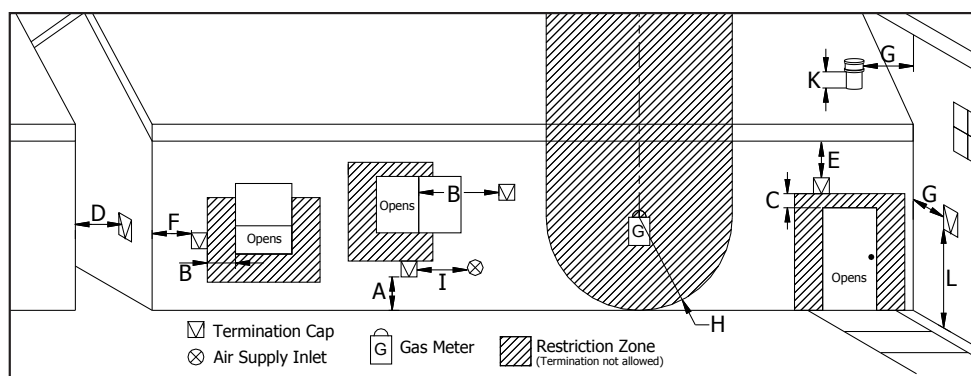


Figure 18: Use in conjunction with Table 1 for allowable exterior vent termination locations.

2. Vent surfaces can become hot enough to cause burns if touched by children. Non-combustible shielding or guards may be required.
3. Termination must exhaust above the inlet elevation. It is recommended that at least five feet of vertical pipe be installed outside when the appliance is vented directly through a wall, to create some natural draft to prevent the possibility of smoke or odor during appliance shut down or power failure. This will keep exhaust from causing a nuisance or hazard from exposing people or shrubs to high temperatures. In any case, the safest and preferred venting method is to extend the vent through the roof vertically.
4. Distance from the bottom of the termination and grade is 12" (30 cm) minimum. This is conditional upon the plants and nature of grade surface. The exhaust gases are hot enough to ignite grass, plants and shrubs located in the vicinity of termination. The grade surface must not be lawn.
5. If the unit is incorrectly vented or the air to fuel mixture is out of balance, a slight discoloration of the exterior of the house might occur. Since these factors are beyond the control of Sherwood Industries Ltd, we grant no guarantee against such incidents.

**NOTE: Venting terminals shall not be recessed into walls or siding.**

# INSTALLATION

## OUTSIDE FRESH-AIR CONNECTION:

**Outside fresh air is mandatory when installing this unit in airtight homes and mobile homes.**

**A Fresh-air intake is strongly recommended for all installations.** Failure to install intake air may result in improper combustion as well as the unit smoking during power failures.

When connecting to an outside fresh air source, do not use plastic or combustible pipe. A 2" minimum (51 mm) ID (inside diameter) steel, aluminum or copper pipe should be used. It is recommended, when you are installing a fresh air system, to keep the number of bends in the pipe to a minimum.

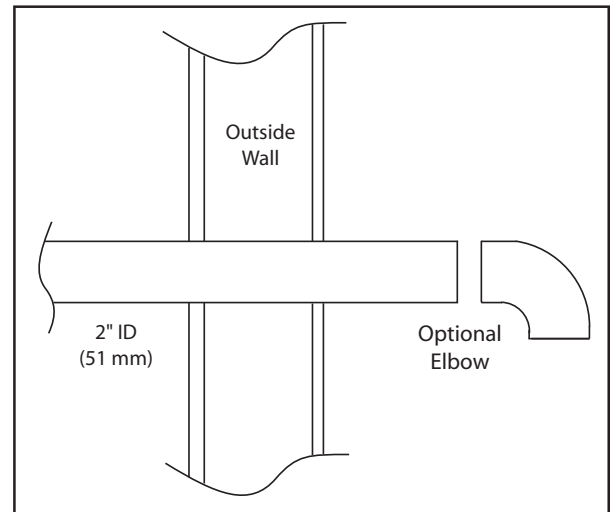


Figure 19: Outside Air Connection.

## EXHAUST AND INTAKE LOCATIONS:

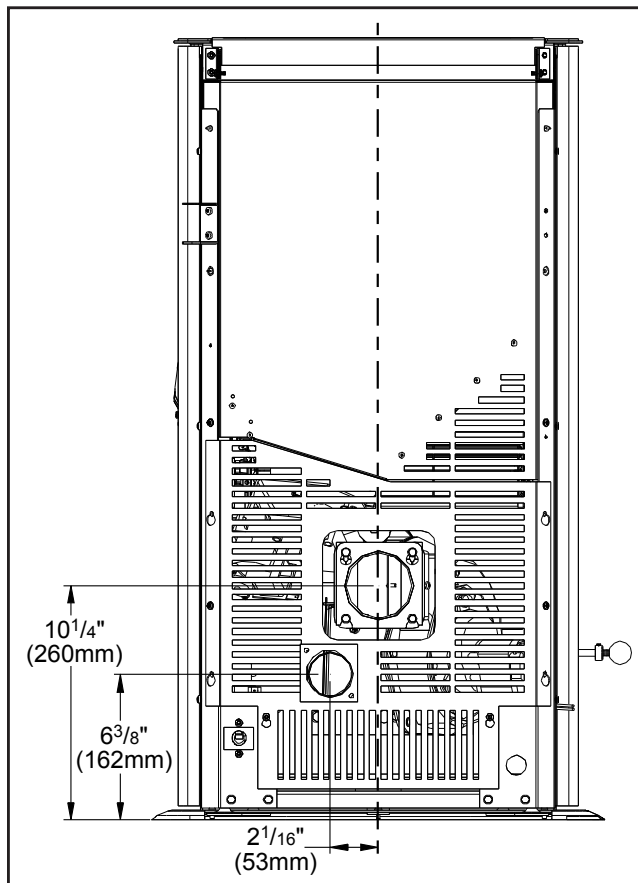


Figure 20: Mini Inlet and Outlet Location.

### EXHAUST

Base of unit to center of flue	10 $\frac{1}{4}$ " (255 mm)
Center of unit to center of flue	0" (0 mm) [at center of unit]

### FRESH AIR INTAKE.

Base of unit to center of intake	6 $\frac{3}{8}$ " (162 mm)
Center of unit to center of intake	2 $\frac{1}{16}$ " (53 mm)



# INSTALLATION

## MOBILE HOME INSTALLATION:

- Secure the heater to the floor using the two holes in the pedestal.
- Ensure the unit is electrically grounded to the chassis of your home (permanently).
- Do not install in a room people sleep in.
- Outside fresh air is mandatory. Secure outside air connections directly to fresh air intake pipe and secure with three (3) screws evenly spaced.

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

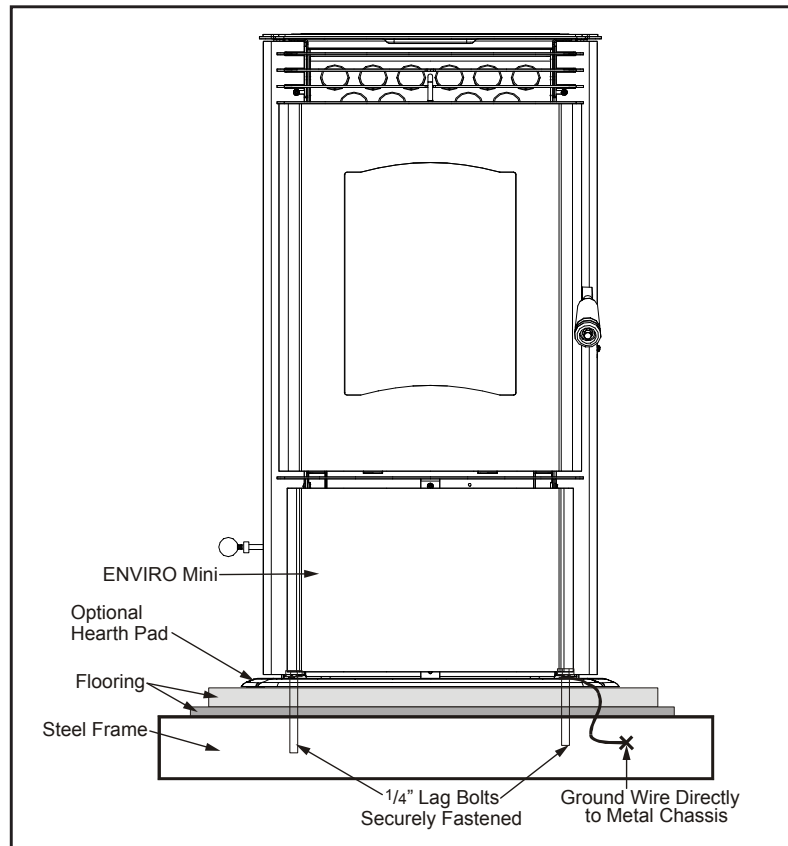


Figure 21: Mobile home installation.

## CORNER THROUGH WALL INSTALLATION:

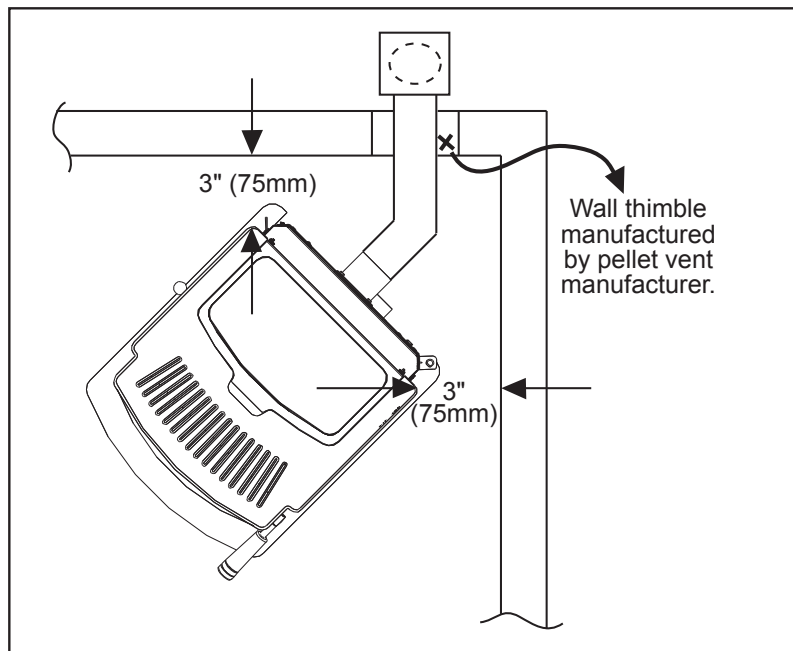


Figure 22: Corner Installation.



# INSTALLATION

## HORIZONTAL EXHAUST THROUGH WALL INSTALLATION:

### Vent installation: install vent at clearances specified by the vent manufacturer.

A chimney connector shall not pass through an attic or roof space, closet or similar concealed spaces, or a floor, or ceiling. Where passage through a wall or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365 Installation Code for Solid-Fuel-Burning Appliances and Equipment. Only use venting of L or PL type with an inside diameter of 3 or 4 inches (7.6 or 10.1 cm).

1. Choose a location for your stove that meets the requirements stated in this manual and allows installation with the least amount of interference to house framing, plumbing, wiring, etc.
2. Install a non-combustible hearth pad (where necessary).
3. Place the appliance 15" (37.5 cm) away from the wall. If the stove is to be set on a hearth pad, set the unit on it, and adjust the leveling legs.
4. Locate the center of the exhaust pipe on the stove. Extend that line to the wall. Once you have located the center point on the wall, refer to pellet vent manufacturer installation instructions for correct hole size and clearance to combustibles.
5. Install the wall thimble as per the instructions written on the thimble.

Maintain an effective vapour barrier in accordance with local building codes.

6. Install a length of 3" (75 mm) or 4" (100 mm) vent pipe into the wall thimble. The pipe should install easily into the thimble.
7. Connect the exhaust vent pipe to the exhaust pipe on the stove. Seal the connection with high temperature silicone.
8. Push the stove straight back, leaving a minimum of 4" (10 cm) clearance from the back of the stove to the wall. Seal the vent pipe to the thimble with high temperature silicone.

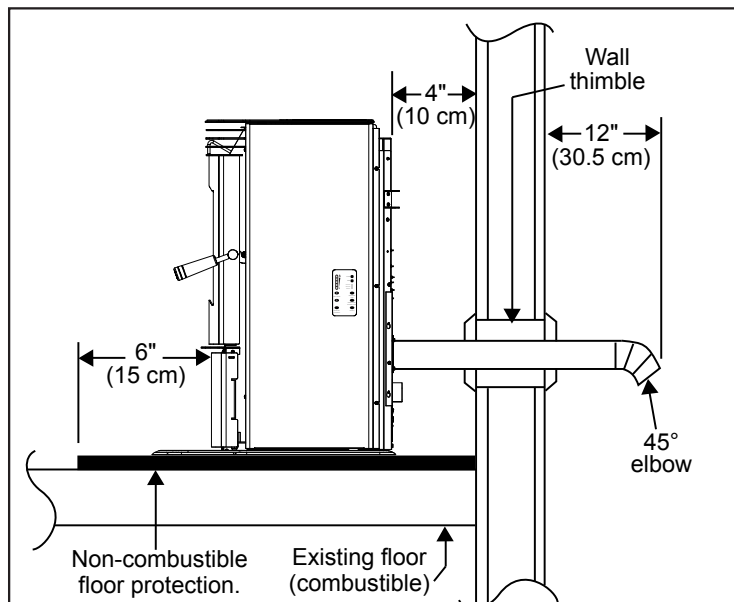


Figure 23: Straight through wall Installation.

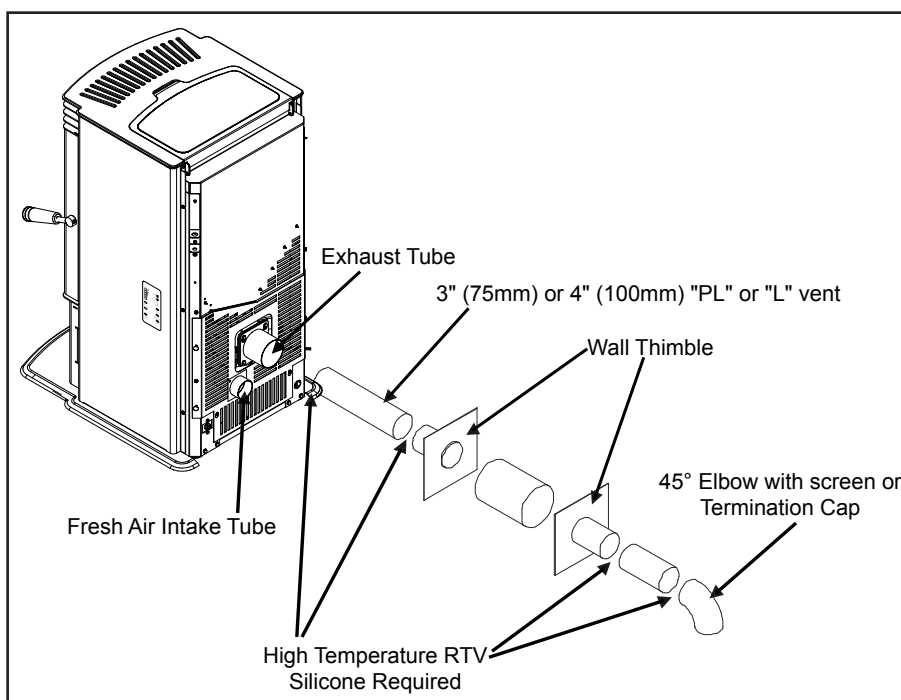


Figure 24: Venting to use with straight through wall Installation.

# INSTALLATION

9. The pipe must extend at least 12" (30 cm) away from the building. If necessary, bring another length of pipe (PL type) to the outside of the home to connect to the first section. Do not forget to place high temperature silicone around the pipe that passes through the thimble.
10. Install a vertical pipe, or if all requirements for direct venting are met, install vent termination. The stainless steel cap termination manufactured by the vent manufacturer is recommended. However, when the vent terminates several feet above ground level and there are no trees, plants, etc. within several feet, a 45° elbow can be used as termination. The elbow must be turned down to prevent rain from entering.

## NOTE:

- It is recommended that horizontal through wall installations have 3 to 5 feet (91 to 152 cm) of vertical pipe in the system to help naturally draft the unit in the event of extreme weather or a power outage.
- Some horizontal through wall installations may require a "T" and 3 to 5 feet (91 to 152 cm) of vertical pipe outside the building to help draft the unit. This may be required if a proper burn cannot be maintained, after the stove has been tested and the airflow set. This is due to the back pressure in the exhaust caused by airflow around the structure.
- Follow vent manufacturer guidelines for installation of venting. High temp Sealent must be used when connecting vent pipe to the unit's starter pipe. Improper seals at the vent joints may cause combustion by-products to leak into the room where installed - **seal as required**.

## THROUGH WALL WITH VERTICAL RISE AND HORIZONTAL TERMINATION INSTALLATION - FREESTANDING:

A 45° elbow may be used in place of the termination cap (or stainless steel termination hood).

Figure 25 is the recommended installation set up.

Figure 26 is the installation to use if there is a concrete or retaining wall in line with exhaust vent on a pellet stove. The termination must be 12" (30 cm) from the outside wall and 12" (30 cm) above the ground.

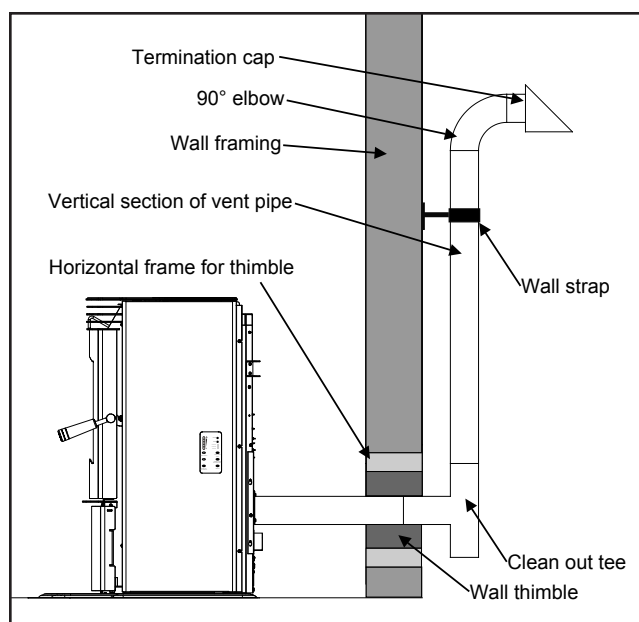


Figure 25: Venting horizontally with rise.

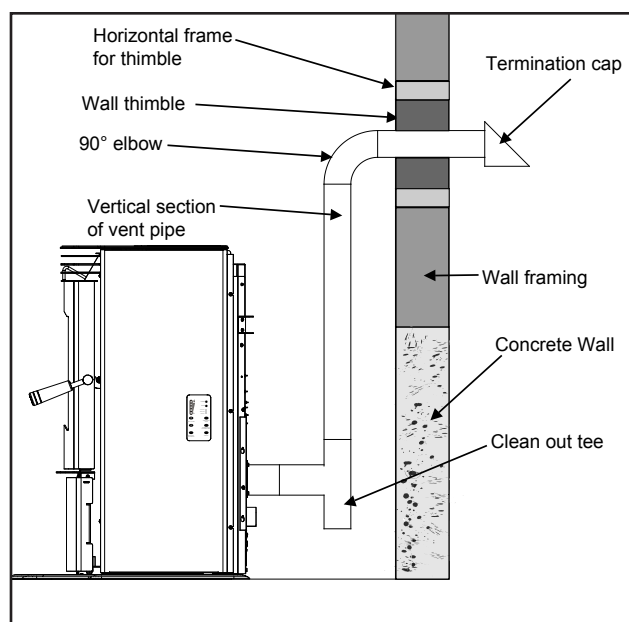


Figure 26: Venting with concrete wall behind unit .

# INSTALLATION

## INSIDE VERTICAL INSTALLATIONS:

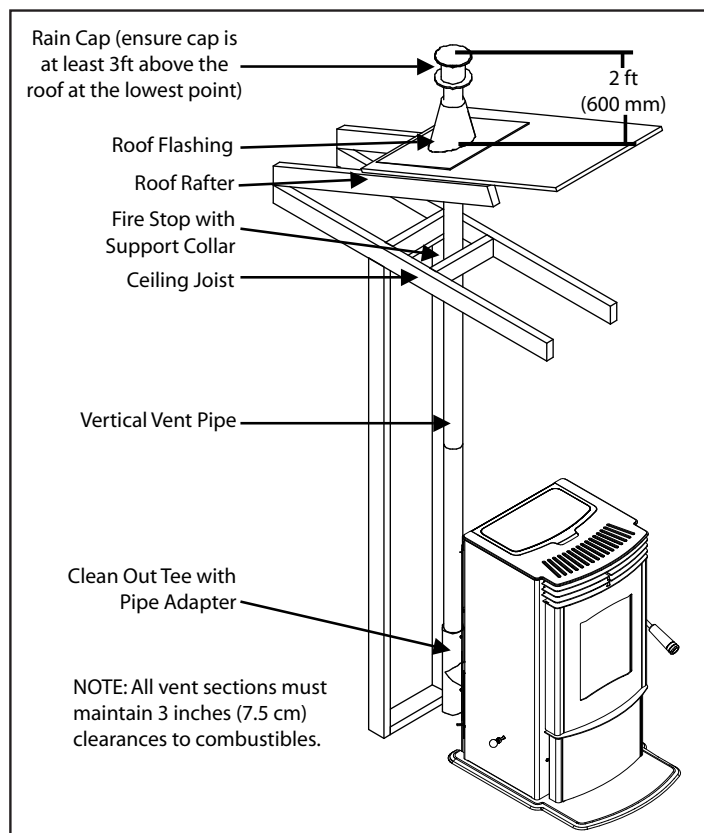


Figure 27: Inside Vertical Installation.

1. Choose a stove location that is ideal. See the section "DECIDING WHERE TO LOCATE YOUR PELLET APPLIANCE."
2. Place a non-combustible hearth pad where necessary.
3. Place the unit on the hearth pad (if installed on a combustible surface) and space the unit in a manner so when the pellet vent is installed vertically, it will be 3" (7.5 cm) away from a combustible wall.
4. Install the tee with clean out.
5. Install the pellet vent upward from there. When you reach the ceiling, make sure that the vent goes through the ceiling fire stop. Maintain a 3" (7.5 cm) distance to combustibles and keep attic insulation away from the vent pipe. Maintain an effective vapor barrier.
6. Finally, extend the pellet vent to go through the roof flashing.
7. Ensure that the rain cap is approximately 24" (600 mm) above the roof.

## OUTSIDE VERTICAL INSTALLATIONS:

To accomplish a outside vertical pipe installation, follow steps 1 through 5 in the "INSIDE VERTICAL INSTALLATIONS - FREESTANDING" section and then finish it by performing the following (refer to Figure 16).

