

Confidential Business Information (NON-CBI)

Certification Test Report

Manufacturer: Hearth & Home Technologies, LLC
Heater Type: Wood Pellet Stove (Freestanding)
Model: P43-C

Prepared for: Hearth & Home Technologies, LLC
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Halifax, PA 17032
USA

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Test Period: August 7, 2023 - October 25, 2023

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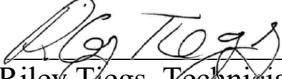
Report Number: 0135PS023E
Project Number: 0135PS023E. REV002

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Authorized Signatories


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

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TABLE OF CONTENTS

PREFACE.....	(4 pages)
1. INTRODUCTION AND APPLIANCE DESCRIPTION.....	5
Introduction.....	5
Summary of Test Results.....	5
Appliance Description.....	6
2. TEST PREPARATION AND FACILITY.....	7
Appliance Conditioning.....	7
Appliance Installation.....	7
Example Dilution Tunnel.....	7
Sampling System.....	8
3. TEST PROCEDURES AND RESULTS.....	9
Manufacturer’s Written Instructions.....	10
Test Description.....	11
Summary Tables.....	13
Table 1 - Particulate Emissions Results.....	13
Table 2 - B415.1 Efficiency and CO Emissions.....	13
Table 3 - Test Facility Conditions.....	14
Table 4 - Dilution Tunnel Gas Measurements and Sampling Data.....	14
Table 5 – Comparison of Three Test Runs.....	14
4. TEST DATA.....	15
Conditioning Data.....	16
Integrated Test Run.....	18
Pre-burn Data.....	19
Integrated Test Data.....	22
Lab Data.....	30
Emissions Results.....	31
Lab Data Uncorrected.....	33
Emissions Results Uncorrected.....	34
CSA B415.1 Results & Report Tables.....	36
First Hour Test Data.....	38
First Hour Lab Data.....	41
First Hour Emissions Results.....	42
CSA B415.1 Data & Reports.....	44
CSA B415.1 Data & Reports-Overall.....	45
CSA B415.1 Data & Reports-High.....	56
CSA B415.1 Data & Reports-Medium.....	60
CSA B415.1 Data & Reports-Low.....	65
Test Run Sheets and Tare Sheets.....	72
Test Run Sheets.....	73
Tare Sheets.....	76

5.	QUALITY ASSURANCE/QUALITY CONTROL	79
	OMNI's Quality Statement	79
	Equipment Calibrations	80
	Example Calculations	120
	Archived Test Specimen	149
	Manufacturer's Quality Assurance Procedure	150
	EPA 30 Day Notice	153
6.	APPLIANCE LABELING & OWNER'S MANUAL	156
	Labeling	157
	Owner's Manual	158
	Installation Manual	196
7.	APPENDIXES	224
	A. Invalid Run 1 Test Data	224
	B. Invalid Run 2 Test Data	287
	C. Memorandum	345
	D. Pellet Analysis Report	347
8.	REVISION HISTORY	349

1. Introduction and Appliance Description

Introduction

Hearth & Home Technologies, LLC. (HHT) retained OMNI Test Laboratories to perform U.S. Environmental Protection Agency (EPA) certification testing on the P43-C wood pellet stove. The unit is a pellet-fired free standing room heater.

Testing was performed at OMNI-Test Laboratories located in Portland Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in on August 1, 2023, then assigned and labeled with OMNI ID #2470.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this section. Performance test data of run 1 and run 2 which are invalid are summarized in Appendix A and B. The results in this report are limited to the item submitted.

P43-C 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 PFI graded fuel. Particulate emissions were measured using dual sampling train consisting of two Glass Fiber 47mm filters (front and back), and first hour emissions were measured with a separate sampling train.

The unit was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10. Efficiency results were calculated using spread sheet Version 2.4 created 04/15/2010 and distributed by CSA. Example calculations for CSA B415.1 were not provided by CSA; spreadsheet is protected from modifications by means of a password.

Summary of Test Results

The results from the integrated test run3 are summarized as follows:

The overall emissions of the single integrated test run indicate a particulate emission rate of 1.82 gram per hour.

The particulate emission factor of the single integrated test run was measured to be 1.19 gram per kilogram of dry fuel.

The thermal efficiency of the integrated test run was measured to be 76.7%.

The emission rate calculated from the first hour sampling was 2.63 grams per hour.

The P43-C test results are within the emission limit of 2.0 g/h for affected appliances manufactured after May 15, 2020.

The proportionality results for the single test run were acceptable. All other validity criteria were within specified limits, and no sampling anomalies occurred. Quality checks of the results for this integrated test run are presented in Section 5 of this report.

Appliance Description

The P43-C wood pellet stove manufactured by HHT are pellet-fired free standing room heaters for residential or mobile home installation. The unit consists of a fuel hopper, firebox, burn pot, convection blower, combustion blower, and an auger motor. These components are controlled by a circuit board that controls convection blower speed, auger duty cycling and voltage, and combustion motor speed depending on the desired heat output. Ashes fall through the burn pot into a removable ash drawer located at the bottom of the unit, the drawer is accessed through a mild steel door. Combustion products are routed out of the firebox via a baffle type heat exchanger and vented through a 3" diameter flue collar located at the back of the appliance. The unit is made of mild steel.

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



Free Standing Wood Pellet Stove



Control Board



Firebox and Burn Pot



Fuel Hopper

2. Testing Preparation and Facility

Conditioning

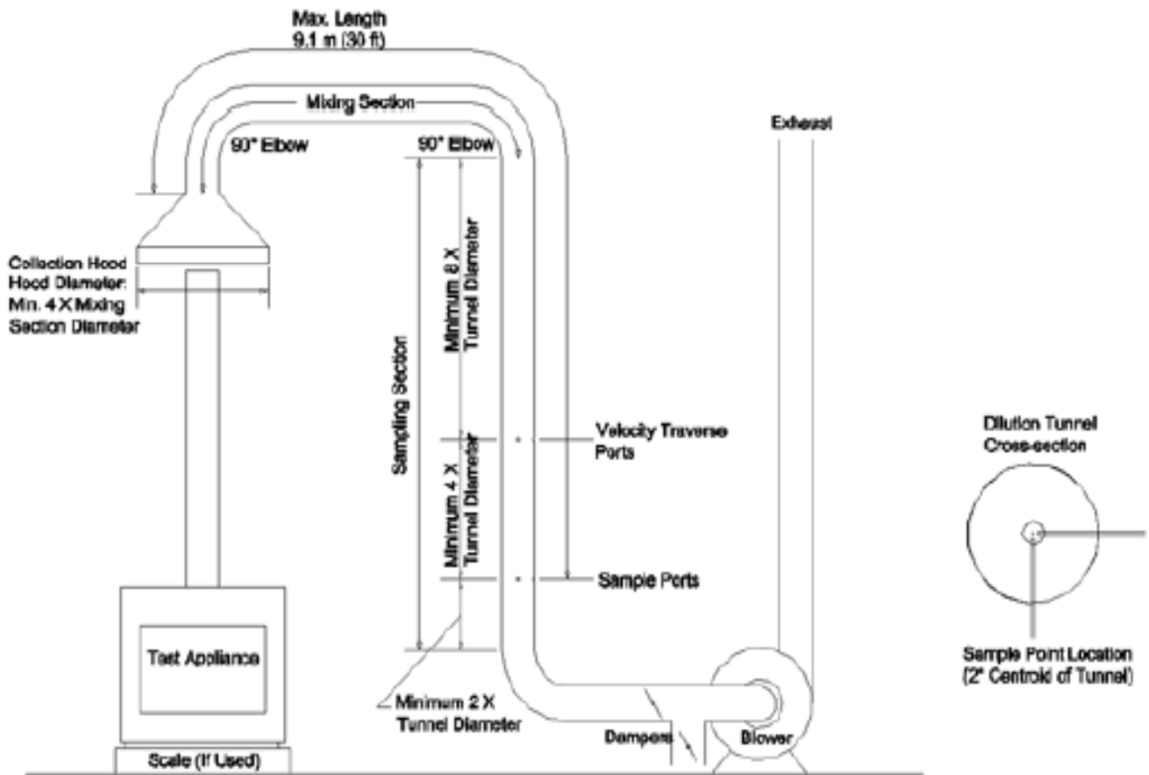
The required minimum 50 hours of conditioning was conducted by the manufacturer in advance of shipment of the appliance to OMNI. See Section 4 of this report for the conditioning data.

Appliance Installation

In preparation for testing, the appliance was placed on a 1000 lb. capacity scale and fitted with 3 inch double wall pipes to a height approximately 15 feet from the top of the scale under the dilution tunnel collection hood. At 8.5 feet above the top of the scale the flue pipe was fitted with a 3/8" diameter hole for ready access of a flue gas probe and with a 3/16" diameter hole for ready access of a flue temperature probe. A 3/8" diameter hole was also procured at the flue pipe less than 1 foot above the flue connector for the purpose of serving a draft probe. All joining sections of pipes and flue attachment were sealed with furnace cement.

Dilution Tunnel

OMNI's facility has permanent and dedicated dilution tunnels that were designed and are maintained to meet the specifications of the dilution tunnel specifications prescribed in ASTM E2515. The dilution tunnel was cleaned on 10/19/23 prior to the test, sample point and travers point locations were verified to ensure placement is within specifications.



Dilution Tunnel as Illustrated in ASTM E2515-11

Prior to testing, sample point and travers point locations are verified to ensure placement is within the specification of ASTM E2515. Collection hood, tunnel diameter, and mixing section length are also verified to be within specifications.

Sampling Systems

The sampling systems consisted of two independent systems, each managing two dry gas meters (a total of four dry gas meters). One of the systems was designated for sampling of Train A and Train B for the duration of test(s), and the other system was designated for sampling of the First Hour emissions and background ambient particulate. These systems were arranged identically to and in accordance with Section 6 of ASTM E2515 with the only exception that the pressure drop through an orifice on the exhaust end of the meter(s) were monitored with a manometer to aid in identifying and responding to changes in the sample flow rate(s).

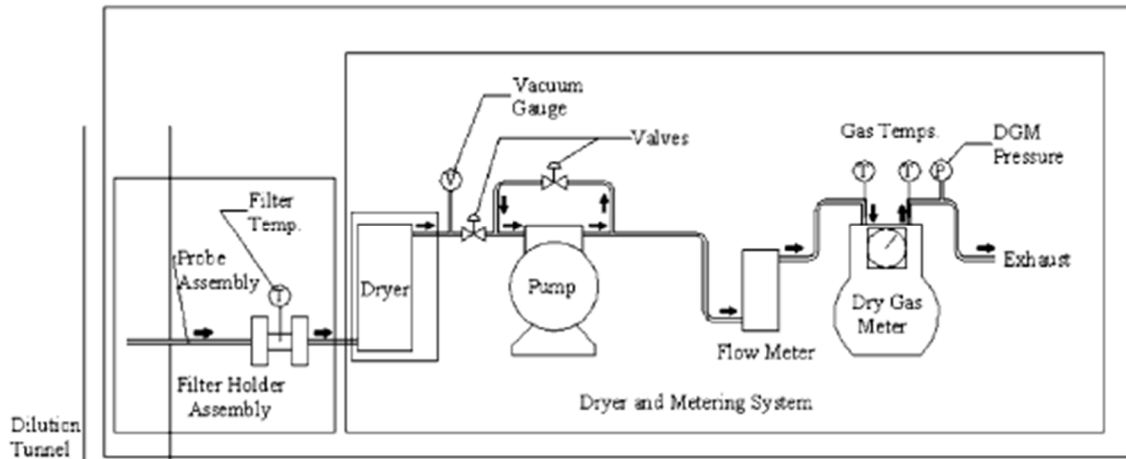


Figure of Particulate Sampling Train from E2515-11



Unit Installed beneath Dilution Tunnel



Particulate Sampling Trains

3. Test Procedure and Results

P43-C Manufacturer Test Instructions.

Preset:

Remove from ashpan area: scraper, brush, firebrick, Flame guide, DDM

Fully clean stove and scrape burn pot.

Install cast Flame guide onto burn pot.

Install firebrick horizontally on ledge above flame guide.

Fully insert ashpan until it is against firebox back.

Load 40 pound bag of Energex Pellets.

Press down on hopper handle to fully close hopper lid (clicks in place)

Do not open hopper lid during test.

Connect DDM to stove control board.

Power supply:

Make sure Range Switch is Low Range and Frequency knob is 60Hz.

Set Volts knob to 114V then slowly increase until supply just changes to 115V.

Set Mode knob to OFF before plugging in stove.

Plug in stove to power supply.

Stove Draft adjust -34V (already set).

Set stove Igniter switch to Auto.

High: (Setting when ready to start stove, stove preheat takes about 1.5hours)

Feed Adjuster knob: Feed 45.0s (#4.17+- .02 on screen d)

Temperature knob: Full Clockwise #7

Mode knob: Full Counter Clockwise into the (Constant burn mode)

Medium<50%:

Feed Adjuster knob: 27.5s (#2.15+- .02 on screen d)

Temperature knob: #1.53 or 301F setpoint

Mode knob: Mode knob pointer center down (Constant burn mode)

Low:

Mode Dial to lowest spot on green section. Or the "C" in Constant Mode.

Feed Adjuster knob: 20.0s (#1.33 screen d)

Temperature knob: Full Counter Clockwise #1

End of Test:

Mode knob: OFF position.

Test Description

Run 1 (08/07/2023) - Run 1 began as scheduled on August 7, 2023. However, it was subsequently learned that the parameter of feed rate setting on the control board was not configured as intended by the manufacturer, which made the test run invalid.

Run 2 (08/28/2023) - An additional inadvertent suspension in testing occurred due to erroneous readings by the appliance's control circuitry of the appliance's integral flue gas thermal sensor causing the control board to make incorrect self-adjustments from the design parameters. The manufacturer conditioned and supplied a new inspected specimen (meeting all original design specifications). Therefore, this test run was considered invalid.

Run 3 (10/25/2023) - Test procedures described in ASTM E2779-10, ASTM 2515-11 were followed to perform an integrated test run comprised of maximum, medium and minimum burn rate segments. Set the feed rate of parameters at the control board to 4.17 for high burn rate segment and conducted pre-burn for 90 minutes before the integrated test run started. Test segments were run in order from high burn to low burn. After 60 minutes operation at high burn, the feed rate was adjusted to 2.15 for medium burn and ran the stove for 120 minutes before the feed rate was set to 1.33 for minimum burn and low burn segment lasted for 180 minutes. Emission and flue gas samplings were conducted over the full length of the integrated test run. Negative filter weights were found on Train 1. This is caused by filter material transferring to the O-ring gasket. Transfer weight can be seen as a positive weight on the O-ring, negative filter weight is added back into the calculation to prevent transfer weight as being counted as emissions. No additional sampling anomalies occurred, this test run was determined to be valid and appropriate.

Test configurations

Segment	Feed Limit	Temperature Dial	Mode Selector
High Burn	4.17	7.0 (Full Clockwise)	High at Constant Burn
Medium Burn	2.15	1.53	Medium at Contant Burn
Low Burn	1.33	1.0 (Full Conterclockwise)	Low at Constant Burn



High Burn (On Screen)



High Burn (On Dials)



Medium Burn (On Screen)



Medium Burn (On Dials)



Low Burn (On Screen)



Low Burn (On Dials)

Summary Tables

Table 1a – Particulate Emissions Uncorrected¹

	First Hour	Integrated
Emission Rate (g/h)	2.63	1.82
Emission Factor (g/dry Kg)	1.08	1.19

Table 1b – Particulate Emissions Corrected²

	First Hour	Integrated
Emission Rate (g/h)	2.63	1.90
Emission Factor (g/dry Kg)	1.08	1.24

¹Uncorrected refers to gravimetric analysis that takes negative filter weights as a negative value in cases where filter residue was transferred to (stuck to) O-ring gaskets to account for the mass transfer.

²Corrected refers to gravimetric analysis where negative filter weights are taken as zero, thus reporting a higher value by overreporting of transferred filter material. The uncorrected values were added to this report in response to a request by the US EPA.

Table 2 – B415.1 Efficiency and CO Emissions

Burn Rate Segment	Maximum	Medium	Minimum	Integrated
Time (minutes)	60	120	180	360
Burn Rate (dry kg/h)	2.43	1.43	1.29	1.53
Heat Output Rate (Btu/h)	33,252	20,293	18,783	21,790
Efficiency (% , HHV)	73.5	76.1	78.4	76.7
Efficiency (% , LHV)	79.3	82.1	84.5	82.7
CO Emissions (g/MJ Output)	0.16	7.16	5.90	4.87
CO Emissions (g/kg Dry Fuel)	2.25	106.93	90.79	73.35
CO Emissions (g/min)	0.091	2.553	1.948	1.866

Table 3 – Test Facility Conditions

Room Temperature (°F)		Barometric Pressure (” Hg)		Air Velocity (ft/min)	
Before	After	Before	After	Before	After
65	65	29.99	30.00	<50	<50

Table 4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Length of Test (min)	Average Dilution Tunnel Gas Measurements		
	Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
360	18.54	210.98	76

Table 5 – Comparison of Three Test Runs

	Emissions				Burn Rate and Efficiency			
	First Hour		Integrated		Max	Med	Min	Integrated
	g/hr	g/dry kg	g/hr	g/dry kg	dry kg/hr / (%)	dry kg/hr / (%)	dry kg/hr / (%)	dry kg/hr / (%)
Run1*	2.880	1.040	1.517	1.097	2.781 / 74.2%	1.260 / 73.9%	0.999 / 70.3%	1.383 / 72.8%
Run2*	2.050	0.740	1.303	0.927	2.780 / 74.5%	1.240 / 74.1%	1.060 / 72.2%	1.400 / 73.7%
Run3	2.630	1.080	1.820	1.190	2.430 / 73.5%	1.430 / 76.1%	1.290 / 78.4%	1.530 / 76.7%

* Test results not included in final results

4. Test Data

Conditioning Data

Conducted at Medium Burn Rate at HHT Facility

P43-C Conditioning Data (Data collected during medium burn rate)



Conditioning Hours	Exhaust Temperature	Fuel Added (lbs)	Date
0	275.00	40	9/18/2023
1	277.00		9/18/2023
2	278.00		9/18/2023
3	274.00		9/18/2023
4	283.00		9/18/2023
5	280.00		9/18/2023
6	279.00		9/18/2023
7	277.00		9/19/2023
8	281.00	40	9/19/2023
9	284.00		9/19/2023
10	282.00		9/19/2023
11	279.00		9/19/2023
12	283.00		9/19/2023
13	285.00		9/19/2023
14	288.00		9/19/2023
15	282.00		9/19/2023
16	286.00	40	9/19/2023
17	286.00		9/19/2023
18	279.00		9/20/2023
19	278.00		9/20/2023
20	291.00		9/20/2023
21	294.00		9/20/2023
22	288.00		9/20/2023
23	279.00		9/20/2023
24	286.00		9/20/2023
25	289.00	40	9/20/2023
26	290.00		9/20/2023
27	277.00		9/21/2023
28	275.00		9/21/2023
29	282.00		9/21/2023
30	288.00		9/21/2023
31	294.00		9/21/2023
32	289.00		9/21/2023
33	285.00		9/21/2023
34	292.00	40	9/21/2023
35	289.00		9/21/2023
36	276.00		9/25/2023
37	280.00		9/25/2023
38	291.00		9/25/2023
39	296.00		9/25/2023
40	299.00		9/25/2023
41	296.00		9/25/2023
42	294.00	40	9/25/2023
43	290.00		9/25/2023
44	287.00		9/25/2023
45	274.00		9/25/2023
46	275.00		9/26/2023
47	279.00		9/26/2023
48	286.00		9/26/2023
49	293.00		9/26/2023
50	288.00		9/26/2023

Data Collected By Lab Tech Len Bixler

Integrated Test Run

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 10/25/2023

PB Length: 90 min
 Recording Interval: 1 min

Averages:	379	65	0.07	6.75	0.27
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Elapsed Time (min)	Scale Reading	Weight Change	Stack (F)	Ambient (F)	Draft ("H2O)	CO2 (%)	CO (%)
0	39.0	-	168	63	0.101	0.09	0.00
1	38.9	-0.10	210	63	0.097	0.09	0.00
2	38.8	-0.10	251	63	0.103	0.09	0.00
3	38.8	0.00	276	64	0.118	0.09	0.00
4	38.7	-0.10	292	64	0.132	0.09	0.00
5	38.6	-0.10	303	64	0.141	0.09	0.00
6	38.5	-0.10	311	63	0.000	0.09	0.00
7	38.5	0.00	316	64	0.034	0.09	0.00
8	38.4	-0.10	321	64	0.033	0.09	0.00
9	38.3	-0.10	328	64	0.000	0.09	0.00
10	38.2	-0.10	336	64	0.032	0.09	0.00
11	38.1	-0.10	344	64	0.034	0.09	0.00
12	38.0	-0.10	346	64	0.032	0.09	0.00
13	37.9	-0.10	354	64	0.034	0.09	0.00
14	37.8	-0.10	359	64	0.035	0.09	0.00
15	37.7	-0.10	364	65	0.037	0.09	0.00
16	37.6	-0.10	366	64	0.038	0.09	0.00
17	37.5	-0.10	367	64	0.040	0.09	0.00
18	37.4	-0.10	369	64	0.040	0.09	0.00
19	37.3	-0.10	373	64	0.040	0.09	0.00
20	37.2	-0.10	377	64	0.043	0.08	0.00
21	37.1	-0.10	380	64	0.044	0.09	0.00
22	37.0	-0.10	383	64	0.048	0.00	0.00
23	36.9	-0.10	386	64	0.050	0.00	0.00
24	36.8	-0.10	386	64	0.053	16.72	4.39
25	36.7	-0.10	387	64	0.052	16.86	4.38
26	36.6	-0.10	388	65	0.054	15.03	0.05
27	36.5	-0.10	389	65	0.054	15.02	0.05
28	36.4	-0.10	390	64	0.055	15.02	0.05
29	36.3	-0.10	389	66	0.054	15.03	0.05

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 10/25/2023

PB Length: 90 min
 Recording Interval: 1 min

Averages:	379	65	0.07	6.75	0.27
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30	36.2	-0.10	390	66	0.055	15.04	0.05
31	36.1	-0.10	392	65	0.057	0.03	0.00
32	36.0	-0.10	393	65	0.058	15.97	4.19
33	35.9	-0.10	394	65	0.058	16.85	4.38
34	35.8	-0.10	396	64	0.060	15.01	0.05
35	35.7	-0.10	396	65	0.060	15.02	0.05
36	35.6	-0.10	394	64	0.061	15.02	0.05
37	35.5	-0.10	396	64	0.060	15.02	0.05
38	35.4	-0.10	396	64	0.061	15.02	0.05
39	35.3	-0.10	396	65	0.063	15.02	0.05
40	35.2	-0.10	396	65	0.063	4.89	0.02
41	35.1	-0.10	397	65	0.065	5.29	1.27
42	35.0	-0.10	397	64	0.067	16.83	4.42
43	35.0	0.00	397	65	0.066	2.86	0.46
44	35.3	0.30	396	64	0.065	6.15	0.02
45	35.2	-0.10	396	65	0.067	7.40	0.02
46	35.1	-0.10	397	65	0.067	7.43	0.01
47	35.0	-0.10	399	64	0.067	8.14	0.01
48	34.9	-0.10	399	65	0.069	7.36	0.02
49	34.8	-0.10	399	65	0.069	7.88	0.03
50	34.7	-0.10	401	65	0.067	8.55	0.01
51	34.6	-0.10	400	65	0.071	7.62	0.01
52	34.5	-0.10	402	65	0.070	8.22	0.02
53	34.4	-0.10	402	65	0.071	7.94	0.01
54	34.3	-0.10	400	65	0.072	7.16	0.01
55	34.2	-0.10	401	65	0.072	7.93	0.01
56	34.1	-0.10	401	65	0.072	7.29	0.02
57	34.0	-0.10	401	65	0.071	7.59	0.01
58	33.9	-0.10	399	65	0.072	7.20	0.02
59	33.8	-0.10	398	66	0.074	6.99	0.02
60	33.7	-0.10	395	65	0.074	6.19	0.02
61	33.7	0.00	395	65	0.075	6.44	0.01

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 10/25/2023

PB Length: 90 min
 Recording Interval: 1 min

Averages:	379	65	0.07	6.75	0.27
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62	33.6	-0.1	395	65	0.08	7.43	0.01
63	33.5	-0.1	397	65	0.08	7.54	0.02
64	33.4	-0.1	398	65	0.08	8.14	0.03
65	33.3	-0.1	398	66	0.08	7.11	0.01
66	33.2	-0.1	399	65	0.08	7.50	0.02
67	33.1	-0.1	401	65	0.08	8.09	0.01
68	33.0	-0.1	399	66	0.08	6.76	0.02
69	32.9	-0.1	398	65	0.08	7.22	0.02
70	32.8	-0.1	398	65	0.08	7.27	0.01
71	32.7	-0.1	398	65	0.03	7.67	0.01
72	32.6	-0.1	400	65	0.03	7.75	0.02
73	32.5	-0.1	401	65	0.03	7.62	0.02
74	32.4	-0.1	401	66	0.05	7.69	0.01
75	32.3	-0.1	402	65	0.05	7.57	0.01
76	32.2	-0.1	404	66	-0.01	8.22	0.02
77	32.2	0	403	65	-0.02	7.32	0.01
78	32.1	-0.1	402	65	-0.02	7.28	0.02
79	32.0	-0.1	401	65	-0.02	7.34	0.01
80	32.0	0	399	66	0.21	6.78	0.02
81	31.9	-0.1	399	65	0.23	7.22	0.02
82	31.7	-0.2	403	65	0.26	8.82	0.06
83	31.3	-0.4	402	65	0.78	7.94	0.04
84	31.2	-0.1	400	65	-0.03	7.11	0.02
85	31.8	0.6	402	65	0.00	7.35	0.01
86	31.5	-0.3	402	65	0.19	7.23	0.02
87	31.0	-0.5	400	66	-0.03	7.32	0.02
88	31.1	0.1	399	66	-0.04	7.15	0.01
89	31.0	-0.1	401	65	-0.04	7.68	0.01
90	30.9	-0.1	401	66	-0.04	7.45	0.01

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 3

Manufacturer: Hearth & Home Technologies
Model: P43-C
Tracking No.: 2470
Project No.: 0135PS023E REV002
Test Date: 25-Oct-23
Beginning Clock Time: 10:43

High Burn End Time: 60
Medium Burn End Time: 180
Total Sampling Time: 360 min
Recording Interval: 1 min
Background Sample Volume: 57.274 cubic feet

Meter Box Y Factor: 1.016 (1) 1.011 (2) 1.011 (Amb)

Barometric Pressure: Begin Middle End Average
29.99 29.94 30.00 29.98 Hg

PM Control Modules: 00335, 00336, 00372
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: -0.370 H2O
Tunnel Area: 0.1963 ft^2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.54 ft/sec.
Initial Tunnel Flow: 205.1 scfm
Average Tunnel Flow: 211.0 scfm
Post-Test Leak Check (1): 0.002 cfm @ 17 in. Hg
Post-Test Leak Check (2): 0.001 cfm @ 19 in. Hg
Fuel Moisture (%): 4.537 Dry Basis 4.340 Wet Basis

Table with Velocity Traverse Data columns (Pt.1 to Center) and rows for Initial dP and Temp. Includes Vstrav and Vscnt values.

Main data table with columns: Elapsed Time (min), Gas Meter 1 (ft^3), Gas Meter 2 (ft^3), 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), Tunnel Center dP, Pro. Rate 1, Pro. Rate 2, Scale Reading, Weight Change, Stack, Filter 1, Dryer 1, Filter 2, Dryer 2, Ambient, Draft (H2O), CO2 (%), CO (%).

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 3

Manufacturer: Hearth & Home Technologies High Burn End Time: 60
 Model: P43-C Medium Burn End Time: 180
 Tracking No.: 2470 Total Sampling Time: 360 min
 Project No.: 0135PS023E REV002 Recording Interval: 1 min
 Test Date: 25-Oct-23
 Beginning Clock Time: 10:43 Background Sample Volume: 57.274 cubic feet

Meter Box Y Factor: 1.016 (1) 1.011 (2) 1.011 (Amb)

Barometric Pressure: Begin Middle End Average
29.99 29.94 30.00 29.98 ^{°Hg}

PM Control Modules: 00335, 00336, 00372

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: -0.370 ^{H₂O}
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.54 ft/sec.
 Initial Tunnel Flow: 205.1 scfm
 Average Tunnel Flow: 211.0 scfm
 Post-Test Leak Check (1): 0.002 cfm @ 17 in. Hg
 Post-Test Leak Check (2): 0.001 cfm @ 19 in. Hg
 Fuel Moisture (%): 4.537 Dry Basis 4.340 Wet Basis

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.070	0.090	0.080	0.060	0.056	0.090	0.092	0.070	0.098	
Temp:	94	94	94	94	94	94	94	94	94	
V _{strav}		18.63			ft/sec		V _{scnt}		21.24	
				ft/sec		F _p		0.877		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (°H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 (°Hg)	Orifice dH 2 (°H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 (°Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft (°H ₂ O)	CO ₂ (%)	CO (%)
343	54.837	54.866	0.16	0.16	1.22	76	2.07	0.91	76	2.30	71	0.101	98	99	10.6	0.0	210	66	55	66	55	65	-0.039	7.18	1.050
344	54.995	55.025	0.16	0.16	1.23	76	2.08	0.91	76	2.30	71	0.099	99	100	10.5	-0.1	210	66	55	66	55	65	-0.039	7.36	1.210
345	55.155	55.182	0.16	0.16	1.21	76	2.07	0.91	76	2.30	71	0.099	100	98	10.4	-0.1	212	66	55	66	55	65	-0.040	8.37	1.290
346	55.313	55.341	0.16	0.16	1.22	77	2.08	0.90	76	2.30	71	0.101	98	99	10.4	0.0	213	66	55	66	55	65	-0.041	7.35	1.340
347	55.471	55.499	0.16	0.16	1.25	77	2.12	0.91	76	2.30	71	0.102	97	98	10.3	-0.1	213	66	55	66	55	65	-0.041	7.28	1.330
348	55.631	55.658	0.16	0.16	1.25	76	2.12	0.93	76	2.40	72	0.101	99	99	10.3	0.0	214	66	55	66	55	65	-0.040	7.45	0.710
349	55.792	55.818	0.16	0.16	1.25	77	2.12	0.93	76	2.40	72	0.099	101	100	10.2	-0.1	214	66	55	66	55	65	-0.040	7.01	0.410
350	55.952	55.977	0.16	0.16	1.25	76	2.12	0.93	76	2.40	71	0.099	100	100	10.2	0.0	214	66	55	66	55	65	-0.040	6.81	0.490
351	56.112	56.137	0.16	0.16	1.25	76	2.12	0.93	76	2.40	71	0.099	100	100	10.1	-0.1	213	66	55	66	55	65	-0.040	6.43	0.600
352	56.272	56.297	0.16	0.16	1.25	77	2.12	0.92	76	2.40	71	0.101	99	99	10.1	0.0	213	66	55	66	55	65	-0.040	6.61	0.330
353	56.432	56.456	0.16	0.16	1.25	77	2.13	0.93	76	2.40	71	0.101	99	99	10.0	-0.1	213	66	55	66	55	65	-0.041	7.14	0.250
354	56.593	56.615	0.16	0.16	1.24	77	2.13	0.93	76	2.40	71	0.101	100	99	10.0	0.0	213	66	55	66	55	65	-0.040	7.03	0.380
355	56.753	56.775	0.16	0.16	1.24	76	2.13	0.92	76	2.40	72	0.100	100	100	9.9	-0.1	214	66	55	66	55	65	-0.040	7.06	0.670
356	56.912	56.933	0.16	0.16	1.24	77	2.13	0.92	76	2.40	71	0.100	99	98	9.9	0.0	213	66	55	66	55	65	-0.040	6.86	0.580
357	57.072	57.093	0.16	0.16	1.24	77	2.13	0.92	76	2.40	71	0.102	99	99	9.8	-0.1	212	66	55	66	55	65	-0.040	6.73	0.590
358	57.232	57.252	0.16	0.16	1.24	76	2.14	0.92	76	2.40	71	0.100	100	99	9.8	0.0	212	66	55	66	55	65	-0.040	6.78	0.550
359	57.392	57.410	0.16	0.16	1.24	77	2.14	0.92	76	2.40	71	0.102	99	98	9.7	-0.1	212	66	55	66	55	65	-0.040	6.87	0.420
360	57.551	57.570	0.16	0.16	1.24	77	2.14	0.92	76	2.40	71	0.101	98	99	9.7	0.0	212	66	55	66	55	65	-0.039	6.72	0.290
Avg/Tot	57.551	57.570	0.16	0.16	1.24	76	1.92	0.93	76	2.16	76	0.10	100	100			252	67	52	66	52	65	-0.041	6.97	0.532

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Run #: 3 Technician Signature: _____
 Date: 10/25/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
1 st hour Sub-Total, mg:					0.0

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F103	122.2	130.4	8.2
B. Rear filter catch	Filter	F104	125.1	124.4	-0.7
C. Probe catch*	Probe	71	117765.8	117765.8	0.0
D. Filter seals catch*	Seals	S590	4125.3	4125.9	0.6
Sub-Total, mg:					8.1
Train 1 Aggregate, mg:					8.1

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F105	121.8	130.1	8.3
B. Rear filter catch	Filter	F106	124.5	124.5	0.0
C. Probe catch*	Probe	79	118145.0	118145.0	0.0
D. Filter seals catch*	Seals	S592	3370.9	3371.1	0.2
Train 2 Aggregate, mg:					8.5

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter	F107	121.7	121.7	0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Project No.: 0135PS023E REV002
 Tracking No.: 2470
 Run: 3
 Test Date: 10/25/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	1.82 g/hr
Total Particulate Emissions - E_T	10.92 g
Emissions Factor	1.19 g/kg
CSA B415 Efficiency	76.7% HHV

First Hour Emissions	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E_T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg

Burn Rate (Composite)	1.53 kg/hr dry
Burn Rate (High)	2.43 kg/hr dry
Burn Rate (Medium)	1.43 kg/hr dry
Burn Rate (Low)	1.29 kg/hr dry
Average Tunnel Temperature	76 degrees F
Avg. Velocity in Dilution Tunnel - v_s	18.54 ft/second
Avg. Flow Rate in Dilution Tunnel - Q_{sd}	12658.6 dscf/hour
Average Δp	0.100 inches H2O
Average ΔH	1.24 inches H2O
Total Time of Test	360 minutes

<Average of High and Low

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E REV002

Tracking No.: 2470

Run: 3

Technician Signature: _____

Test Date: 10/25/23

	1 st Hour	Sample Train 1	Sample Train 2	Sample	Unit
Total Sample Volume - V_m		57.551	57.570	57.274	ft ³
Average Gas Meter Temperature		75.55	75.96	65	°F
Sample Volume (Std. Conditions) - V_{mstd}		57.910	57.555	58.318	dsf ³
Total Particulates - m_n		8.1	8.5	0	mg
Particulate Concentration - C_r/C_s	#DIV/0!	1.40E-04	1.48E-04	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	#DIV/0!	10.62	11.22	0.00	g
Particulate Emission Rate	#DIV/0!	1.77	1.87	0.00	g/hr
Emissions Factor	#DIV/0!	1.16	1.23		g/kg
Delta from Avg. Particulate Emissions		0.30	0.30		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	OK	Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK	Dual Train Comparison	2.72%
		Train Precision g/kg	0.06

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Run #: 3 Technician Signature: _____
 Date: 10/25/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
1 st hour Sub-Total, mg:					0.0

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F103	122.2	130.4	8.2
B. Rear filter catch	Filter	F104	125.1	124.4	0.0
C. Probe catch*	Probe	71	117765.8	117765.8	0.0
D. Filter seals catch*	Seals	S590	4125.3	4125.9	0.6
Sub-Total, mg:					8.8
Train 1 Aggregate, mg:					8.8

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F105	121.8	130.1	8.3
B. Rear filter catch	Filter	F106	124.5	124.5	0.0
C. Probe catch*	Probe	79	118145.0	118145.0	0.0
D. Filter seals catch*	Seals	S592	3370.9	3371.1	0.2
Train 2 Aggregate, mg:					8.5

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter	F107	121.7	121.7	0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Uncorrected

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Project No.: 0135PS023E REV002
 Tracking No.: 2470
 Run: 3
 Test Date: 10/25/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	1.90 g/hr
Total Particulate Emissions - E _T	11.38 g
Emissions Factor	1.24 g/kg
CSA B415 Efficiency	72.8% HHV

First Hour Emissions	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg

Burn Rate (Composite)	1.53 kg/hr dry
Burn Rate (High)	2.43 kg/hr dry
Burn Rate (Medium)	1.43 kg/hr dry
Burn Rate (Low)	1.29 kg/hr dry
Average Tunnel Temperature	76 degrees F
Avg.Velocity in Dilution Tunnel - v _s	18.54 ft/second
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12658.6 dscf/hour
Average Δp	0.100 inches H2O
Average ΔH	1.24 inches H2O
Total Time of Test	360 minutes