1. Install a tee with clean out on the outside of the house.
2. Install PL vent upward from the tee. Make sure that you install support brackets to keep the vent straight and secure.
3. Install ceiling thimble and secure the flashing as you go through the roof.
4. Ensure that the rain cap is approximately 24" (600 mm) above the roof.

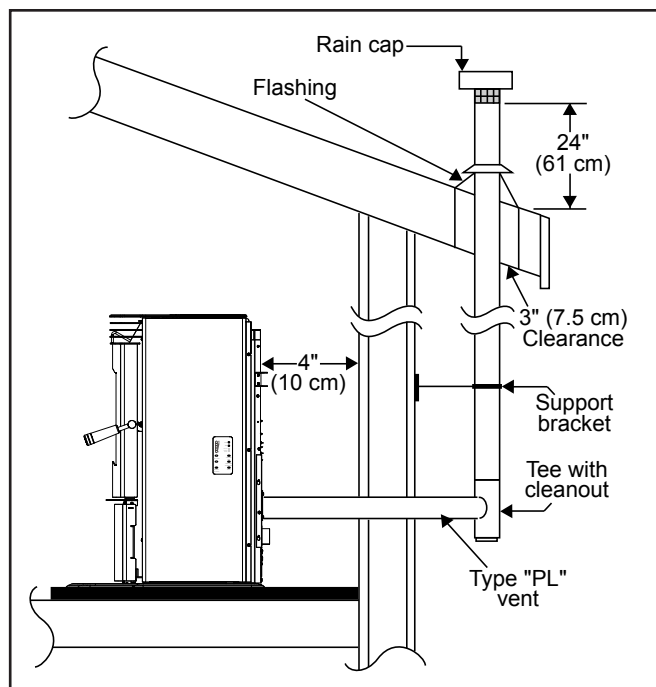


Figure 28: Outside Vertical Installation.

# INSTALLATION

## HEARTH MOUNT INSTALLATION:

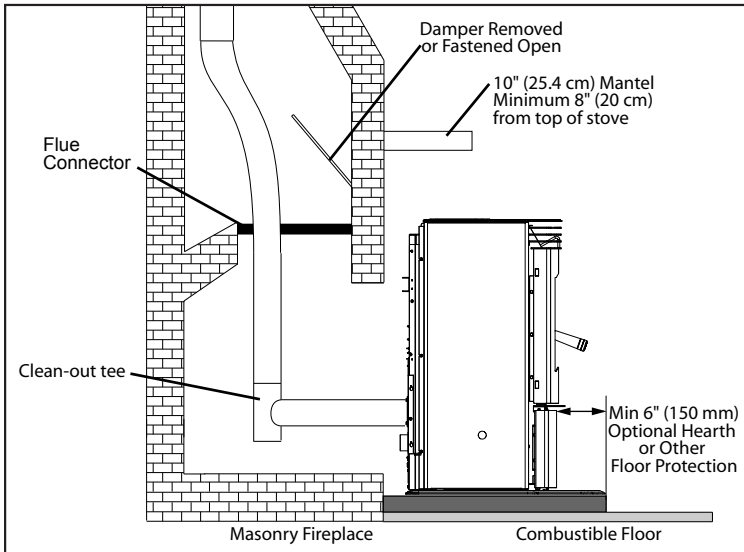


Figure 29: Freestanding hearth mount installation.

Refer to Figures 29 and 30.

1. Install the hearth pad.
2. Lock the fireplace damper in the open position.
3. Install a positive flue connector at the fireplace dampers or seal the chimney at the top.
4. Connect a tee to the exhaust pipe.
5. Install flexible stainless steel liner or listed pellet vent to the top of the chimney.

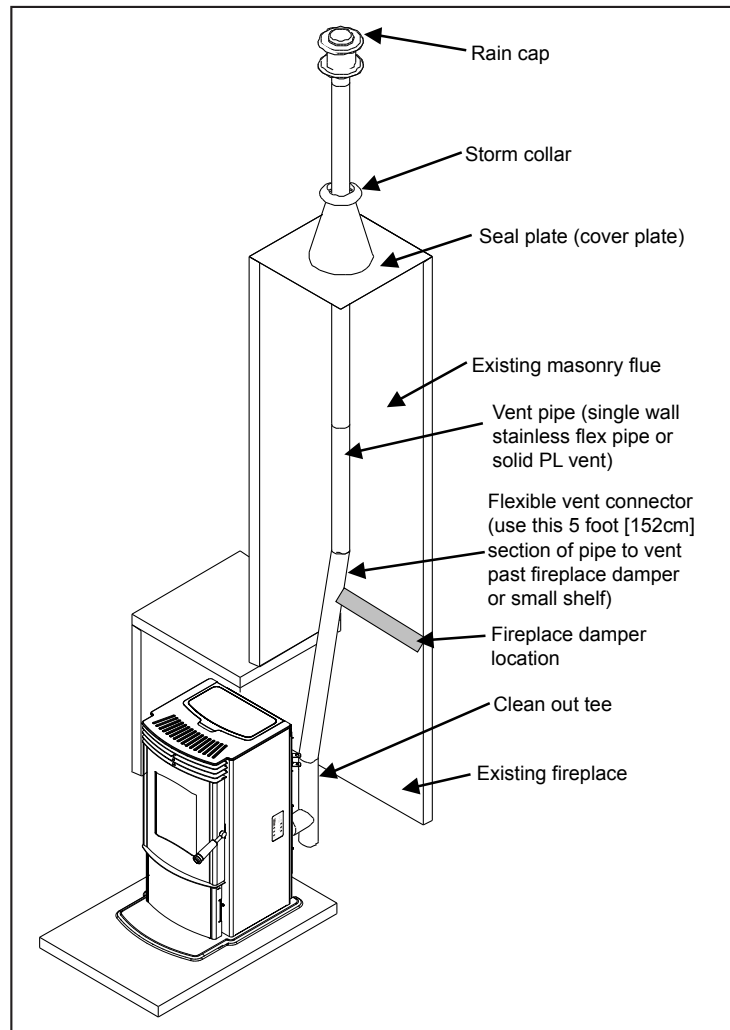


Figure 30: Freestanding hearth mount installation overview.

# INSTALLATION

## EXTERIOR MOUNTED EXHAUST BLOWER (20-070):

The Mini can be equipped with an externally mounted exhaust blower. This optional kit includes all components necessary to install the exhaust blower on any vertical wall surface.

Choose a location for your stove that meets the requirements stated in your manual and allows installation with the least amount of interference with house framing, plumbing, wiring, etc.

Included in the Exterior Mounted Exhaust Blower Kit are:

- 1 - Exhaust blower housing box.
- 1 - Blower cover plate.
- 1 - Hardware bag

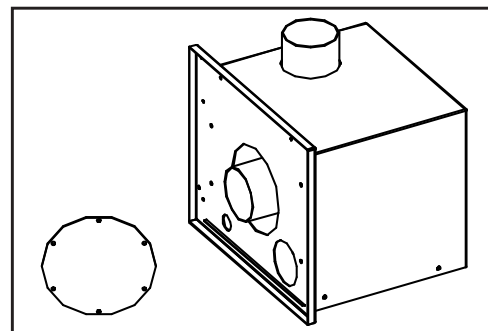


Figure 31: Exterior Blower Kit.

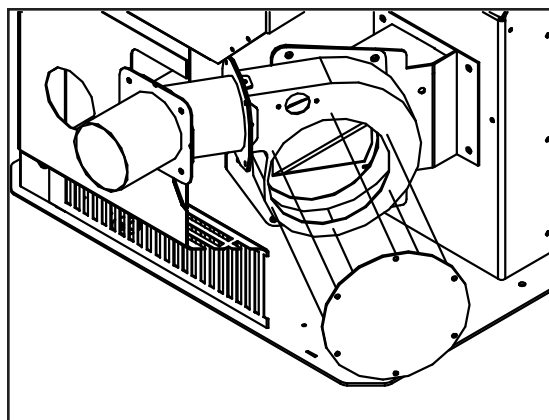


Figure 32: Exterior Blower Kit.

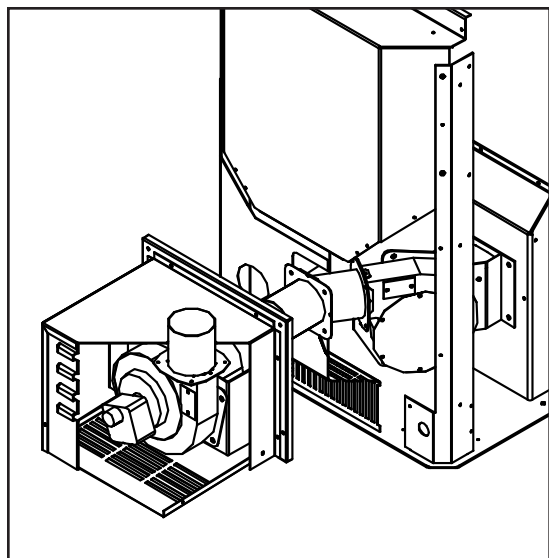


Figure 33: Exterior Blower Kit cut-through.

1. Remove the left hand cabinet side by removing the two (2) screws down the front. Loosen the three screws on the back of the cabinet side and remove panel.
2. Loosen the six (6) screws that hold the back grill in place. Lift the back grill off the screws.
3. Disconnect the Exhaust blower wires from the wire harness. Remove the exhaust blower motor from the housing; six (6) screws. Cover hole in housing with cover plate provided (see Figure 32).
4. Remove the cover from the exhaust blower housing box.
5. Install the exhaust blower housing box into the pipe placed through the wall thimble, seal with high temperature silicone. Fasten the box to the wall with (4) four screws, seal edges of box to wall with clear silicone.
6. Drill a hole through the wall thimble plate for the electrical wires. Pass the armored cable through the wall thimble. Use the strain relief provided. **Do not pass cable through vent hole.**
7. Install the Exhaust Blower motor into the external exhaust blower housing box. Make the electrical connections to the wire harness and exhaust blower.
8. Replace the cover on the Exhaust Box and the back grill of the stove and ensure the screws are tightened down.
9. Install vertical pipe as instructed in appropriate section.

# INSTALLATION

## TYPICAL THROUGH WALL WITH EXTERIOR BLOWER KIT INSTALLATION - HORIZONTAL TERMINATION:

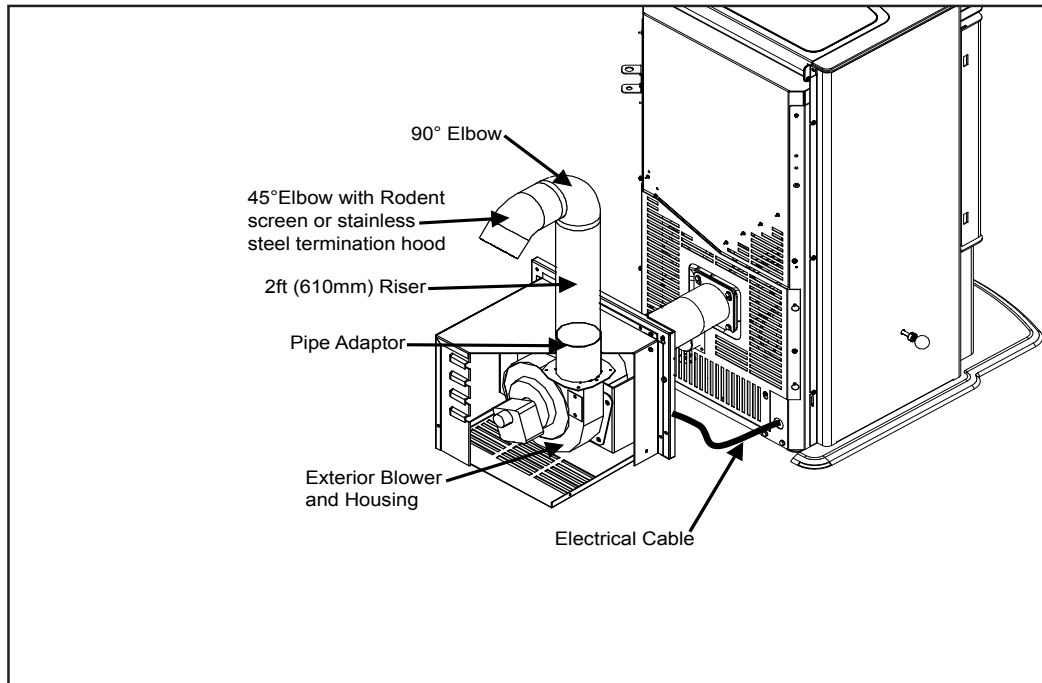


Figure 34: Through Wall Installation with Exterior Blower Kit.

### NOTE:

Ensure that all interior vent connections are sealed by placing a small bead of high temperature silicone around each chimney connection.

Also ensure that all vertical vent sections are properly supported and that all clearances to combustibles are maintained in accordance with the vent manufacturer's specifications.

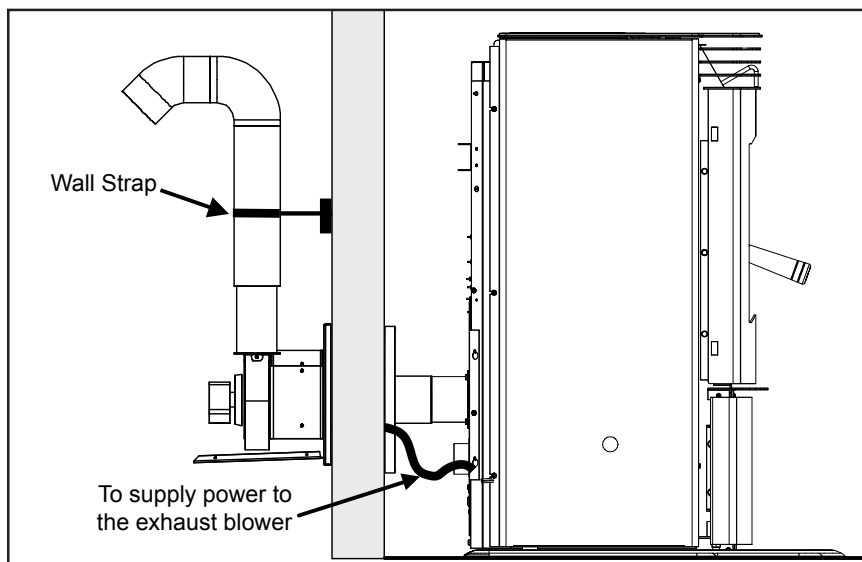


Figure 35: Through Wall Installation with Exterior Blower Kit; Side View.

Install the armour coated electrical cable from the exhaust blower housing, through the wall thimble plate and attach to the pre drilled hole in the left hand rear hopper pillar. Hook up to wires from the exhaust blower wiring harness.

**All electrical connections must be in accordance to local code requirements**

# INSTALLATION

## TYPICAL THROUGH WALL WITH EXTERIOR BLOWER KIT INSTALLATION - VERTICAL TERMINATION:

Follow the previous pages for through wall installations. Ensure that vent pipe is properly secured to wall using wall straps. Maintain clearances to combustibles on vent pipe as well as unit.

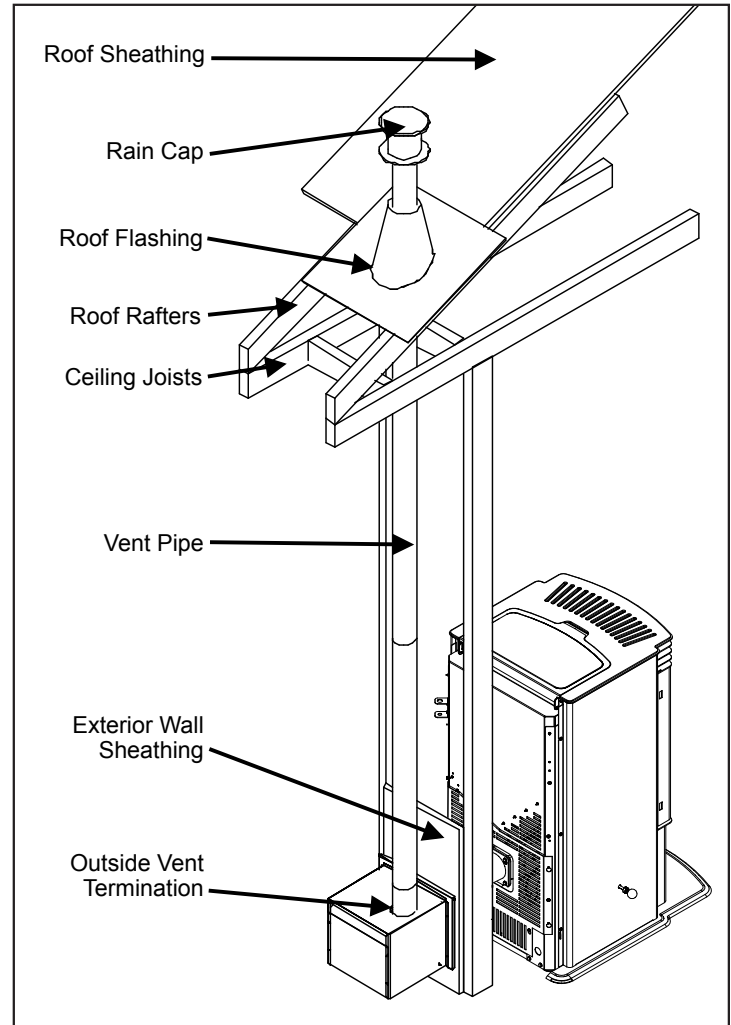


Figure 36: Through Wall Installation with Exterior Blower Kit; Vertical Termination.

## THERMOSTAT INSTALLATION:

1. Install the wall thermostat in a location that is not too close to the unit but will effectively heat the desired area.
2. Install a 12 or 24 Volt Thermostat using an 18 x 2 gauge wire from the unit to the thermostat.

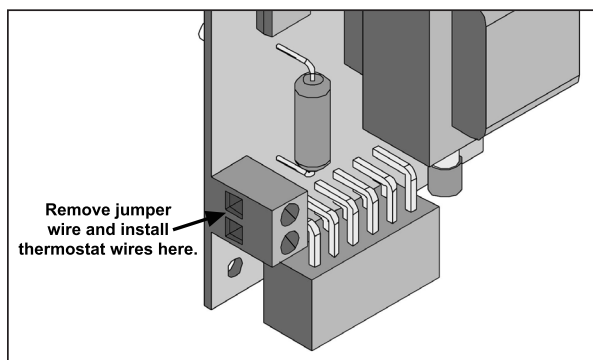


Figure 37: Thermostat wire placement.

If the unit has been placed in the HI / LOW mode, the unit will be taken to a low or idle setting when the thermostat is not calling for heat. When the thermostat calls for heat, the unit will go to the setting that is displayed on the control board Heat Indicator.



# TROUBLESHOOTING

---

## DO NOT:

- Service the stove with wet hands. The stove is an electrical appliance, which may pose a shock hazard if handled improperly. Only qualified technicians should deal with possible internal electrical failures.
- Do not remove from the firebox any screws without penetrating oil lubrication.

## WHAT TO DO IF:

1. The stove will not start.
2. The stove will not operate when hot.
3. The exhaust blower will not function normally.
4. Light # 2 on Heat output bar flashing.
5. Auger light flashes but auger motor does not turn at all
6. Light # 4 on Heat output bar flashing.
7. The convection blower will not function normally.
8. Igniter- the pellets will not light.
9. Control settings (Heat Level) has no effect on the fire.
10. The stove keeps going out.

**\*NOTE: All troubleshooting procedures should be carried out by qualified technicians or installers.**

### 1. The stove will not start.

- ✓Make sure the stove is plugged in and the wall outlet is supplying power..
- ✓If the Control Board has been placed in the ON /OFF thermostat mode, then turn the thermostat up to call for heat.
- ✓Check the Heat Level Indicator. - If the # 2 light is flashing (see the # 2 light is flashing)
- ✓Check the fuse on the circuit board.
- ✓If the unit still does not start, contact your local service dealer for service.

### 2. The stove will not operate when hot.

- ✓Check the Heat Level Indicator if a fire is not detected, or if the fire has gone out **the #3 light will flash** because the Exhaust Temperature Sensor's contacts have opened.
- ✓Check the hopper for fuel.
- ✓Incorrect air damper setting. - Excessive air may consume the fire too quickly before the next drop of fuel, leaving completely unburned fuel in the burn pot liner. - Insufficient air will cause build up, further restricting the air flow through the Burn Pot Liner. This in turn will cause the fuel to burn cold and very slowly. Fuel may build up and smother the fire. In this case clean the burn pot. **(NOTE: unit may require a change to the vent system or installation of fresh air to correct Air to Fuel ratio problems).**
- ✓Combustion Blower failure. - The Combustion Blower is not turning fast enough to generate the proper vacuum in the fire box. Visual Check – is the blower motor turning.
- ✓Check the Exhaust Blower voltage across the blower wires ( $\geq 114V$  on #5 setting and  $\geq 82V$  on #1 setting). – Replace the Circuit Board if the Voltage reading is less than 82 V. with a line voltage  $>114$  V AC.
- ✓Check Vacuum levels in the exhaust channel by bypassing the Vacuum Switch, then remove the Vacuum hose from Vacuum Switch. Check exhaust vacuum readings by placing the open end of the Vacuum Hose on a Magnahelic Gauge (readings must be above .10" W.C. on low fire).  
If the motor fails to reach a 0.10" W.C. readings, then replace the Combustion Blower.



# TROUBLESHOOTING

---

- ✓ Poor Quality Fuel – Insufficient energy in the fuel to produce enough heat to keep the stove burning or operational.
- ✓ Exhaust Temperature Sensor failure. – Bypass sensor located on Exhaust Blower if stove now operates properly, the unit may require cleaning or a new sensor. Contact your local dealer for service.
- ✓ Check the fuse on the circuit board.

## **3. The exhaust motor will not function normally.**

- ✓ Open the left side access panel; check all connections against the wiring diagram.
- ✓ See "2. The stove will not operate when hot." section.

## **4. Light # 2 on Heat output bar flashing.**

(The Vacuum Switch contacts have opened for more than 15 sec.)

- ✓ Pinch, break or blockage in Vacuum Hose - Check hose for pinch points or damage, replace or re-route as required. Blow out Vacuum Hose
- ✓ Blocked Hose Barb on Exhaust Channel - Use a paper clip to clean out Hose Barb or remove the Vacuum Hose from the Vacuum Switch and blow into the hose to remove blockage.
- ✓ Blocked exhaust / venting system - Have stove and venting cleaned and inspected.
- ✓ Severe negative pressure in area where unit is installed - Check the operation by opening a window, does this solve the problem? If it does, install fresh air intake to unit or room. Venting system may require vertical section to move termination into a low pressure zone.
- ✓ Vacuum Switch failure - Bypass the vacuum switch, if this corrects the problem check for above problems before replacing the Vacuum Switch.
- ✓ Damage to gray wires between Circuit Board and Vacuum Switch - Inspect wires and connectors
- ✓ Combustion Blower failure - The Combustion Blower is not turning fast enough to generate the proper vacuum in the Exhaust Channel. Visual Check; is the blower motor turning? Check the Exhaust Blower voltage across the blower wires ( $\geq 114V$  on #5 setting and  $\geq 82V$  on #1 setting). – Replace the Circuit Board if the Voltage reading is less than 82 V. with a line voltage  $>114 V AC$ .
- ✓ Check Vacuum levels in the exhaust channel by bypassing the vacuum switch, then remove the Vacuum hose from Vacuum Switch. Check exhaust vacuum readings by placing the open end of the Vacuum Hose on a Magnahelic Gauge. (readings must be above .10" W.C. on low fire).