<Average of High and Low

ASTM E2779 / ASTM E2515 Emissions Results

Uncorrected

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Project No.: 0135PS023E REV002
 Tracking No.: 2470
 Run: 3
 Test Date: 10/25/23

Technician Signature: _____

	1 st Hour	Sample Train 1	Sample Train 2	Sample	Unit
Total Sample Volume - V_m		57.551	57.570	57.274	ft ³
Average Gas Meter Temperature		75.55	75.96	65	°F
Sample Volume (Std. Conditions) - V_{mstd}		57.910	57.555	58.318	dsf ³
Total Particulates - m_n		8.8	8.5	0	mg
Particulate Concentration - C_r/C_s	#DIV/0!	1.52E-04	1.48E-04	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	#DIV/0!	11.54	11.22	0.00	g
Particulate Emission Rate	#DIV/0!	1.92	1.87	0.00	g/hr
Emissions Factor	#DIV/0!	1.26	1.23		g/kg
Delta from Avg. Particulate Emissions		0.16	0.16		g

Quality Checks			
Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	OK	Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK	Dual Train Comparison	1.43%

CSA B415.1 Results - Overall & By Category

Manufacturer: Hearth & Home Technologies
Model: P43-C
Date: 10/25/23

Run: 3
Control #:
Test Duration: 360 mins

Results in Accordance with CSA B415 Version 2.4 - Overall			
	HHV Basis	LHV Basis	
Overall Efficiency	76.7%	82.7%	
Combustion Efficiency	95.0%	95.0%	
Heat Transfer Efficiency	81.0%	87.0%	
Output Rate (kJ/h)	22,971	21,790	(Btu/h)
Burn Rate (kg/h)	1.53	3.36	(lb/h)
Input (kJ/h)	29,947	28,408	(Btu/h)
Test Load Weight (dry kg)	9.16	20.19	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	10.92		
CO (g)	672		
Test Duration (h)	6.00		
Emissions	Particulate	CO	
g/MJ Output	0.08	4.87	
g/kg Dry Fuel	1.19	73.35	
g/h	1.82	111.96	
lb/MM Btu Output	0.18	11.33	
Air/Fuel Ratio (A/F)	14.67		

Results in Accordance with CSA B415 Version 2.4 - Maximum			
	HHV Basis	LHV Basis	
Overall Efficiency	73.5%	79.3%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	74.0%	79.7%	
Output Rate (kJ/h)	35,054	33,252	(Btu/h)
Burn Rate (kg/h)	2.43	5.36	(lb/h)
Input (kJ/h)	47,688	45,237	(Btu/h)
Test Load Weight (dry kg)	2.43	5.36	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	2.63		
CO (g)	5.46		
Test Duration (h)	1.00		
Emissions	Particulate	CO	
g/MJ Output	0.08	0.16	
g/kg Dry Fuel	1.08	2.25	
g/h	2.63	5.46	
lb/MM Btu Output	0.17	0.36	
Air/Fuel Ratio (A/F)	12.89		

Results in Accordance with CSA B415 Version 2.4 - Medium			
	HHV Basis	LHV Basis	
Overall Efficiency	76.1%	82.1%	
Combustion Efficiency	92.6%	92.6%	
Heat Transfer Efficiency	82.0%	88.6%	
Output Rate (kJ/h)	21,393	20,293	(Btu/h)
Burn Rate (kg/h)	1.43	3.16	(lb/h)
Input (kJ/h)	28,102	26,657	(Btu/h)
Test Load Weight (dry kg)	2.86	6.30	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	0.00		
CO (g)	306.31		
Test Duration (h)	2.00		
Emissions	Particulate	CO	
g/MJ Output	-	7.16	
g/kg Dry Fuel	-	106.93	
g/h	-	153.16	
lb/MM Btu Output	-	16.64	
Air/Fuel Ratio (A/F)	14.26		

Results in Accordance with CSA B415 Version 2.4 - Minimum			
	HHV Basis	LHV Basis	
Overall Efficiency	78.4%	84.5%	
Combustion Efficiency	93.7%	93.7%	
Heat Transfer Efficiency	84.0%	90.2%	
Output Rate (kJ/h)	19,801	18,783	(Btu/h)
Burn Rate (kg/h)	1.29	2.84	(lb/h)
Input (kJ/h)	25,263	23,965	(Btu/h)
Test Load Weight (dry kg)	3.86	8.51	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	0.00		
CO (g)	350.70		
Test Duration (h)	3.00		
Emissions	Particulate	CO	
g/MJ Output	-	5.90	
g/kg Dry Fuel	-	90.79	
g/h	-	116.90	
lb/MM Btu Output	-	13.72	
Air/Fuel Ratio (A/F)	26.84		

Table 1.1 - Particulate Emissions

	One-Hour Filter	Integrated Total
Emission Rate (g/hr)	2,630	1,820
Emission Factor (g/dry kg)	1,080	1,193

Table 1.2 - Efficiency and CO

Time (minutes)	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
Time (minutes)	60	120	180	360 mins
Burn Rate (dry kg/hr)	2,430	1,430	1,290	1,530
Heat Input Rate (BTU/hr, HHV)	45,237	26,657	23,965	28,408
Heat Output Rate (BTU/hr, HHV)	33,252	20,293	18,783	21,790
Efficiency (% HHV)	73.5%	76.1%	78.4%	76.7%
Efficiency (% LHV)	79.3%	82.1%	84.5%	82.7%
CO Emission Rate (g/min)	0.091	2,553	1,948	1,866

Table 1.3 - Test Facility Conditions

	Initial	Middle	Final
Room Temperature (° F)	74	78	76
Barometric Pressure (in Hg)	29.99	29.94	30.00
Air Velocity (ft/min)	<50	<50	<50
Induced Draft (in H2O)	∅	∅	∅

EPA Application Format - Tables 1.1 & 1.2

Run #	Date	Setting	Burn Rate (dry kg/h)	Time (min)	Heat Input (Btu/hr)	Heat Output (Btu/hr)	1 st Hour PM (g/hr)	Total PM (g/hr)	CO Emissions (g/min)	Overall CO (g/hr)	Heating Efficiency (% HHV)	Overall Heating Efficiency (% HHV)
3	10/25/2023	H	2.43	60	45,237	33,252	2.63	1,820	0.091	111,955	73.5%	76.7%
		M	1.43	120	26,657	20,293					76.1%	
		L	1.29	180	23,965	18,783					78.4%	
		OA	1.53	360 mins	28,408	21,790					76.7%	

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

First Hour Test Data

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **3**

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E
 Test Date: 25-Oct-23
 Beginning Clock Time: 10:43

High Burn End Time: 60
 Medium Burn End Time: _____
 Total Sampling Time: 60 min
 Recording Interval: 1 min
 Background Sample Volume: 9.417 cubic feet

Meter Box Y Factor: 1.015 (1) _____ (2) 1.011 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
<u>30.14</u>	<u>30.13</u>	<u>30.06</u>	<u>30.11</u> "Hg

PM Control Modules: 371

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: -0.360 "H₂O
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.70 ft/sec.
 Initial Tunnel Flow: 205.5 scfm
 Average Tunnel Flow: 206.4 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 23 in. Hg
 Post-Test Leak Check (2): _____ cfm @ _____ in. Hg
 Fuel Moisture (%): 4.537 Dry Basis 4.340 Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	<u>0.070</u>	<u>0.090</u>	<u>0.080</u>	<u>0.060</u>	<u>0.056</u>	<u>0.090</u>	<u>0.092</u>	<u>0.070</u>	<u>0.098</u>
Temp:	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>94</u>
	V _{strav} <u>18.58</u> ft/sec			V _{scnt} <u>21.18</u> ft/sec			F _p <u>0.877</u>		

Elapsed Time (min)	Particulate Sampling Data											Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data					
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
43	6.860		0.16		2.21	66	-2.92				95	0.099	101		26.8	-0.1	397	70	48			65	-0.043	7.03	0.020
44	7.019		0.16		2.21	66	-2.76				95	0.099	99		26.7	-0.1	399	70	48			65	-0.043	7.92	0.010
45	7.180		0.16		2.22	66	-2.87				95	0.098	101		26.6	-0.1	401	70	48			65	-0.043	7.90	0.010
46	7.339		0.16		2.20	66	-3.26				95	0.098	100		26.5	-0.1	401	70	48			65	-0.044	7.73	0.010
47	7.500		0.16		2.21	66	-3.26				95	0.097	102		26.4	-0.1	401	70	49			65	-0.044	6.94	0.020
48	7.659		0.16		2.20	66	-2.95				95	0.100	99		26.3	-0.1	401	70	49			66	-0.044	7.48	0.020
49	7.819		0.16		2.21	66	-2.85				95	0.101	99		26.2	-0.1	401	70	49			66	-0.043	7.42	0.020
50	7.979		0.16		2.21	66	-2.80				95	0.098	101		26.1	-0.1	398	70	49			65	-0.043	6.58	0.030
51	8.138		0.16		2.21	66	-3.18				95	0.100	99		26.0	-0.1	396	70	49			66	-0.043	6.10	0.020
52	8.299		0.16		2.20	66	-3.15				95	0.100	100		25.9	-0.1	395	70	49			66	-0.043	6.20	0.010
53	8.458		0.16		2.20	66	-3.15				95	0.099	99		25.8	-0.1	397	70	49			65	-0.044	7.31	0.010
54	8.618		0.16		2.20	66	-2.83				95	0.100	100		25.7	-0.1	398	70	49			65	-0.043	7.38	0.010
55	8.778		0.16		2.20	66	-3.00				95	0.098	101		25.6	-0.1	398	70	50			65	-0.044	7.39	0.020
56	8.938		0.16		2.19	66	-2.88				95	0.097	101		25.5	-0.1	399	70	50			65	-0.044	7.27	0.020
57	9.097		0.16		2.20	66	-3.17				95	0.099	99		25.5	0.0	397	70	50			65	-0.043	7.13	0.010
58	9.257		0.16		2.20	66	-2.90				95	0.098	101		25.4	-0.1	397	70	50			65	-0.043	7.11	0.030
59	9.416		0.16		2.20	66	-2.91				95	0.100	99		25.3	-0.1	398	70	50			65	-0.044	7.23	0.010
60	9.577		0.16		2.20	66	-2.77				95	0.099	101		25.2	-0.1	398	70	50			65	-0.043	7.18	0.010
Avg/Tot	9.577	0.000	0.16	#DIV/0!	2.19	65	-2.97	#DIV/0!	#DIV/0!	#DIV/0!	95	0.10	100	#DIV/0!			399	69	46	#DIV/0!	#DIV/0!	65	-0.043	7.23	0.014

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E
 Run #: 3 Technician Signature: _____
 Date: 10/25/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F101	124.5	126.4	1.9
B. Rear filter catch	Filter	F102	124.6	124.6	0.0
C. Probe catch*	Probe	82	116286.1	116286.1	0.0
D. Filter seals catch*	Seals	S589	4093.2	4093.4	0.2
1 st hour Sub-Total, mg:					2.1

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Sub-Total, mg:					0.0
Train 1 Aggregate, mg:					2.1

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Train 2 Aggregate, mg:					0.0

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter				0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E

Tracking No.: 2470

Run: 3

Technician Signature: _____

Test Date: 10/25/23

Integrated Test Run	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg
CSA B415 Efficiency	#REF! HHV

First Hour Emissions	
Particulate Emission Rate	2.63 g/hr
Total Particulate Emissions - E _T	2.63 g
Emissions Factor	1.08 g/kg

Burn Rate (Composite)	2.43 kg/hr dry	
Burn Rate (High)	2.43 kg/hr dry	
Burn Rate (Medium)	#VALUE! kg/hr dry	#VALUE!
Burn Rate (Low)	#VALUE! kg/hr dry	#VALUE!
Average Tunnel Temperature	95 degrees F	
Avg.Velocity in Dilution Tunnel - v _s	18.70 ft/second	
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12381.1 dscf/hour	
Average Δp	0.099 inches H2O	
Average ΔH	2.19 inches H2O	
Total Time of Test	60 minutes	

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E

Tracking No.: 2470

Run: 3

Technician Signature: _____

Test Date: 10/25/23

	1 st Hour	1 st Hour	Sample Train 2	Sample	Unit
Total Sample Volume - V_m	9.577	9.577	0.000	9.417	ft ³
Average Gas Meter Temperature	65.44	65.44	#DIV/0!	65	°F
Sample Volume (Std. Conditions) - V_{mstd}	9.879	9.879	#DIV/0!	9.630	dsf ³
Total Particulates - m_n	2.1	2.1	0.0	0	mg
Particulate Concentration - C_r/C_s	2.126E-04	2.13E-04	#DIV/0!	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	2.63	2.63	#DIV/0!	0.00	g
Particulate Emission Rate	2.63	2.63	#DIV/0!	0.00	g/hr
Emissions Factor	1.08	1.08	#DIV/0!		g/kg
Delta from Avg. Particulate Emissions		#DIV/0!	#DIV/0!		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	#DIV/0!	Pro-Rate Variation	OK
Medium Burn Rate < 50%	#VALUE!	Dual Train Comparison	#DIV/0!

CSA B415.1 Data & Reports

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 10/25/2023

Run: 3

Control #: 2470

Test Duration: 360

Output Category: Overall

Wood Moisture (% wet): 4.34

Load Weight (lb wet): 21.10

Burn Rate (dry kg/h): 1.53

Total Particulate Emissions: 10.92 g

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

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

Fuel Data

HHV 19,620 kJ/kg
%C 50
%H 6.6
%O 42.85
%Ash 0.55

Default Fuel Values

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

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

Averages 0.53 6.97 #DIV/0! 251.57 65.04
Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	21.10	0.01	7.23		400.0	65.0
1	21.00	0.01	7.75		401.0	65.0
2	20.90	0.01	7.20		400.0	65.0
3	20.80	0.01	6.89		398.0	65.0
4	20.70	0.01	8.11		401.0	65.0
5	20.60	0.01	7.58		402.0	65.0
6	20.50	0.02	7.75		402.0	65.0
7	20.40	0.01	7.46		403.0	65.0
8	20.30	0.01	7.43		402.0	67.0
9	20.20	0.01	7.27		403.0	67.0
10	20.10	0.01	7.60		404.0	67.0
11	20.00	0.03	7.42		404.0	65.0
12	19.90	0.01	7.09		404.0	65.0
13	19.90	0.01	7.07		402.0	64.0
14	19.80	0.01	6.38		400.0	66.0
15	19.70	0.01	7.22		400.0	65.0
16	19.60	0.01	7.42		401.0	64.0
17	19.50	0.01	7.66		401.0	64.0
18	19.40	0.01	6.87		399.0	65.0

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

19	19.30	0.01	6.57		397.0	65.0
20	19.20	0.01	6.39		395.0	65.0
21	19.10	0.01	7.55		397.0	66.0
22	19.00	0.01	7.18		398.0	66.0
23	18.90	0.01	7.23		397.0	64.0
24	18.80	0.01	7.58		398.0	64.0
25	18.70	0.01	7.35		399.0	64.0
26	18.60	0.01	8.15		401.0	64.0
27	18.50	0.01	8.00		402.0	65.0
28	18.50	0.01	6.63		401.0	64.0
29	18.40	0.01	6.67		398.0	65.0
30	18.30	0.02	6.31		396.0	65.0
31	18.20	0.01	7.11		397.0	65.0
32	18.10	0.01	7.28		398.0	65.0
33	18.00	0.01	7.35		398.0	65.0
34	17.90	0.02	7.27		398.0	65.0
35	17.80	0.01	7.32		398.0	65.0
36	17.70	0.01	7.25		399.0	66.0
37	17.60	0.01	7.15		399.0	66.0
38	17.50	0.01	7.22		399.0	65.0
39	17.40	0.02	6.81		398.0	65.0
40	17.30	0.04	7.86		400.0	65.0
41	17.20	0.02	6.96		399.0	65.0
42	17.20	0.02	7.06		398.0	65.0
43	17.10	0.02	7.03		397.0	65.0
44	17.00	0.01	7.92		399.0	65.0
45	16.90	0.01	7.90		401.0	65.0
46	16.80	0.01	7.73		401.0	65.0
47	16.70	0.02	6.94		401.0	65.0
48	16.60	0.02	7.48		401.0	66.0
49	16.50	0.02	7.42		401	66
50	16.40	0.03	6.58		398	65
51	16.30	0.02	6.1		396	66
52	16.20	0.01	6.2		395	66
53	16.10	0.01	7.31		397	65
54	16.00	0.01	7.38		398	65
55	15.90	0.02	7.39		398	65
56	15.80	0.02	7.27		399	65
57	15.80	0.01	7.13		397	65

58	15.70	0.03	7.11		397	65
59	15.60	0.01	7.23		398	65
60	15.50	0.01	7.18		398	65
61	15.40	0.01	7.3		397	66
62	15.30	0.01	6.1		392	66
63	15.30	0.02	4.23		378	66
64	15.20	0.03	4.02		348	66
65	15.20	0.02	3.45		322	65
66	15.20	0.01	2.95		303	66
67	15.20	0.01	2.83		288	65
68	15.10	0.01	2.62		275	65
69	15.10	0.01	2.83		263	66
70	15.10	0.01	3.63		255	66
71	15.00	0.01	3.67		248	66
72	15.00	0.01	4.21		242	65
73	15.00	0.01	4.46		237	65
74	14.90	0.02	3.8		232	65
75	14.90	0.03	3.88		228	65
76	14.90	0.01	4.55		225	66
77	14.90	0.01	5.12		222	65
78	14.80	0.02	6.04		221	65
79	14.80	0.04	7.12		221	66
80	14.70	0.04	7.2		221	65
81	14.60	0.05	7.42		222	65
82	14.60	0.03	7.18		222	65
83	14.50	0.24	7.92		223	65
84	14.50	0.28	7.28		223	64
85	14.40	0.52	7.41		223	65
86	14.40	0.61	7.66		223	65
87	14.30	0.62	7.87		224	65
88	14.20	0.79	7.88		225	65
89	14.20	0.95	7.49		225	64
90	14.10	1.06	7.48		225	65
91	14.10	0.79	7.57		225	64
92	14.00	1.3	7.47		225	65
93	13.90	1.04	7.74		225	64
94	13.90	1.07	7.72		225	64
95	13.80	1.1	7.62		226	64
96	13.80	1.03	7.31		225	64

97	13.70	1.28	7.41		226	65
98	13.70	1.22	7.13		225	65
99	13.60	1.2	7.59		225	66
100	13.50	1.22	7.87		226	65
101	13.50	0.97	7.55		226	65
102	13.40	1.68	7.44		226	65
103	13.30	1.16	7.44		226	65
104	13.30	1.09	7.6		226	65
105	13.20	1.1	7.35		226	65
106	13.20	1.49	7.64		228	65
107	13.10	1.32	7.96		228	65
108	13.00	1.42	7.39		228	65
109	13.00	1.06	7.37		229	65
110	12.90	0.78	7.79		229	65
111	12.90	0.7	7.45		229	65
112	12.80	0.73	7.74		229	66
113	12.80	0.31	7.56		229	65
114	12.70	0.62	7.91		230	65
115	12.60	0.73	7.56		230	66
116	12.60	0.9	8.28		230	66
117	12.50	0.55	7.54		229	65
118	12.50	0.21	6.88		229	64
119	12.40	0.46	7.3		228	64
120	12.40	0.57	7.18		227	65
121	12.30	0.62	7.67		227	64
122	12.30	0.71	7.53		227	64
123	12.20	0.73	7.39		228	64
124	12.20	0.72	7.18		228	64
125	12.10	0.72	7.08		227	65
126	12.00	1.1	7.78		228	64
127	12.00	0.84	7.81		229	64
128	11.90	0.72	7.65		228	65
129	11.90	0.94	7.57		228	65
130	11.80	0.76	7.63		228	64
131	11.70	0.81	7.68		228	64
132	11.70	0.8	7.37		228	64
133	11.60	0.72	7.2		228	65
134	11.60	0.86	7.72		228	64
135	11.50	0.81	7.61		228	65

136	11.50	0.92	7.12		228	65
137	11.40	0.93	7.33		228	65
138	11.30	0.95	7.56		228	65
139	11.30	1.11	7.8		229	65
140	11.20	0.97	7.74		229	65
141	11.20	1.18	7.34		229	65
142	11.10	1.04	7.46		229	65
143	11.00	1.21	7.8		229	65
144	11.00	0.74	8.01		230	65
145	10.90	0.46	7.5		230	64
146	10.90	0.48	7.56		231	64
147	10.80	0.36	6.87		230	65
148	10.80	0.26	6.81		229	65
149	10.70	0.3	6.76		229	65
150	10.70	0.26	7.09		228	65
151	10.60	0.47	7.08		227	65
152	10.60	0.59	7.54		227	65
153	10.50	0.78	7.34		227	65
154	10.50	0.94	7.26		227	65
155	10.40	1.13	7.57		227	65
156	10.30	0.95	7.76		228	65
157	10.30	0.98	7.59		228	65
158	10.20	0.97	7.64		228	65
159	10.20	1.84	7.25		228	65
160	10.10	1.06	8.08		228	65
161	10.00	0.93	7.65		229	65
162	10.00	1.04	7.2		229	65
163	9.90	0.7	7.02		228	65
164	9.90	0.87	7.34		228	65
165	9.80	0.85	7.72		228	65
166	9.70	0.77	7.44		228	65
167	9.70	1.05	7.32		227	65
168	9.60	1.22	7.41		227	66
169	9.60	1.19	7.5		227	65
170	9.50	1.69	8.31		228	65
171	9.40	1.5	7.48		229	65
172	9.40	1.04	7.32		228	65
173	9.30	0.72	7.2		228	65
174	9.30	0.98	7.5		228	65

175	9.20	0.98	7.35		228	65
176	9.10	1.14	7.82		229	65
177	9.10	1.08	7.76		229	65
178	9.00	1.12	7.54		229	65
179	9.00	0.78	7.33		228	65
180	8.90	0.88	7.44		228	65
181	8.80	1.02	7.38		228	65
182	8.80	1.12	7.79		229	65
183	8.70	0.76	7.3		228	66
184	8.70	0.6	6.69		228	66
185	8.60	0.46	6.81		227	66
186	8.60	0.33	6.71		226	65
187	8.50	0.29	6.62		226	66
188	8.50	0.11	6.37		225	66
189	8.40	0.12	6.46		224	65
190	8.40	0.13	6.27		223	66
191	8.40	0.09	5.92		222	66
192	8.30	0.13	6.16		221	65
193	8.30	0.08	5.84		219	65
194	8.20	0.12	5.78		219	66
195	8.20	0.11	5.8		217	65
196	8.20	0.09	6.08		216	65
197	8.10	0.15	6.28		215	65
198	8.10	0.12	6.11		215	65
199	8.00	0.16	6.66		214	65
200	8.00	0.14	6.52		214	65
201	7.90	0.16	6.2		213	65
202	7.90	0.18	6.2		213	65
203	7.90	0.17	6.04		212	65
204	7.80	0.34	6.43		212	65
205	7.80	0.27	5.95		211	65
206	7.70	0.21	6.13		211	65
207	7.70	0.09	5.75		210	64
208	7.60	0.1	5.9		209	65
209	7.60	0.22	5.96		207	65
210	7.60	0.4	5.99		207	65
211	7.50	0.59	6.09		206	65
212	7.50	0.59	6.59		206	65
213	7.40	0.77	6.66		205	65

214	7.40	0.51	7.26		205	65
215	7.30	0.82	6.86		206	65
216	7.30	1.4	6.95		206	65
217	7.20	1.38	7.01		206	64
218	7.10	1.24	7.79		208	66
219	7.10	1.16	7.51		208	66
220	7.00	1.36	7.49		209	65
221	7.00	1.32	7.88		210	65
222	6.90	1.66	7.5		211	65
223	6.80	1.33	7.42		211	65
224	6.80	1.13	6.87		211	65
225	6.70	0.83	7.21		212	65
226	6.70	0.71	6.86		212	66
227	6.60	0.73	7.02		212	66
228	6.60	0.69	6.87		212	66
229	6.50	0.45	6.75		212	65
230	6.50	0.48	6.47		212	66
231	6.40	0.43	6.63		211	66
232	6.40	0.32	6.58		211	65
233	6.30	0.4	6.66		211	66
234	6.30	0.53	6.59		210	66
235	6.20	0.27	6.54		210	66
236	6.20	0.55	6.86		210	66
237	6.10	0.65	7.26		210	64
238	6.10	0.68	7.19		210	65
239	6.00	0.55	7.05		210	64
240	6.00	0.45	6.72		210	64
241	6.00	0.29	6.75		209	64
242	5.90	0.23	6.59		209	64
243	5.90	0.42	6.59		208	64
244	5.80	0.43	6.9		208	64
245	5.80	0.62	7.07		208	64
246	5.70	0.75	7.49		210	64
247	5.70	0.65	7.49		210	65
248	5.60	0.65	7.24		210	64
249	5.60	0.87	7.18		210	65
250	5.50	1.17	6.81		210	65
251	5.40	1.33	7.32		211	65
252	5.40	1.03	7.29		212	65

253	5.30	1.23	7.32		212	65
254	5.30	0.56	7.39		212	65
255	5.20	0.67	7.24		212	65
256	5.20	0.89	6.78		213	65
257	5.10	0.69	7.11		213	65
258	5.10	0.56	6.33		212	65
259	5.00	0.28	6.81		212	65
260	5.00	0.49	6.9		212	65
261	4.90	0.59	7		211	65
262	4.90	0.75	7.22		212	65
263	4.80	0.67	7.04		211	65
264	4.80	0.29	7.08		212	65
265	4.70	0.41	6.72		212	65
266	4.70	0.25	6.65		212	65
267	4.60	0.21	6.35		211	65
268	4.60	0.24	6.26		210	65
269	4.50	0.19	6.79		210	65
270	4.50	0.41	6.4		209	65
271	4.50	0.76	6.52		208	65
272	4.40	0.66	6.7		208	65
273	4.30	1.2	7.05		209	65
274	4.30	0.73	7.34		209	65
275	4.20	0.87	7.04		210	65
276	4.20	0.7	7.04		210	65
277	4.10	1.34	6.81		209	65
278	4.10	1.19	7.79		210	65
279	4.00	1.44	7.37		210	65
280	3.90	1.13	7.3		210	65
281	3.90	1.36	6.93		210	65
282	3.80	1.4	7.34		211	65
283	3.80	1.84	7.7		211	65
284	3.70	1.68	7.58		212	65
285	3.60	1.24	8.1		213	65
286	3.60	0.69	7.87		214	65
287	3.50	0.56	7.26		215	65
288	3.50	0.48	7.19		215	65
289	3.40	0.4	7.37		216	65
290	3.40	0.41	7.01		216	65
291	3.30	0.2	6.67		216	65

292	3.30	0.22	6.54		215	66
293	3.30	0.1	6.55		215	66
294	3.20	0.16	6.37		214	65
295	3.20	0.13	6.59		214	65
296	3.10	0.13	6.82		213	65
297	3.10	0.11	7.12		214	66
298	3.00	0.2	6.88		214	66
299	3.00	0.36	7.32		214	67
300	2.90	0.37	7.11		214	66
301	2.90	0.31	6.98		215	66
302	2.80	0.39	7.28		215	66
303	2.80	0.31	6.78		214	65
304	2.70	0.24	6.44		214	65
305	2.70	0.45	6.76		213	64
306	2.60	0.39	6.48		213	64
307	2.60	0.35	6.77		212	64
308	2.50	0.39	6.77		212	65
309	2.50	0.41	7.03		211	65
310	2.50	0.23	6.52		210	65
311	2.40	0.23	6.67		210	64
312	2.40	0.41	6.63		210	64
313	2.30	0.73	7.43		211	65
314	2.30	0.85	7.35		212	65
315	2.20	0.57	7.19		212	65
316	2.20	0.67	7.11		212	65
317	2.10	0.49	6.71		212	65
318	2.10	0.47	6.59		211	65
319	2.00	0.35	6.54		211	65
320	2.00	0.28	6.52		211	65
321	1.90	0.47	6.89		210	65
322	1.90	0.46	6.67		210	65
323	1.80	0.36	7.15		211	65
324	1.80	0.41	6.69		211	65
325	1.70	0.22	6.62		212	65
326	1.70	0.28	6.91		212	65
327	1.60	0.15	6.7		212	65
328	1.60	0.61	6.5		211	65
329	1.50	0.38	6.78		211	65
330	1.50	0.13	6.28		210	65

331	1.50	0.24	6.43		210	66
332	1.40	0.14	6.5		210	65
333	1.40	0.18	6.09		209	65
334	1.30	0.38	6.69		208	65
335	1.30	0.42	6.92		208	65
336	1.20	0.53	6.5		208	65
337	1.20	0.73	6.77		207	65
338	1.10	0.81	7.59		208	65
339	1.10	0.46	7.69		209	65
340	1.00	0.85	7.35		209	65
341	1.00	0.73	7.35		209	65
342	0.90	1.17	6.67		209	65
343	0.90	1.05	7.18		210	65
344	0.80	1.21	7.36		210	65
345	0.70	1.29	8.37		212	65
346	0.70	1.34	7.35		213	65
347	0.60	1.33	7.28		213	65
348	0.60	0.71	7.45		214	65
349	0.50	0.41	7.01		214	65
350	0.50	0.49	6.81		214	65
351	0.40	0.6	6.43		213	65
352	0.40	0.33	6.61		213	65
353	0.30	0.25	7.14		213	65
354	0.30	0.38	7.03		213	65
355	0.20	0.67	7.06		214	65
356	0.20	0.58	6.86		213	65
357	0.10	0.59	6.73		212	65
358	0.10	0.55	6.78		212	65
359	0.00	0.42	6.87		212	65
360	0.00	0.29	6.72		212	65

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 10/25/23
Run: 3
Control #: 2470
Test Duration: 360
Output Category: Overall

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	76.7%	82.7%
Combustion Efficiency	95.0%	95.0%
Heat Transfer Efficiency	81%	87.0%

Output Rate (kJ/h)	22,971	21,790	(Btu/h)
Burn Rate (kg/h)	1.53	3.36	(lb/h)
Input (kJ/h)	29,947	28,408	(Btu/h)

Test Load Weight (dry kg)	9.16	20.18	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	10.92		
CO (g)	672		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.08	4.87
g/kg Dry Fuel	1.19	73.35
g/h	1.82	111.96
lb/MM Btu Output	0.18	11.33

Air/Fuel Ratio (A/F)	14.67
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 10/25/2023

Run: 3

Control #: 2470

Test Duration: 60

Output Category: High

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.34
Load Weight (lb wet): 5.60
Burn Rate (dry kg/h): 2.43
Total Particulate Emissions: 2.63 g

Fuel Data

HHV 19,620 kJ/kg
%C 50
%H 6.6
%O 42.85
%Ash 0.55

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

Averages 0.01 7.23 #DIV/0! 399.33 65.11
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp. (°F)	Room Temp
		CO	CO ₂	O ₂		
0	5.60	0.01	7.23		400.0	65.0
1	5.50	0.01	7.75		401.0	65.0
2	5.40	0.01	7.20		400.0	65.0
3	5.30	0.01	6.89		398.0	65.0
4	5.20	0.01	8.11		401.0	65.0
5	5.10	0.01	7.58		402.0	65.0
6	5.00	0.02	7.75		402.0	65.0
7	4.90	0.01	7.46		403.0	65.0
8	4.80	0.01	7.43		402.0	67.0
9	4.70	0.01	7.27		403.0	67.0
10	4.60	0.01	7.60		404.0	67.0
11	4.50	0.03	7.42		404.0	65.0
12	4.40	0.01	7.09		404.0	65.0
13	4.40	0.01	7.07		402.0	64.0
14	4.30	0.01	6.38		400.0	66.0
15	4.20	0.01	7.22		400.0	65.0
16	4.10	0.01	7.42		401.0	64.0
17	4.00	0.01	7.66		401.0	64.0
18	3.90	0.01	6.87		399.0	65.0

19	3.80	0.01	6.57		397.0	65.0
20	3.70	0.01	6.39		395.0	65.0
21	3.60	0.01	7.55		397.0	66.0
22	3.50	0.01	7.18		398.0	66.0
23	3.40	0.01	7.23		397.0	64.0
24	3.30	0.01	7.58		398.0	64.0
25	3.20	0.01	7.35		399.0	64.0
26	3.10	0.01	8.15		401.0	64.0
27	3.00	0.01	8.00		402.0	65.0
28	3.00	0.01	6.63		401.0	64.0
29	2.90	0.01	6.67		398.0	65.0
30	2.80	0.02	6.31		396.0	65.0
31	2.70	0.01	7.11		397.0	65.0
32	2.60	0.01	7.28		398.0	65.0
33	2.50	0.01	7.35		398.0	65.0
34	2.40	0.02	7.27		398.0	65.0
35	2.30	0.01	7.32		398.0	65.0
36	2.20	0.01	7.25		399.0	66.0
37	2.10	0.01	7.15		399.0	66.0
38	2.00	0.01	7.22		399.0	65.0
39	1.90	0.02	6.81		398.0	65.0
40	1.80	0.04	7.86		400.0	65.0
41	1.70	0.02	6.96		399.0	65.0
42	1.70	0.02	7.06		398.0	65.0
43	1.60	0.02	7.03		397.0	65.0
44	1.50	0.01	7.92		399.0	65.0
45	1.40	0.01	7.90		401.0	65.0
46	1.30	0.01	7.73		401.0	65.0
47	1.20	0.02	6.94		401.0	65.0
48	1.10	0.02	7.48		401.0	66.0
49	1.00	0.02	7.42		401	66
50	0.90	0.03	6.58		398	65
51	0.80	0.02	6.1		396	66
52	0.70	0.01	6.2		395	66
53	0.60	0.01	7.31		397	65
54	0.50	0.01	7.38		398	65
55	0.40	0.02	7.39		398	65
56	0.30	0.02	7.27		399	65
57	0.30	0.01	7.13		397	65

58	0.20	0.03	7.11		397	65
59	0.10	0.01	7.23		398	65
60	0.00	0.01	7.18		398	65

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 10/25/23
Run: 3
Control #: 2470
Test Duration: 60
Output Category: High

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	73.5%	79.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74%	79.7%

Output Rate (kJ/h)	35,054	33,252	(Btu/h)
Burn Rate (kg/h)	2.43	5.36	(lb/h)
Input (kJ/h)	47,688	45,237	(Btu/h)

Test Load Weight (dry kg)	2.43	5.36	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	2.63		
CO (g)	5		
Test Duration (h)	1.00		

	Particulate	CO
Emissions g/MJ Output	0.08	0.16
g/kg Dry Fuel	1.08	2.25
g/h	2.63	5.46
lb/MM Btu Output	0.17	0.36

Air/Fuel Ratio (A/F)	15.18
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 10/25/2023

Run: 3

Control #: 2470

Test Duration: 120

Output Category: Medium

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.34
Load Weight (lb wet): 6.60
Burn Rate (dry kg/h): 1.43
Total Particulate Emissions: 0 g

Fuel Data

HHV 19,620 kJ/kg
%C 50
%H 6.6
%O 42.85
%Ash 0.55

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

Averages 0.73 7.00 #DIV/0! 236.84 64.95
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	6.60	0.01	7.18		398.0	65.0
1	6.50	0.01	7.30		397.0	66.0
2	6.40	0.01	6.10		392.0	66.0
3	6.40	0.02	4.23		378.0	66.0
4	6.30	0.03	4.02		348.0	66.0
5	6.30	0.02	3.45		322.0	65.0
6	6.30	0.01	2.95		303.0	66.0
7	6.30	0.01	2.83		288.0	65.0
8	6.20	0.01	2.62		275.0	65.0
9	6.20	0.01	2.83		263.0	66.0
10	6.20	0.01	3.63		255.0	66.0
11	6.10	0.01	3.67		248.0	66.0
12	6.10	0.01	4.21		242.0	65.0
13	6.10	0.01	4.46		237.0	65.0
14	6.00	0.02	3.80		232.0	65.0
15	6.00	0.03	3.88		228.0	65.0
16	6.00	0.01	4.55		225.0	66.0
17	6.00	0.01	5.12		222.0	65.0
18	5.90	0.02	6.04		221.0	65.0

19	5.90	0.04	7.12		221.0	66.0
20	5.80	0.04	7.20		221.0	65.0
21	5.70	0.05	7.42		222.0	65.0
22	5.70	0.03	7.18		222.0	65.0
23	5.60	0.24	7.92		223.0	65.0
24	5.60	0.28	7.28		223.0	64.0
25	5.50	0.52	7.41		223.0	65.0
26	5.50	0.61	7.66		223.0	65.0
27	5.40	0.62	7.87		224.0	65.0
28	5.30	0.79	7.88		225.0	65.0
29	5.30	0.95	7.49		225.0	64.0
30	5.20	1.06	7.48		225.0	65.0
31	5.20	0.79	7.57		225.0	64.0
32	5.10	1.30	7.47		225.0	65.0
33	5.00	1.04	7.74		225.0	64.0
34	5.00	1.07	7.72		225.0	64.0
35	4.90	1.10	7.62		226.0	64.0
36	4.90	1.03	7.31		225.0	64.0
37	4.80	1.28	7.41		226.0	65.0
38	4.80	1.22	7.13		225.0	65.0
39	4.70	1.20	7.59		225.0	66.0
40	4.60	1.22	7.87		226.0	65.0
41	4.60	0.97	7.55		226.0	65.0
42	4.50	1.68	7.44		226.0	65.0
43	4.40	1.16	7.44		226.0	65.0
44	4.40	1.09	7.60		226.0	65.0
45	4.30	1.10	7.35		226.0	65.0
46	4.30	1.49	7.64		228.0	65.0
47	4.20	1.32	7.96		228.0	65.0
48	4.10	1.42	7.39		228.0	65.0
49	4.10	1.06	7.37		229	65
50	4.00	0.78	7.79		229	65
51	4.00	0.7	7.45		229	65
52	3.90	0.73	7.74		229	66
53	3.90	0.31	7.56		229	65
54	3.80	0.62	7.91		230	65
55	3.70	0.73	7.56		230	66
56	3.70	0.9	8.28		230	66
57	3.60	0.55	7.54		229	65

58	3.60	0.21	6.88		229	64
59	3.50	0.46	7.3		228	64
60	3.50	0.57	7.18		227	65
61	3.40	0.62	7.67		227	64
62	3.40	0.71	7.53		227	64
63	3.30	0.73	7.39		228	64
64	3.30	0.72	7.18		228	64
65	3.20	0.72	7.08		227	65
66	3.10	1.1	7.78		228	64
67	3.10	0.84	7.81		229	64
68	3.00	0.72	7.65		228	65
69	3.00	0.94	7.57		228	65
70	2.90	0.76	7.63		228	64
71	2.80	0.81	7.68		228	64
72	2.80	0.8	7.37		228	64
73	2.70	0.72	7.2		228	65
74	2.70	0.86	7.72		228	64
75	2.60	0.81	7.61		228	65
76	2.60	0.92	7.12		228	65
77	2.50	0.93	7.33		228	65
78	2.40	0.95	7.56		228	65
79	2.40	1.11	7.8		229	65
80	2.30	0.97	7.74		229	65
81	2.30	1.18	7.34		229	65
82	2.20	1.04	7.46		229	65
83	2.10	1.21	7.8		229	65
84	2.10	0.74	8.01		230	65
85	2.00	0.46	7.5		230	64
86	2.00	0.48	7.56		231	64
87	1.90	0.36	6.87		230	65
88	1.90	0.26	6.81		229	65
89	1.80	0.3	6.76		229	65
90	1.80	0.26	7.09		228	65
91	1.70	0.47	7.08		227	65
92	1.70	0.59	7.54		227	65
93	1.60	0.78	7.34		227	65
94	1.60	0.94	7.26		227	65
95	1.50	1.13	7.57		227	65
96	1.40	0.95	7.76		228	65

97	1.40	0.98	7.59		228	65
98	1.30	0.97	7.64		228	65
99	1.30	1.84	7.25		228	65
100	1.20	1.06	8.08		228	65
101	1.10	0.93	7.65		229	65
102	1.10	1.04	7.2		229	65
103	1.00	0.7	7.02		228	65
104	1.00	0.87	7.34		228	65
105	0.90	0.85	7.72		228	65
106	0.80	0.77	7.44		228	65
107	0.80	1.05	7.32		227	65
108	0.70	1.22	7.41		227	66
109	0.70	1.19	7.5		227	65
110	0.60	1.69	8.31		228	65
111	0.50	1.5	7.48		229	65
112	0.50	1.04	7.32		228	65
113	0.40	0.72	7.2		228	65
114	0.40	0.98	7.5		228	65
115	0.30	0.98	7.35		228	65
116	0.20	1.14	7.82		229	65
117	0.20	1.08	7.76		229	65
118	0.10	1.12	7.54		229	65
119	0.10	0.78	7.33		228	65
120	0.00	0.88	7.44		228	65

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 10/25/23
Run: 3
Control #: 2470
Test Duration: 120
Output Category: Medium

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	76.1%	82.1%
Combustion Efficiency	92.6%	92.6%
Heat Transfer Efficiency	82%	88.6%

Output Rate (kJ/h)	21,393	20,293	(Btu/h)
Burn Rate (kg/h)	1.43	3.16	(lb/h)
Input (kJ/h)	28,102	26,657	(Btu/h)

Test Load Weight (dry kg)	2.86	6.31	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	0		
CO (g)	306		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.00	7.16
g/kg Dry Fuel	0.00	106.93
g/h	0.00	153.15
lb/MM Btu Output	0.00	16.64

Air/Fuel Ratio (A/F)	14.26
-----------------------------	-------

VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 10/25/2023

Run: 3

Control #: 2470

Test Duration: 180

Output Category: Low

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.34
Load Weight (lb wet): 8.90
Burn Rate (dry kg/h): 1.29
Total Particulate Emissions: 0 g

Fuel Data

HHV	19,620	kJ/kg
%C	50	
%H	6.6	
%O	42.85	
%Ash	0.55	

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

Averages 0.58 6.86 #DIV/0! 212.30 65.07
Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	8.90	0.88	7.44		228.0	65.0
1	8.80	1.02	7.38		228.0	65.0
2	8.80	1.12	7.79		229.0	65.0
3	8.70	0.76	7.30		228.0	66.0
4	8.70	0.60	6.69		228.0	66.0
5	8.60	0.46	6.81		227.0	66.0
6	8.60	0.33	6.71		226.0	65.0
7	8.50	0.29	6.62		226.0	66.0
8	8.50	0.11	6.37		225.0	66.0
9	8.40	0.12	6.46		224.0	65.0
10	8.40	0.13	6.27		223.0	66.0
11	8.40	0.09	5.92		222.0	66.0
12	8.30	0.13	6.16		221.0	65.0
13	8.30	0.08	5.84		219.0	65.0
14	8.20	0.12	5.78		219.0	66.0
15	8.20	0.11	5.80		217.0	65.0
16	8.20	0.09	6.08		216.0	65.0
17	8.10	0.15	6.28		215.0	65.0
18	8.10	0.12	6.11		215.0	65.0

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

19	8.00	0.16	6.66		214.0	65.0
20	8.00	0.14	6.52		214.0	65.0
21	7.90	0.16	6.20		213.0	65.0
22	7.90	0.18	6.20		213.0	65.0
23	7.90	0.17	6.04		212.0	65.0
24	7.80	0.34	6.43		212.0	65.0
25	7.80	0.27	5.95		211.0	65.0
26	7.70	0.21	6.13		211.0	65.0
27	7.70	0.09	5.75		210.0	64.0
28	7.60	0.10	5.90		209.0	65.0
29	7.60	0.22	5.96		207.0	65.0
30	7.60	0.40	5.99		207.0	65.0
31	7.50	0.59	6.09		206.0	65.0
32	7.50	0.59	6.59		206.0	65.0
33	7.40	0.77	6.66		205.0	65.0
34	7.40	0.51	7.26		205.0	65.0
35	7.30	0.82	6.86		206.0	65.0
36	7.30	1.40	6.95		206.0	65.0
37	7.20	1.38	7.01		206.0	64.0
38	7.10	1.24	7.79		208.0	66.0
39	7.10	1.16	7.51		208.0	66.0
40	7.00	1.36	7.49		209.0	65.0
41	7.00	1.32	7.88		210.0	65.0
42	6.90	1.66	7.50		211.0	65.0
43	6.80	1.33	7.42		211.0	65.0
44	6.80	1.13	6.87		211.0	65.0
45	6.70	0.83	7.21		212.0	65.0
46	6.70	0.71	6.86		212.0	66.0
47	6.60	0.73	7.02		212.0	66.0
48	6.60	0.69	6.87		212.0	66.0
49	6.50	0.45	6.75		212	65
50	6.50	0.48	6.47		212	66
51	6.40	0.43	6.63		211	66
52	6.40	0.32	6.58		211	65
53	6.30	0.4	6.66		211	66
54	6.30	0.53	6.59		210	66
55	6.20	0.27	6.54		210	66
56	6.20	0.55	6.86		210	66
57	6.10	0.65	7.26		210	64

58	6.10	0.68	7.19		210	65
59	6.00	0.55	7.05		210	64
60	6.00	0.45	6.72		210	64
61	6.00	0.29	6.75		209	64
62	5.90	0.23	6.59		209	64
63	5.90	0.42	6.59		208	64
64	5.80	0.43	6.9		208	64
65	5.80	0.62	7.07		208	64
66	5.70	0.75	7.49		210	64
67	5.70	0.65	7.49		210	65
68	5.60	0.65	7.24		210	64
69	5.60	0.87	7.18		210	65
70	5.50	1.17	6.81		210	65
71	5.40	1.33	7.32		211	65
72	5.40	1.03	7.29		212	65
73	5.30	1.23	7.32		212	65
74	5.30	0.56	7.39		212	65
75	5.20	0.67	7.24		212	65
76	5.20	0.89	6.78		213	65
77	5.10	0.69	7.11		213	65
78	5.10	0.56	6.33		212	65
79	5.00	0.28	6.81		212	65
80	5.00	0.49	6.9		212	65
81	4.90	0.59	7		211	65
82	4.90	0.75	7.22		212	65
83	4.80	0.67	7.04		211	65
84	4.80	0.29	7.08		212	65
85	4.70	0.41	6.72		212	65
86	4.70	0.25	6.65		212	65
87	4.60	0.21	6.35		211	65
88	4.60	0.24	6.26		210	65
89	4.50	0.19	6.79		210	65
90	4.50	0.41	6.4		209	65
91	4.50	0.76	6.52		208	65
92	4.40	0.66	6.7		208	65
93	4.30	1.2	7.05		209	65
94	4.30	0.73	7.34		209	65
95	4.20	0.87	7.04		210	65
96	4.20	0.7	7.04		210	65

97	4.10	1.34	6.81		209	65
98	4.10	1.19	7.79		210	65
99	4.00	1.44	7.37		210	65
100	3.90	1.13	7.3		210	65
101	3.90	1.36	6.93		210	65
102	3.80	1.4	7.34		211	65
103	3.80	1.84	7.7		211	65
104	3.70	1.68	7.58		212	65
105	3.60	1.24	8.1		213	65
106	3.60	0.69	7.87		214	65
107	3.50	0.56	7.26		215	65
108	3.50	0.48	7.19		215	65
109	3.40	0.4	7.37		216	65
110	3.40	0.41	7.01		216	65
111	3.30	0.2	6.67		216	65
112	3.30	0.22	6.54		215	66
113	3.30	0.1	6.55		215	66
114	3.20	0.16	6.37		214	65
115	3.20	0.13	6.59		214	65
116	3.10	0.13	6.82		213	65
117	3.10	0.11	7.12		214	66
118	3.00	0.2	6.88		214	66
119	3.00	0.36	7.32		214	67
120	2.90	0.37	7.11		214	66
121	2.90	0.31	6.98		215	66
122	2.80	0.39	7.28		215	66
123	2.80	0.31	6.78		214	65
124	2.70	0.24	6.44		214	65
125	2.70	0.45	6.76		213	64
126	2.60	0.39	6.48		213	64
127	2.60	0.35	6.77		212	64
128	2.50	0.39	6.77		212	65
129	2.50	0.41	7.03		211	65
130	2.50	0.23	6.52		210	65
131	2.40	0.23	6.67		210	64
132	2.40	0.41	6.63		210	64
133	2.30	0.73	7.43		211	65
134	2.30	0.85	7.35		212	65
135	2.20	0.57	7.19		212	65

136	2.20	0.67	7.11		212	65
137	2.10	0.49	6.71		212	65
138	2.10	0.47	6.59		211	65
139	2.00	0.35	6.54		211	65
140	2.00	0.28	6.52		211	65
141	1.90	0.47	6.89		210	65
142	1.90	0.46	6.67		210	65
143	1.80	0.36	7.15		211	65
144	1.80	0.41	6.69		211	65
145	1.70	0.22	6.62		212	65
146	1.70	0.28	6.91		212	65
147	1.60	0.15	6.7		212	65
148	1.60	0.61	6.5		211	65
149	1.50	0.38	6.78		211	65
150	1.50	0.13	6.28		210	65
151	1.50	0.24	6.43		210	66
152	1.40	0.14	6.5		210	65
153	1.40	0.18	6.09		209	65
154	1.30	0.38	6.69		208	65
155	1.30	0.42	6.92		208	65
156	1.20	0.53	6.5		208	65
157	1.20	0.73	6.77		207	65
158	1.10	0.81	7.59		208	65
159	1.10	0.46	7.69		209	65
160	1.00	0.85	7.35		209	65
161	1.00	0.73	7.35		209	65
162	0.90	1.17	6.67		209	65
163	0.90	1.05	7.18		210	65
164	0.80	1.21	7.36		210	65
165	0.70	1.29	8.37		212	65
166	0.70	1.34	7.35		213	65
167	0.60	1.33	7.28		213	65
168	0.60	0.71	7.45		214	65
169	0.50	0.41	7.01		214	65
170	0.50	0.49	6.81		214	65
171	0.40	0.6	6.43		213	65
172	0.40	0.33	6.61		213	65
173	0.30	0.25	7.14		213	65
174	0.30	0.38	7.03		213	65

175	0.20	0.67	7.06		214	65
176	0.20	0.58	6.86		213	65
177	0.10	0.59	6.73		212	65
178	0.10	0.55	6.78		212	65
179	0.00	0.42	6.87		212	65
180	0.00	0.29	6.72		212	65

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 10/25/23
Run: 3
Control #: 2470
Test Duration: 180
Output Category: Low

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	78.4%	84.5%
Combustion Efficiency	93.7%	93.7%
Heat Transfer Efficiency	84%	90.2%

Output Rate (kJ/h)	19,801	18,783	(Btu/h)
Burn Rate (kg/h)	1.29	2.84	(lb/h)
Input (kJ/h)	25,263	23,965	(Btu/h)

Test Load Weight (dry kg)	3.86	8.51	dry lb
MC wet (%)	4.34		
MC dry (%)	4.54		
Particulate (g)	0		
CO (g)	351		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.00	5.90
g/kg Dry Fuel	0.00	90.79
g/h	0.00	116.90
lb/MM Btu Output	0.00	13.72

Air/Fuel Ratio (A/F)	14.78
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VERSION:

2.4

4/15/2010

Test Run Sheets and Tare Sheets

ASTM E2779 Pellet Heater Run Sheets

Client Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 3
 Model: P43-C Tracking Number: 2470 Date: 10/25/2023
 Test Crew: Tony Tong
 OMNI Equipment ID numbers: _____

Pellet Heater Supplemental Data

Start Time: 10:43 Booth #: 1
 Stop Time: 16:43

Stack Gas Leak Check:

Initial: Final:

Sample Train Leak Check:

A: 0.002 @ 17.08" Hg
 B: 0.001 @ 18.54" Hg

Before:

A: 0.002 @ 17.20" Hg
 B: 0.001 @ 19.03" Hg
 A₁: 0.000 @ 23.80" Hg

Calibrations: Span Gas

CO₂: 16.84 CO: 4.38

CO: 500 ppm

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>9:37</u>	<u>9:40</u>	<u>17:15</u>	<u>17:17</u>
CO ₂ %	<u>0.00</u>	<u>16.84</u>	<u>0.00</u>	<u>16.91</u>
CO %	<u>0.00</u>	<u>4.39</u>	<u>0.00</u>	<u>4.39</u>
CO ppm	<u>0.0</u>	<u>494</u>	<u>0.0</u>	<u>496</u>

Air Velocity (ft/min): Initial: <50 Final: 15

Scale Audit (lbs): Initial: 10 Final: 10

Pitot Tube Leak Test: Initial: good Final:

Stack Diameter (in): 3

Induced Draft: 0.000

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 10/19/23 Initials: TT

	Initial	Middle	Ending
P _b (in/Hg)	<u>29.99</u>	<u>29.94</u>	<u>30.00</u>
Ambient (°F)	<u>65</u>	<u>65</u>	<u>65</u>

Tunnel Traverse			
	Microtector Reading	dP (in H ₂ O)	T(°F)
1	<u>0.035</u>	<u>0.070</u>	<u>94</u>
2	<u>0.045</u>	<u>0.090</u>	<u>94</u>
3	<u>0.046</u>	<u>0.080</u>	<u>94</u>
4	<u>0.030</u>	<u>0.060</u>	<u>94</u>
1	<u>0.028</u>	<u>0.056</u>	<u>94</u>
2	<u>0.045</u>	<u>0.090</u>	<u>94</u>
3	<u>0.046</u>	<u>0.092</u>	<u>94</u>
4	<u>0.035</u>	<u>0.070</u>	<u>94</u>
Center:			
	<u>0.049</u>	<u>0.098</u>	<u>94</u>
Static:			
	<u>0.36</u>	<u>0.38</u>	<u>0.36</u>

Background Filter Volume: 57.274 ft³

Technician Signature: Tony Tong
 Control No. P-SFDL-0001, Effective Date: 6/8/2015

Date: 10/25/23 Page 2 of 3

Client Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 3

Model: P43-C Tracking Number: 2470 Date: 10/25/2023

Test Crew: Tony Tong

OMNI Equipment ID numbers: _____

Pellet Heater Run Notes

Air Control Settings

High Burn Rate Target: Maximum

Settings: Feed rate: 4.17 on screen
Temp Dial: full clockwise, 7 on screen
Mode selector: high on Constant Burn

Medium Burn Rate Target: <50% of Maximum

Settings: Feed rate: 2.15 on screen
Temp dial: 1.53 on screen
Mode selector: Medium

Low Burn Rate Target: Feed rate:

Settings: 1.33 on screen
Temp dial: full center
clockwise, 1.00 on screen
Mode selector: low on Constant Burn.

Additional Settings Notes:

Preburn Notes

Time	Notes
9:12	Preburn started at high burn setting
10:40	Replaced draft probe

Test Notes

Time	Notes
10:43	Started sampling at high burn setting
11:43	Turned high burn to medium burn and stopped 1st burn sampling
13:43	Medium burn changed to low burn
16:43	Test completed

Pellet Moisture Content: 4.34% WB
4.54% DB

Technician Signature: Tony Tong
 Control No. P-SFDL-0001, Effective Date: 6/8/2015

Date: 10/25/23
 Page 1 of 3

ASTM E2779 Pellet Heater Run Sheets

Client Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 3

Model: P43-C Tracking Number: 2470 Date: 10/25/2023

Test Crew: Tony Tong

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

Tony Tong

Date/Time in Dessicator:

10/25/23 17:00

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>10/30/23 13:10</u>	Date/Time: <u>10/31/23 8:30</u>	Date/Time: <u>11/01/23 9:00</u>	Date/Time:	Date/Time:
R/H %: <u>15.3</u>	R/H %: <u>13.9</u>	R/H %: <u>13.3</u>	R/H %:	R/H %:
Temp: <u>68.7</u>	Temp: <u>67.4</u>	Temp: <u>67.9</u>	Temp:	Temp:
200 mg Audit: <u>200.1</u>	200 mg Audit: <u>200.1</u>	200 mg Audit: <u>200.1</u>	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2000.3</u>	2 g Audit: <u>2000.3</u>	2 g Audit: <u>2000.3</u>	2 g Audit:	2 g Audit:
100 g Audit: <u>99997.9</u>	100 g Audit: <u>99997.9</u>	100 g Audit: <u>99998.0</u>	100 g Audit:	100 g Audit:
Initials: <u>TT</u>	Initials: <u>TT</u>	Initials: <u>TT</u>	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	F101	124.5	126.4	126.4			
	Rear Filter	F102	124.6	124.6	124.6			
	Probe	82	116286.1	116286.1	116286.1			
	O-Ring Set	S589	4093.2	4093.5	4093.4			
A	Front Filter	F103	122.2	130.4	130.4			
	Rear Filter	F104	125.1	124.5	124.4			
	Probe	71	117765.8	117765.8	117765.8			
	O-Ring Set	S590	4125.3	4126.1	4125.9			
B	Front Filter	F105	121.8	130.1	130.1			
	Rear Filter	F106	124.5	124.5	124.5			
	Probe	79	118145.0	118145.0	118145.0			
	O-Ring Set	S592	3370.9	3371.5	3371.1	3371.1		
BG	Filter	F107	121.7	121.7	121.7			

Technician Signature: Tony Tong
Control No. P-SFDL-0001, Effective Date: 6/8/2015

Date: 11/01/23
Page 3 of 3

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

Prepared By: Tomy Tomy Balance ID #: 50637 Thermohygrometer ID #: 50709 Audit Weight ID #/Mass: 002834 1200 mg

Placed in Dessicator:
 Date: 10/09/23
 Time: 15:30

ID #	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: <u>10/11/23</u> Time: <u>8:40</u> RH %: <u>22.7</u> T (°F): <u>70.4</u> Audit: <u>200.0</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
F101	124.6	124.5	-	-	10/25/23	0135P5023E	3
F102	124.7	124.6	-	-		REV002	
F103	122.2	123.2	-	-			
F104	125.1	125.1	-	-			
F105	122.0	121.8	-	-			
F106	124.6	124.5	-	-			
F107	121.7	121.7	-	-			
F108	122.3	122.3	-	-	11-01-2023	0028W5140E	2
F109	125.2	125.1	-	-			
F110	124.8	124.8	-	-			
F111	122.1	122.2	-	-			
F112	124.5	124.5	-	-			
F113	123.0	123.0	-	-			
F114	125.1	124.9	-	-			
F115	123.1	123.0	-	-			
F116	125.3	125.3	-	-	11-01-2023	0028W5140E	2
F117	122.8	122.8	-	-			
F118	124.6	124.6	-	-			
F119	122.3	122.4	-	-			
F120	124.6	124.7	-	-			

Final Technician Signature: Tomy Tomy Date: 10/11/2023
 Control No. P-SFDP-0002.xls, Effective Date: 2/1/2017
 Evaluator signature: [Signature]

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

Prepared By: Termy Terry Balance ID #: 00637 Thermohyrometer ID #: 00709 Audit Weight ID#/Mass: 00283A 1.00g

Placed in Desiccator: _____ Date: 10/10/23 Time: 15:20 RH %: 20.6 T (°F): 72.8 Audit: 99997.9

ID #	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: <u>10/11/23</u> Time: <u>9:00</u> RH %: <u>22.7</u> T (°F): <u>70.4</u> Audit: <u>99997.9</u>	Date: <u>10/12/23</u> Time: <u>10:40</u> RH %: <u>20.6</u> T (°F): <u>70.8</u> Audit: <u>99997.9</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
23	114076.9	114076.7	114339.6		10-2-2023	00280251405	3
15	116340.4	116286.2	116286.1		N/A used		
82	117371.4	117371.2			10/25/23	0135PS023E Rev 002	3
69	114399.7	114399.6			11-02-2023	00280251405	3
18	115950.4	115950.3					
72	114185.7	114185.2	114185.0		11-02-23	00280251405	29
11	114149.9	114149.7			10-11-01-23	00280251405	2
38	117766.2	117765.9	117765.8		10/25/23	0135PS023E	3
71	118145.4	118145.0	118145.0			REV 002	
79	117079.9	117079.5	117079.4				
65	114254.5	114254.4			11-01-2023	00280251405	2
20	114341.0	114340.7	114340.5				
22	114547.6	114547.2	114547.0		11-01-2023	00280251405	2
14							

Initials: TT Initials: TT Initials: TT Initials: _____

Final Technician Signature: Termy Terry Date: 10/12/23 Evaluator signature: [Signature]
 Control No. P-SFDP-0002.xls, Effective date: 2/1/2017

Tare Sheet: (check one)

Probes

47mm Filters

100mm Filters

O-Ring Pair

Prepared By: Terry Tong

Balance ID #: 00637

Thermohyrometer ID #: 00709

Audit Weight ID #/Mass: 00283A15g

Placed in Dessicator:
Date: 06/29/13
Time: 13:00

Date: 10/09/23
Time: 14:30
RH %: 21.9
T (°F): 74.3
Audit: 5000.0

Date: 10/10/23
Time: 15:40
RH %: 20.6
T (°F): 72.8
Audit: 5000.1

Date: 10/11/23
Time: 9:35
RH %: 19.1
T (°F): 71.7
Audit: 5000.1

Date: _____
Time: _____
RH %: _____
T (°F): _____
Audit: _____

ID #	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
S589	4093.4	4093.2			10/25/23	0135PS003E REV02	3
S590	4125.3	4125.3					
S591	3422.6	3422.3	3422.4		Not used		
S592	3371.2	3370.9	3370.9		10/25/23	0135PS003E REV02	3
S593	3370.8	3370.8			11-03-2023	0028WS140E	5
S594	3372.5	3372.5					
S595	3373.4	3373.2					
S596	3424.6	3424.3	3424.2		10-31-23	0028WS140E	1
S597	3440.4	3440.3					
S598	3434.3	3434.3					
S599	3327.8	3327.8					
S600	3372.8	3372.8			11-01-2023	0028WS140E	2

Initials: TT

Initials: TT

Initials: TT

Initials: _____

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

Date: 10/11/2023

Evaluator signature: H. J. Morgan

5. Quality Assurance/Quality Control

OMNI's Quality Statement

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:

- 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 P43-C at Hearth and Home Technologies, LLC. 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.

Equipment Calibrations

ID #	Lab Name/Purpose	Log Name	Attachment Type
255	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate (07/06/2021)
185	Platform Scale	WI-127	Calibration Certificate (09/01/2022), (09/07/2023)
209	Mercury Barometer	Mercury Barometer	Photo (11/02/2023)
283A	Audit Weights	Troemner 21pc Msas Set	Calibration Certificate (10/26/2018) (10/24/2023)
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023), (09/18/2023)
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023), (09/18/2023)
371	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (04/27/2023) (09/14/2023)
372	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (05/01/2023) (09/14/2023)
410	Microtector	Dwyer Microtector	Calibration Certificate (04/06/2023)
721	Dwyer Anemometer	Dwyer Anemometer	Calibration Certificate (12/05/2022)
709	RH-81 Humidity Meter	RH-81 Humidity Meter	Calibration Log (03/06/2023)
594	Combustion Gas Analyzer	CAI Gas Analyzer	See Run Sheet (VBU)
637	Milligram Balance	Analytical Balance - Mettler - Toledo	Calibration Certificate (08/10/2023)

Certificate of Calibration

Certificate Number: 749605



JJ Calibrations, Inc.

7724 SE Aspen Summit Drive
Portland, OR 97266-9217
Phone 503.786.3005
FAX 503.786.2994

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

PO: 210356
Order Date: 05/28/2021
Authorized By: N/A



Property #: OMNI-00255
User: N/A
Department: N/A
Make: Rice Lake
Model: 10 Lbs. (Class F)
Serial #: OMNI-00255
Description: Mass
Procedure: DCN 500901
Accuracy: Class F (± 450 mg)

Calibrated on: 07/06/2021
*Recommended Due: 07/06/2026
Environment: 20 °C 52 % RH
* As Received: Within Tolerance
* As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 126

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.

This mass meets class F specifications.
Received/returned without accessories.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
256A	Rice Lake	W0133K	Mass Set,	09/18/2022	741788
484A	Rice Lake	1kg-10kg (Class ASTM 1)	Mass Set,	07/02/2023	748551
550A	And (A&D) Co.	HP-30K	Balance 30 Kg	12/31/2021	739307

Parameter

Measurement Data

Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = \bar{U}
Mass								
10 Lbs.		g	4535.92400000	4535.47400000	4536.3740000	0.2288327	4536.1528327 g	3.5E-01 \bar{U}

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to either the SI or to National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NC SL Z540-1-1994, ISO/IEC 17025-2017, 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 stated in the comments, certificates reflect the "Simple Acceptance Rule" as specified by JCGM 106:2012. 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 written approval of JJ Calibrations.

Reviewer

3 Issued 07/08/2021

Rev # 15

Inspector



QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH 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: OMNE03005547220901

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Weigh-Tronix	WI-127 1000x0.1lb	005547	185	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
lbs	0.1	QC033	9/1/22	9/21/21	9/2023

FUNCTIONAL CHECKS

SHIFT TEST		LINEARITY		REPEATABILITY		ENVIRONMENTAL CONDITIONS		
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
500	0.5	HB44	HB44	200	0.2	Good	Fair	Poor
As-Found:		As-Found:		As-Found:		Temperature: 23.8°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"/>			
As-Left:		As-Left:		As-Left:				
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	1000.2	1000.2	0.05
700	700.2	700.2	0.05
500	500.1	500.1	0.05
200	200.0	200.0	0.05
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	7/18/22	7/2024	20221688

Permanent Information Concerning this Equipment:

Old s/n 21676

Comments/Information Concerning this Calibration

9/22 RH= 56%.

Report prepared/reviewed by: DC

Date: 9/1/22

Technician: J. Colacchio

Signature:

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

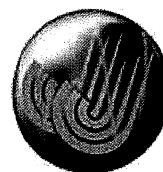
The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of 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. Calibrations comply with ISO/IEC 17025 and ANSI/Z 540-1-1994 quality standards.

Member: National Conference of Standards Laboratories and Weights & Measures



Mercury Barometer

Certificate of Calibration



JJ Calibrations, Inc.

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

Certificate Number: **685888**

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

PO: **180188**
Order Date: **10/09/2018**
Authorized By: **N/A**



Calibrated on: **10/26/2018**
*Recommended Due: **10/26/2023**
Environment: **20 °C 57 % RH**
* As Received: **Within Tolerance**
* As Returned: **Within Tolerance**
Action Taken: **Calibrated**
Technician: **139**

Property #: **OMNI-00283A**
User: **N/A**
Department: **N/A**
Make: **Troemner Inc**
Model: **1mg-100g (Class F)**
Serial #: **47883**
Description: **Mass Set, 21pc**
Procedure: **DCN 500901**
Accuracy: **Class F**

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.

This set meets Class F specifications.
Received and returned eight (8) masses in a black case secured by a rubber band.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
723A	Rice Lake	1mg-200g (Class 0)	Mass Set,	03/23/2019	668240
800A	Sartorius	MSA225W100DI	Analytical Balance	12/11/2018	663857

Measurement Data

Parameter	Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = ✓
Mass								
Dot	200 mg	200.00030	199.4603	200.5403	0.0500	200.0503 mg	6.2E-01	✓
	1 g	1.0000880	0.9991088	1.0009088	0.0000000	1.000088 g	1E-03	✓
	2 g	2.00001470	1.9989147	2.0011147	0.0003250	2.0003397 g	1.3E-03	✓
	5 g	5.00000840	4.9985084	5.0015084	0.0000400	4.9999684 g	1.7E-03	✓
	10 g	10.0000100	9.998010	10.002010	0.000245	9.999765 g	2.3E-03	✓
Dot	20 g	20.0000140	19.996014	20.004014	0.000990	20.001004 g	4.6E-03	✓
	50 g	49.9999660	49.989966	50.009966	0.000595	49.999371 g	1.1E-02	✓
	100 g	100.000000	99.98000	100.02000	0.00194	99.99806 g	2.3E-02	✓

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 10/29/2018 Rev # 15


Inspector

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453



Certificate/SO Number: 19-E6W3O-20-1 Revision 0

Manufacturer: Troemner/Talboys
Model Number: 100 g - 200 mg
Description: Weight Set, 8 Pcs, Class F
Serial Number: 47883
ID: OMNI-00283A

As-Found: In Tolerance
As-Left: In Tolerance

Issue Date: Oct 24, 2023
Calibration Date: Oct 24, 2023
Due Date: Oct 24, 2028

Calibrated To: Manufacturer Specification
Calibration Procedure: 6-AC11601-3

Transcat Calibration Laboratories have been audited and found in compliance with ISO/IEC 17025:2017. Accredited calibrations performed within the Lab Scope of Accreditation are indicated by the presence of the Accrediting Body Logo and Certificate Number. Any measurements on an accredited calibration not covered by the Lab Scope of Accreditation are listed in the notes section of the certificate. SCC, NRC, CLAS or ANAB do not guarantee the accuracy of an individual calibration by accredited laboratories.

Transcat calibrations, as applicable, are performed in compliance with the requirements of the Transcat Quality Manual QAC-P01-000, the customer Purchase Order and/or Quality Agreement requirements, ISO 9001:2015, ANSI/NCSL Z540.1-1994 (R2002), and ISO 10012:2003, as applicable. When specified contractually, the requirements of ISO TS16949:2009, 10CFR21, 10CFR50 App. B, ASME NQA-1:2012, and ANSI/NCSL Z540.3-2006 (R2013) are also covered.

Complete records of work performed are maintained by Transcat and are available for inspection. Laboratory standards used in the performance of this calibration are listed on this certificate.

Transcat documents the traceability of measurements to the SI units through the National Institute of Standards and Technology (NIST), or the National Research Council of Canada (NRC), or other national measurement institutes (NMI) that are signatories to the CIPM Mutual Recognition Arrangement, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus standards or ratio type measurements. Documentation supporting traceability information is available for review upon written request at a Transcat facility. The measured quantity and the measurement uncertainty are required for further dissemination of traceability.

Uncertainties are reported with a coverage factor $k=2$, providing a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4:1 or better (3:1 for mass calibrations), unless otherwise noted. The Test Uncertainty Ratio (TUR) is calculated in accordance with NCSL International RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm³.

The results in this report relate only to the item calibrated or tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental conditions noted. The determination of compliance to the specification is specific to the model/serial no./ID no. referenced above based on the tolerances shown; these tolerances are either the original equipment manufacturers (OEM's) warranted specifications or the client's requested specifications. Any number of factors can cause a unit to drift out of tolerance at any time following its calibration. Limitations on the uses of this instrument are detailed in the OEM's operating instructions. This certificate may not be reproduced except in full, without the written approval of Transcat. Additional information, if applicable may be included on separate report(s).

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453



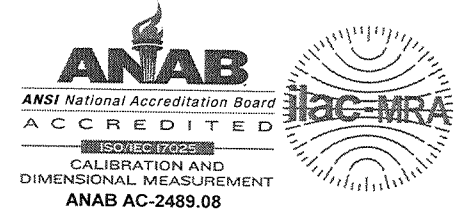
Certificate/SO Number: 19-E6W3O-20-1 Revision 0

As Found/As Left Data

Description	Setpoints	Accuracy	Low Limit	High Limit	As Found / As Left	O O T	Cal Process Uncertainty (k=2; ±)	Measurement Uncertainty (k=2; ±)	Units	TUR
Test Environment Ambient Temperature - W1										
Ambient Temperature					20.000 °C					
Test Environment Ambient Relative Humidity - W1										
Relative Humidity					40.00 %RH					
Test Environment Barometric Pressure - W1										
Barometric Presssure					29.751 "Hg@0°C					
Mass Measurement - W1										
	100.0000g	±(0.02 g)	99.9800	100.0200	99.9982 g		0.00025	0.00025	g	80.0 : 1
Mass Measurement - W2										
	50.0000g	±(0.01 g)	49.9900	50.0100	49.9994 g		0.00015	0.00015	g	66.7 : 1
Mass Measurement - W3										
	20.0000g	±(0.004 g)	19.9960	20.0040	20.0010 g		0.000087	0.000087	g	46.0 : 1
Mass Measurement - W4										
	10.0000g	±(0.002 g)	9.9980	10.0020	9.9998 g		0.000062	0.000062	g	32.3 : 1
Mass Measurement - W5										
	5.000000g	±(0.001501 g)	4.998499	5.001501	4.999870 g		0.000045	0.000045	g	33.4 : 1
Mass Measurement - W6										
	2.000000g	±(0.001122 g)	1.998878	2.001122	2.000407 g		0.000032	0.000032	g	35.1 : 1
Mass Measurement - W7										
	1.00000g	±(0.0009 g)	0.99910	1.00090	1.00011 g		0.000025	0.000025	g	36.0 : 1
Mass Measurement - W8										
	200.0000mg	±(0.5395 mg)	199.4605	200.5395	200.0602 mg		0.0047	0.0047	mg	100.0 : 1

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453

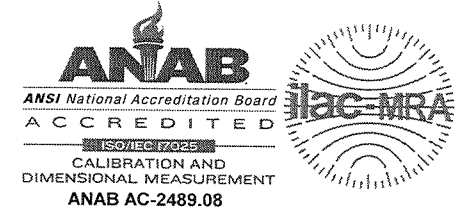


Certificate/SO Number: 19-E6W3O-20-1 Revision 0

Field not applicable.

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453



Certificate/SO Number: 19-E6W3O-20-1 Revision 0

Traceable Standards

Asset	Manufacturer	Model Number	Description	Cal Date	Due Date	Traceability Number	Use
19-321	Fluke	2626-H	Hygro-Thermometer, Probe,	31-May-23	31-Mar-24	19-&19-321-22-1	AF/AL
19-Mass3	Transcat	Echelon III	Transfer Mass Standard Set	23-Oct-23	23-Nov-23	19-&19-Mass3-99-1	AF/AL
19-P100	Troemner	7210-1	Weight Set, 5 kg to 1 g, Class 1	4-Oct-23	31-Oct-24	19-&19-P100-19-1	AF/AL
19-P126	Druck Inc.	DPI 740 (22 to 34 inHg)	Barometer	22-Mar-23	31-Mar-24	19-&19-P126-17-1	AF/AL
19-P129	Mettler Toledo	XPE2004SC	Comparator Balance	25-Oct-22	31-Oct-23	19-&19-P129-15-1	AF/AL
19-P142	Mettler Toledo	UMX5	Micro Balance	25-Oct-22	31-Oct-23	19-&19-P142-13-1	AF/AL

The use of the standard is defined as: AF - used for as-found readings, AL - used for as-left readings.