If the motor fails to reach a 0.10" W.C. readings, then replace the Combustion Blower

**To reset Circuit Board after a trouble code - push the ON/OFF button**

## **5. Auger light flashes but auger motor does not turn at all.**

- ✓ If the Auger gear box does not turn but the motor's armature does try to spin then the auger is jammed. – Try to break apart jam by poking at the jam through the drop tube. If this fails then empty the hopper and remove the Auger Cover \*\*Remember to re-seal the cover after installation\*\*
- ✓ Check the fuse on the circuit board.

## **6. Light # 4 on Heat output bar flashing.**

- ✓ Reset high limit sensor and determine cause – was it Convection Blower failure?

# TROUBLESHOOTING

---

## **7. The convection blower will not function normally.**

- ✓Clean all grill openings at the back and below unit .
- ✓Press the fan button; does the fan come on? Press again to verify that the blower turns on; if, not contact your local dealer for service.

## **8. Ignitor- the pellets will not light.**

- ✓Everything else in the stove operates but the ignitor will not light the pellets.
- ✓Make sure the burn pot liner is up tight and square to the ignitor tube by pushing the burn pot back against the ignitor tube.
- ✓Check to see if the exhaust blower is operating. If not, contact your local dealer for service.
- ✓Check the fuse on the circuit board.

**NOTE:** The ignitor should be bright orange in color. If not replace the ignitor.

## **9. Control settings (Heat Level) has no effect on the fire.**

- ✓NOTE: If the system light is flashing the Control Board has complete control of the unit. When the units system light becomes solid then control of the unit is given back to the operator.
- ✓If there is no control of the Heat Level button make sure the thermostat is calling for heat.
- ✓Call your local dealer for service.

## **10. The stove keeps going out.**

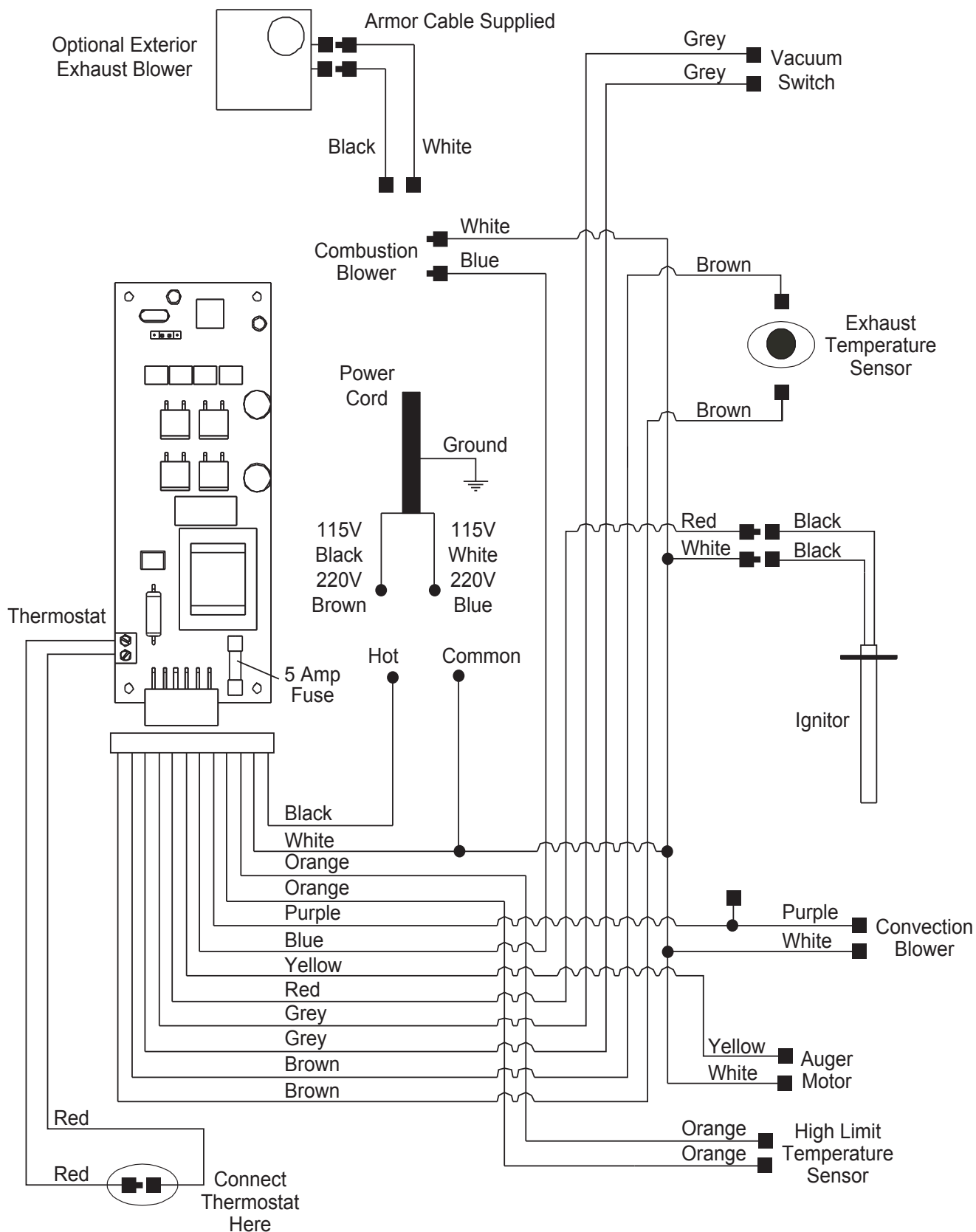
If the stove goes out and leaves fresh unburned pellets or cigarette-like ashes in the burn pot liner, the fire is going out before the stove shuts off.

- ✓Check to see that the Slider / Damper is in the correct position (set with a magnehelic gauge).
- ✓Turn the Heat Level up slightly (poor quality pellets will require slightly higher settings).

If the stove goes out and there are partially burned pellets left in the burn pot liner, the stove has shut down due to a lack of air, exhaust temperature, or power failure.

- ✓Adjust the Slider / Damper.
- ✓Adjust the trim settings
- ✓Check to see if the stove needs a more complete cleaning.
- ✓Turn the Heat Level up slightly (poor quality pellets will require slightly higher settings).
- ✓Did the power go out?
- ✓Contact your local Dealer for service.

# WIRING DIAGRAM



# PARTS LIST

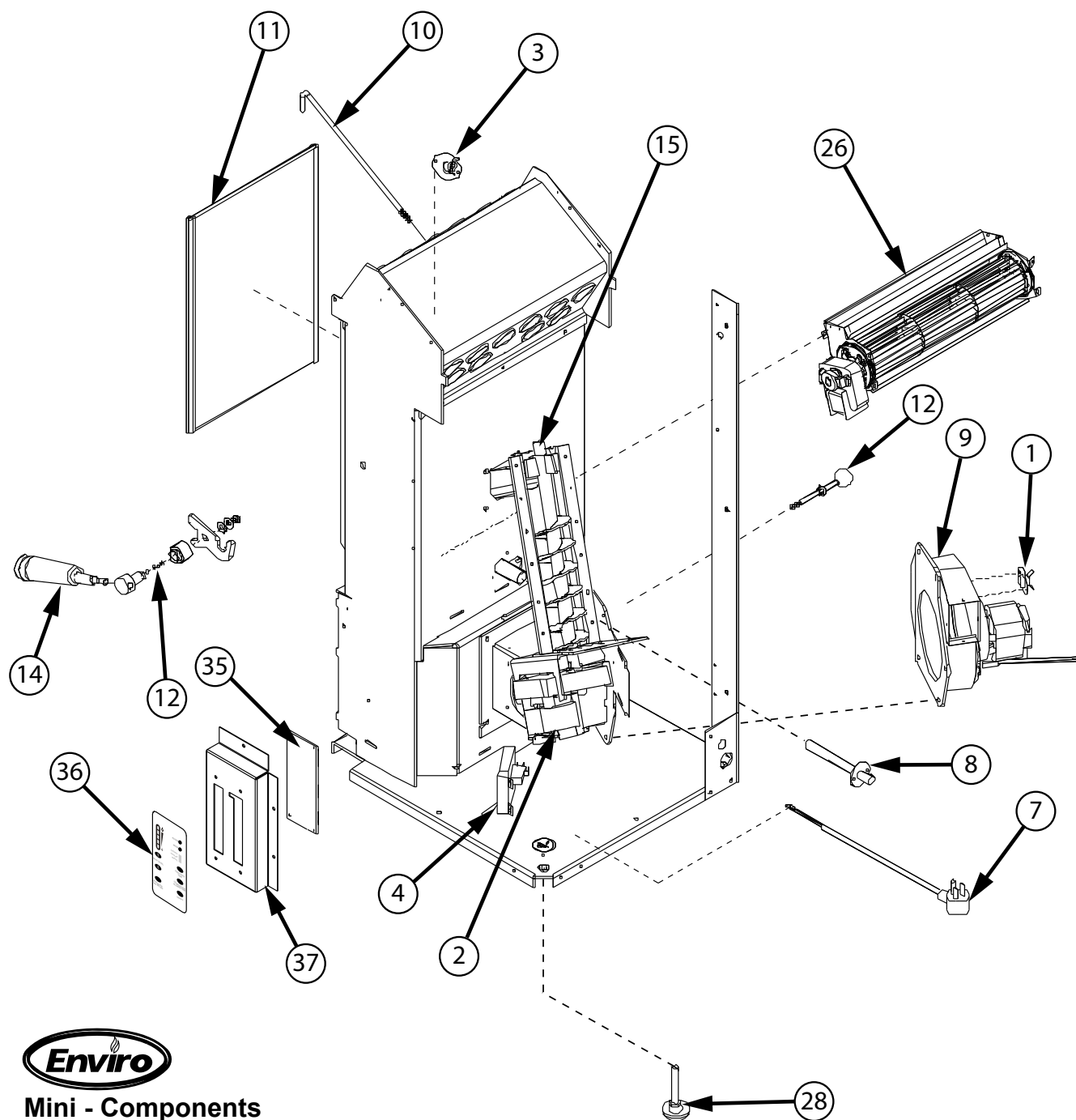
Reference Number	Description	Part Number
1	120°F (49°C) Ceramic Fan Temperature Sensor	EC-001
2	Auger Motor - 115V	EF-001
3	High Limit Temp Sensor 200°F (93°C) Manual Reset	EF-016
4	Vacuum Switch - 115V	EF-017
	Silicone Hose	EF-018
	Aluminum Hose Barb	EF-019
	Shoulder Bolt, Hardened Bushing & Nut (Set of 2)	EF-124
	Combustion Blower motor with mount	EF-161
5	Ash Pan Latch	50-2588
	Auger Brass Bushings (Set of 2)	50-1806
6	Door Hinge Bracket	EF5-135
	External Exhaust Back (For Optional Kit)	EF5-143
	External Exhaust Box (For Optioal Kit)	EF5-144
	External Exhaust Bottom (For Optioal Kit)	EF5-145
7	Domestic Power Cord - 115V	EC-042
	Hardened Bushing	20-020
	External Exhaust Kit (3")	20-070
8	400 Watt Ignitor - 115V	50-619
	Circuit Board 5 Amp Fuse - 115V (Pair)	50-833
9	Exhaust Blower Assembly - 115V	50-901
	5/8" ID Auger Collar with Screw	50-968
10	Heat Exchanger Rod	50-1154
11	Glass with Gasket (356mm x 244mm)	50-1155
12	Slider Damper Rod & Knob	50-1156
	Wire Harness	50-1157
13	Latch Assembly	50-1158
14	Door Handle	50-1159

# PARTS LIST

---

Reference Number	Description	Part Number
15	Auger	50-1161
16	Firebox Panel Set with Insulation	50-1162
17	Front Louvers	50-1169
18	Lid Set	50-1171
19	Stove Top Assembly	50-1172
	Hopper Guard	50-1174
20	Handle Bracket	50-1177
21	Draft Slider	50-1178
22	Ash Pan Cover	50-1180
23	Ash Pan	50-1969
24	Ash Shelf Louver	50-1182
25	Starter Pipe 3"	50-1185
26	60mm Tangential Blower Mini - 115V	50-1217
27	Mini Hearth Pad	50-1219
	Burner Scraper Tool	50-1254
28	Leveling Legs (Set of 4)	50-1342
29	Back Grill	50-1297
30	Burn Pot	50-1922
31	Burn Pot Liner	50-1923
32	Door Assembly Complete	50-1924
33	Cabinet Side Left	50-1925
34	Cabinet Side Right	50-1926
	Mini Owners Manual	50-1927
35	Circuit Board DHC 4100 - 115V	50-1929
36	Control Panel Decal	50-1930
37	Control Panel and Decal	50-1931

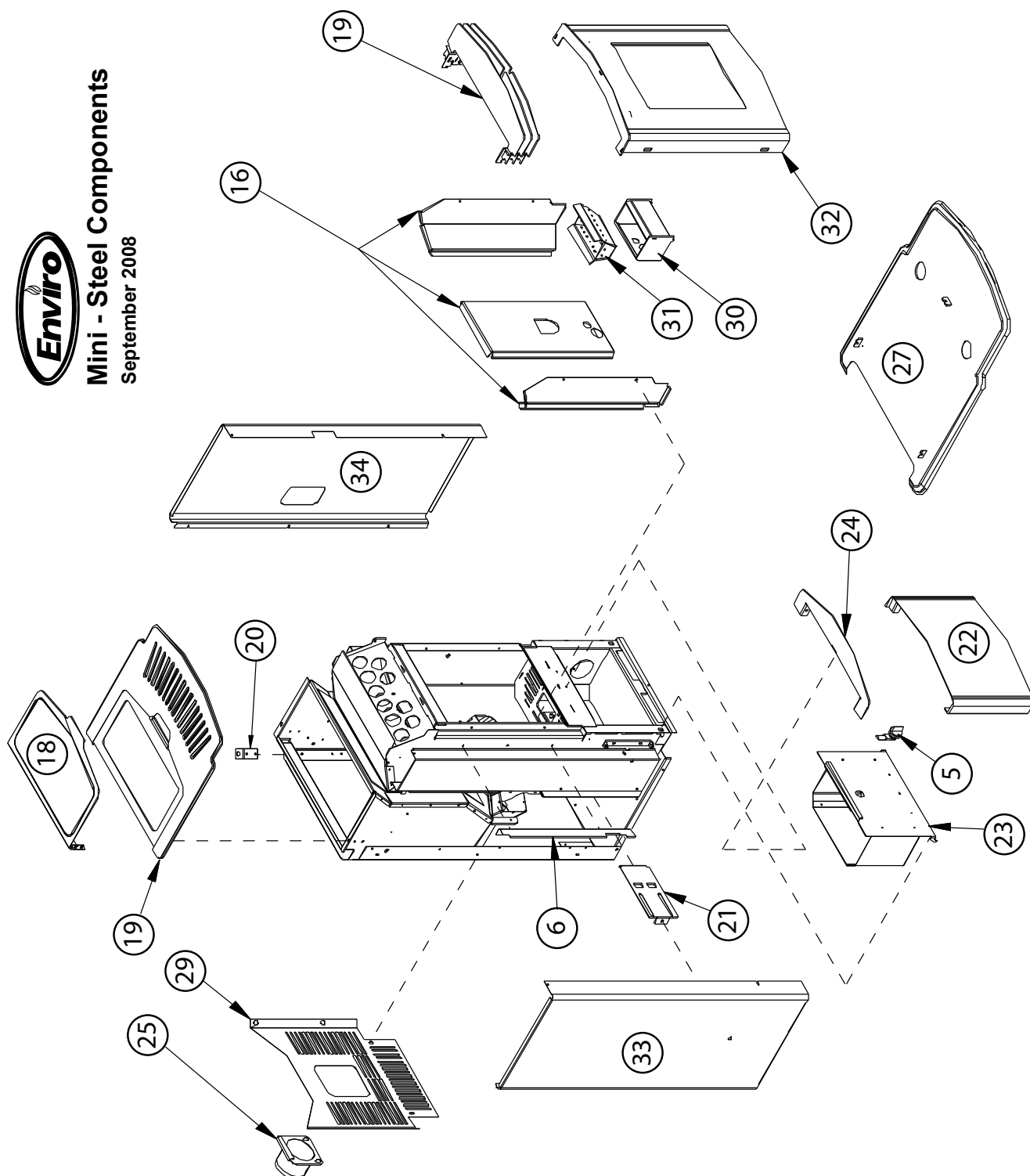
# PARTS DIAGRAM - COMPONENTS



**Mini - Components**  
September 2008

# PARTS DIAGRAM - STEEL

**Enviro**  
Mini - Steel Components  
September 2008





# Warranty for Enviro Pellet Products

Sherwood Industries Ltd. ("Sherwood") hereby warrants, subject to the terms and conditions herein set forth, this product against defects in material and workmanship during the specified warranty period starting from the date of original purchase at retail. In the event of a defect of material or workmanship during the specified warranty period, Sherwood reserves the right to make repairs or to assess the replacement of a defective product at Sherwood's factory. The shipping costs are to be paid by the consumer. All warranties by Sherwood are set forth herein and no claim shall be made against Sherwood on any oral warranty or representation.

## Conditions

- A completed warranty registration must be submitted to Sherwood within 90 days of original purchase via the online warranty registration page or via the mail-in warranty registration card provided. Have the installer fill in the installation data sheet in the back of the manual for warranty and future reference.
- This warranty applies only to the original owner in the original location from date of install.
- The unit must have been properly installed by a qualified technician or installer, and must meet all local and national building code requirements.
- The warranty does not cover removal and re-installation costs.
- Sherwood Industries Ltd. reserves the right to make changes without notice.
- Sherwood Industries Ltd. and its employees or representatives will not assume any damages, either directly or indirectly caused by improper usage, operation, installation, servicing or maintenance of this appliance.
- A proof of original purchase must be provided by you or the dealer including serial number.
- This warranty is void if the unit is used to burn materials for which the unit is not certified by the EPA and void if not operated according to the Owner's Manual.

## Exclusions

An expanded list of exclusions is available at [www.enviro.com/help/warranty.html](http://www.enviro.com/help/warranty.html)

This warranty does not cover:

- Damage as a result of improper usage or abuse.
- Damage caused from over-firing due to incorrect setup or tampering.
- Damage caused by incorrect installation.

## To the Dealer

- Provide name, address and telephone number of purchaser and date of purchase.
- Provide date of purchase. Name of installer and dealer. Serial number of the appliance. Nature of complaint, defects or malfunction, description and part # of any parts replaced.
- Pictures or return of damaged or defective product may be required.

## To the Distributor

- Sign and verify that work and information are correct.

## Sherwood Industries Ltd.

6782 Oldfield Road, Victoria, BC . Canada V8M 2A3  
Online warranty registration: [www.enviro.com/warranty/](http://www.enviro.com/warranty/)

Category	One Year	Two Year	Limited Lifetime (7yr)
Parts <sup>1</sup> (unit serial number required)		✓	
Firebox Brick Panels (Cast)		✓	
Firebox			✓
Heat Exchanger			✓
Burn Pot			✓
Burn Pot Liner		✓	
Firebox Liner Panels w/Insulation			✓
Ceramic Glass <sup>2</sup>	✓		
Pedestal / Legs (excluding finish)			✓
Surround Panels (excluding finish)			✓
Exterior Panels (excluding finish)			Up to 5 years
Electrical Components		✓	
Steel Brick Liner (Metal)	✓		
Exterior Surface Finishing <sup>3</sup>	✓		
Labour	✓		

<sup>1</sup> Whereas warranty has expired, replacement parts will be warrantied for 90 days from part purchase date. Labour not included. Unit serial number required.

<sup>2</sup> Glass is covered for thermal breakage. Photos of box, inside of door, and unit serial # must be supplied for breakage due to shipping.

<sup>3</sup> Exterior Surface finishing covers Plating, Enamel or Paint and excludes colour changes, chipping, and fingerprints.

Gaskets not covered by Warranty.

Travel costs not included.

Cast Agitator: 1 year for pellet. Not covered when burning alternative fuels. (Cast agitators are a consumable item)



## NOTES

---

# INSTALLATION DATA SHEET

The following information must be recorded by the installer for warranty purposes and future reference.

NAME OF OWNER:
_____
ADDRESS:
_____
_____
_____
PHONE: _____

NAME OF DEALER:
_____
ADDRESS:
_____
_____
_____
PHONE: _____

MODEL: _____
SERIAL NUMBER: _____
DATE OF PURCHASE: _____ (dd/mm/yyyy)
DATE OF INSTALLATION: _____ (dd/mm/yyyy)
MAGNEHELIC AT INSTALL: _____
INSTALLER'S SIGNATURE:
_____

NAME OF INSTALLER:
_____
ADDRESS:
_____
_____
_____
PHONE: _____

MANUFACTURED BY:  
SHERWOOD INDUSTRIES LTD.  
6782 OLDFIELD RD. SAANICHTON, BC, CANADA V8M 2A3  
[www.enviro.com](http://www.enviro.com)  
August 28, 2018  
C-15267



WARRANTY REGISTRATION  
ENVIRO.COM/WARRANTY

# P3

## FREESTANDING PELLET STOVE

# OWNER'S MANUAL



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

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

**INSTALLER:** LEAVE THIS MANUAL WITH THE WOOD STOVE.  
**CONSUMER:** RETAIN THIS MANUAL FOR FUTURE REFERENCE.

**50-2970**



# TABLE OF CONTENTS

---

Introduction.....	3
Important Safety Data.....	3
Emissions and Efficiencies.....	4
Safety Warnings And Recommendations.....	5
Rating Label Location.....	7
Pellet Quality.....	7
Installation.....	8
Deciding Where to Locate the Appliance.....	8
Unpacking and Removing Pellet Stove From Pallet.....	8
Clearances to Combustibles.....	10
AlcoveClearances.....	10
Vent Termination Requirements.....	11
Outside Fresh Air Connection.....	12
Exhaust and Intake Locations.....	12
Mobile Home Installation.....	13
Corner Through Wall Installation.....	13
Horizontal Exhaust Through Wall Installation.....	13
Through Wall Vertical Rise Horizontal Termination - Freestanding.....	15
Inside Vertical Installations.....	16
Outside Vertical Installations.....	16
Hearth Mount Installation.....	17
Thermostat Installation.....	18
Specifications.....	19
Dimensions and Specifications.....	19
Operating Instructions.....	20
Control Board Functions.....	20
Automatic Safety Features of Your Pellet Stove.....	20
Operating Your Pellet Stove.....	21
Turning Your Pellet Stove Off.....	21
Damper Set-Up.....	21
Guidelines For Fine-Tuning For Fuel Quality.....	22
Routine Cleaning and Maintenance.....	23
Troubleshooting.....	27
Wiring Diagram.....	30
Parts List.....	31
Parts Diagram.....	33
Rating Label.....	35
Warranty.....	36
Installation Data Sheet.....	37

# INTRODUCTION

---

## IMPORTANT SAFETY DATA:

---

**Please read this entire Owner's Manual before installing or operating your ENVIRO Pellet Stove. Failure to follow these instructions may result in property damage, bodily injury or even death. Any unauthorized modification of the appliance or use of replacement parts not recommended by the manufacturer is prohibited.**

Contact your local building or fire official to obtain a permit and any information on installation restrictions and inspection requirements for your area. All local regulations, including those referring to national and European Standards need to be complied with when installing this appliance.