Environmental Data

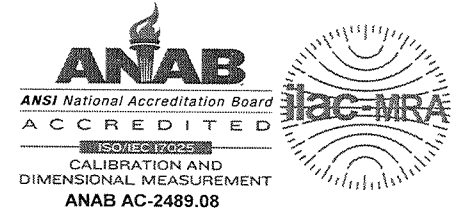
Temperature	Relative Humidity	Temp/ RH Asset	Lab Area	Lab Description
68.80°F /20.44°C	40.20%	19-321	E2C	Echelon II (10 kg)

Decision Rule

When compliance statements are present, they are reported without factoring in the effects of uncertainty and comply with the guidelines as follows: The acceptance zone is defined as: less than or equal to the high limit, and/or greater than or equal to the low limit. The rejection zones are defined as greater than the high limit and/or less than the low limit. Single measurement results in the acceptance zone are identified as in-tolerance. Single measurement results in the rejection zone are identified as out-of-tolerance (OOT). When all measurement results are in the acceptance zone for repeated measurements, for the same characteristic, the test is identified as in-tolerance. For repeated characteristic measurements, a single measurement result in the rejection zone, will cause the test to be identified as out-of-tolerance (OOT). Data rejection for cause, (outliers) is permitted after the "Determining and Verifying Out Of Tolerance(OOT) and/or Op Fail Readings" procedure outlined in this document has been completed and the anomalous reading cannot be repeated, and the anomalous reading does not represent the system under test. Statements of conformity are binary.

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453



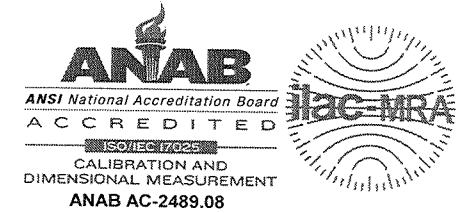
Certificate/SO Number: 19-E6W3O-20-1 Revision 0

Legend

Topic	Description
Accuracy	UUT specification that establishes expected tolerances and a time limit (calibration interval) over which the instrument is expected to hold these tolerances
As Found	Initial measurement results
As Left	Measurement results after adjustment and/or repair
Blank Data Field	Test is not applicable for the UUT
Cal Process Uncertainty (CPU)	The uncertainty of calibration process for the reported measurement result
Calibration Date	Indicates the date that the calibration was completed
Cover Factor (k)	A measure of uncertainty that defines an interval about the measurement result
Due Date	Indicates the end of the calibration cycle as requested by the customer
Issue Date	Indicates the date that the calibration has passed the Data Review Process and was signed by an authorized signatory or the date that a revision to the original certificate has been issued
Low / High Limits	Establishes UUT acceptable performance limits for the test measurement
Measurement Uncertainty	The dispersion of the values attributed to a measured quantity
OOA	Out of Acceptance (#)
OOT	Out of Tolerance (*)
Setpoints	Measurement target values
Traceability	Unbroken chain of comparisons relating an instrument's measurements to a known standard(s)
Traceability Number	Unique identifier(s) used to document traceability of calibration standards
TUR	Test Uncertainty Ratio, ratio of the tolerance or specification of the test measurement in relation to the uncertainty in measurement results
UUT	Unit Under test

Customer: OMNI-TEST LABORATORIES INC
13327 NE AIRPORT WAY
PORTLAND, OR 97230

PO Number: 230453




Certificate/SO Number: 19-E6W3O-20-1 Revision 0


Calibrated At:
1503 E Orangethorpe Ave
Fullerton, CA 92831

Facility Responsible:
1503 E Orangethorpe Ave
Fullerton, CA 92831
800-828-1470

Calibrated By:

 **Electronically Signed By:**
Vianey Manriquez

Reviewed By:

 **Electronically Signed By:**
Cody Viers for

Unit Barcode: 
0900B531163

Vianey Manriquez Oct 24, 2023
Calibration Technician 07:33:18 -04:00

Mathew Bundy Oct 24, 2023
Lab Manager 10:58:21 -04:00

Date Received: October 13, 2023
Service Level : R9

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
1.007

Orifice Meter dH@
N/A

Calibration Date: 04/27/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 10/27/2023
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.19 "Hg
 Signature/Date: Tony Tong / 04/27/2023

Previous Calibration Comparison

Date	<u>10/25/2022</u>	Acceptable Deviation (5%)	Deviation
y Factor	<u>1.004</u>	0.0502	0.003
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	<u>OMNI-00330</u>
	Calib. Date	<u>13-Apr-23</u>
	Calib. Value	<u>1.0017</u> 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	2.00	1.29	1.00
Initial Reference Meter	25.565	31.22	38
Final Reference Meter	30.982	37.935	45.037
Initial DGM	0	0	0
Final DGM	5.354	6.694	7.034
Temp. Ref. Meter (°F), Tr	68.0	68.5	69.1
Temperature DGM (°F), Td	70.0	71.0	71.0
Time (min)	27.0	42.0	50.0
Net Volume Ref. Meter, Vr	5.417	6.715	7.037
Net Volume DGM, Vd	5.354	6.694	7.034
Gas Meter y Factor =	1.012	1.006	1.003
Gas Meter y Factor Deviation (from avg.)	0.005	0.001	0.004
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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

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

** Equations come from EPA Method 5

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer (Flue Draft)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00335

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 03/27/2023

By: Tony Tong

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 – 0.2	0.089	0.091	0.002	0.2
20-40% Max. Range 0.2– 0.4	0.305	0.307	0.002	0.2
40-60% Max. Range 0.4 – 0.6	0.525	0.518	0.007	0.7
60-80% Max. Range 0.6 – 0.8	0.736	0.743	0.007	0.7
80-100% Max. Range 0.8 – 1.0	0.914	0.909	0.005	0.5

*Acceptable tolerance is 4%.

Technician signature: *Tony Tong*

Date: 03/27/2023

Reviewed by: _____

Date: _____

Thermal Metering System Calibration Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 606001
 OMNI Tracking No.: OMNI-00336
 Calibrated Orifice: Yes

**Average Gas Meter y
Factor**
1.015

**Orifice
Meter
dH@**
N/A

Calibration Date: 04/27/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 10/27/2023
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.17 "Hg
 Signature/Date: Tony Tong 104/27/2023

Previous Calibration Comparison

Date	10/25/2022	Acceptable Deviation (5%)	Deviation
y Factor	1.002	0.0501	0.013
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-00330
	Calib. Date	13-Apr-23
	Calib. Value	1.0017 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	2.00	1.00	0.80
Initial Reference Meter	45.723	51.302	56.688
Final Reference Meter	51.24	56.57	62.309
Initial DGM	0	0	0
Final DGM	5.45	5.282	5.638
Temp. Ref. Meter (°F), Tr	69.5	69.6	70.0
Temperature DGM (°F), Td	74.0	78.0	80.0
Time (min)	25.0	33.0	39.0
Net Volume Ref. Meter, Vr	5.517	5.268	5.621
Net Volume DGM, Vd	5.45	5.282	5.638
Gas Meter y Factor =	1.018	1.012	1.016
Gas Meter y Factor Deviation (from avg.)	0.002	0.003	0.000
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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

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

** Equations come from EPA Method 5

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer (ΔP)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00336

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 03/27/2023

By: Tony Tong

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 – 0.2	0.111	0.114	0.003	0.3
20-40% Max. Range 0.2– 0.4	0.308	0.309	0.001	0.1
40-60% Max. Range 0.4 – 0.6	0.458	0.473	0.015	1.5
60-80% Max. Range 0.6 – 0.8	0.726	0.721	0.005	0.5
80-100% Max. Range 0.8 – 1.0	0.927	0.925	0.002	0.2

*Acceptable tolerance is 4%.

Technician signature: *Tony Tong*

Date: 03/27/2023

Reviewed by: _____

Date: _____

**Temperature Calibration
EPA Method 28 R, ASTM 2515**

Booth:		Temperature Monitor Type:			Equipment Number:		
E 1		National Instruments Logger			00335, 00336		
Reference Meter Number: 00373				Calibration Due Date: 10/23/2023			
Calibration Performed By:			Date:	Ambient Temperature(F°):		Barometric Pressure(inHg):	
Tony Tong			03/28/2023	58		29.72	
Input Temp (°F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	0	0	0	0	0	0	0
100	100	100	100	100	100	100	100
300	300	300	300	300	300	300	300
500	500	500	500	500	500	500	500
700	700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000	1000
1500	1500	1500	1500	1500	1500	1500	1500
2000	2000	2001	2001	2000	2000	2000	2000

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	-1	0	0	0	0	0	0	0	-1
100	100	100	100	100	100	100	100	100	100
300	300	300	300	300	300	300	300	300	300
500	500	500	500	500	500	500	500	500	500
700	700	700	700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
2000	2000	2000	2000	2000	2000	2001	2001	2000	2000

Technician Signature: Tony Tong Date: 03/28/2023

Reviewed By: _____ Date: _____

Thermal Metering System Calibration Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 606001
 OMNI Tracking No.: OMNI-000335
 Calibrated Orifice: Yes

**Average Gas Meter y
Factor**
1.016

**Orifice
Meter
dH@**
N/A

Calibration Date: 09/18/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 3/18/2024
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.08 "Hg
 Signature/Date: Tony Tong 09/19/2023

Previous Calibration Comparison

Date	4/27/2023	Acceptable Deviation (5%)	Deviation
y Factor	1.007	0.05035	0.009
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-00330
	Calib. Date	13-Apr-23
	Calib. Value	1.0017 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	2.00	1.26	1.00
Initial Reference Meter	380.314	387.061	393.677
Final Reference Meter	386.864	393.561	400.047
Initial DGM	0	0	0
Final DGM	6.471	6.497	6.39
Temp. Ref. Meter (°F), Tr	76.1	76.6	77.7
Temperature DGM (°F), Td	81.0	86.0	87.0
Time (min)	32.0	40.0	44.0
Net Volume Ref. Meter, Vr	6.550	6.500	6.370
Net Volume DGM, Vd	6.471	6.497	6.39
Gas Meter y Factor =	1.018	1.017	1.013
Gas Meter y Factor Deviation (from avg.)	0.002	0.001	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 Transducer (Draft)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00335

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 09/18/2023

By: Tony Tong

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 – 0.2	0.101	0.103	0.002	0.2
20-40% Max. Range 0.2– 0.4	0.230	0.232	0.002	0.2
40-60% Max. Range 0.4 – 0.6	0.463	0.465	0.002	0.2
60-80% Max. Range 0.6 – 0.8	0.728	0.730	0.002	0.2
80-100% Max. Range 0.8 – 1.0	0.943	0.945	0.002	0.2

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: *Tony Tong*

Date: 09/19/2023

Reviewed by: _____

Date: _____

Thermal Metering System Calibration Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 606001
 OMNI Tracking No.: OMNI-00336
 Calibrated Orifice: Yes

**Average Gas Meter y
Factor**
1.011

**Orifice
Meter
dH@**
N/A

Calibration Date: 09/18/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 3/18/2024
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.06 "Hg
 Signature/Date: Tony Tong 09/19/2023

Previous Calibration Comparison

Date	4/27/2023	Acceptable Deviation (5%)	Deviation
y Factor	1.015	0.05075	0.004
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.002
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *		
Standard	Model	Standard Test Meter
Calibrator	S/N	OMNI-00330
	Calib. Date	13-Apr-23
	Calib. Value	1.0017 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	1.93	0.96	0.75
Initial Reference Meter	401.417	406.87	412.46
Final Reference Meter	406.732	412.324	417.96
Initial DGM	0	0	0
Final DGM	5.292	5.483	5.528
Temp. Ref. Meter (°F), Tr	77.9	78.4	78.3
Temperature DGM (°F), Td	83.0	86.0	88.0
Time (min)	24.0	34.0	38.0
Net Volume Ref. Meter, Vr	5.315	5.454	5.500
Net Volume DGM, Vd	5.292	5.483	5.528
Gas Meter y Factor =	1.011	1.008	1.013
Gas Meter y Factor Deviation (from avg.)	0.000	0.002	0.002
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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* 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 Transducer (ΔP)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00336

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 09/18/2023

By: Tony Tong

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 – 0.2	0.096	0.100	0.004	0.4
20-40% Max. Range 0.2 – 0.4	0.258	0.262	0.004	0.4
40-60% Max. Range 0.4 – 0.6	0.462	0.467	0.005	0.5
60-80% Max. Range 0.6 – 0.8	0.735	0.742	0.007	0.7
80-100% Max. Range 0.8 – 1.0	0.961	0.969	0.008	0.8

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: Tony Tong

Date: 09/19/2023

Reviewed by: _____

Date: _____

**Temperature Calibration
EPA Method 28 R, ASTM 2515**

Booth:		Temperature Monitor Type:			Equipment Number:		
E 1		National Instruments Logger			00335, 00336		
Reference Meter Number: 00373				Calibration Due Date: 10/23/2023			
Calibration Performed By:			Date:	Ambient Temperature(F°):		Barometric Pressure(inHg):	
Tony Tong			09/18/2023	75.2		30.09	
Input Temp (°F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	1	1	1	1	1	0	0
100	101	101	101	101	101	100	100
300	301	301	301	301	301	300	300
500	501	501	501	501	501	500	500
700	701	701	701	701	701	700	700
1000	1001	1001	1001	1001	1001	1001	1001
1500	1501	1501	1501	1501	1501	1501	1501
2000	2002	2002	2002	2001	2002	2001	2001

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	0	0	1	1	1	0
100	100	100	100	100	100	100	101	101	100
300	300	300	300	300	300	301	301	300	300
500	500	500	500	500	500	501	501	501	500
700	700	700	700	700	700	701	701	701	700
1000	1001	1001	1001	1001	1001	1001	1001	1001	1001
1500	1501	1501	1501	1501	1501	1501	1501	1501	1501
2000	2001	2001	2001	2001	2001	2002	2002	2001	2001

Technician Signature: Tony Tong Date: 09/19/2023

Reviewed By: _____ Date: _____

Thermal Metering System Calibration Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 702003
 OMNI Tracking No.: OMNI-00371
 Calibrated Orifice: Yes

Average Gas Meter y Factor
1.014

Orifice Meter dH@
N/A

Calibration Date: 04/27/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 10/27/2023
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.02 "Hg
 Signature/Date: Tony Tong

Previous Calibration Comparison

Date	<u>10/12/2022</u>	Acceptable Deviation (5%)	Deviation
y Factor	<u>0.999</u>	0.04995	0.015
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.007
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *

Standard	Model	Standard Test Meter
Calibrator	S/N	<u>OMNI-00330</u>
	Calib. Date	<u>13-Apr-23</u>
	Calib. Value	<u>1.0017</u> y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
DGM Pressure ("H2O), Pd	<u>3.18</u>	<u>2.28</u>	<u>1.00</u>
Initial Reference Meter	<u>100.065</u>	<u>92.656</u>	<u>74.532</u>
Final Reference Meter	<u>105.438</u>	<u>97.721</u>	<u>79.854</u>
Initial DGM	<u>0</u>	<u>0</u>	<u>0</u>
Final DGM	<u>5.261</u>	<u>5.011</u>	<u>5.324</u>
Temp. Ref. Meter (°F), Tr	<u>67.0</u>	<u>71.8</u>	<u>70.7</u>
Temperature DGM (°F), Td	<u>69.4</u>	<u>75.8</u>	<u>75.0</u>
Time (min)	<u>27.0</u>	<u>31.0</u>	<u>58.0</u>
Net Volume Ref. Meter, Vr	<u>5.373</u>	<u>5.065</u>	<u>5.322</u>
Net Volume DGM, Vd	<u>5.261</u>	<u>5.011</u>	<u>5.324</u>
Gas Meter y Factor =	<u>1.020</u>	<u>1.014</u>	<u>1.007</u>
Gas Meter y Factor Deviation (from avg.)	<u>0.006</u>	<u>0.001</u>	<u>0.007</u>
Orifice dH@	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Orifice dH@ Deviation (from avg.)	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

where:

1. Deviation = |Average value for all runs - current run value|
- ** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* 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 Transducer Flue Draft

Maximum Range: 0 – 1" W.C.

ID Number: OMNI-00371

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 03/23/2023

By: Tony Tong

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 – 0.2	0.178	0.182	0.004	0.4
20-40% Max. Range 0.2 – 0.4	0.230	0.237	0.007	0.7
40-60% Max. Range 0.4 – 0.6	0.475	0.486	0.011	1.1
60-80% Max. Range 0.6 – 0.8	0.780	0.799	0.019	1.9
80-100% Max. Range 0.8 – 1.0	0.921	0.938	0.017	1.7

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: *Tony Tong*

Date: 03/23/2023

Reviewed by: _____

Date: _____

Temperature Calibration EPA Method 28 R, ASTM 2515							
Booth:		Temperature Monitor Type:			Equipment Number:		
Field Test Kit		National Instruments Logger			00371, 00372		
Reference Meter Number: 00373				Calibration Due Date: 10/23/2023			
Calibration Performed By:			Date:	Ambient Temperature(F°):		Barometric Pressure(inHg):	
Tony Tong			03/22/2023	64		29.79	
Input Temp (°F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	-1	0	0	-1	-1	-1	-1
100	99	100	100	99	99	99	99
300	299	299	300	299	299	299	299
500	499	500	500	499	499	499	499
700	699	699	700	699	699	699	699
1000	999	1000	1000	999	999	999	999
1500	1499	1500	1500	1499	1499	1499	1499
2000	1999	2000	2000	1999	1999	1999	1999

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	-1	-1	-1	-1	-1	-1	-1	-1	-1
100	99	99	99	99	99	99	99	99	99
300	299	299	299	299	299	299	299	299	299
500	499	499	499	499	499	499	499	499	499
700	699	699	699	699	699	699	699	699	699
1000	999	999	999	999	999	999	999	999	999
1500	1499	1499	1499	1499	1499	1499	1499	1499	1499
2000	1999	1999	1999	1999	1999	1999	1999	1999	1999

Technician Signature: Tony Tong Date: 03/22/2023

Reviewed By: _____ Date: _____

Thermal Metering System Calibration

Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 702003
 OMNI Tracking No.: OMNI-00371
 Calibrated Orifice: Yes

Average Gas Meter y Factor
1.015

Orifice Meter dH@
N/A

Calibration Date: 09/14/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 3/14/2024
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.08 "Hg
 Signature/Date: Tony Tong / 9/14/2023

Previous Calibration Comparison

Date	<u>4/27/2023</u>	Acceptable Deviation (5%)	Deviation
y Factor	<u>1.014</u>	0.0507	0.001
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.006
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *		
Standard	Model	Standard Test Meter
Calibrator	S/N	<u>OMNI-00330</u>
	Calib. Date	<u>13-Apr-23</u>
	Calib. Value	<u>1.0017</u> y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
DGM Pressure ("H2O), Pd	<u>3.17</u>	<u>2.20</u>	<u>1.00</u>
Initial Reference Meter	<u>343.578</u>	<u>349.273</u>	<u>354.856</u>
Final Reference Meter	<u>349.022</u>	<u>354.658</u>	<u>360.486</u>
Initial DGM	<u>0</u>	<u>0</u>	<u>0</u>
Final DGM	<u>5.329</u>	<u>5.318</u>	<u>5.604</u>
Temp. Ref. Meter (°F), Tr	<u>76.2</u>	<u>76.1</u>	<u>76.7</u>
Temperature DGM (°F), Td	<u>79.0</u>	<u>79.0</u>	<u>80.0</u>
Time (min)	<u>27.0</u>	<u>33.0</u>	<u>52.0</u>
Net Volume Ref. Meter, Vr	5.444	5.385	5.630
Net Volume DGM, Vd	5.329	5.318	5.604
Gas Meter y Factor =	1.021	1.014	1.010
Gas Meter y Factor Deviation (from avg.)	0.006	0.001	0.005
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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* 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 Transducer (Draft)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00371

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 09/13/2023

By: Tony Tong

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 – 0.2	0.083	0.081	0.002	0.2
20-40% Max. Range 0.2– 0.4	0.239	0.238	0.001	0.1
40-60% Max. Range 0.4 – 0.6	0.452	0.455	0.003	0.3
60-80% Max. Range 0.6 – 0.8	0.726	0.729	0.003	0.3
80-100% Max. Range 0.8 – 1.0	0.942	0.948	0.006	0.6

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: Tony Tong

Date: 09/14/2023

Reviewed by: _____

Date: _____

**Temperature Calibration
EPA Method 28 R, ASTM 2515**

Booth:	Temperature Monitor Type:	Equipment Number:	
E 1	National Instruments Logger	00371, 00372	
Reference Meter Number: 00373			Calibration Due Date: 10/23/2023
Calibration Performed By:		Date:	Ambient Temperature(F°):
Tony Tong		09/13/2023	79.9
			Barometric Pressure(inHg):
			30.10
Input Temp (°F)	Ambient	Meter A	Meter B
0	0	1	0
100	100	101	100
300	300	300	300
500	500	500	500
700	700	700	700
1000	1000	1000	1000
1500	1500	1502	1500
2000	2000	2000	2001
			Filter A
			Filter B
			Tunnel
			FB Interior
			1
			1
			101
			101
			301
			301
			501
			501
			701
			701
			1001
			1001
			1501
			1501
			2001
			2001

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	1	1	1	1	1	0	0	0	1
100	101	101	101	101	101	100	100	100	101
300	301	301	301	301	301	300	300	300	301
500	501	501	501	501	501	500	500	500	501
700	701	701	701	701	701	700	700	700	701
1000	1001	1001	1001	1001	1001	1000	1000	1000	1001
1500	1501	1501	1501	1501	1501	1500	1500	1500	1501
2000	2001	2001	2001	2001	2001	2000	2000	2000	2001

Technician Signature: Tony Tong Date: 09/14/2023

Reviewed By: _____ Date: _____

Thermal Metering System Calibration

Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 702004
 OMNI Tracking No.: OMNI-00372
 Calibrated Orifice: Yes

Average Gas Meter y Factor
1.012

Orifice Meter dH@
N/A

Calibration Date: 05/01/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 11/1/2023
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 29.87 "Hg
 Signature/Date: Tony Tong

Previous Calibration Comparison

Date	<u>10/12/2022</u>	Acceptable Deviation (5%)	Deviation
y Factor	<u>1.003</u>	0.05015	0.009
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	<u>OMNI-00330</u>
	Calib. Date	<u>13-Apr-23</u>
	Calib. Value	<u>1.0017</u> 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	2.53	1.67	0.70
Initial Reference Meter	105.92	111.175	116.55
Final Reference Meter	111.175	116.55	122.31
Initial DGM	0	0	0
Final DGM	5.191	5.328	5.75
Temp. Ref. Meter (°F), Tr	67.3	67.3	67.5
Temperature DGM (°F), Td	70.3	71.3	71.4
Time (min)	26.0	33.0	57.0
Net Volume Ref. Meter, Vr	5.255	5.375	5.760
Net Volume DGM, Vd	5.191	5.328	5.75
Gas Meter y Factor =	1.014	1.014	1.009
Gas Meter y Factor Deviation (from avg.)	0.001	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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* 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 Transducer ΔP

Maximum Range: 0 – 1" W.C.

ID Number: OMNI-00372

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 03/23/2023

By: Tony Tong

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 – 0.2	0.105	0.109	0.004	0.4
20-40% Max. Range 0.2 – 0.4	0.241	0.243	0.002	0.2
40-60% Max. Range 0.4 – 0.6	0.518	0.516	0.002	0.2
60-80% Max. Range 0.6 – 0.8	0.786	0.780	0.006	0.6
80-100% Max. Range 0.8 – 1.0	0.954	0.943	0.011	1.1

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: *Tony Tong*

Date: 03/23/2023

Reviewed by: _____

Date: _____

**Temperature Calibration
EPA Method 28 R, ASTM 2515**

Booth:		Temperature Monitor Type:			Equipment Number:		
Field Test Kit		National Instruments Logger			00371, 00372		
Reference Meter Number: 00373				Calibration Due Date: 10/23/2023			
Calibration Performed By:			Date:	Ambient Temperature(F°):		Barometric Pressure(inHg):	
Tony Tong			03/22/2023	64		29.79	
Input Temp (°F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	-1	0	0	-1	-1	-1	-1
100	99	100	100	99	99	99	99
300	299	299	300	299	299	299	299
500	499	500	500	499	499	499	499
700	699	699	700	699	699	699	699
1000	999	1000	1000	999	999	999	999
1500	1499	1500	1500	1499	1499	1499	1499
2000	1999	2000	2000	1999	1999	1999	1999

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	-1	-1	-1	-1	-1	-1	-1	-1	-1
100	99	99	99	99	99	99	99	99	99
300	299	299	299	299	299	299	299	299	299
500	499	499	499	499	499	499	499	499	499
700	699	699	699	699	699	699	699	699	699
1000	999	999	999	999	999	999	999	999	999
1500	1499	1499	1499	1499	1499	1499	1499	1499	1499
2000	1999	1999	1999	1999	1999	1999	1999	1999	1999

Technician Signature: Tony Tong Date: 03/22/2023

Reviewed By: _____ Date: _____

Thermal Metering System Calibration Y Factor

Manufacturer: Apex
 Model: XC-60-EP
 Serial Number: 702004
 OMNI Tracking No.: OMNI-00372
 Calibrated Orifice: Yes

Average Gas Meter y Factor
1.011

Orifice Meter dH@
N/A

Calibration Date: 09/14/23
 Calibrated by: Tony Tong
 Calibration Frequency: Six Month
 Next Calibration Due: 3/14/2024
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 30.05 "Hg
 Signature/Date: Tony Tong /09/14/2023

Previous Calibration Comparison

Date	<u>5/1/2023</u>	Acceptable Deviation (5%)	Deviation
y Factor	<u>1.012</u>	0.0506	0.001
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.004
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *

Standard	Model	Standard Test Meter
Calibrator	S/N	<u>OMNI-00330</u>
	Calib. Date	<u>13-Apr-23</u>
	Calib. Value	<u>1.0017</u> 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	2.50	1.70	0.75
Initial Reference Meter	360.788	366.597	373.258
Final Reference Meter	366.285	373.11	379.564
Initial DGM	0	0	0
Final DGM	5.431	6.452	6.293
Temp. Ref. Meter (°F), Tr	77.0	77.6	78.0
Temperature DGM (°F), Td	80.0	81.0	81.0
Time (min)	28.0	41.0	64.0
Net Volume Ref. Meter, Vr	5.497	6.513	6.306
Net Volume DGM, Vd	5.431	6.452	6.293
Gas Meter y Factor =	1.013	1.013	1.008
Gas Meter y Factor Deviation (from avg.)	0.002	0.002	0.004
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. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr / 13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd / 13.6)) \times (Tr + 460)]$
- ** 3. $dH@ = 0.0317 \times Pd / (Pb (Td + 460)) \times [(Tr + 460) \times \text{time}] / Vr]^2$

* 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 Transducer (ΔP)

Maximum Range: 0 – 1" H₂O

ID Number: OMNI-00372

Calibration Instrument: Digital Manometer

ID Number: OMNI-00633

Date: 09/13/2023

By: Tony Tong

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 – 0.2	0.104	0.105	0.001	0.1
20-40% Max. Range 0.2 – 0.4	0.252	0.254	0.002	0.2
40-60% Max. Range 0.4 – 0.6	0.519	0.524	0.005	0.5
60-80% Max. Range 0.6 – 0.8	0.662	0.669	0.007	0.7
80-100% Max. Range 0.8 – 1.0	0.957	0.967	0.010	1.0

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: *Tony Tong*

Date: 09/14/2023

Reviewed by: _____

Date: _____

Temperature Calibration EPA Method 28 R, ASTM 2515							
Booth:		Temperature Monitor Type:				Equipment Number:	
E 1		National Instruments Logger				00371, 00372	
Reference Meter Number: 00373				Calibration Due Date: 10/23/2023			
Calibration Performed By:			Date:	Ambient Temperature(F°):		Barometric Pressure(inHg):	
Tony Tong			09/13/2023	79.9		30.10	
Input Temp (°F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	0	1	0	0	0	1	1
100	100	101	100	100	100	101	101
300	300	300	300	300	300	301	301
500	500	500	500	500	500	501	501
700	700	700	700	700	700	701	701
1000	1000	1000	1000	1000	1000	1001	1001
1500	1500	1502	1500	1501	1500	1501	1501
2000	2000	2000	2001	2000	2001	2001	2001

Input (°F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	1	1	1	1	1	0	0	0	1
100	101	101	101	101	101	100	100	100	101
300	301	301	301	301	301	300	300	300	301
500	501	501	501	501	501	500	500	500	501
700	701	701	701	701	701	700	700	700	701
1000	1001	1001	1001	1001	1001	1000	1000	1000	1001
1500	1501	1501	1501	1501	1501	1500	1500	1500	1501
2000	2001	2001	2001	2001	2001	2000	2000	2000	2001

Technician Signature: Tony Tong Date: 09/14/2023

Reviewed By: _____ Date: _____

Certificate of Calibration

Certificate Number: 788484



JJ Calibrations, Inc.

7724 SE Aspen Summit Drive
Portland, OR 97266-9217
Phone 503.786.3005
FAX 503.786.2994

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

PO: 230420
Order Date: 02/16/2023
Authorized By: N/A



Calibrated on: 04/06/2023
*Recommended Due: 04/06/2024
Environment: 19 °C 37 % RH
* As Received: Limited
* As Returned: Limited
Action Taken: Calibrated
Technician: 111

Property #: OMNI-00410
User: N/A
Department: N/A
Make: Dwyer
Model: 1430
Serial #: OMNI-00410
Description: Microtector
Procedure: 500908
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.

Previous limitation of the micrometer head calibrated only, continued. Unit was received and returned in a case.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
913A	Starrett	SS88. A1	Gage Block Set, 88 Pieces	07/29/2023	776002

Parameter Measurement Description	Range Unit	Measurement Data				UUT	Uncertainty Accredited = U
		Reference	Min	Max	*Error		
Before/After							
Length	Inch	0.1300	0.129	0.131	0.000	0.130 Inch	2.5E-05 U
	Inch	0.3850	0.384	0.386	0.000	0.385 Inch	2.5E-05 U
	Inch	0.6150	0.614	0.616	0.000	0.615 Inch	2.5E-05 U
	Inch	0.8700	0.869	0.871	0.000	0.870 Inch	2.5E-05 U
	Inch	1.0000	0.999	1.001	0.000	1.000 Inch	2.5E-05 U

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to either the SI or to National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2017, 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 stated in the comments, certificates reflect the "Simple Acceptance Rule" as specified by JCGM 106:2012. 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 written approval of JJ Calibrations.

Reviewer

3 Issued 04/07/2023

Rev # 15

Inspector

NIST Traceable Calibration Report

REPORT NUMBER

1713519

625 East Bunker Court
Vernon Hills, Illinois 60061
PH: 866-466-6225
Fax: 847-327-2993
www.innocalsolutions.com

Reference Number: MUB285900
PO Number: MUB285900

Cole-Parmer
625 E Bunker Ct
Vernon Hills, IL 60061-1844 United States



Manufacturer: Digi-Sense
Model Number: 20250-16
Description: Air Velocity, Hot Wire Anemometer
Asset Number: CP202636
Serial Number: 220723100
Procedure: DS Digi-Sense 20250-16
Remarks:

Calibration Date: 12/05/2022
Calibration Due Date:
Condition As Found: Initial Calibration
Condition As Left: In Tolerance, No adjustment

NIST-traceable calibration performed on the unit referenced above in accordance with customer requirements, published specifications and the lab's standard operating procedures. No adjustments were made to the unit. Recommended calibration due date is 12 months from date of purchase.

Standards Used

Standard ID	Manufacturer	Model Number	Description	Cal Date	Due Date
CP105979	Kanomax	X5602	Air Velocity, Wind Tunnel, Open Jet	5/11/2022	5/31/2023
CP105914	Fluke Corporation	1551A EX	Temperature, Stik Thermometer	7/26/2022	7/31/2023

Calibration Data

Function Tested	Nominal / Reference Value	Measured Value	OOT	Calibration Tolerance <i>g. = Guard Banding Applied</i>	TUR	EMU	
Air Velocity Accuracy	5.00 m/s						
	As Found & As Left	5.00	5.05		4.74 to 5.26 m/s	6.2:1	± 0.042 m/s
	10.00 m/s						
	As Found & As Left	10.00	10.06		9.49 to 10.51 m/s	11:1	± 0.045 m/s
	15.00 m/s						
	As Found & As Left	15.00	15.13		14.24 to 15.76 m/s	8.1:1	± 0.094 m/s
	20.00 m/s						
As Found & As Left	20.00	20.51		18.99 to 21.01 m/s	8.1:1	± 0.12 m/s	
25.00 m/s							
As Found & As Left	25.00	25.67		23.74 to 26.26 m/s	8.1:1	± 0.16 m/s	
Temperature Accuracy	25.0 °C						
	As Found & As Left	25.0	25.2		24.0 to 26.0 °C	13:1	± 0.077 °C

Temperature: 21 °C
Humidity: 21 %RH
Rpt. No.: 1713519

Calibration Performed By:				Quality Reviewer:	
Trevor Sass		Metrologist		James Alexander	12/5/2022
Name	ID #	Title	Phone	Name	Date

This report may not be reproduced, except in full, without written permission of Innocal. The results stated in this report relate only to the items tested or calibrated. Measurements reported herein are traceable to SI units via national standards maintained by NIST and were performed in compliance with MIL-STD-45662A, ANSI/NCSL Z540-1-1994, 10CFR50, Appendix B, ISO 9002:94, and ISO 17025:2017. Conformance based on Simple Acceptance as a Decision Rule. The estimated measurement uncertainty (EMU), if reported on this certificate, is being reported at a confidence level of 95% or K=2 unless otherwise noted in the remarks section.

Certificate of Calibration

Certificate Number: 788485



JJ Calibrations, Inc.

7724 SE Aspen Summit Drive
Portland, OR 97266-9217
Phone 503.786.3005
FAX 503.786.2994

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

PO: 230420
Order Date: 02/16/2023
Authorized By: N/A



Calibrated on: 03/06/2023
*Recommended Due: 03/06/2028
Environment: 23 °C 35 % RH
* As Received: Within Tolerance
* As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 173

Property #: OMNI-00709

User: N/A

Department: N/A

Make: Omega

Model: RH81

Serial #: 10361019

Description: Thermohygrometer

Procedure: DCN 401013/403410

Accuracy: RH ±3%, TEMP ±1°C(±1.8°F)

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
925A	RH Systems	CGS- 240	Humidity Generator	02/22/2024	789080

Measurement Data

Parameter	Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After Relative Humidity									
		RH		25.00	22.0	28.0	0.3	25.3 RH	6.3E-01 \bar{U}
		RH		50.00	47.0	53.0	1.3	48.7 RH	6.3E-01 \bar{U}
		RH		75.00	72.0	78.0	0.7	74.3 RH	6.3E-01 \bar{U}
Temperature									
			°C	20.0	19	21	0	20 °C	2.8E-01 \bar{U}
			°C	30.00	29.0	31.0	0.6	29.4 °C	2.8E-01 \bar{U}
			°C	40.60	39.6	41.6	0.4	40.2 °C	2.8E-01 \bar{U}

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to either the SI or to National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2017, 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 stated in the comments, certificates reflect the "Simple Acceptance Rule" as specified by JCGM 106:2012. 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 written approval of JJ Calibrations.

Reviewer

3 Issued 03/08/2023

Rev # 15

Inspector



Making our world more productive

DocNumber: 538869

Received
5/1/2023



Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22023

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

LGEPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062-9547

Certificate Issuance Date: 04/25/2023
Linde Order Number: 72420708
Part Number: NI CD17C08E-AS
Customer PO Number: 80429067

Fill Date: 04/19/2023
Lot Number: 70086310908
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 1300 psig 99 ft³

Certified Concentration

Expiration Date:	04/25/2031	NIST Traceable
Cylinder Number:	CC241056	Expanded Uncertainty
16.84 %	Carbon dioxide	± 0.09 %
4.38 %	Carbon monoxide	± 0.03 %
16.95 %	Oxygen	± 0.05 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 04/25/2023 Term: 96 Months Expiration Date: 04/25/2031

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO responses have been corrected for O2 interference. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Carbon dioxide

Requested Concentration: 17 %
Certified Concentration: 16.84 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 04/21/2023

First Analysis Data:		Date		04/25/2023	
Z:	0	R:	19.34	C:	16.84
Conc:	16.83				
R:	19.35	Z:	0	C:	16.85
Conc:	16.84				
Z:	0	C:	16.85	R:	19.36
Conc:	16.84				
UOM:	%	Mean Test Assay:		16.84	%

Reference Standard: Type / Cylinder #: NTRM / CC725981
Concentration / Uncertainty: 19.34 % ± 0.03 %
Expiration Date: 01/12/2027

Traceable to: SRM # / Sample # / Cylinder #: NTRM / 190701 / CC725973
SRM Concentration / Uncertainty: 19.34 % / ± 0.031 %
SRM Expiration Date: 01/12/2027

Second Analysis Data:		Date		
Z:	0	R:	0	
Conc:	0			
R:	0	Z:	0	
Conc:	0			
Z:	0	C:	0	
Conc:	0			
UOM:	%	Mean Test Assay:		%

2. Component: Carbon monoxide

Requested Concentration: 4.25 %
Certified Concentration: 4.38 %
Instrument Used: Horiba VIA-510 S/N UB8UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 04/21/2023

First Analysis Data:		Date		04/25/2023	
Z:	0	R:	7.81	C:	4.4
Conc:	4.39				
R:	7.84	Z:	0	C:	4.38
Conc:	4.37				
Z:	0	C:	4.37	R:	7.82
Conc:	4.36				
UOM:	%	Mean Test Assay:		4.38	%

Reference Standard: Type / Cylinder #: GMIS / CC187322
Concentration / Uncertainty: 7.81 % ± 0.04 %
Expiration Date: 04/03/2025

Traceable to: SRM # / Sample # / Cylinder #: SRM 2642a / 51-D-23 / FF23106
SRM Concentration / Uncertainty: 7.859 % / ± 0.039 %
SRM Expiration Date: 07/15/2019

Second Analysis Data:		Date		
Z:	0	R:	0	
Conc:	0			
R:	0	Z:	0	
Conc:	0			
Z:	0	C:	0	
Conc:	0			
UOM:	%	Mean Test Assay:		%

3. Component: Oxygen

Requested Concentration: 17 %
Certified Concentration: 16.95 %
Instrument Used: Siemens Oxymat 6E S/N 7MB20211AA000CA1
Analytical Method: Paramagnetic
Last Multipoint Calibration: 04/21/2023

First Analysis Data:		Date		04/25/2023	
Z:	0	R:	20.9	C:	16.94
Conc:	16.94				
R:	20.89	Z:	0	C:	16.95
Conc:	16.95				
Z:	0	C:	16.96	R:	20.91
Conc:	16.96				
UOM:	%	Mean Test Assay:		16.95	%

Reference Standard: Type / Cylinder #: GMIS / ND29287
Concentration / Uncertainty: 20.90 % ± 0.02 %
Expiration Date: 09/01/2028

Traceable to: SRM # / Sample # / Cylinder #: SRM 2859a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863 % / ± 0.021 %
SRM Expiration Date: 08/23/2021

Second Analysis Data:		Date		
Z:	0	R:	0	
Conc:	0			
R:	0	Z:	0	
Conc:	0			
Z:	0	C:	0	
Conc:	0			
UOM:	%	Mean Test Assay:		%

Analyzed By

Courtney Zinke

Certified By

Ying Yu

Information contained herein has been prepared at your request by qualified experts within Linde Gas & Equipment Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Linde Gas & Equipment Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH 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: OMNE03B729400181230130

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Mettler	MS104TS	B729400181	OMNI-00637	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
g	0.0001	qcs012	1/30/23	7/27/22	7/2023

FUNCTIONAL CHECKS

ECCENTRICITY		LINEARITY		STANDARD DEVIATION			ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:		
50	0.0001	20x4	0.0001	100	0.0001		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
As-Found:		As-Found:		1. 100.0001	5. 100.0001	9. 100.0001	Good Fair Poor
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	2. 100.0000	6. 100.0001	10. 100.0001	
As-Left:		As-Left:		3. 100.0000	7. 100.0001	Result	Temperature: 18.4°C
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	4. 100.0001	8. 100.0000	0.00004	

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
100	100.0004	100.0001	0.00016
80	80.0007	80.0000	0.00016
50	50.0005	50.0000	0.00015
20	20.0002	20.0000	0.00015
1	1.0000	1.0000	0.00015
0.1	0.0999	0.1000	0.00015

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	10 kg to 1 mg	D123	6/27/22	6/2023	20221503

Permanent Information Concerning this Equipment:

Comments/Info Concerning this Calibration:

1/23 - Cleaned, leveled, & adjusted span. RH = 40%

Report prepared/reviewed by: [Signature] Date: 1/30/23

Technician: D. Oudeans
Signature: [Signature]

THIS CERTIFICATE SHALL NOT BE REPRODUCED 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 and readability 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. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards. Results relate only to the item(s) tested. Unless otherwise noted, statements of conformity do not include measurement



QUALITY CONTROL SERVICES

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(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com



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

Report Number: OMNE03B729400181230810

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Mettler	MS104TS	B729400181	OMNI-00637	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
g	0.0001	qcs012	8/10/23	1/30/23	2/2024

FUNCTIONAL CHECKS

ECCENTRICITY		LINEARITY		STANDARD DEVIATION			ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:		
50	0.0001	20x4	0.0001	100	0.0001		<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
As-Found:		As-Found:		1.100.0000	5.100.0000	9.100.0000	Good Fair Poor
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	2.100.0000	6.100.0001	10.100.0000	
As-Left:		As-Left:		3.100.0000	7.100.0000	<u>Result</u>	Temperature: 25.4°C
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	4.100.0000	8.100.0000	0.00003	

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
100	100.0004	100.0001	0.00014
80	80.0002	80.0000	0.00014
50	50.0002	50.0001	0.00013
20	20.0001	20.0000	0.00013
1	1.0000	1.0000	0.00013
0.1	0.1000	0.1000	0.00013

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	10 kg to 1 mg	D123	6/15/23	6/2024	20231316

Permanent Information Concerning this Equipment:

Comments/Info Concerning this Calibration:

8/23 - Cleaned, leveled. & adjusted span. RH = 40%

Report prepared/reviewed by: RB Date: 8-14-23

Technician: D.Oudeans

Signature: R. B. B. for D. Oudeans

THIS CERTIFICATE SHALL NOT BE REPRODUCED 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 and readability 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. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Member: National Conference of Standards Laboratories and Weights & Measures

Quality Control Services

Report of Service and Calibration

2340 S.E. 11TH AVENUE
 PORTLAND, OR 97214
 PHONE 503-236-2712

72900

Sold To OMNI-Test Laboratories, Inc. PT ID: OMNE03 P.O. No: 230418
 Address PO Box 301367 Contact: Michael Castillo
 City Portland, OR 97294 Phone: 503-643-3788
 Ship To 13327 NE Airport Way Portland, OR 97230 Email: mcastillo@omni-test.com

No	Item	Make	Model	Serial Number	Location	Contact	Rate	Date ²⁰²³		Cust ID
								Svc'd	Tech	
1	Balance	Mettler	MS104TS	B729400181	Lab	Michael Castillo	\$170.00	130	00	

Service / Calibration Documentation Requirements

- Certificate of Calibration
- Calibration with Data
- A2LA Certificate

Received By: _____ Date: _____

Comments: _____

Example Calculations

Calculated from Integrated Test

Equations and Sample Calculations - ASTM E2779 & E2515

Manufacturer:	Hearth & Home Technologies
Model:	P43-C
Run:	3
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 in the dilution tunnel, ft/sec

Q_{sd} - Average gas flow rate in dilution tunnel, dscf/hr

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

m_n - Total Particulate Matter Collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf

E_T - Total Particulate Emissions, g

PR - Proportional Rate Variation

PM_R - Average particulate emissions for full integrated test run, g/hr

PM_F - Average particulate emission factor for full integrated test run, g/dry kg of fuel burned

Equations and Sample Calculations - ASTM E2779 & E2515

M_{Bdb} - 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_{Swb} = weight of test fuel in hopper at start of test run, wet basis, kg
- M_{Ewb} = weight of test fuel in hopper at end of test run, wet basis, kg

Sample Calculation:

4.34 %

$$M_{Swb} = 30.8 \text{ lbs}$$

$$M_{Ewb} = 9.7 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(30.8 \times 0.4536) - (9.7 \times 0.4536)] (100/(100 + 4.34))$$

$$M_{Bdb} = 9.17 \text{ kg}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2779 equation (2)

$$M_{BSidb} = (M_{S_{Siwb}} - M_{E_{Siwb}})(100 / (100 + FM))$$

Where,

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

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

Sample Calculation (from medium burn rate segment):

$$FM = 4.34 \%$$

$$M_{S_{Siwb}} = 25.2 \text{ lbs}$$

$$M_{E_{Siwb}} = 18.6 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(25.2 \times 0.4536) - (18.6 \times 0.4536)] (100 / (100 + 4.34))$$

$$M_{BSidb} = 2.9 \text{ kg}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2779 equation (3)

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

Where,

θ = Total length of full intergrated test run, min

Sample Calculation:

$$M_{Bdb} = 9.17 \quad \text{kg}$$

$$\theta = 360 \quad \text{min}$$

$$BR = \frac{60 \times 9.17}{360}$$

$$BR = 1.53 \quad \text{kg/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

BR_{Si} - 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):

$$M_{BSidb} = 2.87 \text{ kg}$$

$$\theta = 120 \text{ min}$$

$$BR = \frac{60 \times 2.87}{120}$$

$$BR = 1.43 \text{ kg/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2515 equations (9)

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

Where:

- F_p = djustment 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
- ΔP^* = Velocity pressure in the dilution tunnel, in H₂O
- T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_s = Absolute average gas static pressure in diluion tunnel, = $P_{bar} + P_g$, in Hg
- P_{bar} = Barometric pressure at test site, in. Hg
- P_g = Static pressure of tunnel, in. H₂O; (in Hg = in H₂O/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:

$$F_p = \frac{18.63}{21.24} = 0.877$$

$$V_s = 0.877 \times 85.49 \times 0.99 \times 0.317 \times \left(\left(\frac{75.9 + 460}{29.98 + \frac{-0.37}{13.6}} \right) \times 28.78 \right)^{1/2}$$

$$V_s = 18.54 \text{ ft/s}$$

*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.

Equations and Sample Calculations - ASTM E2779 & E2515

Q_{sd} - 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_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft ²
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg
T_s	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 18.54 \times 0.1963 \times \frac{528}{75.9 + 460} \times \frac{29.98 + \frac{-0.37}{13.6}}{29.92}$$

$$Q_{sd} = 12658.6 \text{ dscf/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

$V_{m(std)}$ - 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
- ΔH = Average pressure differential across the orifice meter, in. H₂O
- T_m = Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 57.551 \times 1.016 \times \frac{\left(29.98 + \frac{1.24}{13.6} \right)}{\left(75.5 + 460 \right)}$$

$$V_{m(std)} = 57.910 \text{ dscf}$$

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 57.570 \times 1.011 \times \frac{\left(29.98 + \frac{0.93}{13.6} \right)}{\left(76.0 + 460 \right)}$$

$$V_{m(std)} = 57.555 \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 57.27 \times 1.011 \times \frac{\left(29.98 + \frac{0.00}{13.6} \right)}{\left(65.0 + 460 \right)}$$

$$V_{m(std)} = 58.318 \text{ dscf}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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):

$$m_n = 0.0 + 0.0 + 0.0$$

$$m_n = 0.0 \text{ mg}$$

Using equation for Train 1 (remainder):

$$m_n = 0.0 + 7.5 + 0.6$$

$$m_n = 8.1 \text{ mg}$$

Train 1 Aggregate = **8.1 mg**

Using equation for Train 2:

$$m_n = 0.0 + 8.3 + 0.2$$

$$m_n = \mathbf{8.5 \text{ mg}}$$

Equations and Sample Calculations - ASTM E2779 & E2515

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf

ASTM E2515 equation (13)

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

Where:

K_2 = Constant, 0.001 g/mg

m_n = Total mass of particulate matter collected in the sampling train, mg

$V_{m(\text{std})}$ = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{8.1}{57.91}$$

$$C_s = 1.40\text{E-}04 \text{ g/dscf}$$

For Train 2

$$C_s = 0.001 \times \frac{8.5}{57.56}$$

$$C_s = 1.48\text{E-}04 \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{58.32}$$

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

Equations and Sample Calculations - ASTM E2779 & E2515

E_T - Total Particulate Emissions, g

ASTM E2515 equation (15)

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

Where:

- C_s = Concentration of particulate matter in tunnel gas, g/dscf
- C_r = Concentration particulate matter room air, g/dscf
- Q_{std} = Average dilution tunnel gas flow rate, dscf/hr
- θ = Total time of test run, minutes

Sample calculation:

For Train 1

$$E_T = (\underline{0.000140} - 0.000000) \times \underline{12658.6} \times \underline{360} / 60$$
$$E_T = \underline{10.62} \text{ g}$$

For Train 2

$$E_T = (\underline{0.000148} - 0.000000) \times \underline{12658.6} \times \underline{360} / 60$$
$$E_T = \underline{11.22} \text{ g}$$

Average

$$E = \underline{10.92} \text{ g}$$

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

$$7.5\% \text{ of the average} = \underline{0.82}$$

$$\text{Train 1 difference} = \underline{0.30}$$

$$\text{Train 2 difference} = \underline{0.30}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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:

- θ = Total sampling time, min
- θ_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):

$$PR = \left(\frac{360 \times 0.151 \times 18.54 \times (95.0 + 460) \times (75.5 + 460)}{1 \times 57.551 \times 19.03 \times (75.9 + 460) \times (68.0 + 460)} \right) \times 100$$

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

Equations and Sample Calculations - ASTM E2779 & E2515

PM_R - 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

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T \text{ (Dual train average)} = 10.92 \text{ g}$$

$$\theta = 360 \text{ min}$$

$$PM_R = 60 \times (10.92 / 360)$$

$$PM_R = 1.82 \text{ g/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

PM_F - 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:

$$E_T \text{ (Dual train average)} = 10.92 \text{ g}$$

$$M_{Bdb} = 9.17 \text{ kg}$$

$$PM_F = 10.92 / 9.17)$$

$$PM_F = 1.19 \text{ g/kg}$$

Equations and Sample Calculations - ASTM E2779 & E2515

Manufacturer:	Hearth & Home Technologies
Model:	P43-C
Run:	3
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 in the dilution tunnel, ft/sec

Q_{sd} - Average gas flow rate in dilution tunnel, dscf/hr

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

m_n - Total Particulate Matter Collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf

E_T - Total Particulate Emissions, g

PR - Proportional Rate Variation

PM_R - Average particulate emissions for full integrated test run, g/hr

PM_F - Average particulate emission factor for full integrated test run, g/dry kg of fuel burned

Equations and Sample Calculations - ASTM E2779 & E2515

M_{Bdb} - 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_{Swb} = weight of test fuel in hopper at start of test run, wet basis, kg
- M_{Ewb} = weight of test fuel in hopper at end of test run, wet basis, kg

Sample Calculation:

4.34 %

$$M_{Swb} = 30.8 \text{ lbs}$$

$$M_{Ewb} = 9.7 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(30.8 \times 0.4536) - (9.7 \times 0.4536)] (100/(100 + 4.34))$$

$$M_{Bdb} = 9.17 \text{ kg}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2779 equation (2)

$$M_{BSidb} = (M_{S_{Siwb}} - M_{E_{Siwb}})(100 / (100 + FM))$$

Where,

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

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

Sample Calculation (from medium burn rate segment):

$$FM = 4.34 \%$$

$$M_{S_{Siwb}} = 25.2 \text{ lbs}$$

$$M_{E_{Siwb}} = 18.6 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(25.2 \times 0.4536) - (18.6 \times 0.4536)] (100 / (100 + 4.34))$$

$$M_{BSidb} = 2.9 \text{ kg}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2779 equation (3)

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

Where,

θ = Total length of full intergrated test run, min

Sample Calculation:

$$M_{Bdb} = 9.17 \quad \text{kg}$$

$$\theta = 360 \quad \text{min}$$

$$BR = \frac{60 \times 9.17}{360}$$

$$BR = 1.53 \quad \text{kg/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

BR_{Si} - 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):

$$M_{BSidb} = 2.87 \text{ kg}$$

$$\theta = 120 \text{ min}$$

$$BR = \frac{60 \times 2.87}{120}$$

$$BR = 1.43 \text{ kg/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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

ASTM E2515 equations (9)

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

Where:

- F_p = djustment 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
- ΔP^* = Velocity pressure in the dilution tunnel, in H₂O
- T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_s = Absolute average gas static pressure in diluion tunnel, = $P_{bar} + P_g$, in Hg
- P_{bar} = Barometric pressure at test site, in. Hg
- P_g = Static pressure of tunnel, in. H₂O; (in Hg = in H₂O/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:

$$F_p = \frac{18.63}{21.24} = 0.877$$

$$V_s = 0.877 \times 85.49 \times 0.99 \times 0.317 \times \left(\left(\frac{75.9 + 460}{29.98 + \frac{-0.37}{13.6}} \right) \times 28.78 \right)^{1/2}$$

$$V_s = 18.54 \text{ ft/s}$$

*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.

Equations and Sample Calculations - ASTM E2779 & E2515

Q_{sd} - 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_{ws} = Water vapor in gas stream, proportion by volume; assume 2%
- A = Cross sectional area of dilution tunnel, ft²
- T_{std} = Standard absolute temperature, 528 °R
- P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg
- T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_{std} = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 18.54 \times 0.1963 \times \frac{528}{75.9 + 460} \times \frac{29.98 + \frac{-0.37}{13.6}}{29.92}$$

$$Q_{sd} = 12658.6 \text{ dscf/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

$V_{m(std)}$ - 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

ΔH = Average pressure differential across the orifice meter, in. H₂O

T_m = Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 57.551 \times 1.016 \times \frac{\left(29.98 + \frac{1.24}{13.6} \right)}{\left(75.5 + 460 \right)}$$

$V_{m(std)} = 57.910$ dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 57.570 \times 1.011 \times \frac{\left(29.98 + \frac{0.93}{13.6} \right)}{\left(76.0 + 460 \right)}$$

$V_{m(std)} = 57.555$ dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 57.27 \times 1.011 \times \frac{\left(29.98 + \frac{0.00}{13.6} \right)}{\left(65.0 + 460 \right)}$$

$V_{m(std)} = 58.318$ dscf

Equations and Sample Calculations - ASTM E2779 & E2515

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):

$$m_n = 0.0 + 0.0 + 0.0$$

$$m_n = 0.0 \text{ mg}$$

Using equation for Train 1 (remainder):

$$m_n = 0.0 + 7.5 + 0.6$$

$$m_n = 8.1 \text{ mg}$$

Train 1 Aggregate = **8.1 mg**

Using equation for Train 2:

$$m_n = 0.0 + 8.3 + 0.2$$

$$m_n = \mathbf{8.5 \text{ mg}}$$

Equations and Sample Calculations - ASTM E2779 & E2515

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf

ASTM E2515 equation (13)

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

Where:

K_2 = Constant, 0.001 g/mg

m_n = Total mass of particulate matter collected in the sampling train, mg

$V_{m(\text{std})}$ = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{8.1}{57.91}$$

$$C_s = 1.40\text{E-}04 \text{ g/dscf}$$

For Train 2

$$C_s = 0.001 \times \frac{8.5}{57.56}$$

$$C_s = 1.48\text{E-}04 \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{58.32}$$

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

Equations and Sample Calculations - ASTM E2779 & E2515

E_T - Total Particulate Emissions, g

ASTM E2515 equation (15)

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

Where:

- C_s = Concentration of particulate matter in tunnel gas, g/dscf
- C_r = Concentration particulate matter room air, g/dscf
- Q_{std} = Average dilution tunnel gas flow rate, dscf/hr
- θ = Total time of test run, minutes

Sample calculation:

For Train 1

$$E_T = (\underline{0.000140} - 0.000000) \times \underline{12658.6} \times \underline{360} / 60$$
$$E_T = \underline{10.62} \text{ g}$$

For Train 2

$$E_T = (\underline{0.000148} - 0.000000) \times \underline{12658.6} \times \underline{360} / 60$$
$$E_T = \underline{11.22} \text{ g}$$

Average

$$E = \underline{10.92} \text{ g}$$

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

$$7.5\% \text{ of the average} = \underline{0.82}$$

$$\text{Train 1 difference} = \underline{0.30}$$

$$\text{Train 2 difference} = \underline{0.30}$$

Equations and Sample Calculations - ASTM E2779 & E2515

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:

- θ = Total sampling time, min
- θ_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):

$$PR = \left(\frac{360 \times 0.151 \times 18.54 \times (95.0 + 460) \times (75.5 + 460)}{1 \times 57.551 \times 19.03 \times (75.9 + 460) \times (68.0 + 460)} \right) \times 100$$

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

Equations and Sample Calculations - ASTM E2779 & E2515

PM_R - 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

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T \text{ (Dual train average)} = 10.92 \text{ g}$$

$$\theta = 360 \text{ min}$$

$$PM_R = 60 \times (10.92 / 360)$$

$$PM_R = 1.82 \text{ g/hr}$$

Equations and Sample Calculations - ASTM E2779 & E2515

PM_F - 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:

$$E_T \text{ (Dual train average)} = 10.92 \text{ g}$$

$$M_{Bdb} = 9.17 \text{ kg}$$

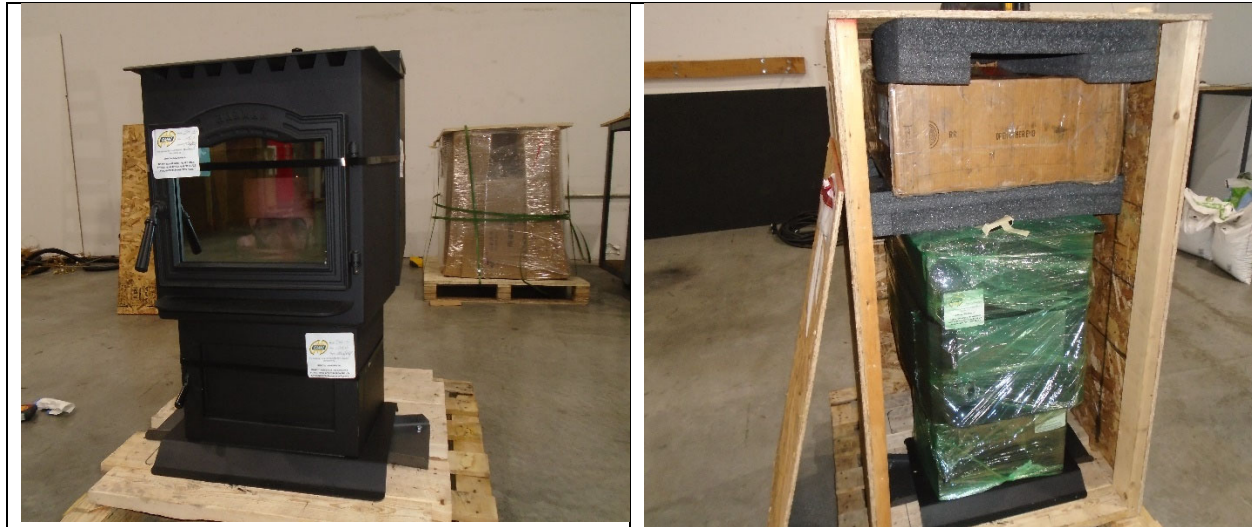
$$PM_F = 10.92 / 9.17)$$

$$PM_F = 1.19 \text{ g/kg}$$

Archived Test Specimen

The tested unit was sealed by OMNI-Test Laboratories after the completion of certification testing. This unit will be stored at the manufacturer's premises in the sealed state until 5 years after the certification testing at the following address:

Hearth & Home Technologies, LLC
352 Mountain House Road
Halifax, PA 17032
USA



Sealed Unit at OMNI Prior to Shipping back to Manufacturer

Manufacturer's Quality Assurance Procedure

1) Purpose

- a) Ensure that the P43-C manufactured by Hearth & Home Technologies, at the Halifax manufacturing facility, meet the requirements set forth in 40 CFR, part 60. As well as, to fulfill the requirements for a Quality Assurance Plan as set forth in 40 CFR, part 60.533 paragraph “m.”

2) Scope

- a) The Quality Assurance Plan is intended to cover all EPA Certified wood and wood pellet fueled stoves manufactured by Hearth & Home Technologies, at the Halifax manufacturing facility.

3) Requirements

a) Inspections for Conformance to Specifications

- i) The manufacturer shall inspect one stove for every 150 stoves manufactured, within a model line, to verify conformance to the tolerances for all components that affect emissions as listed in 40 CFR Part 60.533 paragraph (k)(2), (3), and (4). The exact serial number of the stove inspected may be within 10 stoves before or 10 stoves after the serial number that occurs exactly on the inspection schedule.

b) Inspections for Conformance to Emissions:

- i) The manufacturer or his authorized representative shall conduct an emissions test on a randomly selected stove from within a model line, certified under 40 CFR Part 60.533, according to the schedule described below.

(1) Schedule

- (a) Model lines where weighted average certification results were 70% or less than the standard

- (i) One for every 10,000 stoves manufactured

- (b) Model lines where weighted average certification test results were within 30% of the standard

- (i) One for every 5,000 stoves manufactured

c) Audits of Conformance to the Quality Assurance Plan

- i) The third-party certifier shall perform at least one unannounced audit of the manufacturer’s compliance to the approved Quality Assurance Plan described in this document.
 - (1) The third-party certifier shall submit a copy of the report, fully detailing each audit, to the EPA(Administrator) and the manufacturer within 30 days of the audit.
 - (2) The manufacturer will submit corrective actions and/or responses to any deficiencies, identified in the audit, to the third-party certifier and the EPA(Administrator) within 30 days of receiving each audit report.

d) Alternate Schedules for Conformance to Specifications and Emissions

- i) If two consecutive passing audits are conducted for either Conformance to Specifications or Conformance to Emissions as specified in section 3 paragraph (a) or (b) of this document, the frequency of testing may be modified to skip every other required test.
- ii) If five consecutive passing audits are conducted under the modified schedule described in section 3 paragraph (d)(i) of this document, the frequency of testing shall be further modified to skip three consecutive required tests after each required test is completed.

iii) Auditing shall resume on the frequency specified in section 3 paragraph (a) or (b), as applicable, if an audit failure occurs under a modified schedule.

Change Record

Revision	Date	Originator	Description of Change
A	11/13/18	Corie Podschelne	Release

Distribution & Document Control

The location of Quality systems documents shall be the Hearth & Home Technologies Computer System. Folder location: Halifax (Z:)\Controlled Documents\.... Document and data control shall be through user login. This computer control shall constitute the company-authorized method of document control. The quality assurance manager and /or designated team composite leader shall be the authorized member to maintain the files in the folder.

Printed hard copies printed from the quality systems folder or the Halifax document location folder must be verified with the controlled copy in the computer for -accuracy. Members are responsible for maintaining and ensuring accuracy of printed copies. Any procedure copy printed off the above computer server may be controlled only up to the time of printing. Date and time may be printed on document to indicate control accuracy claim.

EPA 30 Day Notice

From: [Ken Morgan](#)
To: ["WoodHeaterReports@epa.gov"](mailto:WoodHeaterReports@epa.gov)
Cc: [Alex Tiegs](#); [Arline, Rebecca \(HHT\)](#); [Riley Tiegs](#); [Fongeallaz, Bud \(HHT\)](#); [Finance](#)
Subject: 230928 KM email to EPA-RE: Hearth & Home P43-C Suspended Testing
Date: Thursday, September 28, 2023 12:33:12 PM
Attachments: [Run 2 PDF Final.pdf](#)
[ruN_noTES.pdf](#)

Hello,

This is to inform the EPA, as outlined in §60.535 (a) (2) (VIII) of the CFR, of an additional inadvertent suspension in testing and certification of the Hearth & Home model P43-C. Testing had occurred originally occurred on August 7, 2023, as was indicated in the 30-day notice; however, it was subsequently suspended for reasons stated in the email chain below. Upon resumption of testing, it was learned that a thermal sensor used by the control board in monitoring the flue gas temperature was making erroneous readings and therefore responding in a fashion that was not consistent with the design parameters as intended by the manufacturer, thereby invalidating the integrated test run. The manufacturer is conditioning and supplying a newly selected and inspected specimen (meeting all original design specifications) and testing is to resume on Tuesday, October 24, 2023.

Attached are the data that was generated in the second attempt at testing.

Note: OMNI is closed on Fridays.

Regards,

Ken Morgan	
OMNI-Test Laboratories, Inc.	www.omni-test.com
Technical Services Director	kmorgan@omni-test.com
13327 NE Airport Way Portland, Oregon, 97230	Tel: (503) 643-3788 Fax: (503) 643-3799
Internet Email Confidentiality Disclaimer <i>This message may contain privileged and/or confidential information. If you are not the intended recipient, you may not disclose, use, disseminate, distribute, copy, or rely on the information contained within (including any associated documents that may be attached). If you received this in error, please forward it back to the sender. Errors in the presentation of test data, or from the omission of information, or due to other such circumstances are unintentional. If it is suspected that this has occurred, please notify the sender of this message to discuss/resolve.</i>	

From: Ken Morgan

Sent: Thursday, August 24, 2023 4:47 PM

To: 'WoodHeaterReports@epa.gov' <WoodHeaterReports@epa.gov>

Cc: Alex Tiegs <atiegs@omni-test.com>; Arline, Rebecca (HHT) <ArlineR@hearthnhome.com>; Riley Tiegs <rtiegs@omni-test.com>; Fongeallaz, Bud (HHT) <FongeallazB@hearthnhome.com>; Finance <finance@omni-test.com>

Subject: Hearth & Home P43-C Suspended Testing

Hello,

This is to inform the EPA, as outlined in §60.535 (a) (2) (VIII) of the CFR, of an inadvertent suspension in testing and certification of the Hearth & Home model P43-C. Testing had occurred on August 7, 2023, as was indicated in the 30-day notice; however, it was subsequently learned by the manufacturer that one of the control parameter settings used was not configured as intended by the manufacturer, thereby invalidating the integrated test run. The manufacturer is fortifying their written instructions and testing is to resume on Monday, August 28, 2023.

Note: OMNI is closed on Fridays.

Regards,

Ken Morgan

OMNI-Test Laboratories, Inc.

Technical Services Director

www.omni-test.com

kmorgan@omni-test.com

13327 NE Airport Way
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6. Appliance Labeling & Owner's Manual



P1-90-04400-1



MODEL / MODÈLE: "P43-C"

Room Heater Pellet Fuel-Burning Type
SUITABLE FOR MOBILE-HOME INSTALLATION

This pellet burning appliance has been tested and listed for use in
Manufactured Homes in accordance with OAR 814-23-900 through 814-23-909



Made in U.S.A. of US and imported parts. / Fabriqué
aux États-Unis-d'Amérique par des pièces d'origine
américaine et pièces importées.

Report # / Rapport # 0135PS023E / 0135PS023S
Tested to / Testé à: ASTM E 1509-04,
ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

Serial No.
N° de série:

HF

BARCODE LABEL

Room Heater, Pellet Fuel-Burning Type, Also For Use In Mobile Homes. (UM) 84-HUD
"PREVENT HOUSE FIRES" Install and use only in accordance with manufactures
installation and operation instructions.

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.

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

WARNING: FOR MANUFACTURED HOMES: Do not install appliance in a sleeping
room. An outside combustion air inlet must be provided. The structural integrity of the
manufactured home floor, ceiling and walls must be maintained.

Refer to manufacturer's instructions and local codes for precautions required for passing
chimney through a combustible wall or ceiling. Inspect and clean exhaust venting system
frequently in accordance with manufacturer's instructions.

Use a 3" or 4" diameter type "L" or "PL" venting system.

Do not connect this unit to a chimney flue servicing another appliance.

Do not obstruct the space beneath the heater.

FOR USE WITH PELLETIZED WOOD FUEL ONLY.

Input Rating Max: 6.1 lb. fuel/hr

EPA Certified Emissions: 1.82 g/hr

U.S. Electrical Rating: 115 VAC, 60 Hz, Start 4.2 AMPS, Run 2.8 AMPS

Fuel Type: Wood Pellet.

Route power cord away from unit.

OPERATE ONLY WITH DOORS CLOSED

DANGER: Risk of Electrical Shock. Disconnect Power Before Servicing Unit.

For Further Instruction, Refer To Installation and Owner's Manual.

Replace glass only with 5mm mirrored ceramic available from your dealer.

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER CETTE ÉTIQUETTE

**MINIMUM CLEARANCES TO COMBUSTIBLES/ DISTANCES DE
SECURITE PAR RAPPORT AUX MATERIAUX COMBUSTIBLES:**

	Without Side Shields Sans Écrans Latéraux	With Side Shields Avec Écrans Latéraux
Back Wall / Entre Mur Arrière	2" / 51mm	2" / 51mm
Side Wall / Entre Paroi Latér	16" / 406mm	10" / 254mm

CORNER INSTALLATION / EN ANGLE

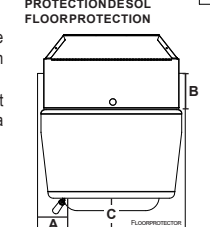
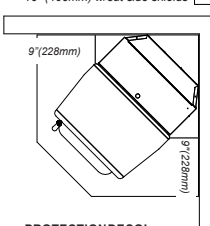
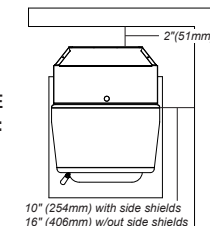
Walls to Appliance / Entre Murs et appareil	9" / 228mm	9" / 228mm
--	------------	------------

FLOOR PROTECTION / Protection Du Plancher

	USA	Canada
Sides/Côtés (A)	6"	152mm
Back/Arrière (B)	6"	152mm
Front/Avant (C)	6"	152mm

Floor Protection Must Be a Non-Combustible Material. Must Also be
Place Under Any Horizontal Flue Connector, Extending 2" or 51mm
Beyond the Pipe Measurement.

Pour protéger le plancher, il faut sous le pôle un matériau. Qui doit
aussi être placé sous les parties horizontales du tuyau de raccord à la
cheminée et s'étendre à 51mm ø 2 po. au-delà de la mesure du tuyau.



Chaudière, Pellet à combustibles Type, également pour les maisons mobiles. (UM) 84-HUD
"EMPÊCHER MAISON INCENDIES" Installer et utiliser uniquement en conformité avec les instructions
du fabricant d'installation et d'exploitation.

Ce poêle à bois doit inspection périodique et la réparation pour un fonctionnement correct. Consultez le
manuel du propriétaire pour plus d'informations. Ce est contre les règlements fédéraux pour faire fonctionner
ce poêle à bois d'une manière incompatible avec les instructions d'utilisation dans le manuel du propriétaire.

Contactez le service des incendies à propos des restrictions et l'inspection d'installation dans votre région.
AVERTISSEMENT: POUR MAISONS PRÉFABRIQUÉES: Ne pas installer l'appareil dans une chambre à
coucher. Une entrée d'air de combustion à l'extérieur doit être fournie. L'intégrité structurelle de la maison
étage, plafond et murs fabriqués doit être maintenue.

Reportez-vous aux instructions du fabricant et les codes locaux pour les précautions nécessaires pour
faire passer la cheminée à travers un mur ou un plafond combustible. Inspectez et nettoyez système
d'évacuation souvent en conformité avec les instructions du fabricant.

Utilisez un "ou 4" Type de diamètre «L» 3 ou le système de ventilation "PL".

Ne pas connecter cet appareil à un conduit de cheminée desservant un autre appareil.

Ne pas obstruer l'espace sous le chauffe-eau.

À UTILISER AVEC LA GRANULE DE BOIS SEULEMENT.

Entrée Max Note: £ 6,1 carburant / h

Émissions certifiés EPA: 1,52 g / h

US Note électrique: 115 VAC, 60 Hz, Start 4,2 AMPS, Run 2,8 AMPS

Type de carburant: granulés de bois.

Route cordon électrique de l'appareil.

Fonctionner uniquement avec les portes fermées

DANGER: Risque de choc électrique. Débranchez l'alimentation avant l'Unité des services.

Pour de plus amples instructions, reportez-vous à l'installation et le manuel du propriétaire.

Remplacer le verre seulement avec 5mm miroir en céramique disponibles chez votre revendeur.

Ne ENLEVEZ PAS CETTE ÉTIQUETTE / NE PAS CETTE ÉTIQUETTE enlever

US ENVIRONMENTAL PROTECTION AGENCY

The P43-C is Certified to comply with 2020 particulate emission standards.

La P43-C est certifié conforme aux normes d'émission de particules de 2020.

Date of Manufacture / Date de fabrication:



Manufactured by / Fabriqué par: **Hearth and Home Technologies 352 Mountain House Road, Halifax PA 17032**

P.N. 8390-044_R5

LABEL TICKET

ECO:	99463	LABEL SIZE:	4-3/8" H x 10-3/4" W
PART # / REV:	8390-044_R5	ADHESIVE:	N/A
ORIGINATOR:	Spidlet	MATERIAL:	24 Gauge Aluminum
DATE:	08/16/23	INK:	Black Background
 The Hearth Experts™		352 Mountain House Road Halifax, PA 17032 (4) Corners = R.062	

Owner's Manual

Care and Operation

INSTALLER: Leave this manual with party responsible for use and operation.

OWNER: Retain this manual for future reference.

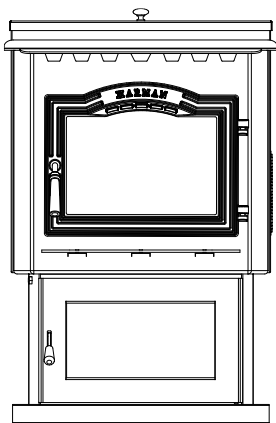
Contact your local dealer with questions on installation, operation or service.

NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):
P43-C, P61-C & P68-C
Freestanding Pellet Stove



CAUTION

Check building codes prior to installation.

- Installation **MUST** comply with local, regional, state and national codes and regulations.
- Contact local building or fire officials about restrictions and installation inspection requirements in your area.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.harmanstoves.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.harmanstoves.com



WARNING



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

Failure to follow these instructions could result in property damage, bodily injury or even death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not overfire - If any external part starts to glow, you are overfiring. Reduce feed rate. Overfiring will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.