To prevent the possibility of a fire, ensure that the appliance is properly installed by adhering to the installation instructions. An ENVIRO dealer will be happy to assist you in obtaining information with regards to your local building codes and installation restrictions.

The stove's exhaust system works with negative combustion chamber pressure and a slightly positive chimney pressure. It is very important to ensure that the exhaust system be sealed and airtight. The ash pan and viewing door must be locked securely for proper and safe operation of the pellet stove. Operating with door open could cause a fire inside the house as well as the release of carbon monoxide into the living space.

Carbon monoxide is a colorless and odorless gas, to prevent it from poisoning you or your family know the symptoms of carbon monoxide poisoning: headache, dizziness, weakness, sleepiness, nausea, vomiting, and confusion. Carbon monoxide reduces the blood's ability to carry oxygen. Low blood oxygen levels can result in loss of consciousness and death.

Do not burn with insufficient combustion air. A periodic check is recommended to ensure proper combustion air is admitted to the combustion chamber. Setting the proper combustion air is achieved by adjusting the slider damper located on the left side of the stove.

When installing the stove in a mobile home, it must be electrically grounded to the steel chassis of the home and bolted to the floor. Make sure that the structural integrity of the home is maintained and all construction meets local building codes.

Consider all large air moving devices when installing your unit and provide room air accordingly. NOTE: Extractor fans when operating in the same room or space as the appliance, may cause problems. Limited air for combustion may result in poor performance, smoking and other side effects of poor combustion.

Soot or creosote may accumulate when the stove is operated under incorrect conditions such as an extremely rich burn (black tipped, lazy orange flames).

Be sure to maintain the structural integrity of your home when passing a vent through walls, ceilings, or roofs. It is recommended that the unit be secured into its position in order to avoid any displacement. This appliance must be installed on a floor with an adequate load bearing capacity. If an existing construction doesn't meet these prerequisite, suitable measures (e.g. load distributing plate) shall be taken to achieve it.

**FRESH AIR:** Outside Fresh Air connection is optional. Fresh Air must be connected to all units installed in Mobile Homes and Air Tight Homes (R2000) or where required by local codes.

If you have any questions with regards to your stove or the above-mentioned information, please feel free to contact your local dealer for further clarification and comments.

# EMISSIONS AND EFFICIENCIES

---

## EMISSIONS AND EFFICIENCY - P3:

---

This manual describes the installation and operation of the Enviro Mini pellet heater. This heater is U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards. Under specific test conditions this heater has been shown to deliver heat at rates ranging from 6,447 - 19,996 Btu/hr.

**Efficiency:** 66.2% HHV



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

**WARNING:** This wood pellet 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 pellet heater in a manner inconsistent with operating instructions in this manual.

# INTRODUCTION

---

## SAFETY WARNINGS AND RECOMMENDATIONS:

---

**Caution:** Do not connect to any air distribution duct or system. Do not burn garbage or flammable fluids such as gasoline, naphtha or engine oil. Unit hot while in operation. Keep children, clothing and furniture away. Contact may cause skin burns.

**Warning:** Parts of the appliance, especially the external surfaces, will be hot to touch when in operation and due care will need to be taken. Never place wood, paper, furniture, drapes or other combustible materials within 80cm (31½") of the front of the unit, 20cm (7⅞") from each side, and 10cm (4") from the back of the unit. Do not let children or pets touch it when it is hot.

To prevent the possibility of a fire, ensure that the appliance is properly installed by adhering to the installation instructions. An ENVIRO dealer will be happy to assist you in obtaining information with regards to your local building codes and installation restrictions.

**FIRE EXTINGUISHER AND SMOKE DETECTION:** All homes with a pellet burning stove should have at least one fire extinguisher in a central location known to all in the household. Smoke detectors and carbon monoxide detectors should be installed and maintained in the room containing the stove. If it sounds the alarm, correct the cause but do not deactivate. You may choose to relocate the smoke detection device within the room; DO NOT REMOVE THE SMOKE OR CARBON MONOXIDE DETECTORS FROM THE ROOM.

**CHIMNEY OR RUN AWAY FIRE:** Call local fire department (or dial 911). Close the draft fully. Examine the flue pipes, chimney, attic, and roof of the house, to see if any part has become hot enough to catch fire. If necessary, spray with fire extinguisher or water from the garden hose. IMPORTANT: Do not operate the stove again until you are certain the chimney and its lining have not been damaged.

**FUEL:** This pellet stove is designed and approved to only burn wood pellet fuel with up to 3% ash content. Dirty fuel will adversely affect the operation and performance of the unit and may void the warranty. Check with your dealer for fuel recommendations.

## THE USE OF CORD WOOD IS PROHIBITED BY LAW.

**SOOT and FLYASH:** Formation and Need for Removal - The products of combustion will contain small particles of flyash. The flyash will collect in the exhaust venting system and restrict the flow of flue gases. Incomplete combustion, such as occurs during startup, shutdown, or incorrect operation of the room heater will lead to some soot formation which will collect in the exhaust venting system. The exhaust venting system should be inspected at least once every year to determine if cleaning is necessary.

**CREOSOTE:** When wood is slowly burned it produces tar and other organic vapours and these combine with expelled moisture to form creosote. The creosote vapours condense in the relatively cool chimney flue associated with a slow burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote can result in an extremely hot chimney fire.

**CLEANING:** There will be some build up of fly ash and small amounts of creosote in the exhaust. This will vary due to the ash content of the fuel used and the operation of the stove. It is advisable to inspect and clean the exhaust vent semi-annually or every two tons of pellets.

**ASHES:** Disposed ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be on a non-combustible floor on the ground, well away from all combustible materials

# INTRODUCTION

---

pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispensed, they should be retained in the closed container until all cinders have been thoroughly cooled.

**ELECTRICAL:** The use of a surge protected power bar is recommended. The unit must be grounded. The grounded electrical cord should be connected to a standard 110-120 volts, nominal average 2.0 Amps (4.1 Amps peak), 60 hertz electrical outlet and also must be accessible. Ensure the polarity to the outlet the unit will be plugged into is correct as incorrect polarity can affect the unit's operation. If this power cord should become damaged, a replacement power cord must be purchased from the manufacturer or a qualified ENVIRO dealer. Be careful that the electrical cord is not trapped under the appliance and that it is clear of any hot surfaces or sharp edges. This unit's maximum power requirement is 184 watts (600 watts peak).

**GLASS:** Do not abuse the glass by striking or slamming the door. Do not attempt to operate the stove with broken glass. The stove uses ceramic glass. Replacement glass must be purchased from an ENVIRO dealer. Do not attempt to open the door and clean the glass while the unit is in operation or if glass is hot. To clean the glass, use a soft cotton cloth and mild window cleaner, gas or wood stove glass cleaner, or take a damp paper towel and dip into the fly ash. This is a very mild abrasive and will not damage the glass.

**FLAMMABLE LIQUIDS:** Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in the heater. Keep all such liquids well away from the heater while it is in use.

**SMOKE DETECTOR:** Smoke detectors should be installed and maintained in the structure when installing and operating a pellet burning appliance.

**OPERATION:** The ash pan and door must be closed securely for proper and safe operation of the pellet stove. Also ensure all gaskets on the door are checked and replaced when necessary.

## **KEEP ASH PAN FREE OF RAW FUEL.**

Do not lace unburned fuel or new fuel in ash pan. A fire in the ash pan may occur.

**INSTALLATION:** Be sure to maintain the structural integrity of your home when passing a vent through walls, ceilings, or roofs. It is recommended that the unit be secured into its position in order to avoid any displacement.

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

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

**FRESH AIR:** Outside Fresh Air connection is optional. Must be connected to all units installed in Mobile and "Air Tight Homes" (R2000) or where required by local codes. Consider all large air moving devices when installing your unit and provide fresh air accordingly. Limited air for combustion may result in poor performance, smoking and other side effects of poor combustion.

If you have any questions with regards to your stove or the above-mentioned information, please feel free to contact your local dealer for further clarification and comments.

**SINCE SHERWOOD INDUSTRIES LTD. HAS NO CONTROL OVER THE INSTALLATION OF YOUR STOVE, SHERWOOD INDUSTRIES LTD. GRANTS NO WARRANTY IMPLIED OR STATED FOR THE INSTALLATION OR MAINTENANCE OF YOUR STOVE. THEREFORE, SHERWOOD INDUSTRIES LTD. ASSUMES NO RESPONSIBILITY FOR ANY CONSEQUENTIAL DAMAGE(S).**

## **SAVE THIS INSTRUCTION MANUAL FOR FUTURE REFERENCE**





# INSTALLATION

## DECIDING WHERE TO LOCATE YOUR PELLET APPLIANCE:

1. Check the "Clearances to Combustibles" section for proper spacing.
2. Do not obtain combustion air from an attic, garage or any unventilated space. Combustion air may be obtained from a ventilated crawlspace.
3. Do not install the stove in a bedroom.
4. You can vent the stove through an exterior wall behind the unit or connect it to an existing masonry or metal wood stove chimney (must be lined if the chimney is over 6" (15 cm) diameter, or over 28 inches<sup>2</sup> (180 cm<sup>2</sup>) cross sectional area). An interior vent can be used with approved pipe passing through the ceiling and roof.
5. Locate the stove in a large and open room that is centrally located in the house. This will optimize heat circulation.
6. The power cord is 8 feet (2.43 m) long and may require a grounded extension cord to reach the nearest electrical outlet.
7. Stove must sit on a non-combustible pad that extends six inches in front of the door or the included hearth pad (50-2929).



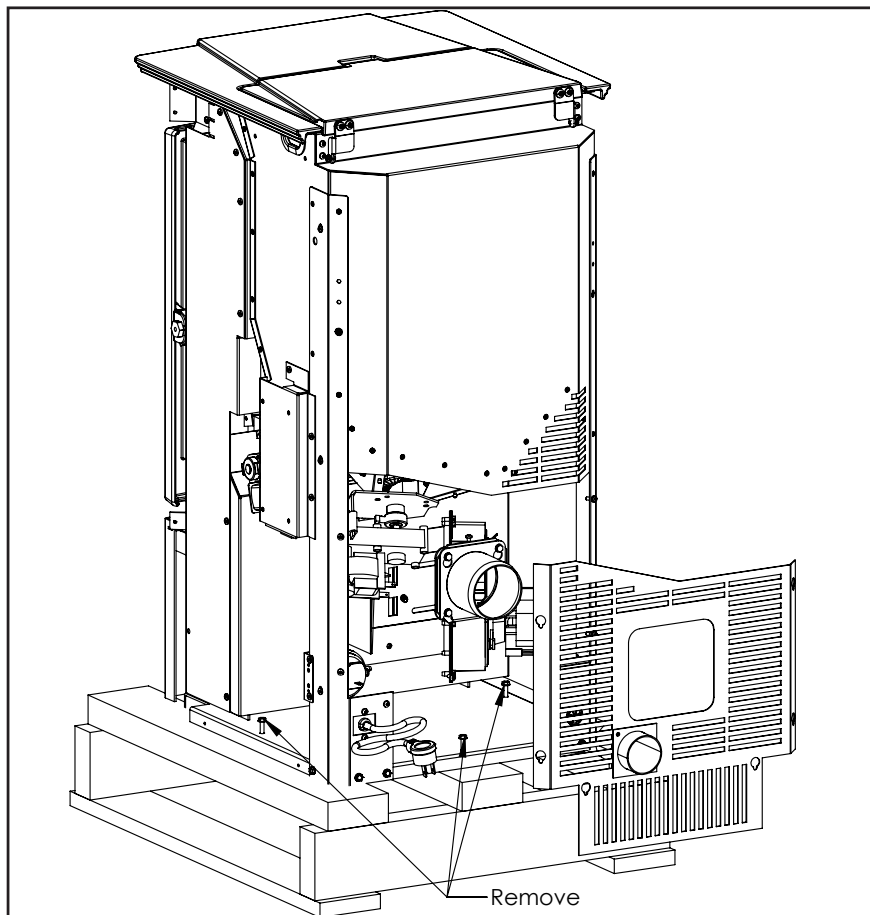
[www.nficertified.org](http://www.nficertified.org)

We recommend that our pellet hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Pellet Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).



## UNPACKING AND REMOVING PELLET STOVE FROM PALLET

1. Start by removing the crating and unit bag, you will need a pry bar and hammer to remove the crating. A sawzall can be used to cut the staples as well.
2. Loosen six screws securing Back Grill, once loose slide downwards and remove.
3. Use a 5/16" wrench or socket to remove the shipping bolts holding the unit to the pallet.



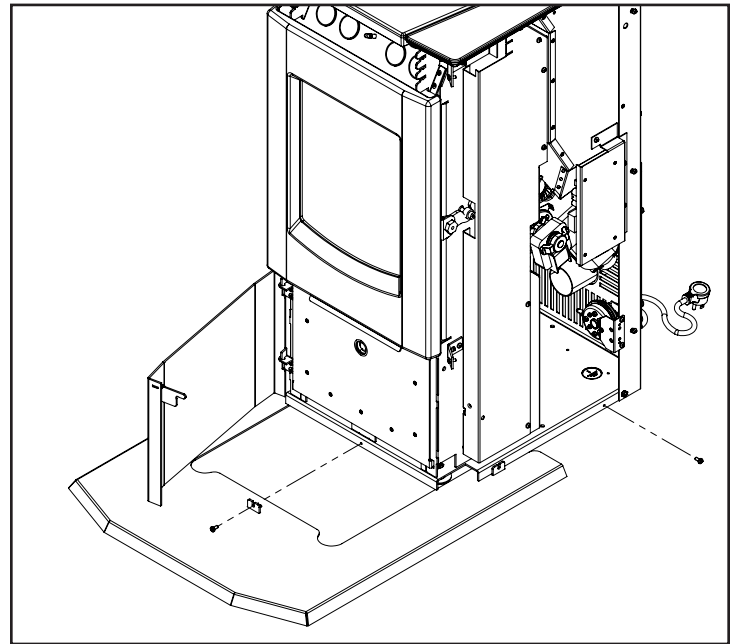
**Figure 1: Shipping Bolt Removal**

126 of 155

# INSTALLATION

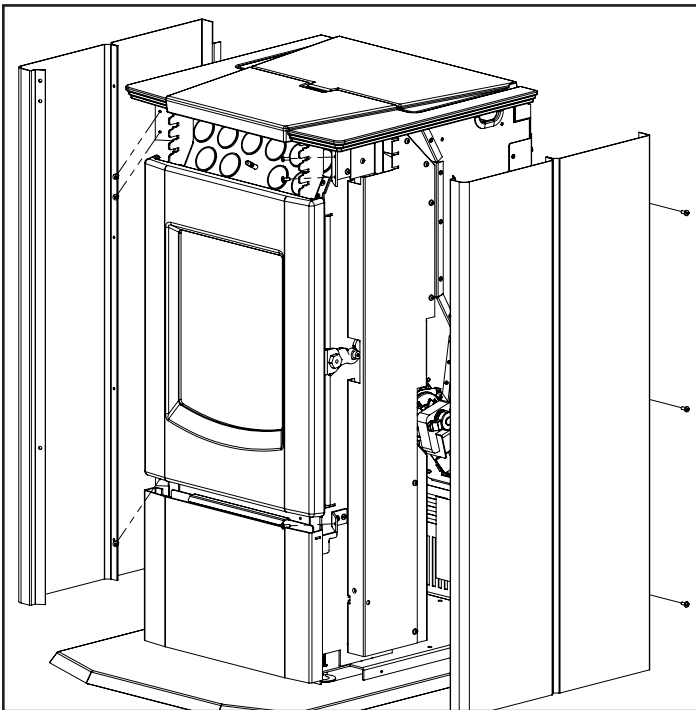
## ASSEMBLY

1. First install the hearth pad if you plan on using it. You may have to unscrew feet to raise unit up. Tilt the unit so it is balancing on the back feet, slide the hearth pad under the unit while making sure the side mounting tabs are on the outside of the base flange. once holes are aligned secure with provided T-20 thread rolling screws. See Figure 2.



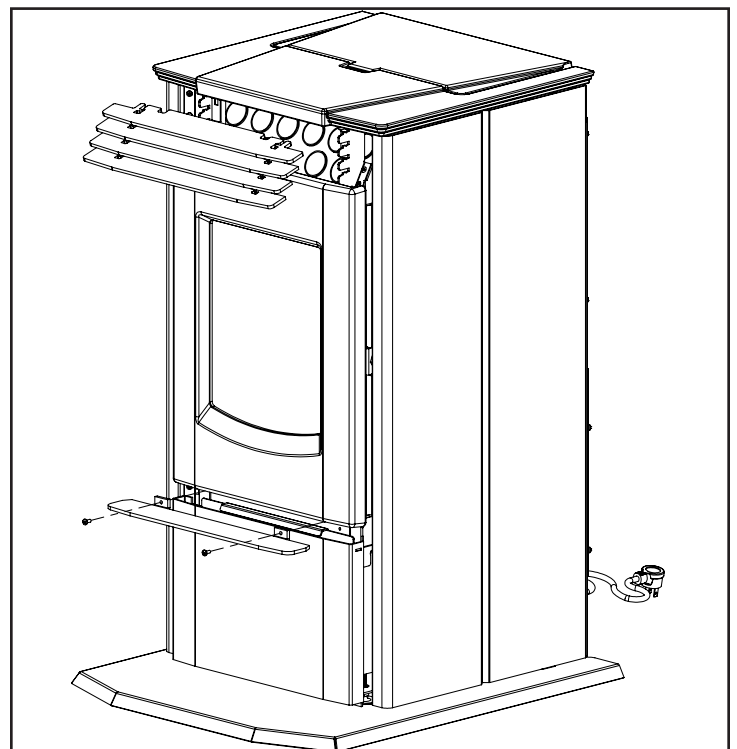
**Figure 2: Hearth Pad Install**

2. Next install the Cabinet Sides. There are six screws for mounting each cabinet side. Start by installing screws at front top of the panels, Do not fully tighten screws. Now get the back top screws started. Now install the rest of the screws and tighten them down. See Figure 3.



**Figure 3: Cabinet Side Install**

3. Now Install Ash Shelf and Louvers. Ash Shelf is mounted using two T-20 thread roller screws. The Louvers are installed by inserting into slots cut into louver mounting brackets located above the door. If properly aligned the louvers should catch on the bracket tabs and sit at a 15 degree angle.

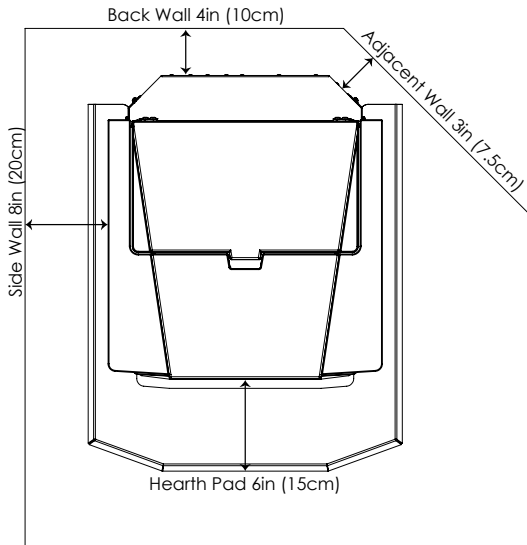


**Figure 4: Louver and Ash Shelf Install**

# INSTALLATION

## CLEARANCES TO COMBUSTIBLES:

**IMPORTANT:** The P3 must have a Hearth Pad when installing the unit on a combustible floor. The included hearth pad meet all the requirement of a proper hearth pad. If you do not use the included hearth pad a certified non combustible Hearth Pad with a minimum R Value of at least 0.84 must be placed underneath the unit and extend six inches in front of the unit measured from the glass. If the P3 is installed on carpet the use of a solid non combustible Hearth Pad must be used under leveling legs.



These dimensions are minimum clearances but it is recommended that you ensure sufficient room for servicing, routine cleaning and maintenance.

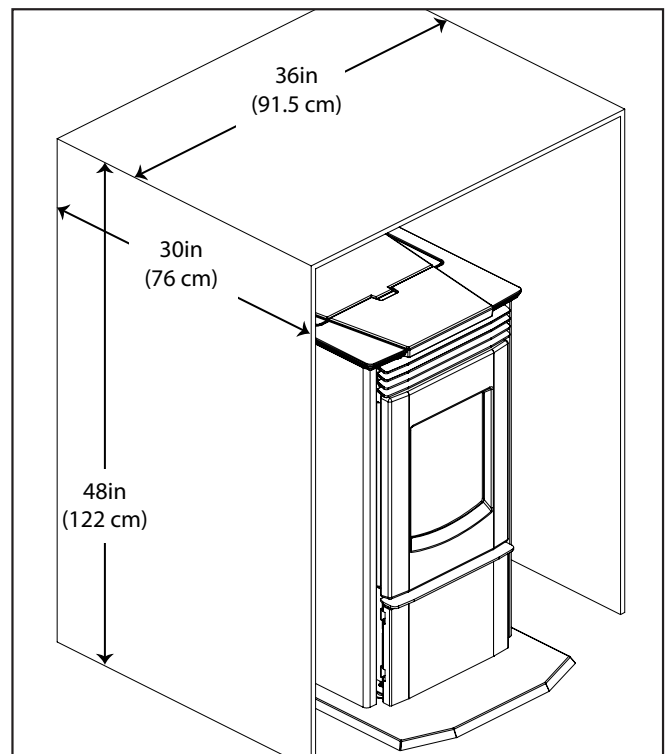
A. Side wall to unit	8 inches (20 cm)
B. Back wall to unit	5.5 inches (14 cm)
C. Back wall to Chimney Connector	4in inches (10cm)
D. Corner to unit	3 inches (7.5 cm)
E. Glass to Hearth Pad	6 inches (15 cm)

**Figure 5: Minimum Install Clearances**

## ALCOVE CLEARANCES:

The unit may be installed in an alcove if desired. These minimum clearances to combustibles must be maintained at all times. Be sure to leave room for servicing, routine cleaning, and maintenance. These are inside dimensions.

Minimum Alcove Width	36 inches (91.5 cm)
Minimum Alcove Height	48 inches (122 cm)
Minimum Alcove Depth	30 inches (76 cm)



**Figure 6: Minimum Alcove Clearances**

# INSTALLATION

## VENT TERMINATION REQUIREMENTS:

IT IS RECOMMENDED THAT YOUR PELLET STOVE BE INSTALLED BY AN AUTHORIZED DEALER/INSTALLER.