WARNING



HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
 - NEVER allow children to touch glass
 - Keep children away
 - CAREFULLY SUPERVISE children in same room as stove.
 - Alert children and adults to hazards of high temperatures.
- High temperatures may ignite clothing or other flammable materials.**
- Keep clothing, furniture, draperies and other flammable materials away.

1 Welcome

Read this manual before operating this appliance.
Please retain this Owner's Manual for future reference.

Read the Installation Manual before making any installation or finishing changes.

A. Congratulations

Congratulations on selecting a Harman® Freestanding Pellet Stove. The Harman® P-Series pellet stove you have selected is designed to provide the utmost in safety, reliability, and efficiency.

As the owner of a new pellet stove, you'll want to read and carefully follow all of the instructions contained in this owner's manual. Pay special attention to all cautions and warnings.

This owner's manual should be retained for future reference. We suggest that you keep it with your other important documents and product manuals.

Your new Harman® P-Series Freestanding Pellet Stove will give you years of durable use and trouble-free enjoyment. Welcome to the Harman® family!

Note: Cast iron is an artisan crafted material, which is made the same way today as nearly 2000 years ago. Due to the intrinsic primitive nature of the casting process, part to part variation is normal and adds to the character of a hand built cast iron appliance

Listing Label Information/Location

The model information regarding your specific stove can be found on the rating plate usually located in the control area of the stove.

Serial Number Model Name

Report # / Rapport # 0135PS023E / 0135PS023S
Tested to / Testé à: ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

MODEL / MODÈLE: "P43-C"
 Room Heater Pellet Fuel-Burning Type
 SUITABLE FOR MOBILE-HOME INSTALLATION
 This pellet burning appliance has been tested and listed for use in Manufactured Homes in accordance with OAR 814-23-900 through 814-23-909

Serial No. / N° de série: HF

BARCODE LABEL

Room Heater, Pellet Fuel-Burning Type, Also For Use In Mobile Homes (UM) 84-HUD
"PREVENT HOUSE FIRES" Install and use only in accordance with manufacturer's installation and operation instructions.
 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.
 Contact local building or fire officials about restrictions and installation inspection in your area.
WARNING: FOR MANUFACTURED HOMES: Do not install appliance in a sleeping room. An outside combustion air inlet must be provided. The structural integrity of the manufactured home floor, ceiling and walls must be maintained.
 Refer to manufacturer's instructions and local codes for precautions required for passing chimney through a combustible wall or ceiling. Inspect and clean exhaust venting system frequently in accordance with manufacturer's instructions.
 Use a 3" or 4" diameter type "L" or "PL" venting system.
 Do not connect this unit to a chimney flue servicing another appliance.
 Do not obstruct the space beneath the heater.
FOR USE WITH PELLETIZED WOOD FUEL ONLY.
 Input Rating Max: 6.1 lb. fuel/hr
 EPA Certified Emissions: 1.52 g/hr
 U.S. Electrical Rating: 115 VAC, 60 Hz, Start 4.2 AMPS, Run 2.8 AMPS
 Fuel Type: Wood Pellet
 Route power cord away from unit.
OPERATE ONLY WITH DOORS CLOSED
DANGER: Risk of Electrical Shock. Disconnect Power Before Servicing Unit.
 For Further Instruction, Refer To Installation and Owner's Manual.
 Replace glass only with 5mm mirrored ceramic available from your dealer.
DO NOT REMOVE THIS LABEL / NE PAS ENLEVER CETTE ÉTIQUETTE

MINIMUM CLEARANCES TO COMBUSTIBLES/ DISTANCES DE SECURITE PAR RAPPORT AUX MATERIAUX COMBUSTIBLES:

	Without Side Shields / Sans Écrans Latéraux	With Side Shields / Avec Écrans Latéraux
Back Wall / Entre Mur Arrière	27" 51mm	27" 51mm
Side Wall / Entre Paroi Latér	16" 406mm	10" 254mm

CORNER INSTALLATION / EN ANGLE
 Walls to Appliance / Entre Murs et appareil: 9" 228mm

FLOOR PROTECTION / Protection de Sol
 Sides/Côtés (A)
 Back/Arrière (B)
 Front/Avant (C)
 Floor Protection Material. Must Also be Place Under Any Horizontal Connector, Extending 2" or 51mm Beyond the Pipe Measurement.
 Pour protéger le plancher, il faut sous le pôle un matériau. Qui doit aussi être placé sous les parties horizontales du tuyau de raccord à la cheminée et s'étendre à 51mm ± 2 po. au-delà de la mesure du tuyau.

US ENVIRONMENTAL PROTECTION AGENCY
 The P43-C is Certified to comply with 2020 particulate emission standards.
 La P43-C est certifié conforme aux normes d'émission de particules de 2020.

Date of Manufacture / Date de fabrication:
 2023 2024 2025 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Manufactured by / Fabriqué par: Hearth and Home Technologies 352 Mountain House Road, Halifax PA 17032

P.N. 8390-044_R5

TABLE OF CONTENTS

1 Welcome

A. Congratulations	2
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2 Product Specific and Important Safety Information

A. Appliance Certification	4
B. Mobile Home Approved	4
C. Glass Specifications (Ceramic)	4
D. Electrical Rating	4
E. California	4
→ F. BTU & Efficiency Specifications	5

3 General Information

A. Appliance Safety	6
B. Clear Space	6
C. Control Explanation	7
D. Fuel Specification	8
E. General Operating Information	9

4 Operating Instructions

A. Starting Your First Fire	10
B. Fire Characteristics	10
C. Feed Rate Adjustment Instructions	10
D. Ignition Cycles	10
E. Automatic Ignition	11

5 Maintenance and Service

A. Proper Shutdown Procedure	13
B. General Maintenance	13
C. Quick Reference Maintenance Chart	14
D. Glass Maintenance	15
E. Burnpot Maintenance	16
F. Combustion Blower Chamber	17
G. Pellet Feeder Chamber	18

▲ Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Used to address practices not related to personal injury.

6 Troubleshooting and Frequently Asked Questions

A. Error Code Description	19
B. Frequently Asked Questions	19
C. Troubleshooting	20

7 Reference Materials

A. Safety Reminders	21
B. Motor and Component Location	22
C. Loss of Power	23
D. Emergency Manual Ignition	23
E. Service Parts	24
P43-C	24
P61-C	28
P68-C	32
F. Limited Lifetime Warranty	38
G. Contact Information	40

→ = Contains updated information

2 Product Specific and Important Safety Information

A. Appliance Certification

MODEL:	P43-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS023E / 0135PS023S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

MODEL:	P61-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS022E / 0135PS022S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

MODEL:	P68-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS013E / 0135PS013S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2004, ULC-S627-00, ULC/ORD-C-1482-M1990, (UM) 84-HUD**

The P43-C, P61-C and P68-C is Certified to comply with 2020 particulate emission standards.



B. Mobile Home Approved

This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.

The structural integrity of the mobile home floor, ceiling, and walls must be maintained. The appliance must be properly grounded to the frame of the mobile home and use only listed pellet vent, Class "PL" connector pipe.

A Harman® Outside Air Kit must be installed in a mobile home installation.



WARNING

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

DO NOT INSTALL IN SLEEPING ROOM.

C. Glass Specifications

This appliance is equipped with 5mm mirrored ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

D. Electrical Rating

120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps

NOTE: Some generator or battery back-up systems may not be compatible with the micro-processor electronics on this appliance. Please consult the power supply manufacturer for compatible systems.

E. California



WARNING

This product and the fuels used to operate this product (wood), and the products of combustion of such fuels, can expose you to chemicals including carbon black, which is known to the State of California to cause cancer, and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov

F. BTU & Efficiency Specifications

→ P43-C Freestanding Pellet Stove:

EPA Certification Number:	165-18
EPA Certified Emissions:	1.82 g/hr
*LHV Tested Efficiency:	78.5%
**HHV Tested Efficiency:	76.7%
***EPA BTU Output:	19,800 – 35,000
****BTU Input:	17,200 - 43,500
Vent Size:	3 Inch
Hopper Capacity:	50 lbs
Fuel	Wood Pellet

P61-C Freestanding Pellet Stove:

EPA Certification Number:	177-19
EPA Certified Emissions:	1.5 g/hr
*LHV Tested Efficiency:	85%
**HHV Tested Efficiency:	79%
***EPA BTU Output:	17,100 - 46,800
****BTU Input:	21,400 - 60,700
Vent Size:	3 Inch
Hopper Capacity:	72 lbs
Fuel	Wood Pellet

P68-C Freestanding Pellet Stove:

EPA Certification Number:	178-19
EPA Certified Emissions:	1.4 g/hr
*LHV Tested Efficiency:	85%
**HHV Tested Efficiency:	79.5%
***EPA BTU Output:	15,900 - 53,100
****BTU Input:	20,200 - 67,600
Vent Size:	3 Inch
Hopper Capacity:	76 lbs
Fuel	Wood Pellet

* Weighted average LHV efficiency using data collected during EPA emissions test.

**Weighted average HHV efficiency using data collected during EPA emissions test.

***A range of BTU outputs based on EPA Default Efficiency and the burn rates from the low and high EPA tests.

****Based on the maximum feed rate per hour multiplied by approximately 8,600 BTU's which is the average BTU's from a pound of pellets.

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

BTU output will vary, depending on the brand of fuel you use in your appliance. Consult your Harman® dealer for best results.

WARNING! Risk of Fire! Hearth & Home Technologies disclaims any responsibility for, and the warranty and agency listing will be voided by the below actions.

DO NOT:

- Install or operate damaged appliance
- Modify appliance
- Install other than as instructed by Hearth & Home Technologies
- Operate the appliance without fully assembling all components
- Overfire
- Install any component not approved by Hearth & Home Technologies
- Install parts or components not Listed or approved.
- Disable safety switches

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

For assistance or additional information, consult a qualified installer, service agency or your dealer.



NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

Harman® is a registered trademark of Hearth & Home Technologies.

3 General Information

A. Appliance Safety

WARNING! DO NOT operate stove before reading and understanding operating instructions. Failure to operate stove according to operating instructions could cause fire or injury.

 WARNING	
	HOT SURFACES! Glass and other surfaces are hot during operation AND cool down.
	Hot glass will cause burns. <ul style="list-style-type: none">• DO NOT touch glass until it is cooled• NEVER allow children to touch glass• Keep children away
<ul style="list-style-type: none">• CAREFULLY SUPERVISE children in same room as stove.• Alert children and adults to hazards of high temperatures.	
High temperatures may ignite clothing or other flammable materials.	
<ul style="list-style-type: none">• Keep clothing, furniture, draperies and other flammable materials away.	

If you expect that small children or vulnerable adults may come into contact with this appliance, the following precautions are recommended:


- Install a physical barrier such as:
 - A decorative fire screen.
 - Adjustable safety gate.
- Install a switch lock or a wall/remote control with child protection lockout feature.
- Keep remote controls out of reach of children.
- Never leave children alone near a hot stove, whether operating or cooling down.
- Teach children to **NEVER** touch the stove.
- Consider not using the stove when children will be present.
- Use only specified components as replacement parts. Other components may not allow your stove to operate as it was intended.

Contact your dealer for more information, or visit: www.hpba.org/safety-information.

To prevent unintended operation when not using your stove for an extended period of time (summer months, vacations, trips, etc):

- Unplug stove from receptacle.

Connect the power cord to a 120 VAC, 60 Hz grounded receptacle. (A surge protector is recommended to protect the circuit board.) Be sure the polarity of the outlet the stove is plugged into is correct.

 WARNING	
THIS WOOD HEATER HAS A MANUFACTURER-SET MINIMUM LOW BURN RATE THAT MUST NOT BE ALTERED. IT IS AGAINST FEDERAL REGULATIONS TO ALTER THIS SETTING OR OTHERWISE OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.	

B. Clear Space

WARNING! RISK OF FIRE! Do **NOT** place combustible objects in front or to the sides of the appliance. High temperatures may ignite clothing, furniture or draperies.

Mantel: Avoid placing candles and other heat-sensitive objects on mantel or hearth. Heat may damage these objects.

NOTICE: Clearances may only be reduced by means approved by the regulatory authority having jurisdiction.

WARNING! RISK OF FIRE! Keep combustible materials, gasoline and other flammable vapors and liquids clear of appliance.

- Do **NOT** store flammable materials in the appliance's vicinity.
- Do **NOT** use gasoline, lantern fuel, kerosene, charcoal lighter fluid or similar liquids to start or "freshen up" a fire in this heater.

Keep all such liquids well away from the heater while it is in use as combustible materials may ignite.

C. Control Explanation

Power Light

Indicates power to the control.

Status Light

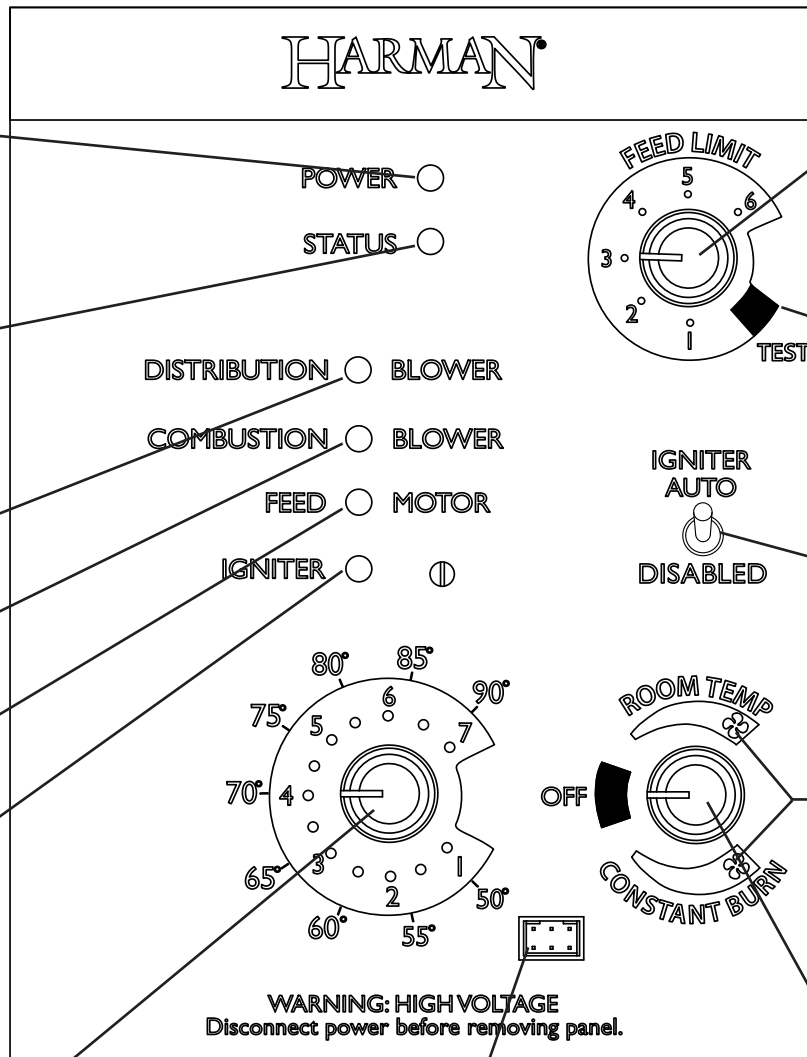
Will be lit in either stove or room temp mode when pointer is not within off position band except after normal shut down. Blinks to indicate errors listed below.

Indicates power to distribution blower.

Indicates power to combustion blower

Indicates power to the feed motor.

Indicates igniter is on.



Feed limit

Sets the maximum feed rate

Test

Runs all motors at full speed for one minute to check operation. Afterwards the control will simulate a minimum burn with the combustion blower remaining on low.

Igniter switch

Set to appropriate Start-Up mode.

Distribution Blower speed adjustment range.

L = low
H = high

Temp dial

Allows you to adjust the room temperature setting, in Room Temp Mode, using the outer scale marked in degrees Fahrenheit. It also allows you to adjust the constant burn setting, while in Constant burn Mode, using the inner scale marked from 1 to 7.

Dealer Diagnostic Port

For dealer maintenance only. Requires special DDM monitor supplied to Harman® Dealers exclusively.

Mode Selector

Allows you to choose between Room Temp Mode, Constant burn Mode, or OFF. Also allows you to vary the distribution blower speed by turning the knob to the high or low side of each mode.

D. Fuel Specifications

Fuel and Fuel Storage

Pellet fuel quality can fluctuate from manufacturer to manufacturer, and even from bag to bag.

Hearth & Home Technologies recommends using only fuel that is certified by the Pellet Fuels Institute (PFI).

Fuel Material

- Made from sawdust and/or other wood by-products
- Source material typically determines ash content

Higher Ash Content Material

- Hardwoods with high mineral content
- Bark and leaves as source material
- “Standard” grade pellets

Lower Ash Content Material

- Softwood; pine, fir, etc.
- Materials with lower mineral content
- “Premium” grade pellets

CAUTION! Do not burn fuel that contains an additive.

- May cause hopper fire
- Damage to product may result

Read the list of ingredients on the packaging.

Clinkers

Minerals and other non-combustible materials, like sand, will turn into a hard glass-like substance when heated.

Trees from different areas will vary in mineral content. For this reason, some fuels will produce more clinkers than others.

Moisture

Always burn dry fuel. Burning fuel with high moisture content takes energy to dry and tends to cool the appliance thus, robbing heat from your home. Damp pellet fuel could turn back into sawdust which does not flow properly through the feed system.

Size

- Pellets are either 1/4 inch or 5/16 inch (6-8mm) in diameter
- Length should be no more than 1-1/2 inches (38mm)
- Pellet length can vary from lot to lot from the same manufacturer.

Performance

- Higher ash content requires more frequent maintenance.
- “Premium” grade pellets will produce the highest heat output.
- Burning pellets longer than 1-1/2 inches (38mm) can cause inconsistent feeding and/or ignition.

We recommend that you buy fuel in multi-ton lots whenever possible. However, we do recommend trying different brands prior to purchasing multi-ton lots, to ensure your satisfaction.

CAUTION! *Tested and approved for use with wood pellets ONLY. Burning of any other fuel will void your warranty.*

Storage

- Wood pellets should be left in their original sealed bag until ready to use, to prevent moisture.
- Do not store fuel within the specified clearance areas, or in a location that will interfere with routine cleaning and maintenance procedures.



CAUTION

Tested and approved for use with wood pellets ONLY.
Burning of any other fuel will void your warranty.

NOTICE

Hearth & Home Technologies is not responsible for stove performance or extra maintenance required as a result of using fuel with higher ash or mineral content.

E. General Operating Information

1. Room Sensor Calls For Heat

The appliance is like most modern furnaces; when the room sensor calls for heat, your appliance will automatically light and deliver heat.

When the room is up to temperature and the room sensor is satisfied, the appliance will shut down.

2. Heat Output Controls

The appliance will turn on and off as the room sensor demands. When the room sensor calls for heat, the appliance will always start up on High. After burning approximately 7-10 minutes, the appliance will then burn at the rate at which it was originally set. If the appliance is set at one of the lower settings, it will run quieter but take longer to heat up an area than if it were set at a higher burn rate.

Regardless of the burn rate, when the area is warm enough to satisfy the room sensor, the appliance will shut off.

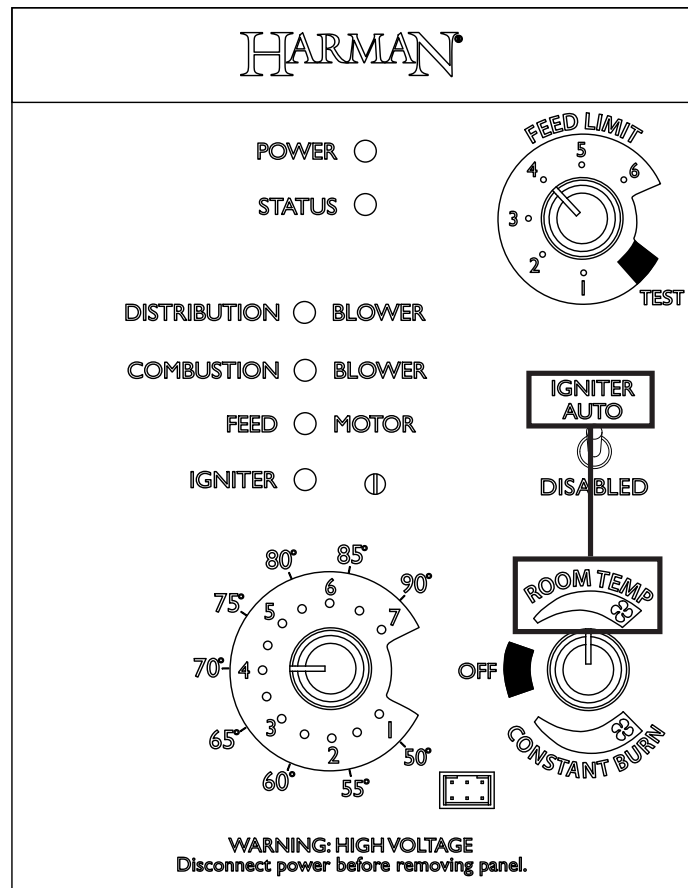


Figure 3.1

WARNING



Fire Hazard

Keep combustible materials, gasoline and other flammable vapors and liquids clear of appliance.

- Do **NOT** store flammable materials in the appliance's vicinity.
- **NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.**
- **DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**
- **DO NOT USE CHEMICALS OF FLUIDS TO START THE FIRE.**
- Combustible materials may ignite.

4 Operating Instructions

A. Starting Your First Fire

1. A room sensor is required for proper operation of this appliance in “Room Temp” mode. At this time, fill the hopper with pellets, insure the control is set to “OFF”. Figure 4.1. Plug the power cord into a properly grounded, nearby outlet.
2. Once power is present, the unit will run through a quick diagnostics test to insure the control is operating properly. This is normal.
3. For your first fire it may be necessary to purge the auger system by putting the feed limit knob to “Test” prior to starting the unit. Figure 4.2. This insures that plenty of fuel enters the burn pot for proper ignition.
4. Flip toggle switch to desired mode “Auto or Disabled”. Figure 4.3. Set feed limit knob to desired setting and turn mode dial to “Room Temp” or “Constant burn” Figure 4.4.
Note: Feed rate of #4 is a good starting point. Adjustments may need to be made depending on fuel quality and/or heat output desired.
5. The fuel feed system and the igniter should now be on.
6. Once the appliance has ignited, let it burn for approximately 7-10 minutes. After this time, the igniter light should turn off and the unit should begin to operate per the settings at the control.

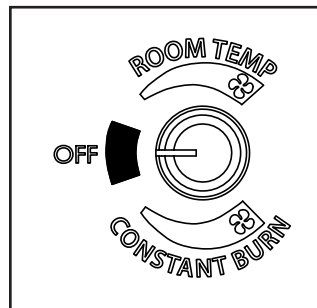


Figure 4.1

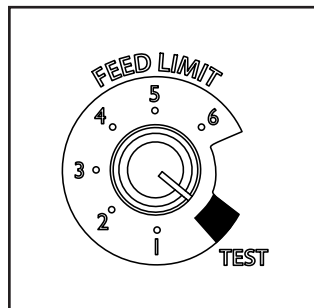


Figure 4.2



Figure 4.3

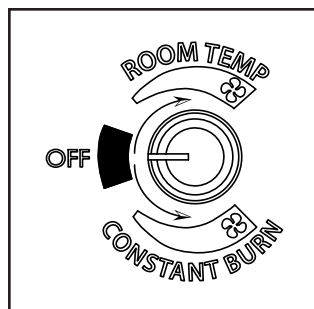


Figure 4.4


B. Fire Characteristics

A properly adjusted fire has a medium active flame pattern that extends out of the burn pot approximately 6 inches (152mm).

C. Feed Limit Instructions

The Feed Limit control is factory set at #4, and should be adequate for most fuels.

However, if the flame height is too high or too low, you will need to adjust the Feed Limit. Wait until the appliance has been burning for 15 minutes before making your adjustments and allow 15 minutes for feed adjustment to take effect.

 CAUTION
Odors and vapors released during initial operation. <ul style="list-style-type: none">• Curing of high temperature paint.• Open windows for air circulation. Odors may be irritating to sensitive individuals.

D. Ignition Cycles

1. At the beginning of each ignition cycle, it is normal to see some smoke in the firebox. The smoke will stop once the fire starts.
2. The distribution blower will automatically turn on after your appliance has reached the set temperature.

This blower transfers heat from your appliance into the room, and will continue to run in “constant burn” mode at the set speed you have the control knob at. In “room temp” mode however, the blower will turn on and off in accordance to what temperature the room sensor is reading. When the room sensor is satisfied the blower will shut down until the room sensor sees a demand for heat.

3. Occasionally the appliance may run out of fuel and shut itself down. When this happens, the unit will need to be turned to the off position and restarted.

If needed, follow the instructions in Section A “Starting Your First Fire”.



WARNING



Fire Risk

Do NOT operate appliance:

- With appliance door open.
- Burnpot floor open.
- Cleaning slide plates open.

Do NOT store fuel:

- Closer than required clearances to combustibles to appliance
- Within space required for loading or ash removal.

E. Automatic Ignition

Adjust Feed Limit. If this is your first fire or you are trying different pellets, set the feed limit to #4, Figure 4.5 This is a conservative number and will probably need to be increased. After you know a Feed Limit setting that works well, use that setting. Remember, if your feed rate is too high you may waste fuel.

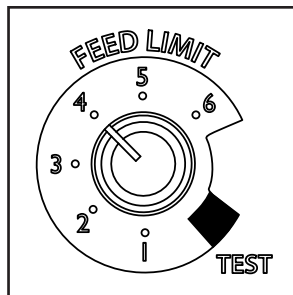


Figure 4.5

Setting the feed limit # for maximum burn: With the unit burning in "AUTO", turn to "Constant Burn" and put the fan on "H". Set the Temperature Dial to #7. Allow the unit to burn for about 30 minutes and check ash on front of burn pot. Figure 4.6. If the ash line is larger than 1", turn the feed limit from #4 to #5. Allow another 30 minutes of burn time and check again. If, at #6 setting, a 1" or less ash bed is not obtainable, it is not a problem. The 1" ash bed is only at maximum burn rate and during normal operation, the ash bed will be larger.

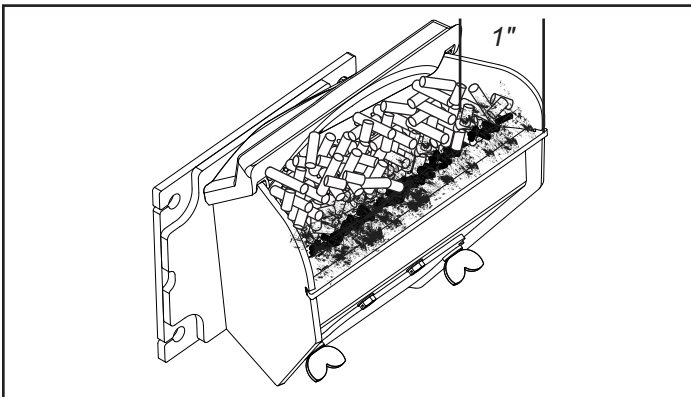


Figure 4.6

Note: The firebox low pressure switch will not allow the auger motor or the igniter element to operate if the view door is open.

Igniter Switch to "AUTO" (up position)

Make sure the unit is plugged into a properly grounded, 120 VAC, 60 Hz electrical source. The power light should be the only light lit.

Note: Be sure there is no fuel or other combustibles in the ash pan prior to lighting.

1. Turn Mode Selector to "OFF".
2. Fill hopper with pellets.
3. Clean burn pot with scraper, if necessary.
4. If starting after an empty hopper, turn Feed Limit to "TEST" (for one 60 second cycle). This will flow pellets into the auger tube and also allow you to check the motors for operation.

NOTE: The auger motor will not operate with the view door open.

5. Turn Feed Limit to #4.
6. Flip the Igniter Switch up into the "AUTO" position.
7. Turn the Temperature Dial to the desired room temperature.
8. Turn Mode Selector to Room Temperature or Constant Burn mode.
9. Fill hopper with pellets and remove ashes as required. Keep the hopper lid and firebox doors closed while in operation. Maintain door seals in good condition. Failure to do so will affect operation of the appliance and may permit escape of smoke or gases into the living space causing smoke detectors to sound.



WARNING

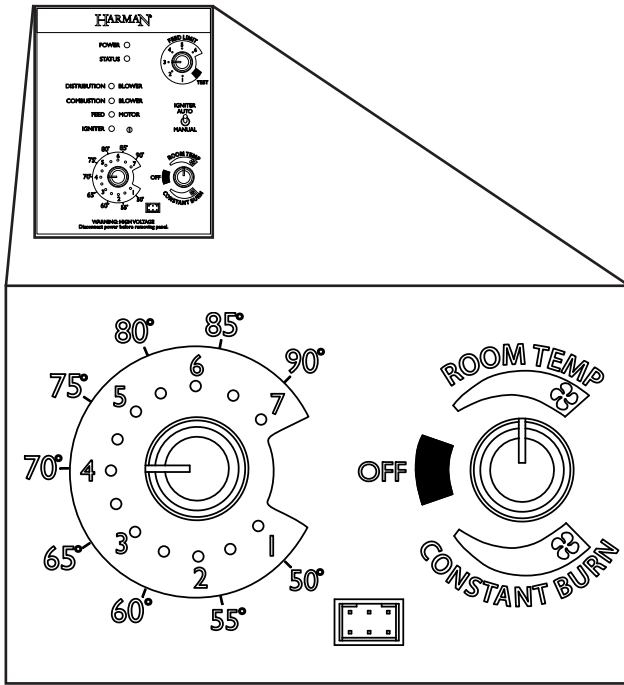
BURNING GARBAGE, USE OF IMPROPER FUELS, FIRESTARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND FOLLOW ONLY THESE OPERATION GUIDELINES.



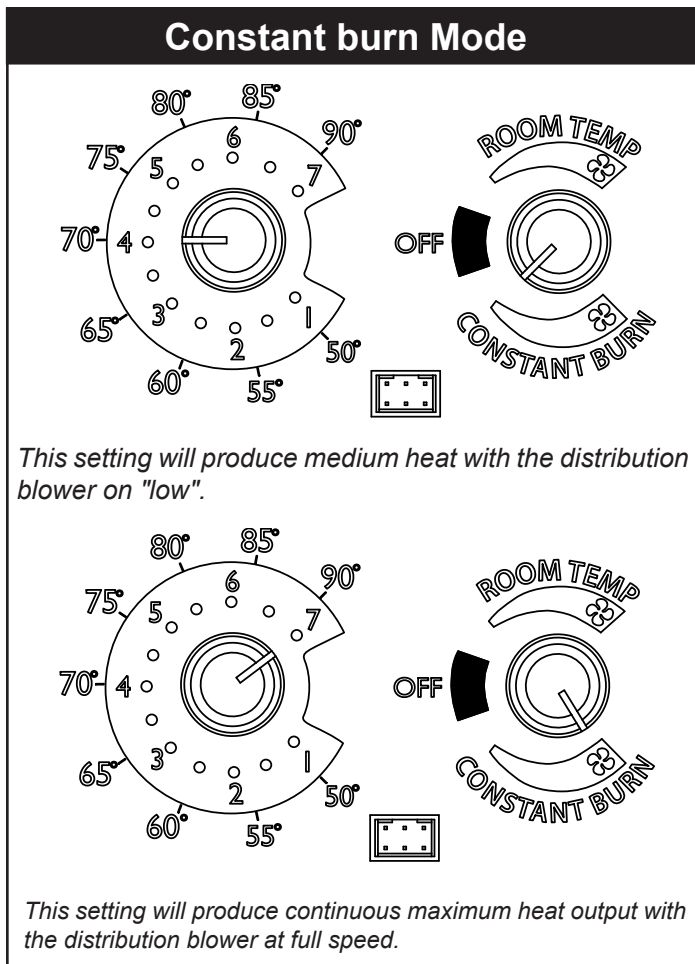
WARNING

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR 'FRESHEN UP' A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER, WHILE IN USE.

E. Automatic Ignition (Continued)



Room Temperature Mode: This setting will produce a room temperature of 70 degrees with the distribution blower at medium speed.



This setting will produce medium heat with the distribution blower on "low".

This setting will produce continuous maximum heat output with the distribution blower at full speed.

The P-Series Pellet Stove is more than just automatic ignition, it is also automatic temperature control. The automatic system will allow the fire size to be adjusted to match the heating needs and even put the fire out if necessary. If heat is needed after the fire is out, the P-Series Pellet Stove will automatically re-ignite and adjust the fire size to match the heating need. The totally automatic room sensor mode is recommended because of its efficiency. The unit can be switched between "AUTO" and "DISABLED" at any time during operation.

Igniter switch to "AUTO"

Room Temperature Mode

In "Room Temp Mode" heat output is controlled automatically by the Room Sensing Probe. When the Room Sensing Probe calls for heat, the stove will increase output. When the Room Sensing Probe is getting close to the set temperature, the stove will begin to level off output and keep the fire burning at just the right temperature to maintain that setting.

High output is determined by the Feed Limit setting. This setting, generally on #4, can be increased if higher burn rates are necessary (Figure 4.6). The unit's maximum burn rate should not create less than 1" of ash on the burn pot front edge (Figure 4.7). Overfeeding is not a safety concern, but fuel may be wasted if unburned pellets fall into the ash pan.

In "Room Temp Mode" a constant fuel consumption rate is sacrificed for exact room temperature. Therefore, as it gets colder more pellets will be burned automatically.

The distribution blower speed will vary according to the position of the mode selector pointer, and fire size.

Igniter switch to "AUTO"

Constant Burn Mode

This allows for automatic ignition upon start-up only. The unit can then be set at any desired setting. The heat output and fuel consumption will remain constant regardless of room temperature. The unit's maximum feed rate should not create less than 1" of ash on the burn pot front edge. Figure 4.7.

The unit's low burn or maintenance setting is as low as it will go. It will not go out unless it runs out of fuel or is turned off.

Shut-Down Procedure

To kill the fire or stop burning the stove, turn the Mode Selector to "OFF". This will cause the fire to diminish and burn out. When the fire burns out and the stove cools down everything will stop.

If you pull the plug to shut down the stove, all motors will stop. This may cause incomplete combustion and smoke in the firebox. If the load door is opened, the smoke may escape.

The best way to shut down the stove is simply let it run out of pellets, then the stove will shut down automatically.



5 Maintenance & Service

When properly maintained, your stove will give you many years of trouble-free service. **Contact your dealer** to answer questions regarding proper operation, trouble-shooting and service for your appliance. Visit www.harmanstoves.com to find a dealer. We recommend annual service by a qualified service technician.

Note: Do not use a household vacuum to clean the stove. We recommend that you use a shop vacuum that is equipped with a fine dust filter called a HEPA filter or a vacuum specially made for fly ash and soot. **USING A VACUUM WHICH IS NOT EQUIPPED WITH A FINE DUST FILTER WILL BLOW FLY ASH AND SOOT OUT INTO THE ROOM.**

NOTE: THE STOVE MUST BE COMPLETELY OUT BEFORE YOU VACUUM THE STOVE. LIVE PELLET EMBERS, IF SUCKED INTO THE VACUUM, WILL LIGHT THE VACUUM ON FIRE AND MAY ULTIMATELY CAUSE A HOUSE FIRE.

A. Proper Shutdown Procedure

 CAUTION	
	Shock and Smoke Hazard
	• Turn unit to the off position, let appliance completely cool and combustion blower must be off. Now you can unplug appliance before servicing.
	• Smoke spillage into room can occur if appliance is not cool before unplugging.
	• Risk of shock if appliance not unplugged before servicing appliance.

Follow the detailed instructions found in this section for each step listed in the chart below.

B. General Maintenance

Types of Fuel

The type of fuel you are burning will dictate how often you have to clean your burnpot.

If the fuel you are burning has a high dirt or ash content, it may be necessary to clean the burnpot more than once a day.

Dirty fuel will cause clinkers to form in the burnpot. A clinker is formed when dirt, ash or a non-burnable substance is heated to 2000°F (1093°C) and becomes glass-like.

C. Quick Reference Maintenance Chart

Frequency	Cleaning Procedure	Safety Measures	Tips
Daily	Scrape Burn pot	Wear flame resistant gloves ³	Vigorous, strong scraping specifically near neck of burn pot. Scrape every time you add pellets or at least every 3 bags of fuel. ²
Weekly	Empty Ash Pan	Wear protective gloves. ¹ Put ashes into a steel non-combustible container with tight fitting lid outside.	Unit does not need to be turned off. Reduce to low burn during removal.
	Clean the Glass	Stove must be turned off and cold.	
Monthly	Scrape & Vacuum Heat Exchanger	Stove must be turned off and cold.	Use provided scraper. Scrape back and sides of firebox.
	Brush & vacuum the distribution fan	Stove must be turned off, cold and unplugged from power supply.	Use provided paint brush. This should be done approximately every 25 bags. ²
	Inspect Hopper lid gasket for damage		Replace gasketing if frays, tears or other visible damage to gasket. This should be done approximately every 50 bags. ²
	Clean Igniter	Stove must be turned off, cold and unplugged from power supply. Wear protective gloves. ¹ Put ashes into a steel non-combustible container with tight fitting lid outside.	Use provided paint brush. Vacuum loose ash from around igniter and inside burn pot.
Stove MUST be turned off, cold and unplugged from power supply for Yearly Cleaning.			
Yearly ⁴	Brush & vacuum the combustion fan and venting/exhaust path	Wear protective gloves. ¹ Put ashes into a steel non-combustible container with tight fitting lid outside.	Use provided paint brush to brush fan blades. *Use flue brush to clean venting being careful not to damage the ESP. ²
	Inspect door gasket		Replace gasketing if frays, tears or other visible damage to gasket.
	Brush & vacuum venting system	Wear protective gloves. ¹ Put ashes into a steel non-combustible container with tight fitting lid outside.	