Table 1: Use in conjunction with Figure 6 for allowable exterior vent termination locations.

Letter	Minimum Clearance	Description
A	24 in (61 cm)	Above grass, top of plants, wood, or any other combustible materials.
B	48 in (122 cm)	Beside/below any door or window that may be opened. (18" (46 cm) if outside fresh air installed.)
C	12 in (30 cm)	Above any door or window that may be opened. (9" (23 cm) if outside fresh air installed.)
D	24 in (61 cm)	To any adjacent building, fences and protruding parts of the structure.
E	24 in (61 cm)	Below any eave or roof overhang
F	12 in (30 cm)	To outside corner.
G	12 in (30 cm)	To inside corner, combustible wall (vertical and horizontal terminations).
H	3 ft (91 cm) within a height of 15 ft (4.5 m) above the meter/regulator assembly	To each side of center line extended above natural gas or propane meter/regulator assembly or mechanical vent.
I	3 ft (91 cm)	From any forced air intake of other appliance
J	12 in (30 cm)	Clearance to non-mechanical air supply inlet to building, or the combustion air inlet to any appliance.
K	24 in (61 cm)	Clearance above roof line for vertical terminations.
L	7 ft (2.13 m)	Clearance above paved sidewalk or paved driveway located on public property.

1. Do not terminate the vent in any enclosed or semi-enclosed areas such as a carport, garage, attic, crawlspace, narrow walkway, closely fenced area, under a sun deck or porch, or any location that can build up a concentration of fumes such as stairwells, covered breezeway, etc.

2. Vent surfaces can become hot enough to cause burns if touched by children. Non-combustible shielding or guards may be required.

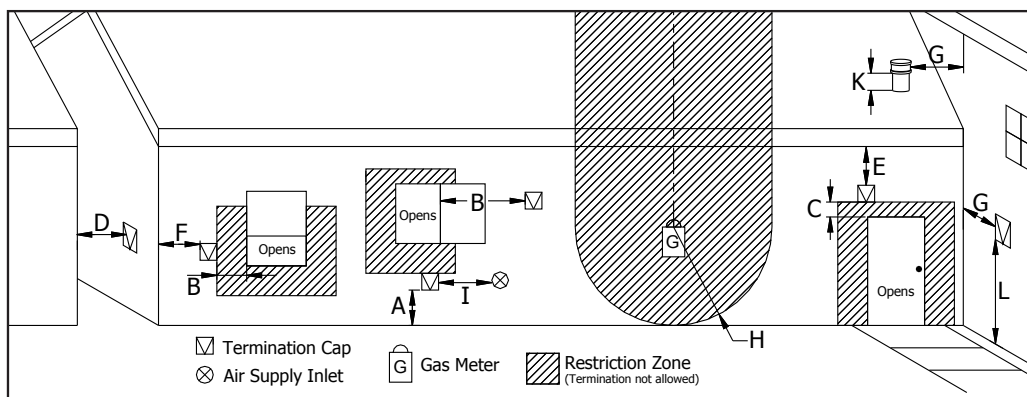


Figure 7: Use in conjunction with Table 1 for allowable exterior vent termination locations.

3. Termination must exhaust above the inlet elevation. It is recommended that at least five feet of vertical pipe be installed outside when the appliance is vented directly through a wall, to create some natural draft to prevent the possibility of smoke or odor during appliance shut down or power failure. This will keep exhaust from causing a nuisance or hazard from exposing people or shrubs to high temperatures. In any case, the safest and preferred venting method is to extend the vent through the roof vertically.
4. Distance from the bottom of the termination and grade is 12" (30 cm) minimum. This is conditional upon the plants and nature of grade surface. The exhaust gases are hot enough to ignite grass, plants and shrubs located in the vicinity of termination. The grade surface must not be lawn.
5. If the unit is incorrectly vented or the air to fuel mixture is out of balance, a slight discoloration of the exterior of the house might occur. Since these factors are beyond the control of Sherwood Industries Ltd, we grant no guarantee against such incidents.

**NOTE: Venting terminals shall not be recessed into walls or siding.**

# INSTALLATION

## OUTSIDE FRESH AIR CONNECTION:

Outside fresh air is mandatory when installing this unit in airtight homes (R2000) and mobile homes.

**A Fresh-air intake is strongly recommended for all installations.** Failure to install a fresh air intake may result in improper combustion as well as the unit smoking during power failures.

When connecting to an outside fresh air source, do not use plastic or combustible pipe. A 2" minimum (51 mm) ID (inside diameter) steel, aluminum or copper pipe should be used. It is recommended, when you are installing a fresh air system, to keep the number of bends in the pipe to a minimum.

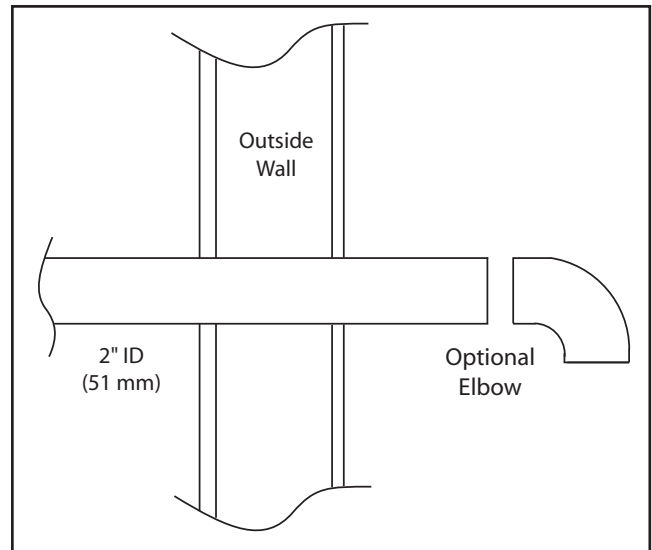


Figure 8: Outside Air Connection.

## EXHAUST AND INTAKE LOCATIONS:

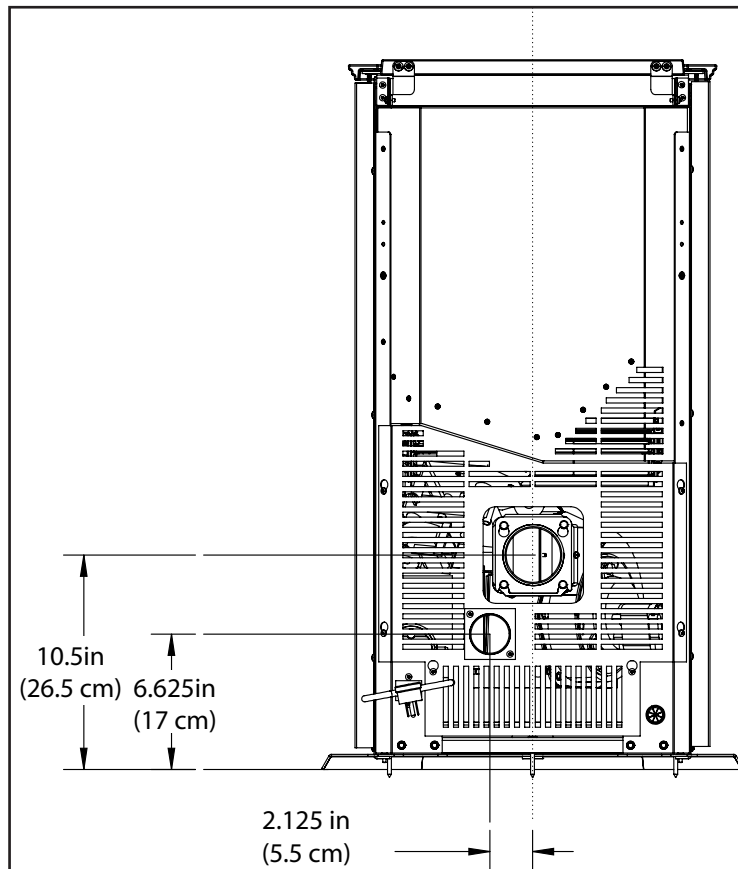


Figure 9: P3 Inlet and Outlet Location.

### EXHAUST

Base of unit to center of flue	10.5 in	(265 mm)
Center of unit to center of flue	0 in	(0 mm)
	[at center of unit]	

### FRESH AIR INTAKE

Base of unit to center of intake	6.625 in	(170 mm)
Center of unit to center of intake	2.125 in	(53 mm)

**IMPORTANT:** When attaching the exhaust venting system to the unit or when joining vent sections three screw must be used at each joint. If vented horizontally, joints shall be made gas tight with aluminum foil duct tape.

# INSTALLATION

## MOBILE HOME INSTALLATION:

- Secure the heater to the floor using the two holes in the pedestal.
- Ensure the unit is electrically grounded to the chassis of your home (permanently).
- Do not install in a room people sleep in.
- Outside fresh air is mandatory. Secure outside air connections directly to fresh air intake pipe and secure with three screws evenly spaced.

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

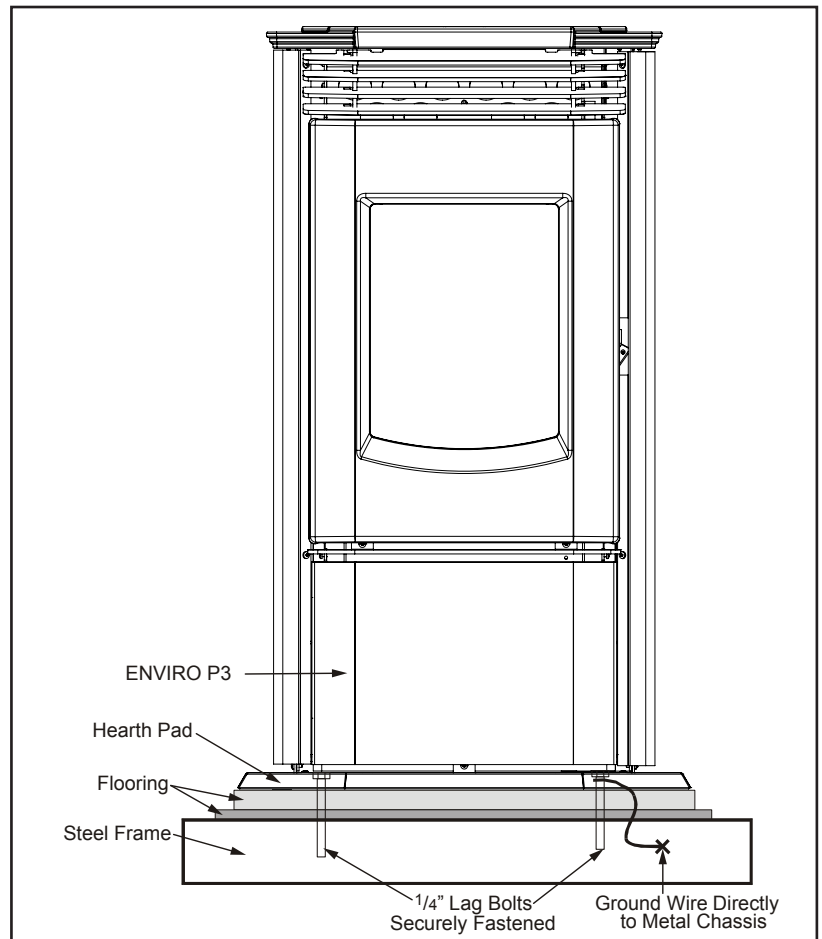


Figure 10: Mobile home installation.

## CORNER THROUGH WALL INSTALLATION:

Minimum clearances must be maintained for a corner installation as shown in figure 11.

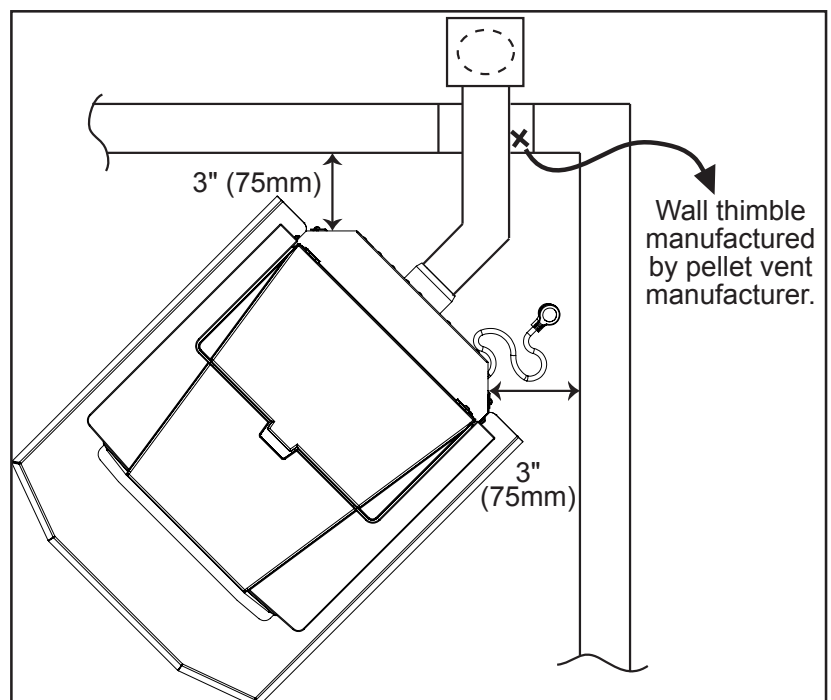


Figure 11: Corner Installation.

# INSTALLATION

## HORIZONTAL EXHAUST THROUGH WALL INSTALLATION:

### Vent installation: install vent at clearances specified by the vent manufacturer.

A chimney connector shall not pass through an attic or roof space, closet or similar concealed spaces, or a floor, or ceiling. Where passage through a wall or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365 Installation Code for Solid-Fuel-Burning Appliances and Equipment. Only use venting of L or PL type with an inside diameter of 3 or 4 inches (7.6 or 10.1 cm).

1. Choose a location for your stove that meets the requirements stated in this manual and allows installation with the least amount of interference to house framing, plumbing, wiring, etc.
2. Install a non-combustible hearth pad (where necessary).
3. Place the appliance 15" (37.5 cm) away from the wall. If the stove is to be set on a hearth pad, set the unit on it, and adjust the leveling legs.
4. Locate the center of the exhaust pipe on the stove. Extend that line to the wall. Once you have located the center point on the wall, refer to pellet vent manufacturer installation instructions for correct hole size and clearance to combustibles.
5. Install the wall thimble as per the instructions written on the thimble. Maintain an effective vapour barrier in accordance with local building codes.
6. Install a length of 3" (75 mm) or 4" (100 mm) vent pipe into the wall thimble. The pipe should install easily into the thimble.
7. Connect the exhaust vent pipe to the exhaust pipe on the stove. Seal the connection with high temperature silicone.
8. Push the stove straight back, leaving a minimum of 5.5" (14cm) clearance from the back of the stove to the wall. Seal the vent pipe to the thimble with high temperature silicone.
9. The pipe must extend at least 12" (30 cm) away from the building. If necessary, bring another length of pipe (PL type) to the outside of the home to connect to the first section. Do not forget to place high temperature silicone around the pipe that passes through the thimble.

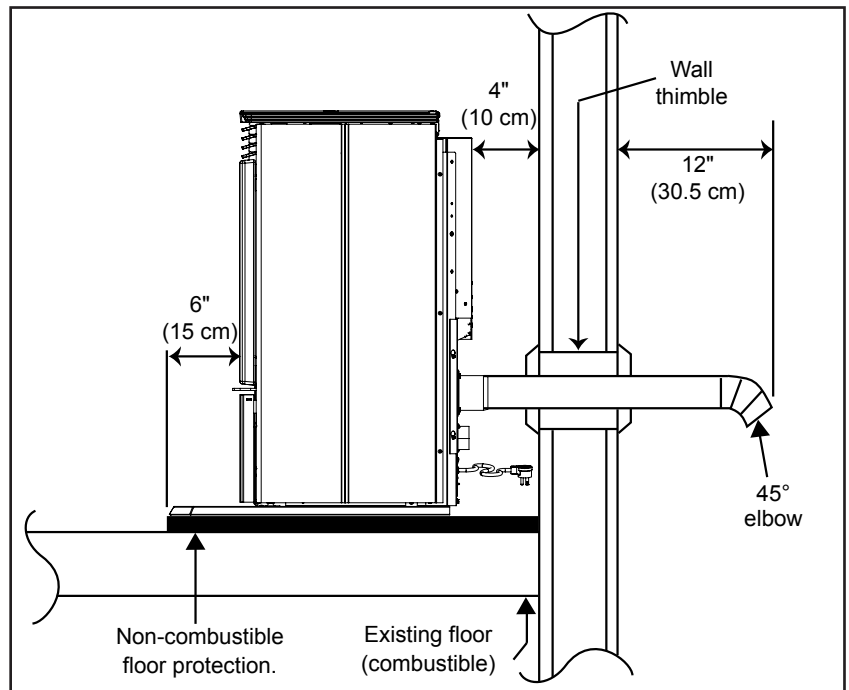


Figure 12: Straight through wall Installation.

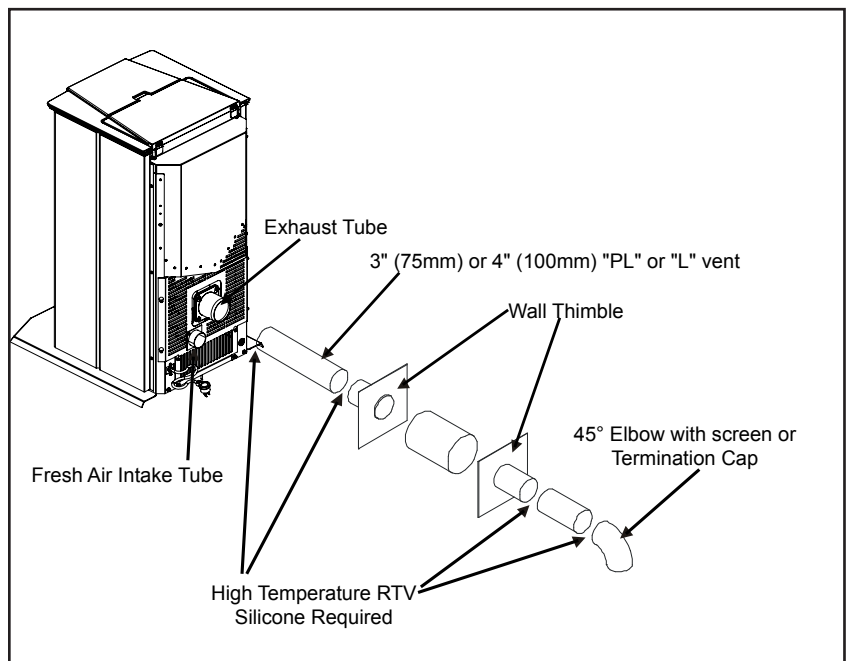


Figure 13: Venting to use with straight through wall Installation.



# INSTALLATION

10. Install a vertical pipe, or if all requirements for direct venting are met, install vent termination. The stainless steel cap termination manufactured by the vent manufacturer is recommended. However, when the vent terminates several feet above ground level and there are no trees, plants, etc. within several feet, a 45° elbow can be used as termination. The elbow must be turned down to prevent rain from entering.

## NOTE:

- It is recommended that horizontal through wall installations have 3 to 5 feet (91 to 152 cm) of vertical pipe in the system to help naturally draft the unit in the event of extreme weather or a power outage.
- Some horizontal through wall installations may require a "T" and 3 to 5 feet (91 to 152 cm) of vertical pipe outside the building to help draft the unit. This may be required if a proper burn cannot be maintained, after the stove has been tested and the airflow set. This is due to the back pressure in the exhaust caused by airflow around the structure.
- Follow vent manufacturer guidelines for installation of venting. High temp sealant must be used when connecting vent pipe to the unit's starter pipe. Improper seals at the vent joints may cause combustion by-products to leak into the room where installed - **seal as required**.

## THROUGH WALL VERTICAL RISE HORIZONTAL TERMINATION INSTALLATION - FREESTANDING:

A termination cap is always recommended for this type of install but a stainless steel termination hood or a 45° elbow may be used in place of the cap.

Figure 14 is the recommended installation set up, venting length is negligible.

Figure 15 is the installation to use if there is a concrete or retaining wall in line with exhaust vent on a pellet stove. The termination must be 12" (30 cm) from the outside wall and 12" (30 cm) above the ground.

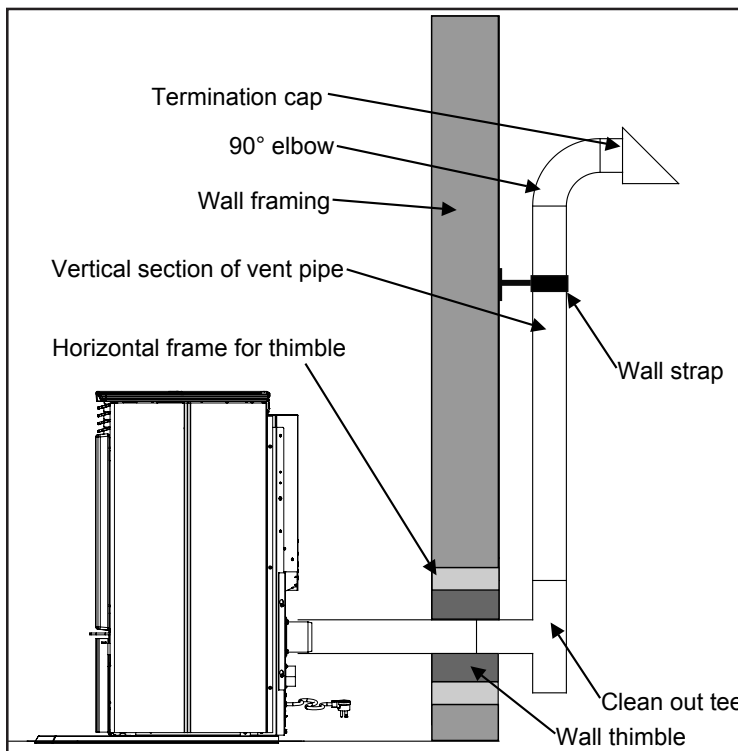


Figure 14: Venting horizontally with rise.