* A flue brush of appropriate size and length may need to be purchased for proper maintenance.

1. Protective gloves will help prevent skin abrasion while working on steel surfaces.
2. Frequency of cleaning depends largely on fuel type. Lower quality pellets require most frequent cleaning.
3. Flame resistant gloves will help protect your skin from potential contact with heat or flames.
4. Yearly cleaning is also known as a Total Clean. This requires completing all the Daily, Weekly, Monthly and Yearly maintenance mentioned. This should be done before you begin burning the unit each heating season.

D. Glass Maintenance

The glass used in your stove is manufactured to exact standards to withstand the high heat of the fire, but like all glass, it must be treated with common sense and care. Never slam the door shut or strike the glass with a heavy object. If the glass is broken or damaged, do not operate the stove until it has been replaced.

Glass - Replacement

If the stove's glass is cracked or broken, you must replace it before operating your stove. Remove pieces carefully. Replace glass only with Harman® replacement glass; **do not use substitutes**.

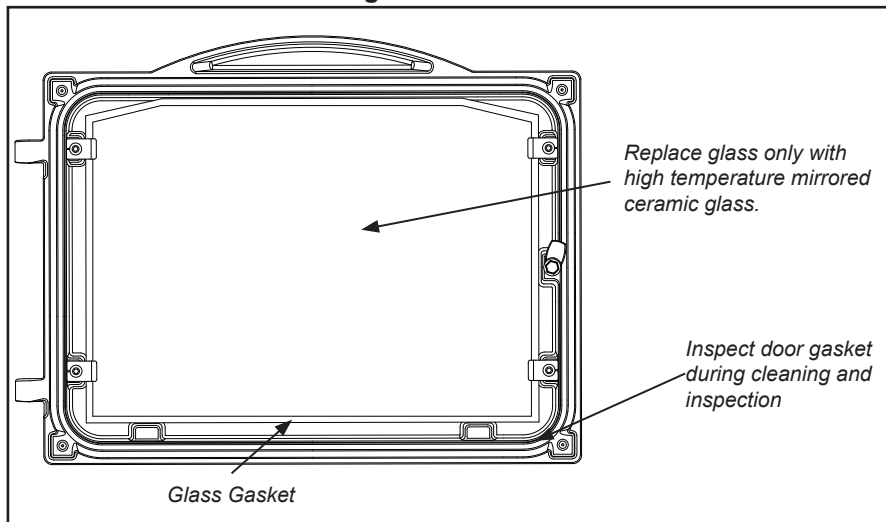
Carefully remove damaged glass, gasket material, and hold down clips (set aside).

Install the self adhesive 1/4" gasket material around the front face of the glass. Set the glass panel and gasket gently onto the door. Install the hold down clips and tighten with bolts.

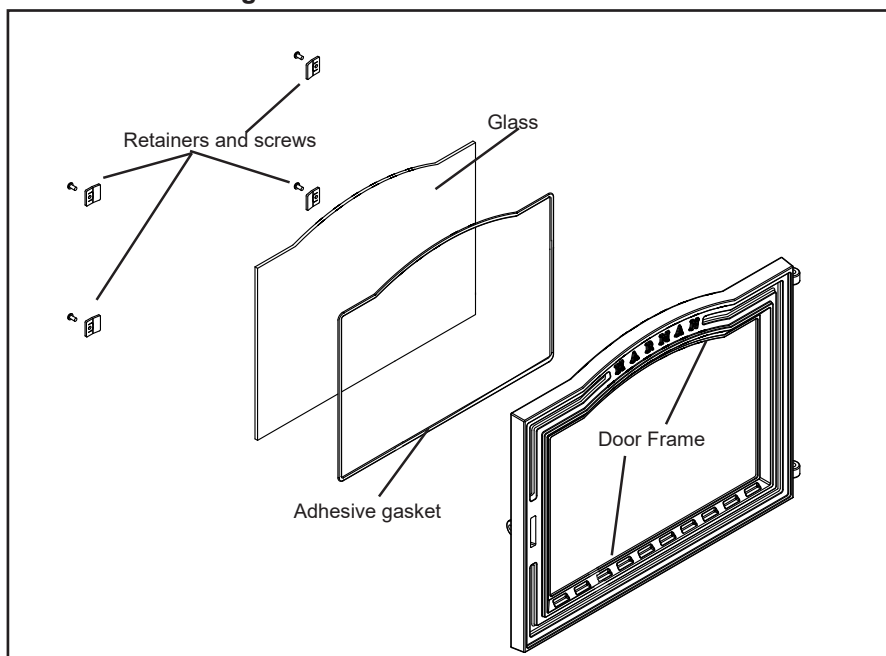
Glass - Cleaning

Sometimes it will be necessary to clean accumulated ash from the glass surface; allowing this ash to remain on the glass for long periods can result in "etching" due to the acidity of the ash. Never clean the glass while it is hot, and **do not** use abrasive substances. Wash the surface with cool water, and rinse thoroughly. You may wish to use a non-abrasive cleaner specifically designed for use on stove glass. In any case, dry thoroughly before relighting your stove.

P43-C & P61-C Freestanding Pellet Stove



P68-C Freestanding Pellet Stove



E. Burnpot Maintenance

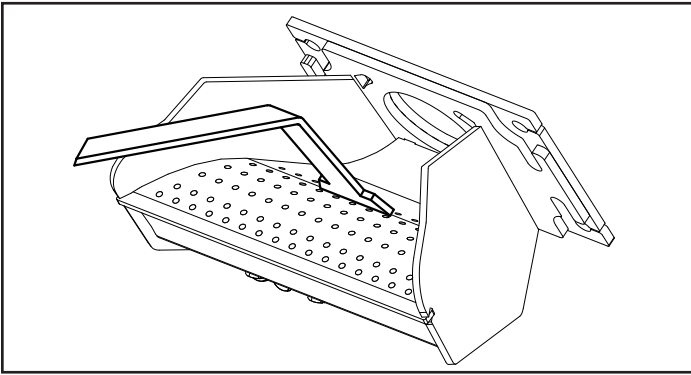
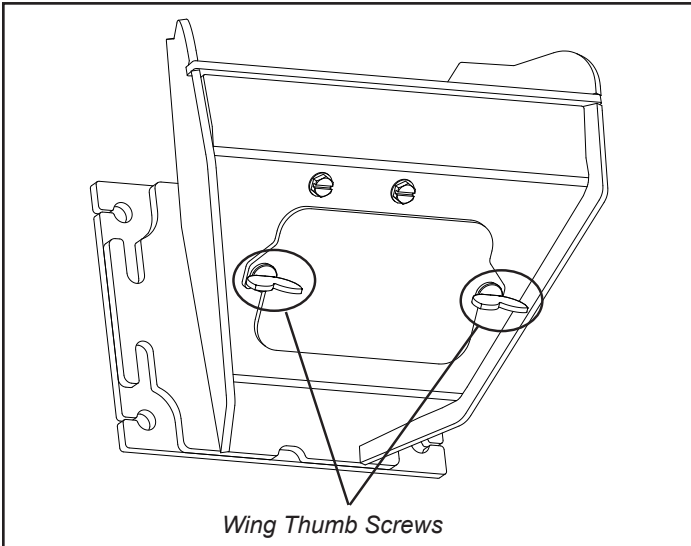


Figure 5.1



Wing Thumb Screws

Figure 5.2

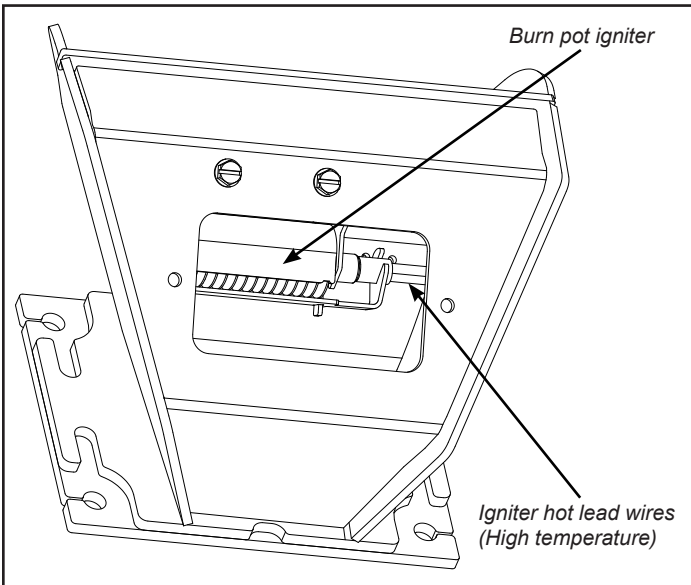


Figure 5.3 - View from below through the ash pan opening.

Whenever adding fuel, take the opportunity to clean the burn pot. **(Weekly at minimum)**

- Scrape the top holed surface and sides of the burn pot down to auger tube Figure 5.1. It is not necessary to completely remove all material from the burn pot. The excess will be pushed out during the next use.
- With the fire out and burn pot cold, use the supplied allen wrench to remove any build-up that may have accumulated in the holes of the burn pot grate. Simply push the allen wrench down through each hole ensuring it is clear of any build-up paying attention not to damage the igniter element in the process.

Monthly, or after each ton of fuel burned:

- Loosen the (2) wing thumb screws on the lower front angle of the burn pot. Figure 5.2
- Lift off the clean-out cover to open the bottom clean-out chamber. Figure 5.3



DANGER

Disconnect the power to the unit before removing cover.

- Clean ash buildup from inside the chamber while cover is off. Use the scraper to tap on the top front edge of the burn pot. This will help knock pieces of ash, loosened by the scraping process, down through the holes. It also helps knock scale off of the igniter element.

Figure 5.3

The igniter is made to be removable for service by insulated male/female wire connectors. These connections between the hot leads (the wires inside the burn pot) and the cold leads (the wires from the control board) are always pulled to the inside rear of the feeder body. **(Not coiled inside the burn pot.)**

It is very important that these connections are to the inside rear of the feeder body. Also, the extra wire of the igniter wire service loop must be pulled out through the rear of the feeder and tied up so that it will not be damaged by any moving parts.

Note: The hot lead/cold lead connection must always be pulled to the rear of the feeder body before operation.



WARNING

Use caution when cleaning burn pot clean-out chamber. Do not damage the high temperature igniter wires.

F. Combustion Blower Chamber

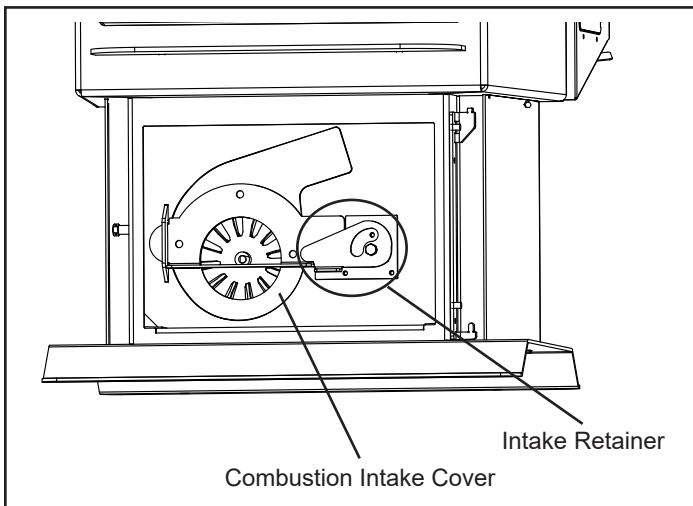


Figure 5.4

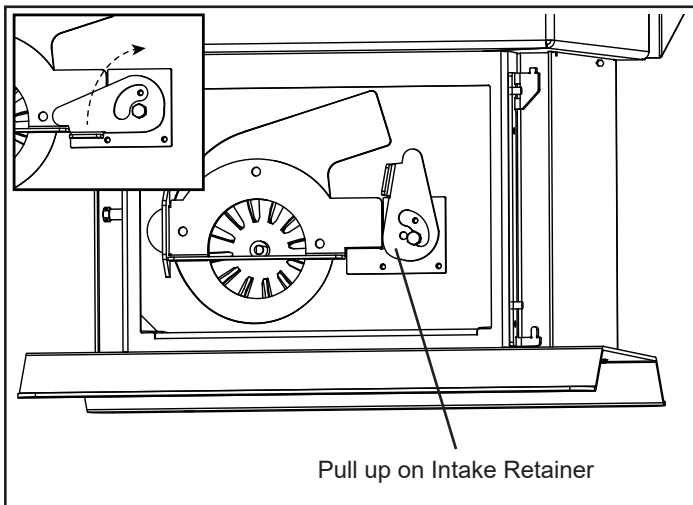


Figure 5.5

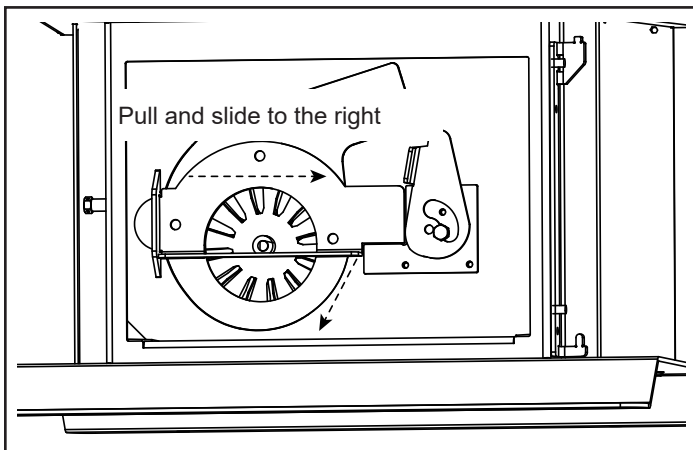


Figure 5.6

Monthly Cleaning- continued:

There is a combustion intake cover located behind the ash pan that must be removed to properly clean the combustion blower fan blade. Figure 5.4. In order to remove the combustion intake cover you must pull up on the intake retainer. Figure 5.5. This will allow the combustion intake cover to be removed. To remove the combustion intake cover pull towards the front of the unit while sliding to the right. Figure 5.6.

Now that the combustion intake cover is removed you can remove any flyash or debris that has collected around combustion blower fan blade and areas around it.

The exhaust passage may need cleaned as well. Keep in mind the ESP Sensor is located just inside the exhaust passage Figure 5.7. Be sure not to damage the ESP Sensor while cleaning this area.

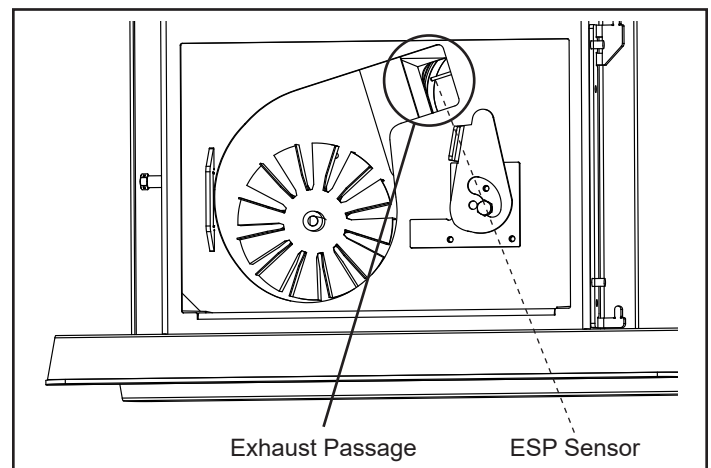


Figure 5.7

G. Pellet Feeder Chamber

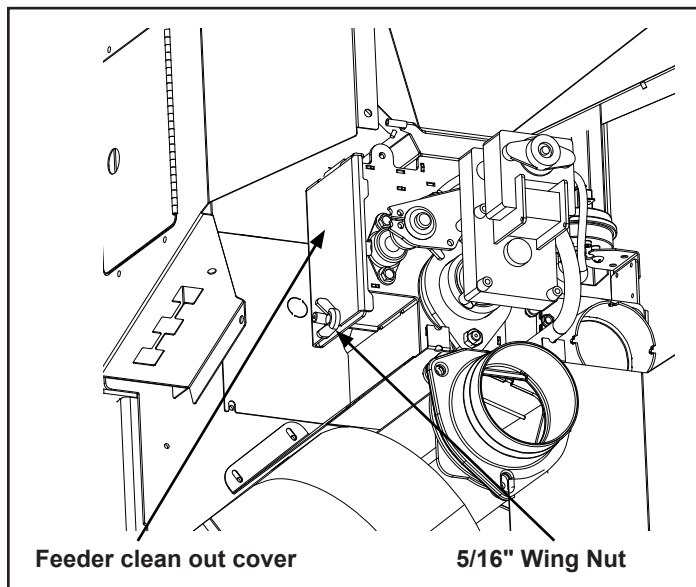


Figure 5.8

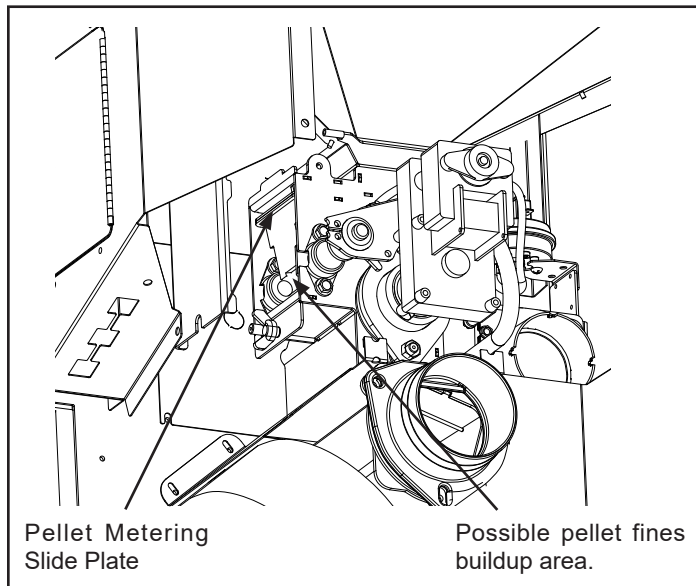


Figure 5.9

Feeder Chamber

This chamber may get a buildup of fines from the feeder mechanism movement. This area should be checked and cleaned at least once a year.

To remove the feeder cover:

- Loosen the 5/16" wing nut. Figure 5.8.
- Lift up and slide the cover off of the threaded stud.
- Inspect and clean the inner chamber if necessary Figure 5.9.
- Reinstall the cover making certain it is seated properly on the feeder body and tighten as tightly as you can by hand.

NOTE: Views are shown with the rear motor covers removed.

6 Troubleshooting and Frequently Asked Questions

A. Error Code Description

Status light error messages:

2 Blinks: Indicates an open feed circuit, typically from pressure switch or hopper switch. Blink status automatically clears when feed circuit is complete. Does not blink if door/hopper is opened when stove is off.

3 Blinks: Indicates that the ESP (Exhaust Sensing Probe) has failed, has a broken connection, or has gone out of range too many times. This requires a manual reset*.

4 Blinks: Can occur only in Room Temp Mode and indicates Room Sensing Probe failed or not installed. If a Room Sensing Probe is then installed, the status light will automatically reset.

NOTE: Unit will not start in "AUTO" with this status error.

5 Blinks (In Igniter Auto. Mode Only): Indicates that the unit has failed to light within the 36 minute start cycle. To reset - Turn Mode Selector to "OFF", then turn to either mode again.)

6 Blinks : Indicates that the control has calculated poor or incomplete combustion occurring for more than 25 minutes.

A six blink status may be set if the stove is allowed to run out of pellets. To reset, turn mode selector to "OFF" then back on to the desired mode. If the unit was not out of pellets, see Troubleshooting section for more details.

* **Manual reset-** disconnect power cord for a few seconds and reconnect. If error still occurs call your Dealer.

B. Frequently Asked Questions

ISSUES	SOLUTIONS
1. Metallic noise.	1. Noise is caused by metal expanding and contracting as it heats up and cools down, similar to the sound produced by a furnace or heating duct. This noise does not affect the operation or longevity of your appliance.
2. White ash buildup on glass.	2. This is normal. Clean the glass using any non-abrasive glass cleaner.
3. Glass has buildup of black soot	3. Excessive build-up of ash. See solution #4. The lower burn settings will produce more ash, the higher burn settings produce less. The more it burns on low the more frequent cleaning of the glass is required.
4. Glass has turned dirty.	4. Excessive build up of ash. The lower burn settings will produce more ash, the higher burn settings produce less. The more it burns on low the more frequent cleaning of the glass is required.
5. Fire has tall flames with black tails and is lazy.	5. The feed rate needs to be reduced or the burnpot needs cleaning. Heat exchanger or exhaust blower needs cleaning.
6. Smoky start-up or puffs of smoke from the airwash.	6. Either the burnpot is dirty or there is too much fuel at start-up and not enough air.
7. Large flame at start-up.	7. This is normal. Flame will settle down once the fire is established.

Contact your dealer for additional information regarding operation and troubleshooting. Visit www.harmanstoves.com to find dealer.

C. Troubleshooting

With proper installation, operation, and maintenance your appliance will provide years of trouble-free service. If you do experience a problem, this troubleshooting guide will assist a qualified service person in the diagnosis of a problem and the corrective action to be taken. This troubleshooting guide can only be used by a qualified service technician.

STOVE DOES NOT FEED

1. No fuel in hopper.
2. Firebox draft may be too low for sensing switch in feeder circuit to operate. **Check for closed doors**, loose or missing gasket on doors or hopper lid.
3. Feed motor will not run until the ESP control senses a certain temperature. Maybe you did not put enough fuel or starting gel in the burn pot before manually lighting the fire.
4. Restriction in the hopper or feeder. Remove all fuel and examine. Clear the obstruction.
5. Feed motor has failed.

PARTIALLY BURNED PELLETS

1. Feed rate too high.
2. Poor air to fuel mixture. (Check burn pot clean-out cover and air intake).
3. Burn pot or heat exchanger tubes may need to be cleaned.
4. Combination of all the above.
5. #6 status blink: A 6 blink control board status indication is caused by poor or incomplete combustion. The circuit board has the ability to track the combustion through feed settings and ESP temperatures. When the control board has calculated poor or incomplete combustion, it will shut down the unit as a safety feature. (Poor or incomplete combustion is a contributor of creosote which may cause a chimney fire)

A 6 blink status may be caused by several things:

1. Blocked or partially blocked flue.
2. Blocked or partially blocked inlet air.
 - a. Backdraft damper on the inlet pipe may be stuck closed.
 - b. If outside air is installed, the inlet cover may be blocked.
3. The air chamber under the burnpot may be filled with fines and small bits of ash.
4. The holes in the burnpot may be getting filled with ash or carbon buildup.
5. Combustion blower fan blades may need cleaned.
6. Fuel restrictions as noted above.

SMOKE SMELL

Follow venting manufacturer's recommendations for sealing pipe joints. The exhaust vent is the only part of the system that is under positive pressure.

FIRE HAS GONE OUT- Check for status light.

1. No fuel in hopper.
2. Draft is too low, blocked flue.
3. Something is restricting fuel flow.
4. Hopper lid not closed properly.
5. Feed motor or combustion blower has failed.

SMOKE IS VISIBLE COMING OUT OF VENT

1. Air-fuel ratio is too rich.
 - a. Feed rate too high.
 - b. Draft too low caused by a gasket leak.

LOW HEAT OUTPUT

1. Feed rate too low
2. Draft too low because of gasket leak.
3. Poor quality or damp pellets
4. Combination of 1 and 2.

HELPFUL HINTS

1. Cleaning Burn Pot

Whenever your stove is not burning, take the opportunity to scrape the burn pot to remove carbon buildup. A vacuum cleaner is handy to remove the residue. Be sure the stove is cold if you use a vacuum.

Carbon buildup can be scraped loose with the fire burning using the special tool provided with your stove. Scrape the floor and sides of the burn pot. The carbon will be pushed out by the incoming fuel. Always wear gloves to do this.

2. Removing Ashes

Turn the Temp Dial to number 1 approximately 30 minutes before removing ashes. This will result in a cooler stove and ash pan.

Maximum Feed Limit settings are not needed in most cases. Operating in the normal range (#4) is recommended when maximum heat output is not required. The ESP probe prevents the stove from being over-fired.

Keep the stove free of dust and dirt.

Fuel

The P-Series Pellet Stove is approved for burning any grade of pelletized bio-mass fuel.

It should be noted, however, that higher ash content will require more frequent ash removal, scraping of the burn pot, and may provide less BTU's per pound.

The moisture content of pellets must not exceed 8%. Higher moisture will rob BTU's and may not burn properly.

Fuel should **not** be stored within the stove installation clearances or within the space required for cleaning and ash removal.

7 Reference Material

A. Safety Reminders

When operating your Harman® P-Series Pellet Stove, respect basic safety standards. Read these instructions carefully before you attempt to operate the P-Series Pellet Stove. Failure to do so may result in damage to property or personal injury and may void the product warranty.

CAUTION: This appliance must be vented to the outside.

Due to high temperatures, this stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burn to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this stove.

Installation and repair of this stove should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning will be required. It is imperative that control compartments and circulating air passageways of this stove be kept clean.

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

Soot and fly ash: Formation and need for removal. The products of combustion contain small particles of fly ash. The fly ash will collect in the exhaust venting system and will restrict the flow of the flue gases. Pellet fuels have different ash contents depending on what type of wood has been used to make the pellets. **We recommend to clean the system after approximately 1 ton of pellets have been burned and judge from that how often the stove should be cleaned, remember if you change pellets it may change how often you have to clean your stove.**

When burning wood slowly, the potential exists for creosote to form. The venting system should be inspected periodically throughout the heating season to determine if a creosote buildup has occurred. If a significant layer of creosote has accumulated (3mm or more), it should be removed to reduce the risk of a chimney fire. If a fire occurs, call the fire department, shut down the stove, and evacuate the residence. Before using the appliance, have the venting system thoroughly inspected and replace any damaged components.



WARNING

MOBILE/MANUFACTURED HOME GUIDELINES DO NOT ALLOW INSTALLATION IN A SLEEPING ROOM.



CAUTION

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



CAUTION

THE STOVE IS HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.



WARNING

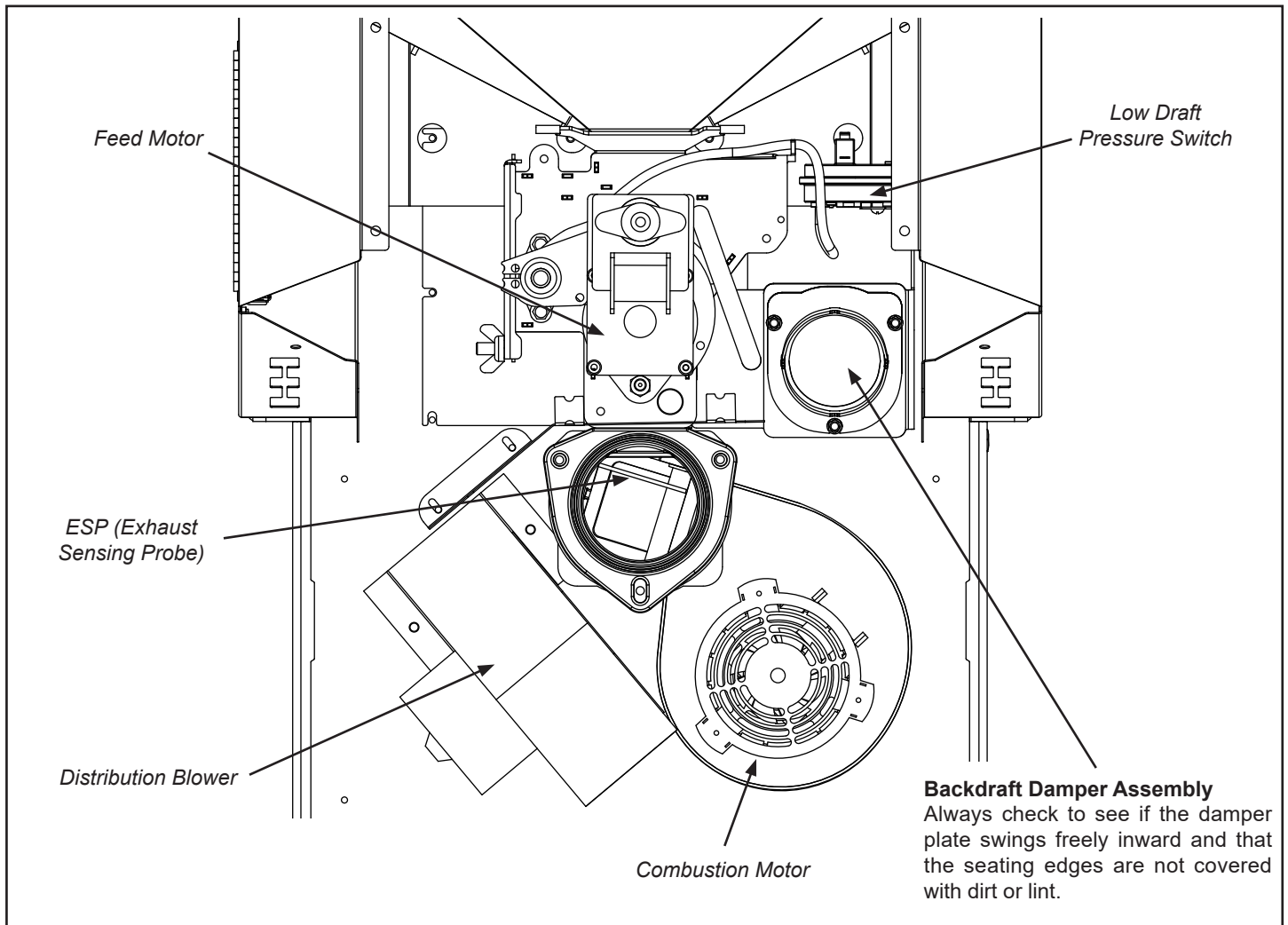
KEEP COMBUSTIBLE MATERIALS SUCH AS GRASS, LEAVES, ETC. AT LEAST 3 FEET AWAY FROM THE POINT DIRECTLY UNDER THE VENT TERMINATION.



WARNING

USE OF IMPROPER FUELS, FIRESTARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND OPERATION GUIDELINES

B. Motor and Component Location



P-Series Pellet Stove Safety Devices

The **Control Board/ESP** combination is responsible for all high limit safety control. There are 2 high limits, one normal operation high limit and one backup high limit. The control has an automatic diagnostic circuit that continuously monitors the ESP and Room Sensor for faults. If a fault should occur, the control sends a status alert and at the same time the unit goes down to minimum feed/minimum burn as a safety condition.

The **Low Draft Pressure Switch** is a differential pressure switch that monitors the negative pressure (Draft) in the firebox. If the draft becomes too low for proper combustion, the switch opens, cutting power to the feed motor and the igniter circuits. This switch is connected into the AC (high voltage) wiring.

C. Loss of Power

Harman pellet burning appliances rely on a combustion blower to remove exhaust from the firebox. A power failure will cause the combustion blower to stop running, which may lead to exhaust see page into the room. Vertical rise in the venting system can help create natural draft, which may reduce the likelihood of exhaust leakage into the home.

Installation of a low-cost uninterruptible power supply (UPS) or battery backup system can help ensure the units shuts down without any minor smoke leakage into the home. Harman recommends the installation of one of these two systems for areas prone to power outages.

There is one Harman® approved UPS option for your appliance:

Uninterruptible Power Supply UPS battery back-ups are available online or at computer and office equipment stores. Your Harman® appliance with Rev E or later software available beginning in November 2010 may be plugged directly into a Harman® approved UPS:

- **TrippLite model INTERNET750U** is tested and approved. Other brands or models may not be compatible.

When power is lost, a fully charged UPS will power a safe, combustion blower only shut-down. Your appliance will pulse the blower every few seconds to clear exhaust until the fire is out. **NOTE: The UPS provides safe shut-down only. It is not intended for continued operation.**

- A Inverter/Charger connects to a 12 volt deep cycle battery that will run your appliance for up to eight (8) hours. It includes a trickle charge feature that keeps your battery charged when power is available. **NOTE:** If the power is out for longer than battery life, smoke leakage may still occur unless your stove has been safely shut down.

For an approved Inverter/Charger refer to www.harmanstoves.com.

Your appliance will recognize when power is restored. What happens depends on ESP temperature and whether it is equipped with automatic ignition:

- In **“Automatic” Mode**, units equipped with automatic ignition will respond to the set point and ESP temperature and resume normal operation.
- In **“Idle” Mode**, or for units without automatic ignition:
 - If the ESP is cool, the appliance will remain shut down.
 - If the fire is out and the ESP is still warm, the feeder may restart. Since the fire is out, the ESP temperature will not rise. The unit will then shut-down, and may flash a six-blink status error. (See ESP error codes)
 - If the fire is still burning, it will resume normal operation.

Contact your dealer if you have questions about UPS compatibility with your appliance.

IMPORTANT! : UPS or Battery Backup cannot prevent smoke leakage from an improperly maintained unit. Keep the venting system clean and free from obstructions and maintain all gaskets to keep an airtight seal.

WARNING

Use only Harman® approved battery back-up devices. Other products may not operate properly, can create unsafe conditions or damage your appliance.

CAUTION

Always keep appliance doors and hopper lid closed and latched during operation and during power failures to minimize risk of smoke or burn-back.

D. Emergency Manual Ignition

Harman® pellet stoves and inserts should be lit using the automatic ignition system. This is the safest and most reliable way for igniting the unit. In the event the automatic igniter is not functioning, the steps below may be followed to manually light the stove or insert in the “Constant Burn” mode. Manual lighting is for emergency purposes only, and the igniter should be repaired or replaced as soon as practical.

WARNING

Only use firestarter commercially marketed for pellet stoves and inserts, including wax coated wood chips, pellet starter gel and pellet igniter blocks. Use of any other type of firestarter is prohibited.

To avoid serious injury or death read and follow manufacturer’s warning and instructions for use of firestarter. Use of firestarter is only permitted when performing a cold start.

Never attempt to manually light a stove or insert that has been operated recently and is not at room temperature. If automatic ignition was attempted, be sure to give the stove or insert at least 30 minutes or longer to cool to room temperature.

Be sure that the stove or insert is in the “Igniter - Disabled” mode of operation.

Once all the precautions have been taken, follow these steps:

1. Turn the Mode Selector to “OFF”.
2. Fill burn pot with pellets, only half way. (Do Not Over Fill).
3. Add firestarter to pellets following manufacturer’s instructions.
4. Light pellet gel with a match, and close the door, turn Mode Selector to Constant Burn. Operation will begin when the fire reaches the proper temperature.