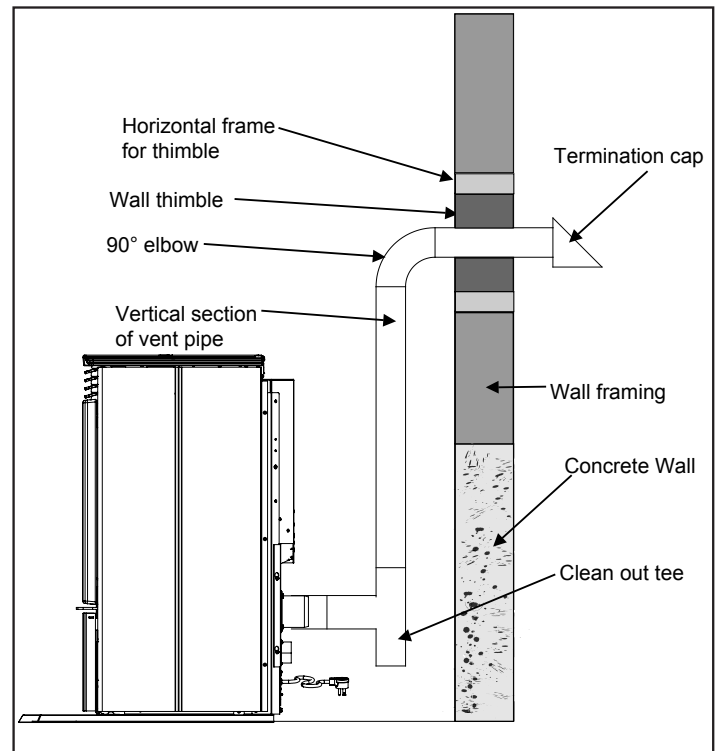


Figure 15: Venting with concrete wall behind unit .

# INSTALLATION

## INSIDE VERTICAL INSTALLATIONS:

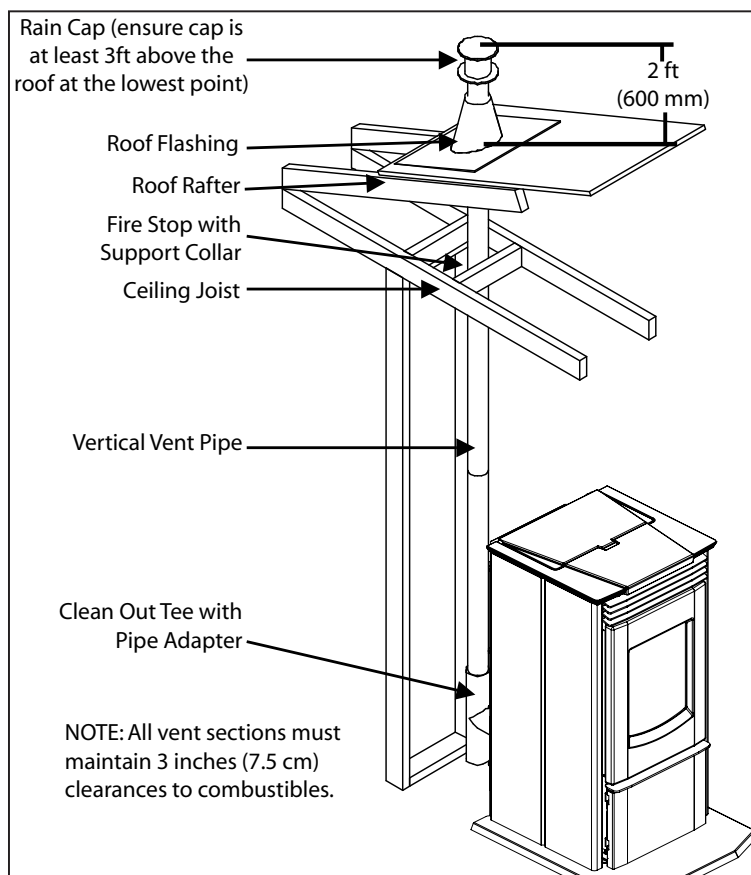


Figure 16: Inside Vertical Installation.

## OUTSIDE VERTICAL INSTALLATIONS:

To accomplish a outside vertical pipe installation, follow steps 1 through 5 in the "INSIDE VERTICAL INSTALLATIONS - FREESTANDING" section and then finish it by performing the following (refer to Figure 17).

1. Install a tee with clean out on the outside of the house.
2. Install PL vent upward from the tee. Make sure that you install support brackets to keep the vent straight and secure.
3. Install ceiling thimble and secure the flashing as you go through the roof.
4. Ensure that the rain cap is approximately 24" (600 mm) above the roof.

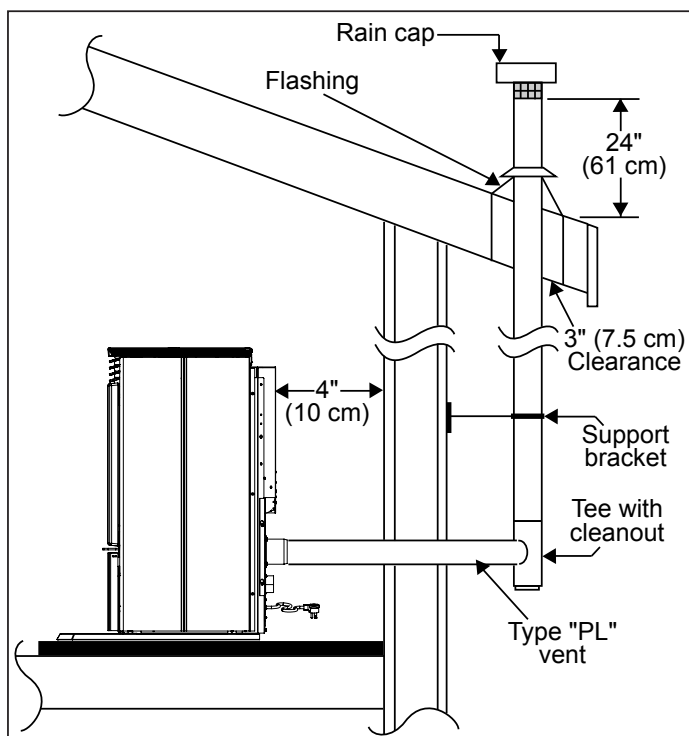


Figure 17: Outside Vertical Installation.

# INSTALLATION

## HEARTH MOUNT INSTALLATION:

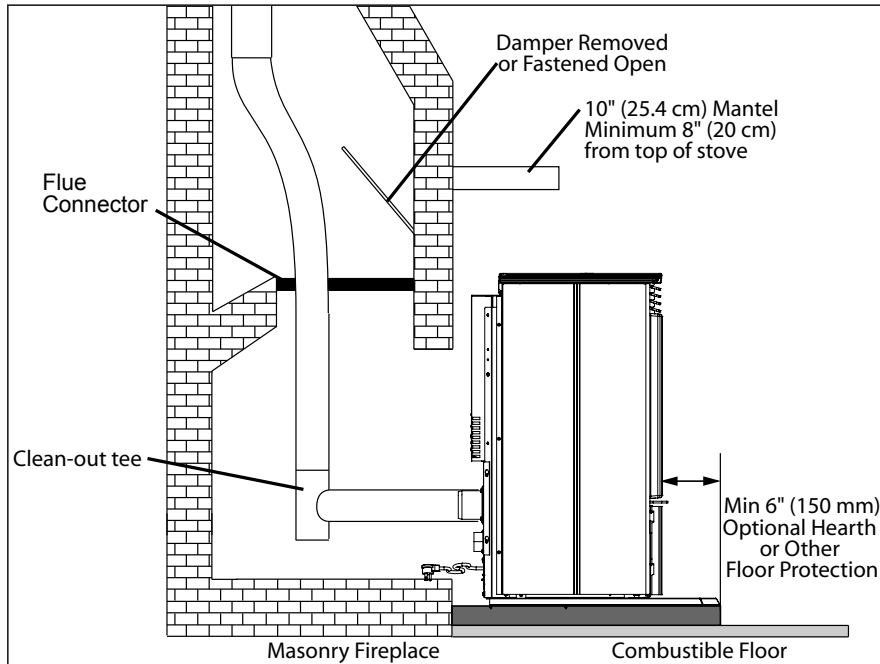


Figure 18: Freestanding hearth mount installation.

Refer to Figures 18 and 19.

1. Install the hearth pad.
2. Lock the fireplace damper in the open position.
3. Install a positive flue connector at the fireplace dampers or seal the chimney at the top.
4. Connect a tee to the exhaust pipe.
5. Install flexible stainless steel liner or listed pellet vent to the top of the chimney.

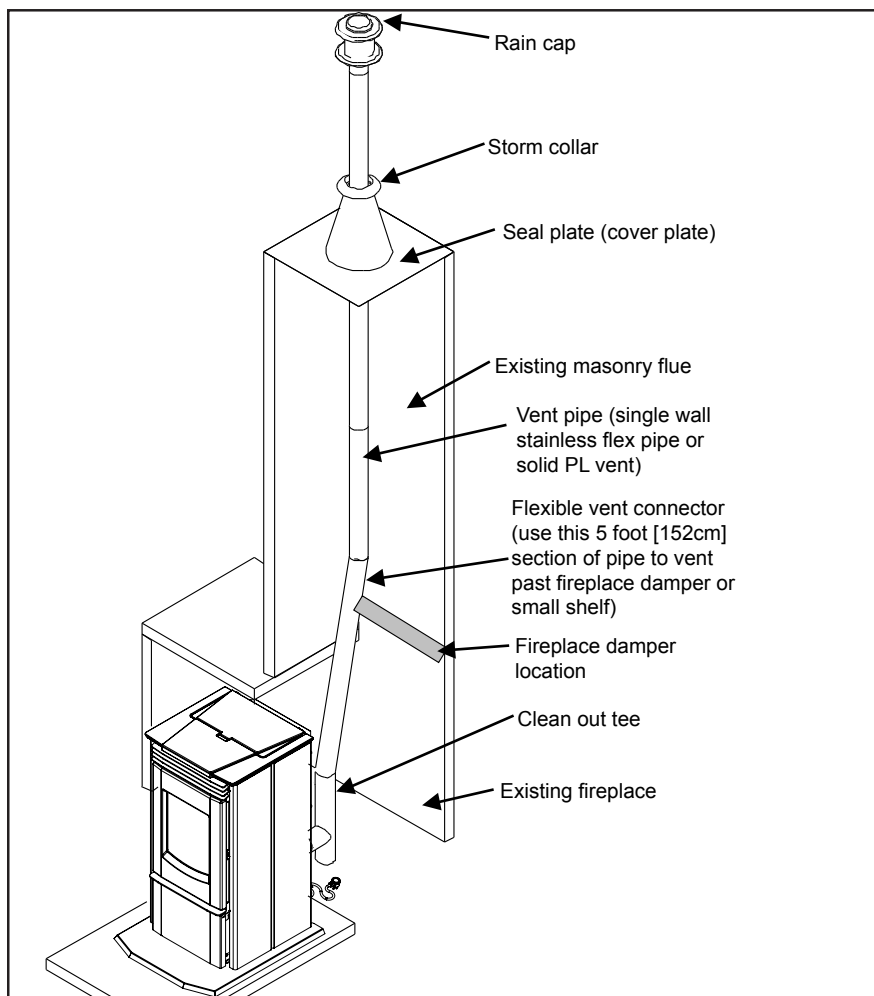


Figure 19: Freestanding hearth mount installation overview.

# INSTALLATION

## THERMOSTAT INSTALLATION:

1. Install the wall thermostat in a location that is not too close to the unit but will effectively heat the desired area.
2. The Right Cabinet Side will need to be removed to access the Control Board. Once the side has been removed you can remove three screws securing the Control Board Cover.
3. Now that the board can be accessed, wire the Thermostat using 2 connector wire from the unit to the thermostat.

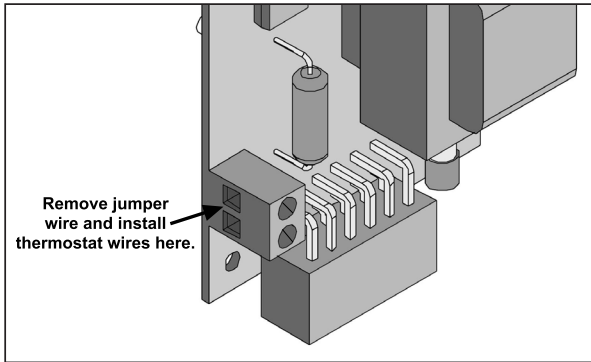
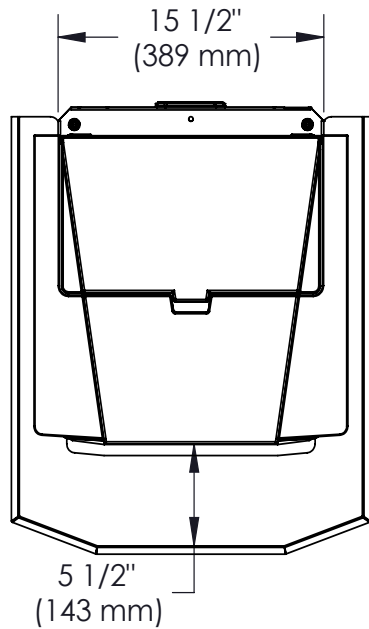


Figure 20: Thermostat wire placement.

# SPECIFICATIONS

## DIMENSIONS AND SPECIFICATIONS:



Weight (with full hopper): 275 lb (125 Kg)

Hopper Capacity: up to 62 lb (28 Kg)

Voltage: 110 - 120 V

Max Current: 4.1 Amps

Consumption on High: 3.1 lb/hr (1.4 Kg/hr)\*

Consumption on Low: 1.3 lb/hr (0.6 Kg/hr)\*

(Note: Consumption will vary with the type of fuel used.)

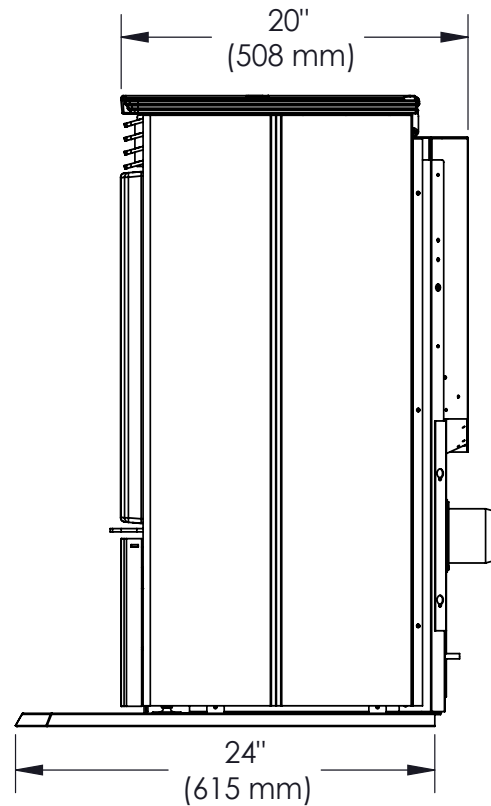
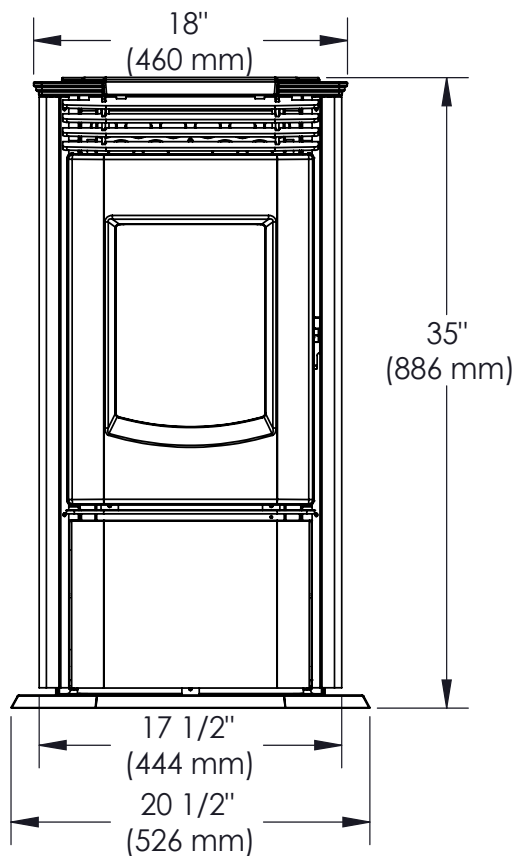


Figure 21: Dimensions of P3.

# OPERATING INSTRUCTIONS

## CONTROL BOARD FUNCTIONS:

- 1. POWER BUTTON:** This is the green button with the power symbol, it is used to turn the unit on and off. When the power is on and the blue LED beside the button will be illuminated. The LED will flash during the start-up cycle. Once start-up cycle is complete the power LED will stay on.
- 2. AUTO BUTTON:** Located below the Power button, when pressed this activates Auto or "Comfort" mode. LED beside button will be illuminated when active.
- 3. THERMOSTAT BUTTON:** Located below the Auto Button. This is for external thermostat control. LED beside button will be illuminated when active.
- 4. ARROW BUTTONS:** The Arrow Buttons are used to adjust heat level and trim settings.

**START-UP:** When the unit is turned on it will go into a start-up cycle while trying to light a fire. During start-up you have no control over the settings. The Power LED will flash until start-up is complete. You can adjust heat levels or toggle the different modes during start-up but these adjustments will not come into affect until the start-up cycle is complete.

**MANUAL MODE:** Once the start-up cycle is completed you will be in either Manual mode or Auto mode. When in Manual mode the Power LED is illuminated and AUTO LED is not. Use the Arrow buttons to adjust heat level from L1-L5.

**AUTO MODE:** Press the Auto button to activate Auto or "Comfort" mode. When activated the Power and Auto LED's will be illuminated. Use the Arrow buttons to adjust from C1-C9. Each setting corresponds to a different temperature set point. The stove will automatically adjust to hold this temperature. As the room temperature gets close to the set point the fire will decrease in size. If room temperature is above the set point for a certain amount of time the stove will shut down and go into Suspend mode.

**SUSPEND MODE:** Once a stove has gone into Suspend mode the fire will go out. This means the room has heated up beyond the Auto set point. Once temperature in the room drops below the Auto set point the stove start back up and run until the room gets to hot once again. When in suspend mode the Auto LED will flash.

**THERMOSTAT MODE:** This can only be used in Manual mode, and is for external thermostat control. A external thermostat can be wiring to the main control board. When activated the LED beside the Thermostat Button will be illuminated.

**FEED/COMBUSTION TRIM:** To adjust the Feed Trim you must be in Manual mode heat level 1. Press the hidden button located under the down arrow. The Display will then change from P (Program) to A (Auger) to C (Combustion) with a two second delay between changes. When the display shows an A use the arrows to adjust the feed trim. To adjust the combustion fan trim wait until the display shows C then use the arrows to adjust.

**SERVICE INDICATOR:** If you see the "S1" on the LED display this is a maintenance recommended indicator. The "S1" will come on when your stove has run for so many hours. It is recommended that you contact your local dealer for component inspection and servicing. Pellet stoves require regular maintenance to keep running efficiently.

## AUTOMATIC SAFETY FEATURES OF YOUR PELLET STOVE:

- The stove will shut off if the fire unexpectedly goes out, once exhaust temperature drops below 120°F (49°C), you will see an **E3** code on the LED display.
- The stove has a high temperature safety switch. If the temperature on the hopper reaches 200°F (93°C), the auger will automatically stop and the stove will shut down. The LED display will show an **E4** error code, see Troubleshooting section. If this happens, call your local dealer to reset the 200°F (93°C) high limit switch. **ALSO FIND THE REASONS WHY THE UNIT OVERHEATED.** This code can also be cause by leaving the hopper lid open, there is a magnetic safety switch.
- The unit is equipped with a vacuum switch to monitor the venting pressure; if it becomes blocked the vacuum switch will turn off the auger and there will be an **E2** error code on The LED Display.



Figure 22: Circuit Board Control Panel Decal.

# OPERATING INSTRUCTIONS

## OPERATING YOUR PELLET STOVE:

**PRE-BURN INSTRUCTIONS:** The burn pot liner holes must be clear and the liner installed properly against the ignitor tube for proper operation. Check the hopper for enough pellets to start the unit.

**DO NOT OPERATE THE UNIT WITH THE DOOR OR ASH PAN OPEN.**

**TO START:** Press the Power button. The stove will turn on. The LED beside the Power button will flash to indicate a start-up cycle. The Heat Level is shown on the LED display, you can change the Heat Level and mode but these adjustments will not take affect until the start-up cycle is complete. If this is the first time the unit has been started or the unit has run out of fuel, the auger will need to be primed. You may need restart the unit if an **E3** error occurs, to do this just press the Power button again. Once you see pellets start to drop the auger is primed.

**TO OPERATE:** When a fire has been established, the Power LED will turn solid (after approximately 10 - 15 minutes) and the current settings will now take affect.

The convection blower (room air blower) will turn on once the start-up cycle is complete. The speed of this blower is automatically controlled and is based off the heat level setting.

## TURNING YOUR PELLET STOVE OFF:

To turn off your Pellet stove just press the Power button. This will not shut off the stove instantly, it will go into a shut down cycle and take approximately 5 minutes for the fire to burn out. The fans will stay running until the unit has cooled sufficiently.

**NEVER unplug a unit that is running!**

**DO NOT unplug unit while Combustion fan is running.**

**Unplugging may cause smoke to be released into the home.**

## DAMPER SET-UP:

**THE SLIDER / DAMPER MUST BE SET AT TIME OF INSTALLATION. This is used to regulate the airflow through the pellet stove. Following these steps will minimize visible emissions.**

If the pellets being burnt are of poor quality there is a higher chance of clinker build up and over time the fire may build up and overflow the burn pot. Poor quality pellets will require more primary air to help complete the burn, the slider damper must be pulled out to compensate. Pulling the slider damper out gives the fire more air. It is crucial to make sure the burn pot is clean and that no holes are blocked for proper combustion. It is recommended to get the stove hot then set the damper at heat level 1, this is the most sensitive setting.

There are two ways to set the damper. You can visually set the damper if you have experience.

- A tall, lazy flame with dark orange tips requires more air – Open slider (pull out) slightly.
- A short, brisk flame, like a blowtorch, has too much air – Close slider (push in) slightly.
- If the flame is in the middle of these two characteristics with a bright yellow/orange, active flame with no black tips then the air is set for proper operation.

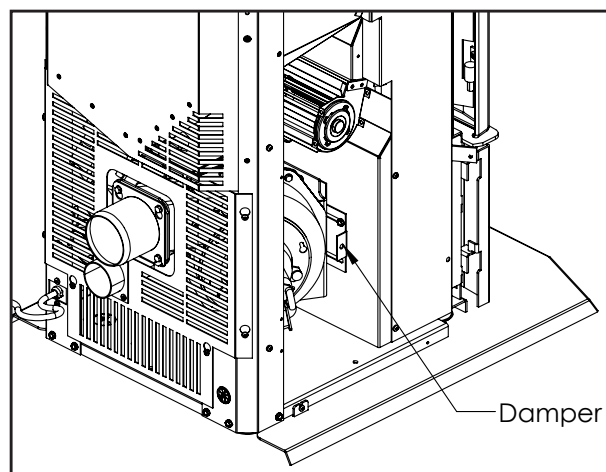


Figure 23: Slider/Damper Adjustment

# OPERATING INSTRUCTIONS

**IMPORTANT:** Taking a reading of vacuum pressure inside the firebox with a magnehelic gauge should be used to set the slider for best combustion. The slider damper should be set only on a hot stove (operating for thirty (30) minutes or more) by using a Magnahelic Pressure Gauge to measuring the pressure in the firebox. **The best settings are a reading of approximately 0.11 0.12 inches of water column (27.4 - 29.9 Pa) on the high fire setting. Some fuels may require higher or lower settings.** The reading can be taken from the  $\frac{1}{8}$ " (3 mm) hole located on the front of the unit below the ash shelf.

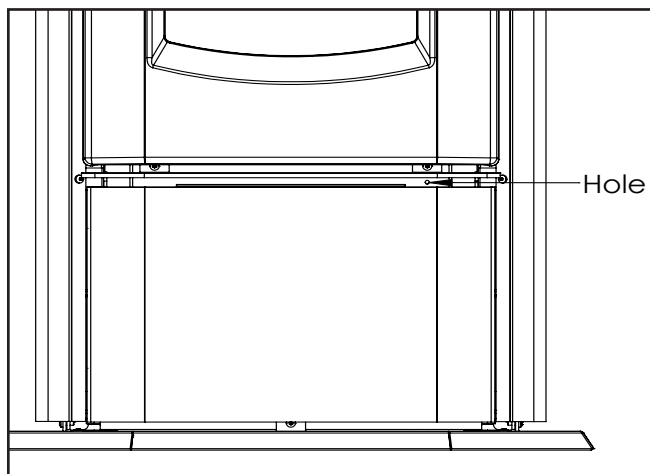
## **SPECIAL NOTES:**

**Pellet quality** is a major factor in how the Pellet stove will operate. If the pellets have a high moisture content or ash content the fire will be less efficient and has a higher possibility of the fire building up and creating clinkers (hard silica ash build-up).

**Overfiring** should not occur if stove is operating properly, if stove looks like it is burning unusually high turn off the unit with the power button, **DO NOT** unplug. There is a built in safety switch if unit gets too hot from overfiring it will shut down automatically.



**Figure 24: Efficient Flame.**



**Figure 25: Magnehelic Test Hole.**

## **GUIDELINES FOR FINE-TUNING FOR FUEL QUALITY:**

Due to fuel quality the slider damper and control board trims may need to be fine-tuned.

1. If the unit builds up on all settings, the slider damper rod should be pulled out in small increments to give the unit more air.
2. If the unit has excesses ash build-up in the liner on the lower feed settings, the Combustion Blower Trim should be increased one setting at a time until the problem improves (Factory Setting is #2).
3. If the fire is going out on low because the airflow is too great, the Combustion Blower Trim can be lowered to the #1 setting.
4. If the stove has excesses ash build-up in the liner on the higher settings the Feed Rate Trim should be trimmed down a setting at a time until the problem improves (Factory setting is #4).
5. If you need more heat and the fuel has long pellets, the majority are over 1" (2.5cm) in length, the Feed Rate Trim can be moved up to the #5 setting. NOTE: Only do this if the fuel burns without building up.



# ROUTINE CLEANING AND MAINTENANCE

The following list of components should be inspected and maintained routinely to ensure that the appliance is operating at its' optimum and giving you excellent heat value:

<u>2-3 Days / Weekly</u>	<u>Semi-annually or 2 Tons of Fuel</u>
Burn Pot and Liner	Exhaust Vent
Heat Exchanger Tubes	Air Intake
Ash Pan	Blower Mechanisms
Door Glass	Heat Exchanger Tubes
Inside Firebox	Behind Firebox Liners & Covers
Ash Pan and Door Gaskets	All Hinges
Door Latch	Post Season Clean-up

## TOOLS REQUIRED TO CLEAN UNIT:

Torx T-20 Screwdriver,  $\frac{5}{16}$ " wrench or socket, Brush, Soft Cloth, Vacuum with fine filter bag

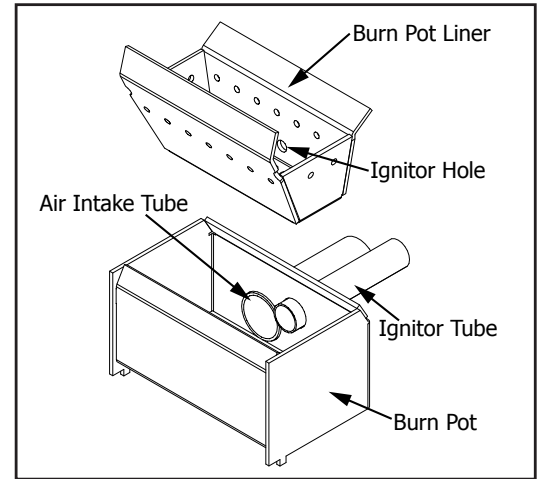


Figure 26: P3 Burn pot and Liner

## BURNER POT AND LINER (2-3 days)

Every two to three days (when the unit is cold), remove the burn-pot liner from the stove. Using a metal scraper, remove material that has accumulated or is clogging the liner's holes. Then dispose of the scraped ashes from the liner and from inside the burn-pot. Place the burn-pot back into the stove, making sure that the pipes are properly inserted into the burn pot. Place the liner back into the burn-pot, making sure that the ignitor hole in the liner is aligned with the ignitor tube (shown in Figure 32). Push the liner up against the ignitor tube.

If after long periods of burning, the fire continually builds up and overflows the burn pot or there is a build up of clinkers, this is an indication that the pellet fuel quality is poor, the stove may need cleaning, or the air adjusted. Check the stove for ash build up (clean if required) and adjust the damper to produce the proper clean combustion.

## HEAT EXCHANGER TUBES (2-3 days)

A rod is located in the center of the stove just above the door behind the top louvers, see Figure 35. This rod is to be pulled up and down a few times (ONLY WHEN THE UNIT IS COLD) in order to clean away any fly ash that may have collected on the heat exchanger tubes. As different types of pellets produce different amounts of ash, cleaning of the tubes should be done on a regular basis to enable the unit to run efficiently. Do not pull on rod excessively if it is not sliding. If stuck inspect rod for bend and try and free up scraper plate from inside firebox.

## ASH PAN AND DOOR GASKETS (weekly)

After extended use the gasket may come loose. To repair this, glue the gasket on using high-temperature fiberglass gasket glue available from your local dealer. This is important to maintain an airtight assembly.

# ROUTINE CLEANING AND MAINTENANCE

## DOOR GLASS CLEANING (2-3 days)

Cleaning of the glass must only be done when stove is cold. Open the door. The glass can be cleaned by wiping down the outside and inside of the glass with a soft dry cloth.

If the glass has build up that can not be removed with only the cloth, clean the glass using paper towel and a gas appliance glass cleaner, this may be purchased through most dealers. If a gas appliance glass cleaner is not available, use a damp paper towel dipped in fly ash to clean the glass. After the glass has been cleaned use the dry soft cloth to wiping down the outside and inside of the glass.

## ASH PAN (weekly)

This part is located behind the bottom door. To remove the ash pan, open the cover from the right hand side, and lift the ash pan up and out. Dump the ashes into a metal container stored away from combustibles. Monitor the ash level every week. Remember that different pellet fuels will have different ash contents. Ash content is a good indication of fuel efficiency and quality. Refer to "SAFETY WARNINGS AND RECOMMENDATIONS" for disposal of ashes. Vacuum the inside of the ash pan compartment inside the pedestal including the hole at the top back of the compartment. Replace the ash pan ,close the latch, and close pedestal door. **DO NOT PLACE UNBURNED OR RAW PELLET FUEL IN ASH PAN.**

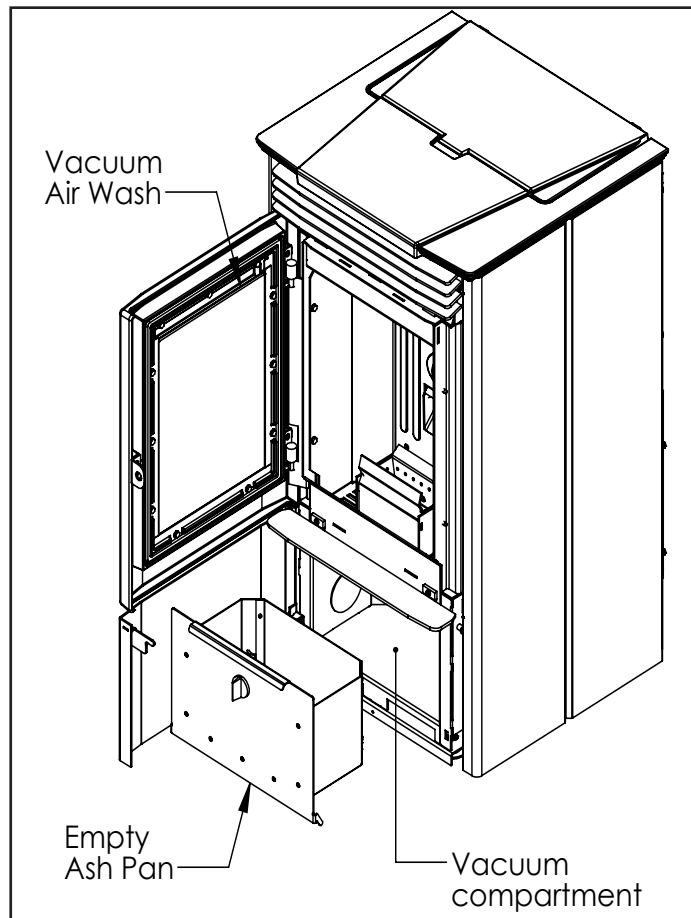


Figure 27: P3 Open

## AIR INTAKE (semi-annually)

Inspect periodically to be sure that it is not clogged with any foreign materials.

## EXHAUST PASSAGES (Semi-annually)

To prevent build up of fly-ash all the exhaust passages must be cleaned and vacuumed.

### Clean behind clean-out covers:

- Open ash box cover.
- Remove ash box.
- Using a  $\frac{5}{16}$ " socket, loosen the six screws in the ash box compartment; four on the back.
- Rotate the back cover counter clockwise.
- 

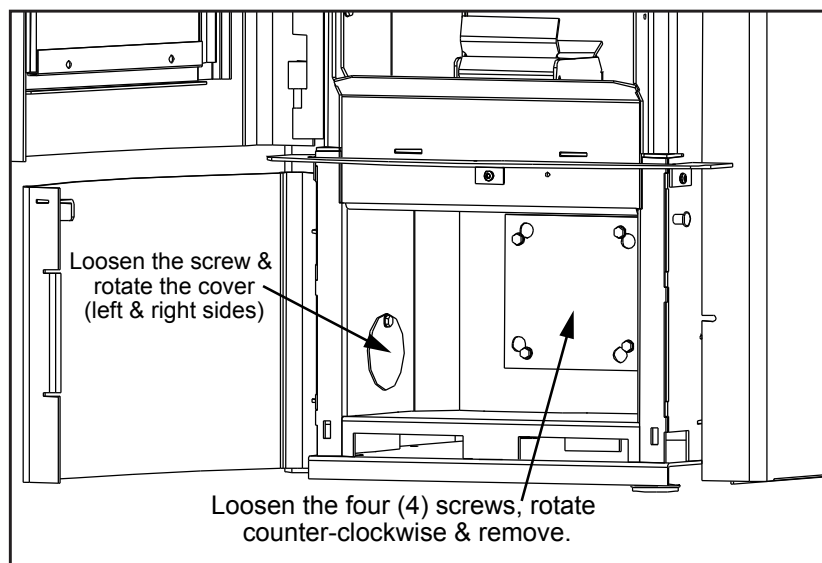


Figure 27: P3 Clean-Out Covers.

# ROUTINE CLEANING AND MAINTENANCE

- To remove and rotate the side covers to open them.
- Vacuum out all three 3 chambers.
- Close all the clean-out covers and tighten the screws.

## HEAT EXCHANGER TUBES (2-3 days)

- The heat exchanger tubes are located behind the Louver assembly. To access Heat Exchanger Scraper Rod, remove middle two louvers by tipping up and pulling out.
- Pull out the Scraper Rod shown in Figure 35 in order to remove any fly ash that may have collected on the heat exchanger tubes. This will allow for optimal heat transfer to convection air.

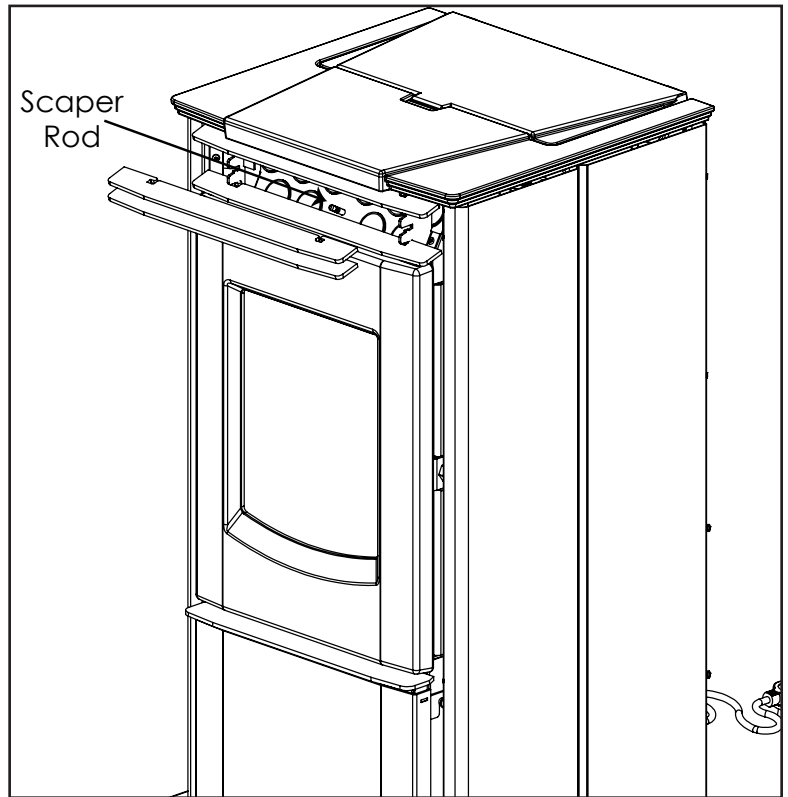


Figure 29: P3 Heat Exchanger Tubes

## REMOVAL OF FIREBOX PANELS

- Open the door, remove the door, burn pot and burn pot liner.
- Lubricate all screws with penetrating oil.
- Remove the four screws that hold the side panels in place.
- With the tip of a flat screwdriver, gently lift up the side panels and remove the side panels.
- Pull the center panel out.
- Vacuum thoroughly.
- Re-install panel by inserting center panel.
- Place the side panels back into the firebox locking them into place and re-install the two screws on each side.
- Clean thoroughly.

**Note: Screws that secure left side panel also secure hinge bracket which holds cast door. Remove door before unscrewing.**

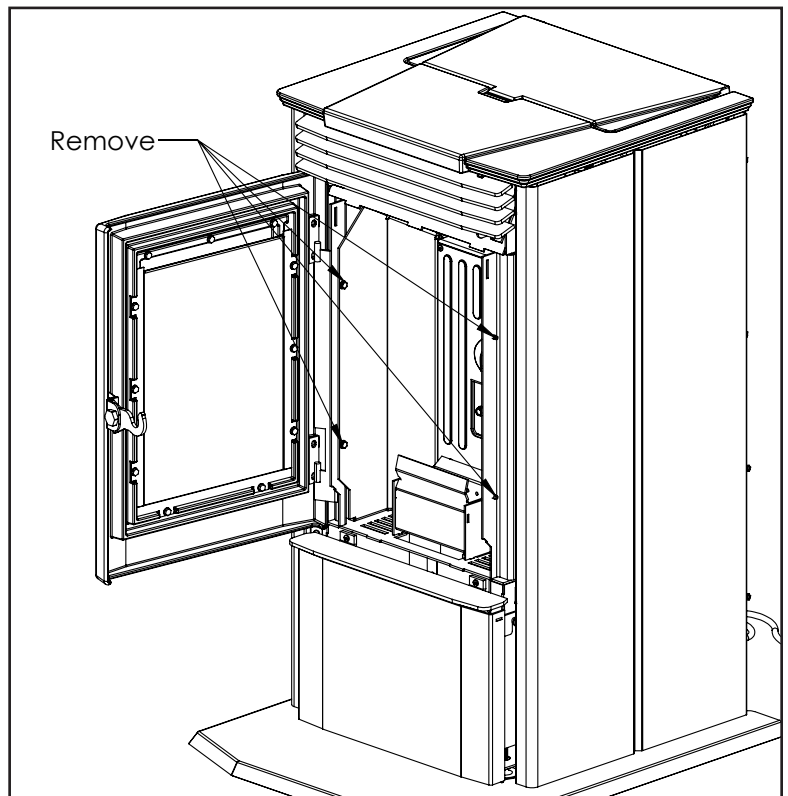


Figure 30: P3 Firebox Panels

# ROUTINE CLEANING AND MAINTENANCE

---

## **FIREBOX** (weekly)

The paint on the steel firebox panels may peel. This is due to extreme conditions applied to the paint and is in no way covered by warranty. Brush and vacuum up all soot and flyash from firebox.

## **AIR WASH** (semi-annually)

Vacuum out the air wash passages at the top of the glass (see Figure 33). We recommend that a soft brush nozzle head is used on the vacuum.

## **EXHAUST VENT** (semi-annually)

This vent should be cleaned every year or after two tons of pellets. We recommend contacting your dealer for professional cleaning. To clean the vent pipe, tap lightly on the pipe to dislodge any loose ash. Open the bottom of the "T" to dump the ash, then vacuum as much of the ash out of the vent pipe as possible. Failure to clean exhaust venting can result in a serious creosote fire.

## **BLOWER MECHANISMS** (semi-annually)

Unplug the stove then open the right and left side panels to access the two blowers. Vacuum all dust from motors. DO NOT lubricate the motors. Check gaskets and replace if needed.

## **HINGES**

Check to make sure all hinges are working properly. You may use high temp anti-seize on door hinges for smoother operation.

## **POST SEASON CLEAN-UP**

Once you are finished using the pellet appliance for the season, unplug the stove for added electrical protection. It is very important that the stove be thoroughly cleaned and serviced. Pellet should be regularly serviced for optimum efficiency and prolonged life.

## **DOOR GLASS REPLACEMENT**

Never run a stove with broken glass, new glass must be purchased and installed by a Enviro dealer. The door glass is made of high temperature "PYROCERAM" ceramic glass. The proper glass size is 13" x 9.5" x 0.2" (5mm). To replace the glass, unscrew and remove the seven retainer screws. Carefully remove the glass and any broken pieces using protective gloves. High temperature fiberglass tape should be used around the glass on the sides and bottom. Place glass with fiberglass tape around outside into cast door, there should be no gasket at the top. Use the same retainers to secure the glass in place, make sure glass is properly seated in the cast door before tightening screws. Do not strike or slam door shut this can cause glass to break. The use of substitute glass materials is prohibited use only part 50-2942.

## **How can I reduce the visible emissions?**

---

If all of the steps for cleaning and operating are followed, there should be no visible emissions.

# TROUBLESHOOTING

---

## DO NOT:

- Service the stove with wet hands. The stove is an electrical appliance, which may pose a shock hazard if handled improperly. Only qualified technicians should deal with possible internal electrical failures.
- Do not remove any screws from the firebox without penetrating oil lubrication.

## WHAT TO DO IF:

1. The stove will not start.
2. E2 on LED Display.
3. E3 on LED Display.
4. E4 on LED Display.
5. The Exhaust Blower will not function normally.
6. The Auger is not feeding pellets.
7. The Convection Blower will not function normally.
8. The Igniter not working.
9. Control settings (Heat Level) has no effect on the fire.

**\*NOTE: All troubleshooting procedures should be carried out by qualified technicians or installers.**

### 1. The stove will not start.

- Make sure the stove is plugged in and the wall outlet is supplying 115-120V AC power.
- If the Control Board has been set to Thermostat mode, turn the thermostat up to call for heat.
- Check the LED display for error codes. - If Display reads **E2, E3**, or **E4** use Troubleshoot sections.
- Check the fuses on the circuit board.
- If the unit still does not start, contact your local service dealer for service.

### 2. E2 on LED Display (The Vacuum Switch contacts have opened for more than 1:00 min)

- Pinch, break or blockage in Vacuum Hose - Check hose for pinch points or damage, replace or re-route as required. Blow out Vacuum Hose with compressed air.
- Blocked Hose Barb on Exhaust Channel - Use a paper clip to clean out Hose Barb or remove the Vacuum Hose from the Vacuum Switch and blow into the hose to remove blockage.
- Blocked exhaust / venting system - Have stove and venting cleaned and inspected.
- Air Damper is closed or set to low - open damper slightly.
- Severe negative pressure in area where unit is installed - Check the operation by opening a window, does this solve the problem? If it does, install fresh air intake to unit or room. Venting system may require vertical section to move termination into a low pressure zone.
- Vacuum Switch failure - Bypass the vacuum switch, if this corrects the problem check for above problems before replacing the Vacuum Switch.
- Damage to gray wires between Circuit Board and Vacuum Switch - Inspect wires and connectors
- Combustion Blower failure - If the Combustion Blower is not turning fast enough to generate the proper vacuum in the Exhaust Channel. Visually Check if the blower motor is turning, check the Exhaust Blower voltage across the blower wires ( $\geq 115V$  on #5 setting and  $\geq 82V$  on #1 setting). – Replace the Circuit Board if the Voltage reading is less than 82 V. with a line voltage  $>115 V$  AC.
- Check Vacuum levels in the exhaust channel by bypassing the vacuum switch, then remove the Vacuum hose from Vacuum Switch. Check exhaust vacuum readings by placing the open end of the Vacuum Hose on a Magnehelic Gauge. (readings must be above .09" WC on low fire).
- If the motor fails to reach a 0.09" WC readings, then replace the Combustion Blower

**To reset Circuit Board after a trouble code - press Power button.**

# TROUBLESHOOTING

---

## 3. E3 on LED Display (Proof of Fire Failure)

- If a fire is not detected, or if the fire has gone out the display will read E3 because the exhaust temperature is too low causing Exhaust Temperature Sensor's contacts to open.
- Check the hopper for fuel. Auger may need to be primed if stove has run out of pellet or being fired for the first time.
- Incorrect air damper setting. - Excessive air may consume the fire too quickly before the next drop of fuel, leaving completely unburned fuel in the burn pot liner. - Insufficient air will cause build up, further restricting the air flow through the Burn Pot Liner. This in turn will cause the fuel to burn cold and very slowly. Fuel may build up and smother the fire. In this case clean the burn pot. **(NOTE: unit may require a changes to the vent system or installation of fresh air intake to correct Air to Fuel ratio problems).**
- Combustion Blower failure. - The Combustion Blower is not turning fast enough to generate the proper vacuum in the fire box. Visual Check – is the blower motor turning.
- Check the Exhaust Blower voltage across the blower wires ( $\geq 114V$  on #5 setting and  $\geq 82V$  on #1 setting). – Replace the Circuit Board if the Voltage reading is less than 82 V. with a line voltage  $>114 V$  AC.
- Check Vacuum levels in the exhaust channel by bypassing the Vacuum Switch, then remove the Vacuum hose from Vacuum Switch. Check exhaust vacuum readings by placing the open end of the Vacuum Hose on a Magnehelic Gauge (readings must be above .10" WC on low fire).
- Poor Quality Fuel – Insufficient energy in the fuel to produce enough heat to keep the stove burning or operational.
- Exhaust Temperature Sensor failure. – Bypass the sensor located on Exhaust Blower, if stove now operates properly, the unit may require cleaning or a new sensor. Contact your local dealer for service.
- Check the fuse on the circuit board.

## 4. E4 on LED Display (High Limit or Lid Switch Failure)

- If unit has been running normally and you now have an E4 this could be a High Limit switch. This is a safety feature, if the hopper gets too hot the unit will shut off. The High limit switch is located the right side of the hopper near the bottom.
- If the high limit has tripped something is wrong with the unit, possibly a component failure or a hopper fire has occurred.
- Slowly open the hopper lid, if you see and smoke at all keep it closed. A fire extinguisher or water can be used to put out a fire.
- If there is no smoke the Hopper Lid switch may not be engaged or there has been a component failure. The components will need to be tested, contact an Enviro dealer. The High limit switch is a manual reset switch and a small red button on the back of the switch will need to be manually pressed in order for the unit be started again.
- To check Hopper Lid switch make sure Hopper Lid is fully closed, If you think it is properly closed, open and close the lid, you should hear an audible click from magnetic Hopper Lid switch located in control board area.
- If no click is heard check that magnet on underside of Hopper Lid is still magnetic. This is a strong magnet.
- If magnet is good, alignment is out or switch is bad.
- Test switch for audible click with another magnet, switch is right above LED Display on control board.

## 5. The Combustion Blower will not function normally.

- If the Combustion "Exhaust" Blower is not functioning properly the stove will most likely will give an E2 or E3 error code.
- Check the wiring against the wiring diagram to make sure everything is connected properly.
- The fan can be directly hooked up to power to check motor.

**NOTE: DO NOT attempt any electrical troubleshooting without knowledge of electrical systems, make sure unit is not plugged in. It is recommended to call an authorized Enviro dealer or service technician.**



# TROUBLESHOOTING

---

## **6. Auger is not Feeding Pellets.**

- If this is the first time starting the unit or during the previous burn the unit ran out of pellets the Auger will need to be primed. You may get an E3 while auger is filling with pellets, just press the power button again. Once the Auger is full of pellets it will start dropping them into the burn pot.
- If Auger is primed and no pellets are dropping remove the Rear Grill to see Auger motor, you will see the auger collar and set screw rotating if the Auger is operating properly.
- If the motor's armature tries to spin but the auger shaft doesn't then the auger is jammed. – Try to break apart jam by poking at the jam through the drop tube. If this fails then empty the hopper and remove the Auger Cover \*\*Remember to re-seal the cover with silicone after clearing jam\*\*
- Check the set screw locking the motor shaft to the auger shaft. This needs to be tightened to the flat on the motor shaft for proper rotation.
- Check the fuses on the main circuit board.

## **7. The Convection Blower will not function normally.**

- The Convection fan should come on when the unit is started. Speed is automatically controlled, the higher the heat level the higher the convection fan voltage will be.
- Check Wiring against wiring diagram.
- AC wall voltage can be directly hooked up to fan to test motor.
- Check that blade spins with very little friction.
- Check fuses on main circuit board.

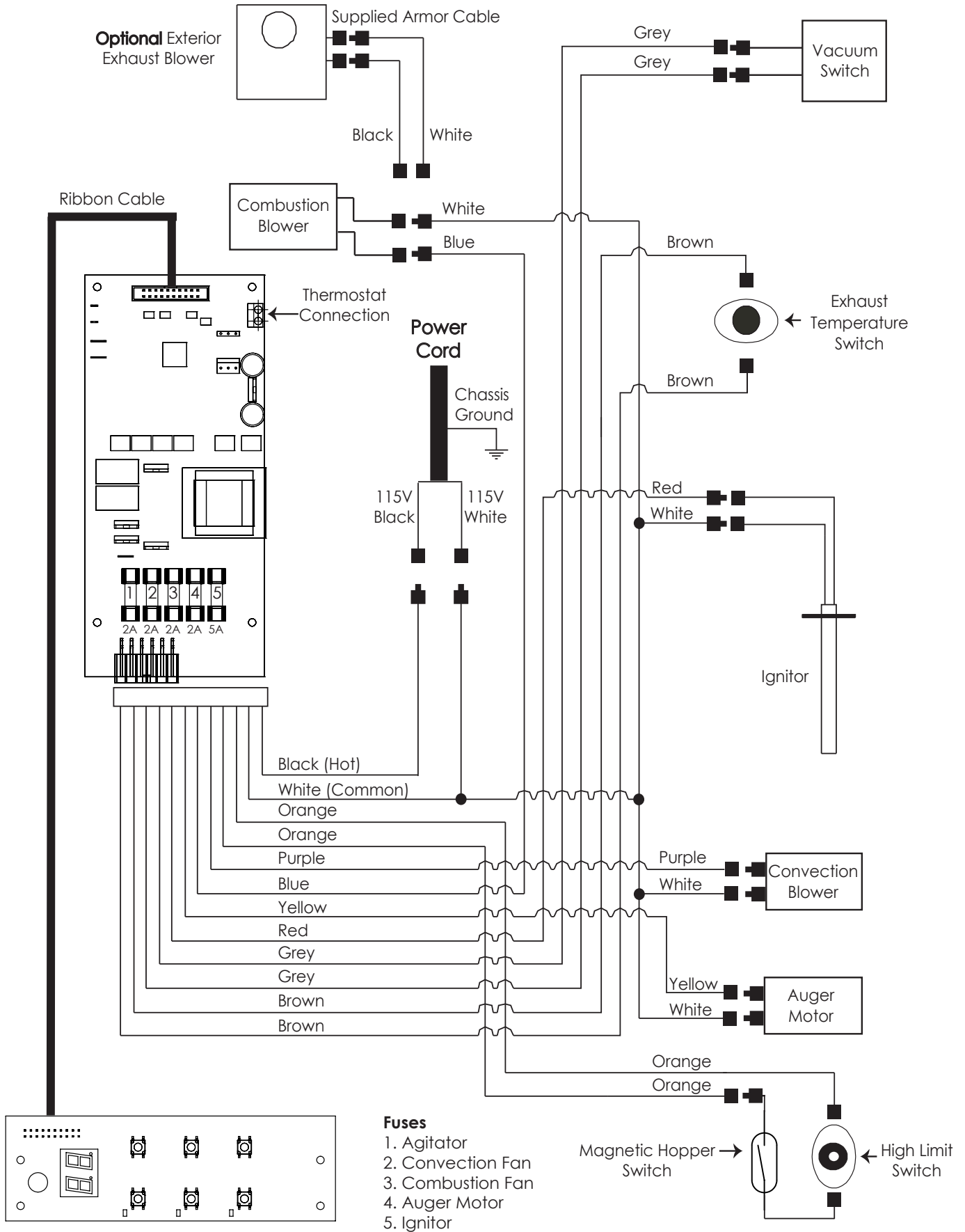
## **8. Ignitor not working**

- If pellets are feeding and the combustion blower is working your stove should light a fire or at least start smoking.
- Make sure the burn pot and burn pot liner are correctly installed square to the Ignitor and air tube.
- If stove errors out before lighting open door and carefully check to see if pellets around the Ignitor hole are warm - If not remove ignitor and test, replace if it does not heat up.
- If the air damper is closed too much or Combustion Blower is not working the stove will not light.
- Check the fuses on the main circuit board.

## **9. Control settings (Heat Level) has no effect on the fire.**

- If the LED beside the Power button is flashing the Control Board has complete control of the unit. This means the unit is in start-up mode, once the start-up cycle is complete the light will go solid.
- If running in Auto or "Comfort mode" and the LED light beside the Auto button is flashing the unit is in suspend mode because it has overshot the set point. Once temperature drops below the set point the stove will turn back on.

# WIRING DIAGRAM





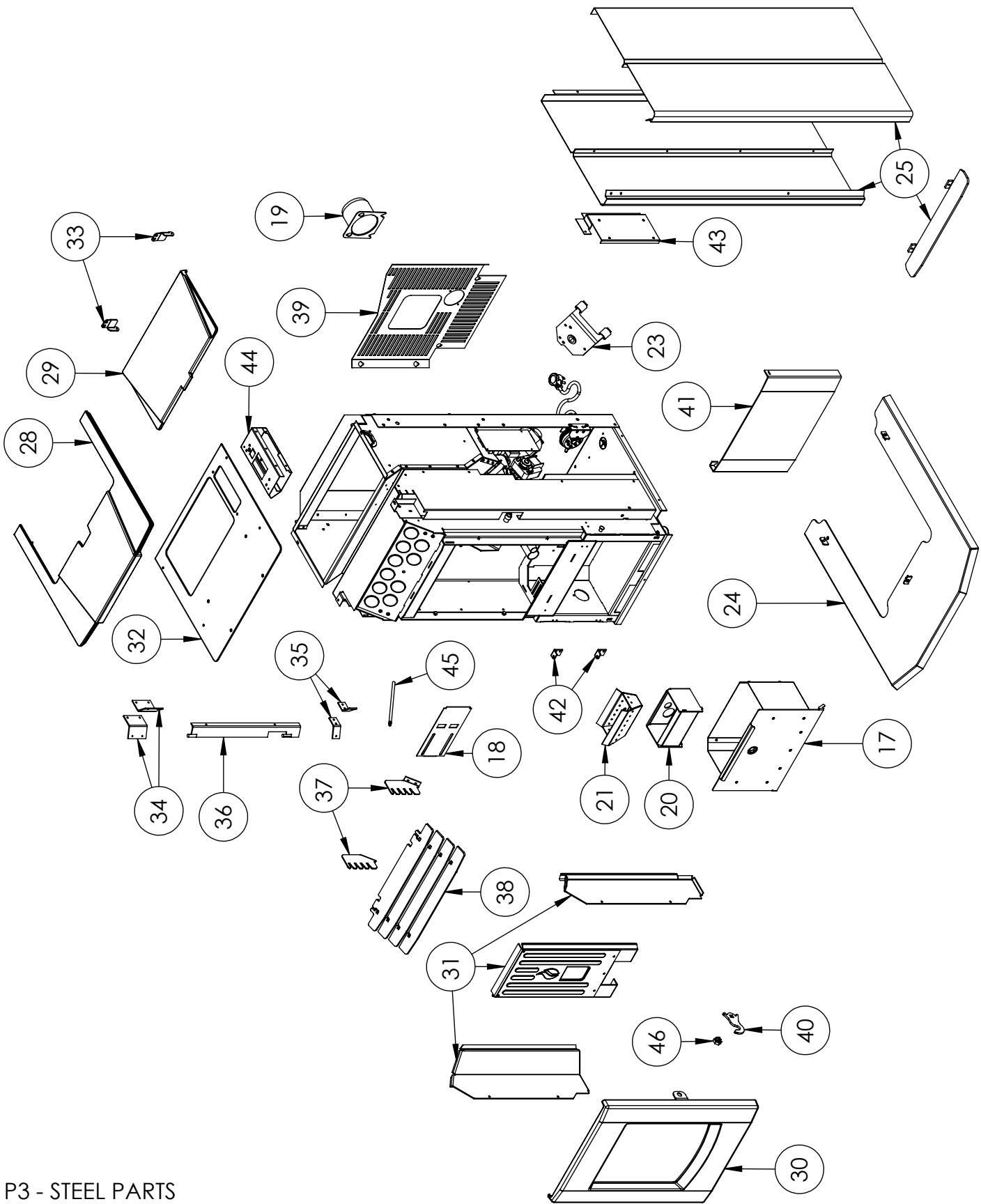
# PARTS LIST

Ref. #	Description	Part #
1	120°F Ceramic Fan Temperature Sensor	EC-001
2	Auger Motor - 115V	EF-001
3	High Limit Temp Sensor 200°F (93°C) Manual Reset	EF-016
4	Vacuum Switch - 115V	EF-017
5	Silicone Hose	EF-018
6	SS Ash Pan Latch	50-2588
7	Domestic Power Cord - 115V	EC-042
8	400 Watt Ignitor - 115V	50-619
9	Exhaust Blower Assembly - 115V	50-901
10	60mm Tangential Blower Mini - 115V	50-1217
11	Leveling Legs (Set of 4)	50-1296
12	Hopper Switch (magnetic)	50-2052
13	P3 Glass With Gasket	50-2942
14	LED Motherboard	50-2943
15	LED Daughterboard	50-2944
16	Control Decal	50-2948
17	Ash Pan With SS Latch	50-1969
18	Draft Slider	50-1178
19	Starter Pipe 3"	50-1185
20	Burn Pot	50-1922
21	Burn Pot Liner	50-1923
22	Auger with Paddles Weldment	50-1161
23	Auger Stop Plate	50-2206
24	P3 Hearth Pad With Mounting Hardware	50-2929
25	P3 Cabinet Sides and Ash Shelf (PAINTED)	50-2945
26	P3 Cabinet Sides and Ash Shelf (RED)	50-2946
27	P3 Cabinet Sides and Ash Shelf (IVORY)	50-2947
28	P3 Cast Top	50-2949
29	P3 Cast Hopper Lid	50-2950
30	P3 Cast Door Assembly	50-2951
31	P3 Firebox Panel Set With Insulation	50-2952

# PARTS LIST

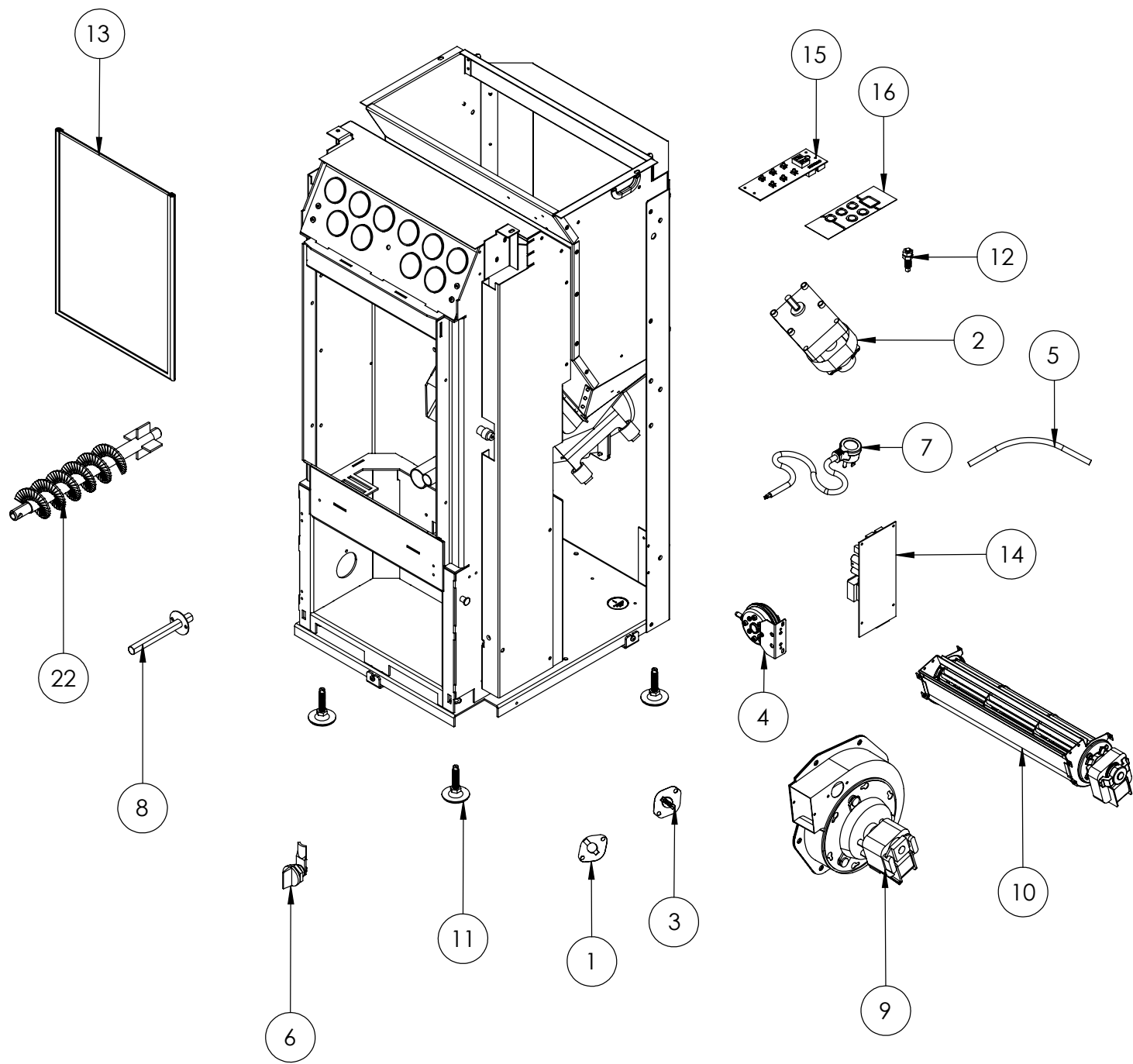
Ref. #	Description	Part #
32	Top Cast Mount Plate	50-2953
33	Hopper Hinge Set (Left And Right)	50-2954
34	Top Cabinet Mount Set (2)	50-2955
35	Bottom Cabinet Mount Set (2)	50-2956
36	Door Hinge Weldment	50-2957
37	Louver Bracket Set (Left And Right)	50-2958
38	Louver Set	50-2959
39	P3 Rear Grill	50-2960
40	Steel Door Latch	50-2961
41	Ash Pan Access Door	50-2962
42	Ash Pan Access Door Hinge Set (2)	50-2963
43	Motherboard Mounting Bracket	50-2964
44	Daughterboard Mount Box	50-2965
45	P3 Heat Exchanger Scaper Rod	50-2966
46	Machined Door Latch Nut	50-2967
	Chrome Plated Ash Shelf	50-3006
	25ft Extension Probe	50-3005
	P3 Door Gasket 54" with Joint Tape	50-2968
	Aluminum Hose Barb (Vacuum Line)	EF-019
	Auger Brass Bushings (Set of 2)	50-1806
	External Exhaust Back (For Optional Kit)	EF5-143
	External Exhaust Box (For Optioal Kit)	EF5-144
	External Exhaust Bottom (For Optioal Kit)	EF5-145
	External Exhaust Kit ( 3" )	20-070
	Circuit Board 2 Amp Fuse - 115V (single)	50-2075
	Circuit Board 5 Amp Fuse - 115V (Pair)	50-833
	5/8" ID Auger Collar with Screw	50-968
	Wire Harness	50-1157
	Auger Stops (Clear Tube)	50-1559
	Burnpot Scraper Tool	50-1254
	Cleaning Brush	EF-156
	P3 Door Tool	50-2969

# PARTS DIAGRAM



P3 - STEEL PARTS

# PARTS DIAGRAM





# Warranty for Enviro Pellet Products

Sherwood Industries Ltd. ("Sherwood") hereby warrants, subject to the terms and conditions herein set forth, this product against defects in material and workmanship during the specified warranty period starting from the date of original purchase at retail. In the event of a defect of material or workmanship during the specified warranty period, Sherwood reserves the right to make repairs or to assess the replacement of a defective product at Sherwood's factory. The shipping costs are to be paid by the consumer. All warranties by Sherwood are set forth herein and no claim shall be made against Sherwood on any oral warranty or representation.

## Conditions

- A completed warranty registration must be submitted to Sherwood within 90 days of original purchase via the online warranty registration page or via the mail-in warranty registration card provided. Have the installer fill in the installation data sheet in the back of the manual for warranty and future reference.
- This warranty applies only to the original owner in the original location from date of install.
- The unit must have been properly installed by a qualified technician or installer, and must meet all local and national building code requirements.
- The warranty does not cover removal and re-installation costs.
- Sherwood Industries Ltd. reserves the right to make changes without notice.
- Sherwood Industries Ltd. and its employees or representatives will not assume any damages, either directly or indirectly caused by improper usage, operation, installation, servicing or maintenance of this appliance.
- A proof of original purchase must be provided by you or the dealer including serial number.
- This warranty is void if the unit is used to burn materials for which the unit is not certified by the EPA and void if not operated according to the Owner's Manual.

## Exclusions

An expanded list of exclusions is available at [www.enviro.com/help/warranty.html](http://www.enviro.com/help/warranty.html)

This warranty does not cover:

- Damage as a result of improper usage or abuse.
- Damage caused from over-firing due to incorrect setup or tampering.
- Damage caused by incorrect installation.

## To the Dealer

- Provide name, address and telephone number of purchaser and date of purchase.
- Provide date of purchase. Name of installer and dealer. Serial number of the appliance. Nature of complaint, defects or malfunction, description and part # of any parts replaced.
- Pictures or return of damaged or defective product may be required.

## To the Distributor

- Sign and verify that work and information are correct.

## Sherwood Industries Ltd.

6782 Oldfield Road, Victoria, BC . Canada V8M 2A3

Online warranty registration: [www.enviro.com/warranty/](http://www.enviro.com/warranty/)

Category	One Year	Two Year	Limited Lifetime (7yr)
Parts <sup>1</sup> (unit serial number required)		✓	
Firebox Brick Panels (Cast)		✓	
Firebox			✓
Heat Exchanger			✓
Burn Pot			✓
Burn Pot Liner		✓	
Firebox Liner Panels w/Insulation			✓
Ceramic Glass <sup>2</sup>	✓		
Pedestal / Legs (excluding finish)			✓
Surround Panels (excluding finish)			✓
Exterior Panels (excluding finish)			Up to 5 years
Electrical Components		✓	
Steel Brick Liner (Metal)	✓		
Exterior Surface Finishing <sup>3</sup>	✓		
Labour	✓		

<sup>1</sup> Whereas warranty has expired, replacement parts will be warrantied for 90 days from part purchase date. Labour not included. Unit serial number required.

<sup>2</sup> Glass is covered for thermal breakage. Photos of box, inside of door, and unit serial # must be supplied for breakage due to shipping.

<sup>3</sup> Exterior Surface finishing covers Plating, Enamel or Paint and excludes colour changes, chipping, and fingerprints.

Gaskets not covered by Warranty.

Travel costs not included.

Cast Agitator: 1 year for pellet. Not covered when burning alternative fuels. (Cast agitators are a consumable item)

# INSTALLATION DATA SHEET

The following information must be recorded by the installer for warranty purposes and future reference.

NAME OF OWNER:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PHONE: \_\_\_\_\_

NAME OF DEALER:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PHONE: \_\_\_\_\_

MODEL: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

DATE OF PURCHASE: \_\_\_\_\_ (dd/mm/yyyy)

DATE OF INSTALLATION: \_\_\_\_\_ (dd/mm/yyyy)

MAGNEHELIC AT INSTALL: \_\_\_\_\_

INSTALLER'S SIGNATURE:

\_\_\_\_\_

NAME OF INSTALLER:

\_\_\_\_\_

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PHONE: \_\_\_\_\_

# NOTES

---

MANUFACTURED BY:  
SHERWOOD INDUSTRIES LTD.  
6782 OLDFIELD RD. SAANICHTON, BC, CANADA V8M 2A3  
[www.enviro.com](http://www.enviro.com)  
August 28th 2018  
C-15544  
155 of 155