E. Service Parts

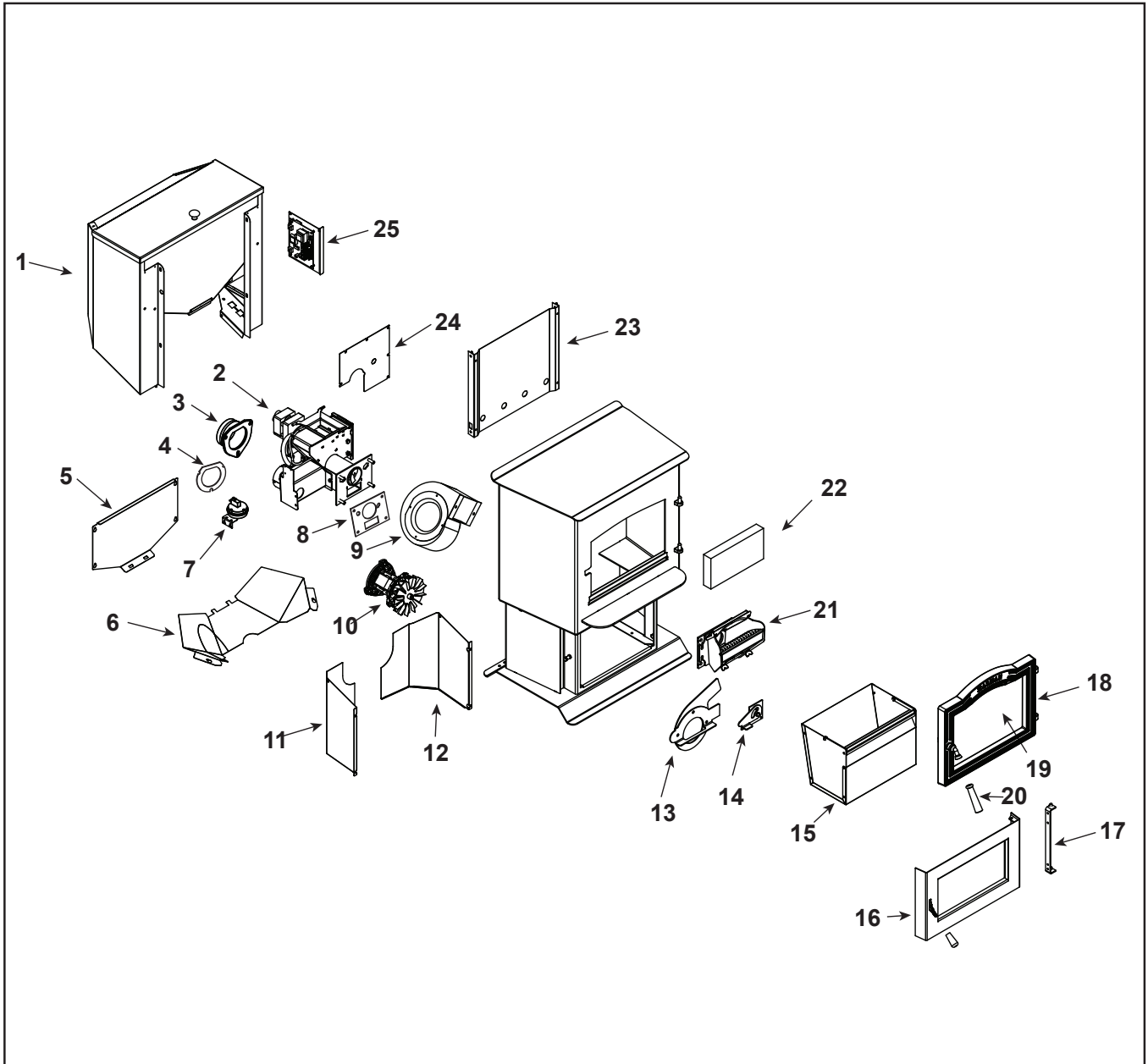


Service Parts

Steel Pellet Stove
1-90-04400-1 (Black)

P43-C Pellet

Beginning Manufacturing Date: March 2019
Ending Manufacturing Date: Active



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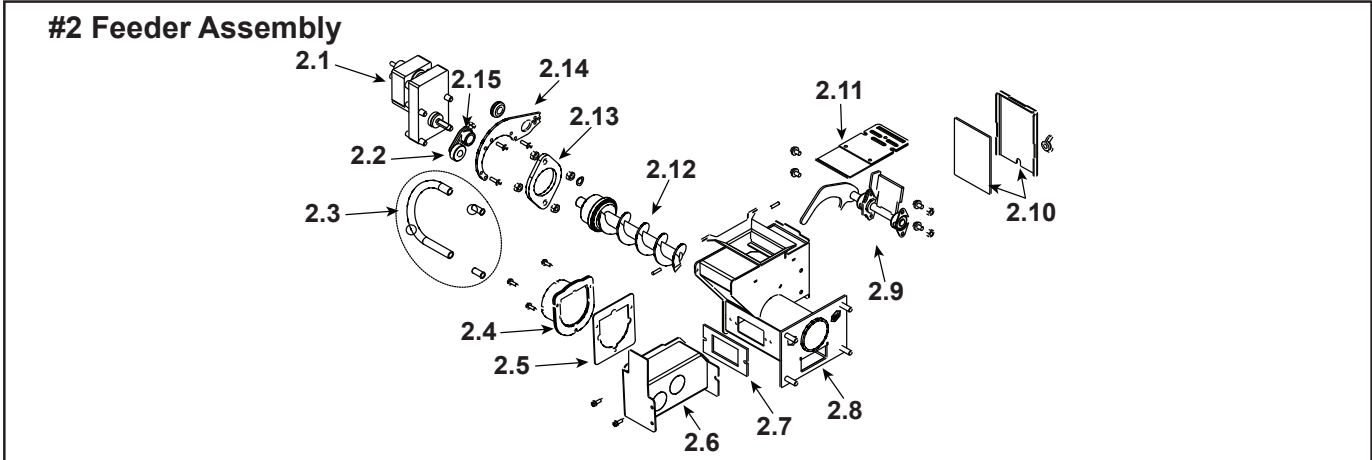


Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
1	Hopper Assembly		1-10-04300	Y
	Hopper Knob		1-00-02000-1	
	Hopper Latch Assembly	Pre HF2372946	1-00-773901	
		Post HF2372946	SRV8000-050	
	Hopper Lid w/Hinge, Knob		1-10-773900	

Additional service parts on following page.

1/23



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Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
2	Feeder Assembly		1-10-09535A	
2.1	Pellet Feeder Gear Motor, 4RPM		3-20-60906	Y
2.2	UL Feeder Cam Bearing		3-31-3014	Y
2.3	Feeder Crossover Kit		1-00-67900	Y
	9MM Silicone Tube	5 Ft	1-00-511427	Y
2.4	Pellet Air Intake Assembly		1-10-06810A	
2.5	Gasket Feeder Air Intake	Pkg of 6	3-44-72224-6	Y
2.6	UL Feeder Air Intake		1-10-72222	
2.7	Gasket Ultra Air Intake	Pkg of 10	3-44-677160-10	Y
2.8	Ultra Feeder Weldment		1-10-724132	Y
2.9	UL Feeder Pusher Arm		1-10-677187W	Y
2.10	Gasket, UL Feeder		1-00-677122	Y
2.11	Slide Plate Assembly		1-10-677121A	Y
2.12	UL Feeder Auger Assembly		3-50-00565	Y
2.13	Bearing Flange w/Hardware		1-00-04035	Y
2.14	UL Feeder Gear Motor Bracket w/Grommet		1-00-247406	Y
2.15	UL Feeder Cam Block		3-00-677154	Y
	Hopper Switch Feeder Fitting	Pkg of 2	1-00-142818	Y
	Motor Bracket Grommet	Pkg of 12	3-31-2761-12	
	Pillow Block	Pkg of 4	3-31-3614087-4	Y
	Silicone Tubing, 1/8"	5 Ft	1-00-5113574	Y
3	Flue Tail Pipe		3-00-247237	Y
4	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
5	Auger Motor Cover		2-00-773843P	Y
6	Auger Motor Shield		2-00-773815P	Y
7	Differential Switch		3-20-6866	Y
8	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y

Additional service parts on following page.

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Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
9	Distribution Blower		3-21-33647	Y
10	Combustion Blower		3-21-08639	Y
	Combustion Blower Mounting Screws (Pkg of 100)	Commonly required for Combustion Blower replacement	1-00-53483208	
	Fan Blade, 5" Double Paddle (Combustion Blower)		3-20-502221	Y
11	Rear Cover Left		2-00-773828-1P	Y
12	Rear Cover Right		2-00-773828-2P	Y
13	Comb Intake Weldment		1-10-08516S	Y
14	Retainer Assembly		1-10-08533S	Y
15	Ash Pan		1-10-7738108A	Y
16	Ash Door Assembly		1-10-773904A	
	Wood Handle		1600663	
17	Bolt on Hinge		2-00-06968B	
18	Cast Door Frame		4-00-06800P	
	Cast Door w/Glass		1-10-06800M	
	Pin, Slick (Pkg of 2)	Post #HF2371860	1-00-110	
19	Glass Panel w/Gasket		1-00-950133647	Y
20	Door Handle Assembly		1-00-453001	Y
	Contains: Handle, 6 mm Washer, SHCS, handle, Elbow, Paw (Cast), SSS, Bhcs.			
	Wooden Handle w/Hardware, Load Door		1-00-00247	Y
	Wave Washer	Pkg of 10	SRV3-31-453013	
21	Burn Pot Weldment		1-10-00675	Y
	Flame Guide		3-00-03000	Y
	Clean Out Cover	2 Sets	1-00-06623	Y
	Thumb Screw	Pkg of 10	3-31-782108-10	Y
22	Fire Brick 4-1/2 x 9 x 1-1/4"	Pkg of 7	1-00-900450125	Y
	Firebrick, Full Skid	414 Pcs	3-40-900450-414	
23	Hopper Heat Shield		2-00-773854B	
24	Feeder Cover		2-00-773826L	
25	Circuit Board w/Knobs & Shafts		1-00-05886	Y
	Control Board Label		3-90-07766	
	Circuit Board Plate, Studded w/label		1-10-08327	
	Knob, Control Board/D-Shaft	25 Sets	1-00-015605	Y
	Arrow Burn Pot Scraper	Pkg of 10	2-00-773850-10	
	Cradle Assembly			
	Igniter Holder, Cradle, & Flat Bottom		1-00-777907	Y
	Diagnostic Display Module		3-20-05401	Y
	DDM Replacement Cable		1-00-05402	

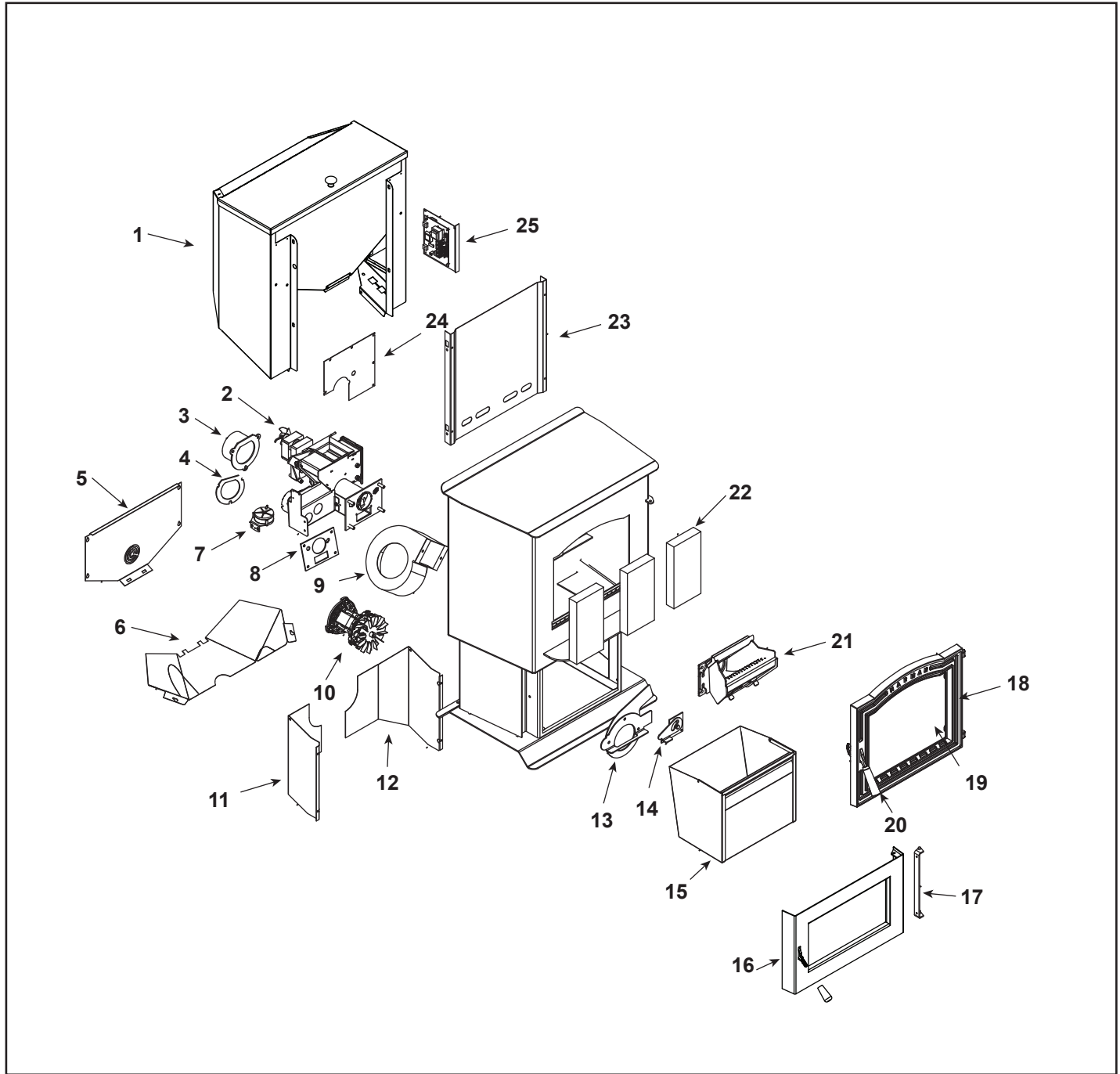
Additional service parts on following page.

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Stocked
at Depot

ITEM	Description	COMMENTS	PART NUMBER	Stocked at Depot
	Door Hinge w/pin, Cast	Pre #HF2371860	3-00-773813	
	Draft Meter Assembly		1-00-00637	Y
	Draft Meter Bolt and Tube		1-00-04004	
	Fuse, 5 Amp Ceramic	Pkg of 5	1-00-05237	Y
	Gasket, 1/4" Rope Black W/PSA (Glass)	15 Ft	1-00-2312	Y
	Gasket, 3/8" Rope White LD (Ash or Load Door)	15 Ft	1-00-1203589	Y
	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
	Gasket, Hopper Lid		1-00-00248	Y
	Gasket, Hopper Throat		3-44-677185	Y
	Gasket, Burn Pot		3-44-237639	Y
	Glass Clip	Pkg of 4	1-00-249140	Y
	Igniter		3-20-677200	Y
		Pkg of 10	1-00-677200	Y
	Label, Caution & Danger	10 ea	1-00-200408541	
	Manual Pack		SRV1-00-00680	
	Outside Air Termination Cap		1-10-09542	
	Power Cord		3-20-39685	Y
	Room Sensor		3-20-00906	Y
	Thermister Probe (ESP Probe)		3-20-00844	Y
	Thermostat Extension		3-20-00607	Y
	Touch up Paint, Black		3-42-19905	
	Wiring Harness		3-20-08727	Y
	LeafDoor Trim	Brushed Stainless	3-43-06802-7	
		No longer available	3-43-06802-8	
	Modern Door trim	Brushed Stainless	3-43-06839-7	
	Ash Lip Trim	Brushed Stainless	3-43-08400-7	
		Bright Nickel	3-43-08400-8	
	Tile Frame	Brushed Stainless	3-43-06729-7	
		No longer available	3-43-06729-8	
	Spring Clips (Required for installation of Tile Frame)	Pkg of 20	3-31-232547-20	



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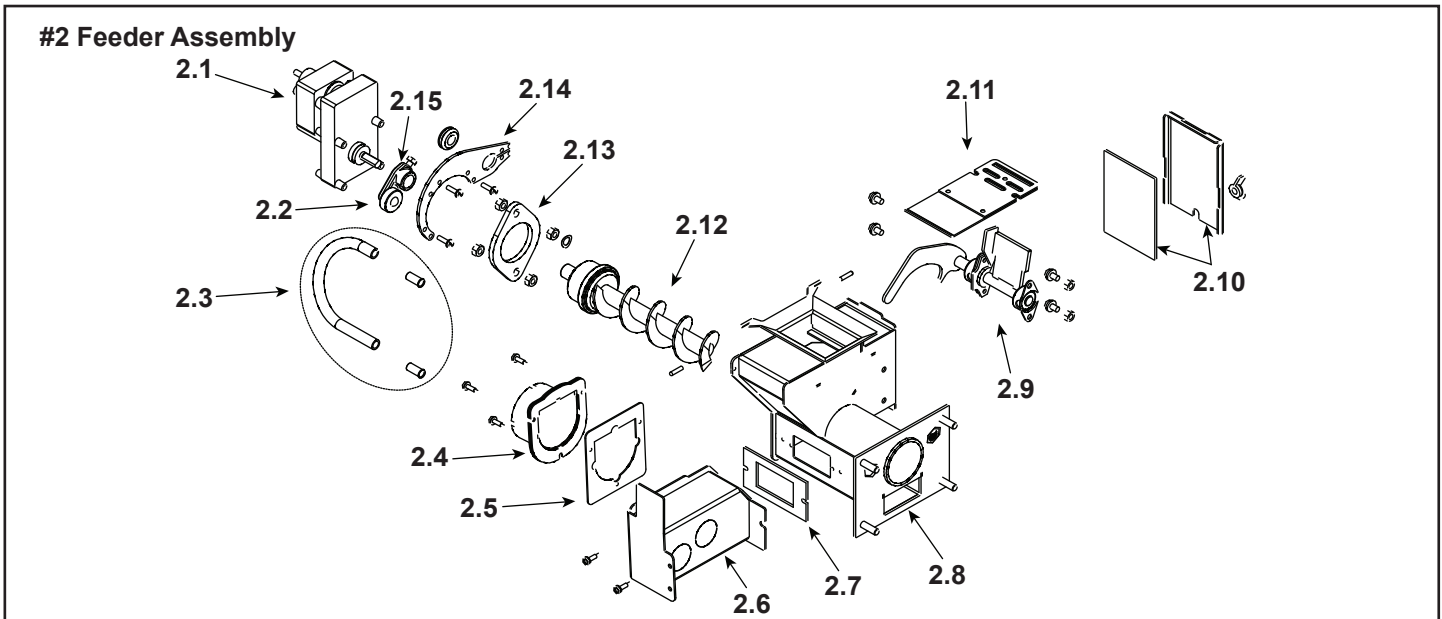


Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
1	Hopper Assembly		1-10-05803	Y
	Hopper Knob		1-00-02000-1	
	Hopper Latch Assembly	Pre HF2402759	1-00-773901	
		Post HF2402759	SRV8000-050	

Additional service parts on following page.

1/23



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**Stocked
at Depot**

ITEM	Description	COMMENTS	PART NUMBER	
2	Feeder Assembly	Post 008085803	1-10-09684A	
2.1	Pellet Feeder Gear Motor, 4RPM		3-20-60906	Y
2.2	UL Feeder Cam		3-31-3014	Y
2.3	Feeder Air Crossover Kit		1-00-67900	Y
	9MM Silicone Tube	5 Ft	1-00-511427	Y
2.4	Pellet Air Intake Assembly		1-10-06810A	
2.5	Gasket Feeder Air Intake	Pkg of 6	3-44-72224-6	Y
2.6	UL Feeder Air Intake		1-10-72228	
2.7	Gasket Ultra Air Intake	Pkg of 10	3-44-677160-10	Y
2.8	Ultra Feeder Weldment		1-10-724132	Y
2.9	UL Feeder Pusher Arm		1-10-677188W	Y
2.10	Gasket, UL Feeder Cover		1-00-677122	Y
2.11	Slide Plate Assembly		1-10-677121A	Y
2.12	UL Feeder Auger Assembly		3-50-00565	Y
2.13	Pellet Feeder Bearing Retainer w/Hardware	Pkg of 2	1-00-04035	Y
2.14	UL Feeder Gear Motor Bracket w/Grommet		1-00-247406	Y
2.15	UL Feeder Cam Block		3-00-677154	Y
	Gasket, Hopper Throat		3-44-677185	Y
	Hopper Switch Feeder Fitting	Pkg of 2	1-00-142818	Y
	Motor Bracket Grommet	Pkg of 12	3-31-2761-12	
	Pillow Block	Pkg of 4	3-31-3614087-4	Y
	Silicone Tubing, 1/8"	5 Ft	1-00-5113574	Y

Additional service parts on following page.

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**Stocked
at Depot**

ITEM	Description	COMMENTS	PART NUMBER	
3	Flue Tail Pipe		3-00-247237	Y
4	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
5	Auger Motor Cover		2-00-06470P	Y
6	Auger Motor Shield		2-00-06467P	Y
7	Differential Switch		3-20-6866	Y
8	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
9	Distribution Blower		3-21-33647	Y
10	Combustion Motor		3-21-08639	Y
	Combustion Blower Grommets & Spacers	Pkg of 25	1-00-960026	
	Combustion Blower Mounting Screws (Pkg of 100)	Commonly required for Combustion Blower replacement	1-00-53483208	
	Fan Blade, 5" Double Paddle (Combustion Blower)		3-20-502221	Y
11	Rear Cover Left		2-00-06468-1P	Y
12	Rear Cover Right		2-00-06468-2P	Y
13	Comb Intake Weldment		1-10-08516S	Y
14	Retainer Assembly		1-10-08533S	Y
15	Ash Pan		1-10-05800	Y
16	Ash Door Assembly		1-10-06798A	
	Wood Handle		1600663	
17	Bolt on Hinge		2-00-06968B	
18	Cast Door Frame		4-00-06800P	
	Cast Door w/Glass		1-10-06800M	
	Pin, Slick (Pkg of 2)	Post #HF2402358	1-00-110	
19	Glass Panel w/Gasket		1-00-950133647	Y
	Glass Clip w/Hardware (Pkg of 4)		1-00-249140	
20	Door Handle Assembly		1-00-453001	Y
	Contains: Wooden Handle, Wave Washer, SHCS, Cast Handle, , SSS, Bhcs, Cast Pawl			
	Paw Bolt	No longer available	4-31-06393	
	Wooden Handle w/Hardware, Load Door	2 Sets	1-00-00247	Y
	Wave Washer	Pkg of 10	SRV3-31-453013	
21	Burn Pot Weldment		1-10-05802	Y
	Flame Guide		3-00-08534	Y
	Clean Out Cover	2 Sets	1-00-06623	Y
	Thumb Screw	Pkg of 10	3-31-782108-10	Y
22	Fire Brick 4-1/2 x 9 x 1-1/4"	Pkg of 7	1-00-900450125	Y
	Fire Brick , Full Skid	414 Pcs	3-40-900450-414	
23	Hopper Heat Shield		2-00-06471B	
24	Feeder Cover		2-00-773826L	

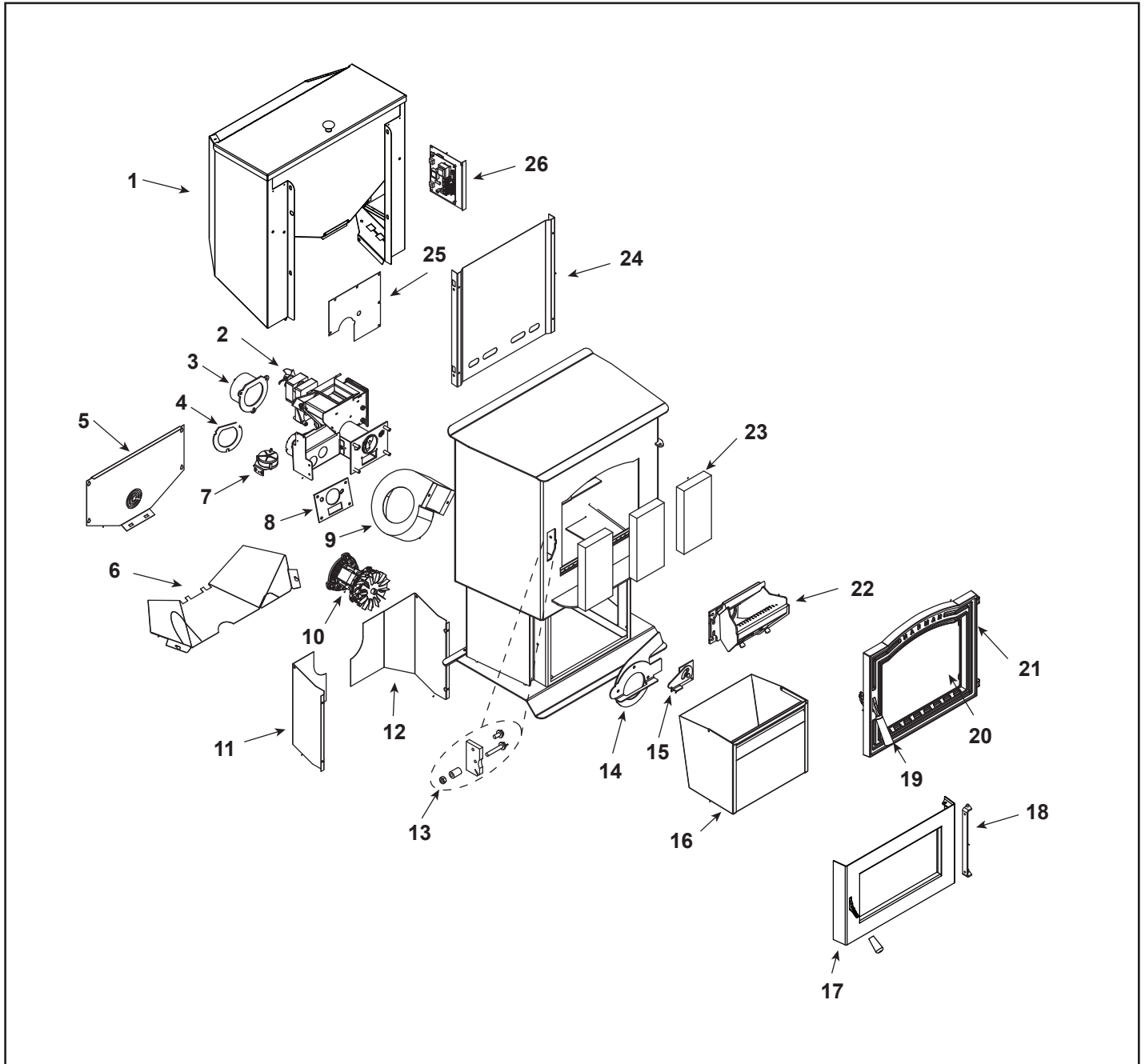
Additional service parts on following page.

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**Stocked
at Depot**

ITEM	Description	COMMENTS	PART NUMBER	
25	Circuit Board w/Knobs & Shafts		1-00-05886	Y
	Circuit Board Plate, Studded w/label		1-10-08327	
	Control Panel Label		3-90-07766	
	Knob, Contol Board/D-Shaft	25 Sets	1-00-015605	Y
	Arrow Burn Pot Scraper	Pkg of 10	2-00-773850-10	
	Cast Weld on Door Hinge (Qty 2 req)	Pre #HF2402358	3-00-773813	
	Cradle Assembly (Igniter Holder, Cradle, & flat Bottom)		1-00-777907	Y
	Diagnostic Display Module		3-20-05401	Y
	DDM Replacement Cable		1-00-05402	
	Draft Meter Assembly		1-00-00637	Y
	Draft Meter Bolt and Tube		1-00-04004	
	Fuse, 5 Amp Ceramic	Pkg of 5	1-00-05237	Y
	Gasket, 1/4" Rope Black W/PSA (Glass)	15 Ft	1-00-2312	Y
	Gasket, 3/8" Rope White LD (Ash or Load Door)	15 Ft	1-00-1203589	Y
	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
	Gasket, Hopper Lid		1-00-00248	Y
	Hopper Lid w/Hinge, Knob		1-10-06493	
	Igniter		3-20-677200	Y
		Pkg of 10	1-00-677200	Y
	Labels, Caution & Danger	10 ea	1-00-200408541	
	Manual Pack		SRV1-00-00680	
	Outside Air Termination Cap		1-10-09542	
	Power Cord		3-20-39685	Y
	Room Sensor		3-20-00906	Y
	Thermostat Extension		3-20-00607	Y
	Thermister Probe (ESP Probe)		3-20-00844	Y
	Touch up Paint, Black, 12 oz Can		3-42-19905	
	Wiring Harness		3-20-08727	Y
	Leaf Door Trim	Brushed Stainless	3-43-06802-7	
		No longer available	3-43-06802-8	
	Modern Door Trim	Brushed Stainless	3-43-06839-7	
	Ash Lip Trim	Brushed Stainless	3-43-08400-7	
		Bright Nickel	3-43-08400-8	
	Tile Frame	Brushed Stainless	3-43-06729-7	
		No longer available	3-43-06729-8	
	Spring Clips (Required for installation of Tile Frame)	Pkg of 20	3-31-232547-20	



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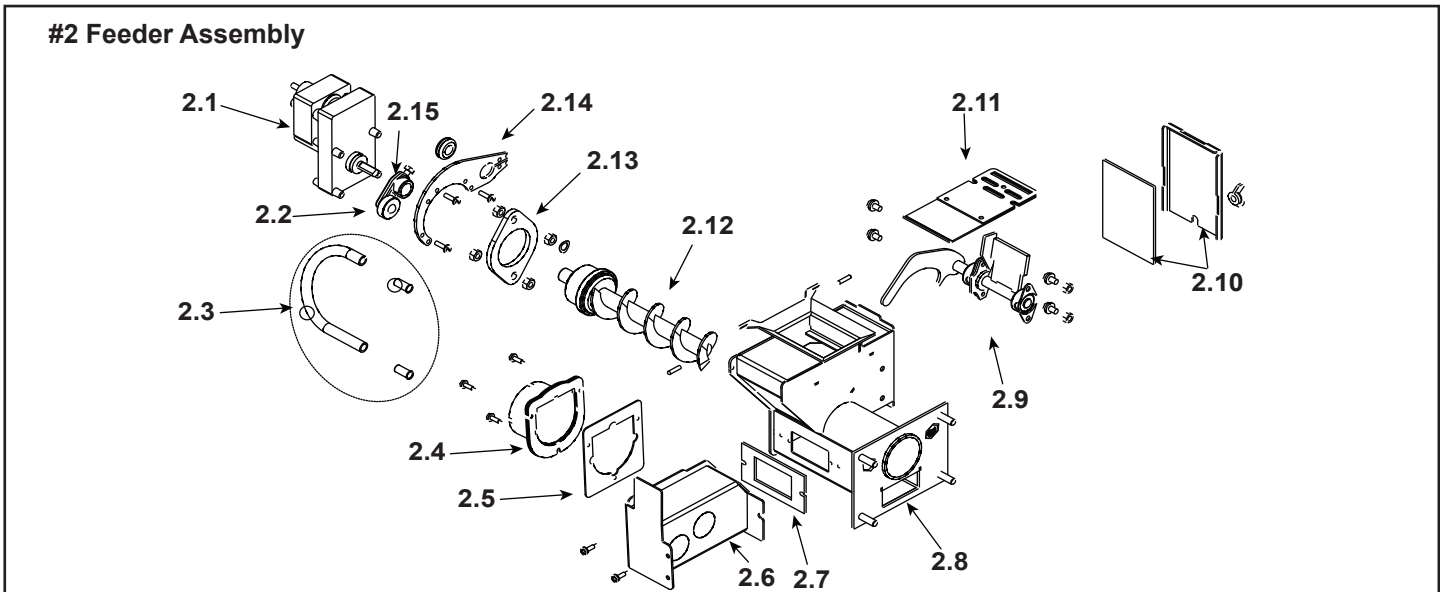


Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
1	Hopper Assembly		1-10-00688	Y
	Hopper Latch Assembly	Pre HF2424081	1-00-773901	
		Post HF2424081	SRV8000-050	
	Hopper Knob		1-00-02000-1	

Additional service parts on following page.

1/23



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Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
2	Feeder Assembly	Post 008280309	1-10-07906A	
2.1	Pellet Feeder Gear Motor, 6RPM		3-20-09302	Y
	Gear Motor Fan Blade	Pkg of 3	3-20-09302-3	Y
2.2	UL Feeder Cam		3-31-3014	Y
2.3	Feeder Air Crossover Kit		1-00-67900	Y
	9MM Silicone Tube	5 Ft	1-00-511427	Y
2.4	Pellet Air Intake Assembly		1-10-06810A	
2.5	Gasket Feeder Air Intake	Pkg of 6	3-44-72224-6	Y
2.6	UL Feeder Air Intake		1-10-72228	
2.7	Gasket Ultra Air Intake	Pkg of 10	3-44-677160-10	Y
2.8	Ultra Feeder Weldment		1-10-724132	Y
2.9	UL Feeder Pusher Arm		1-10-677187W	Y
2.10	Gasket, UL Feeder Cover		1-00-677122	Y
2.11	Slide Plate Assembly		1-10-677121A	Y
2.12	UL Feeder Auger Assembly		3-50-00565	Y
2.13	Bearing Flange w/Hardware		1-00-04035	Y
2.14	UL Feeder Gear Motor Bracket w/Grommet		1-00-247406	Y
2.15	UL Feeder Cam Block		3-00-677154	Y
	Gasket, Hopper Throat		3-44-677185	Y
	Hopper Switch Feeder Fitting	Pkg of 2	1-00-142818	Y
	Motor Bracket Grommet	Pkg of 12	3-31-2761-12	
	Pillow Block	Pkg of 4	3-31-3614087-4	Y
	Silicone Tubing, 1/8"	5 Ft	1-00-5113574	Y

Additional service parts on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers.** Provide model number and serial number when requesting service parts from your dealer or distributor.



**Stocked
at Depot**

ITEM	Description	COMMENTS	PART NUMBER	
3	Flue Tail Pipe		3-00-247237	Y
4	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
5	Auger Motor Cover		2-00-06470P	Y
6	Auger Motor Shield		2-00-06467P	Y
7	Differential Switch		3-20-6866	Y
8	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
9	Distribution Blower		3-21-33647	Y
10	Combustion Blower		3-21-08639	Y
	Combustion Blower Grommets & Spacers	Pkg of 25	1-00-960026	
	Combustion Blower Mounting Screws (Pkg of 100)	Commonly required for Combustion Blower replacement	1-00-53483208	
	Fan Blade, 5" Double Paddle (Combustion Blower)		3-20-502221	Y
11	Rear Cover Left		2-00-06468-1P	Y
12	Rear Cover Right		2-00-06468-2P	Y
13	Door Latch Assembly Contains: Latch Adjustment, SHCS(1/4-20 X 1), Lock Nut (1/4 X 20), Jam Nut (HX Jam 1/4-20Z) Steel Bushing,		1-00-06713	Y
14	Comb Intake Weldment		1-10-08516S	Y
15	Retainer Assembly		1-10-08533S	Y
16	Ash Pan		1-10-05800	Y
17	Ash Door Assembly		1-10-06798A	
	Wood Knob		1600663	
18	Bolt on Hinge		2-00-06968B	
19	Cast Door Frame		3-00-06718P	
	Slick Pins, 1 pair		1-00-110	Y
20	Glass Panel w/Gasket		1-00-00688	Y
	Glass Clip w/Hardware	Pkg of 4	1-00-249140	Y
21	Door Handle Assembly Contains: Handle, 6 mm Washer, SHCS, handle, Dowel, Plunger, SSS, Bhcs		1-00-249119	Y
	Ball Plunger	Pkg of 3	3-31-5500-3	
	Front Door Latch		3-00-249119P	Y
	Latch Ball Spring Bracket		2-00-06714	
	Wooden Handle , Load Door	Pkg of 2	1-00-00247	Y
22	Burn Pot Weldment		1-10-06723	Y
	Flame Guide		3-00-03000	Y
	Clean Out Cover	2 Sets	1-00-06623	Y
	Thumb Screw	Pkg of 10	3-31-782108-10	Y
23	Fire Brick 4-1/2 x 9 x 1-1/4"	Pkg of 7	1-00-900450125	Y
	Fire Brick , Full Skid	414 Pcs	3-40-900450-414	

Additional service parts on following page.

IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers.** Provide model number and serial number when requesting service parts from your dealer or distributor.



**Stocked
at Depot**

ITEM	Description	COMMENTS	PART NUMBER	
24	Hopper Heat Shield		2-00-06715B	
25	Feeder Opening Cover		2-00-773826L	
26	Circuit Board w/Knobs & Shafts		1-00-05886	Y
	Circuit Board Plate-Studded w/label		1-10-08327	
	Control Panel Label		3-90-07766	
	Knob, Contol Board/D-Shaft	25 Sets	1-00-015605	Y
	Arrow Burn Pot Scraper	Pkg of 10	2-00-773850-10	
	Cradle Assembly			
	Igniter Holder, Cradle, & Flat Bottom		1-00-777907	Y
	Diagnostic Display Module		3-20-05401	Y
	DDM Replacement Cable		1-00-05402	
	Draft Meter Assembly		1-00-00637	Y
	Draft Meter Bolt and Tube		1-00-04004	
	Fuse, 5 Amp Ceramic	Pkg of 5	1-00-05237	Y
	Gasket, 1/4" Rope Black W/PSA (Glass)	15 Ft	1-00-2312	Y
	Gasket, 3/8" Rope White LD (Ash or Load Door)	15 Ft	1-00-1203589	Y
	Gasket Set, Burn Pot & Tailpipe	Pkg of 5 Sets	1-00-07381	Y
	Gasket, Burn Pot		3-44-237639	Y
	Gasket, Hopper Lid		1-00-00248	Y
	Hopper Lid w/Hinge, Knob		1-10-06493	
	Igniter		3-20-677200	Y
		Pkg of 10	1-00-677200	Y
	Labels, Caution & Danger	10 ea	1-00-200408541	
	Load Door Hinge		2-00-06707L	
	Manual Pack		SRV1-00-00680	
	Outside Air Termination Cap		1-10-09542	
	Room Sensor		3-20-00906	Y
	Power Cord		3-20-39685	Y
	Thermister Probe (ESP Probe)		3-20-00844	Y
	Thermostat Extension		3-20-00607	Y
	Touch up Paint, Black, 12 oz Can		3-42-19905	
	Wiring Harness		3-20-08727	Y

Additional service parts on following page.

G. Warranty Policy

Hearth & Home Technologies LLC LIMITED LIFETIME WARRANTY

Hearth & Home Technologies LLC (“HHT”) extends the following warranty for HHT gas, wood, pellet and electric hearth appliances (each a “Product” and collectively, the “Product(s)”) and certain component parts set forth in the table below (“Component Part(s)”) that are purchased from a HHT authorized dealer or distributor.

WARRANTY COVERAGE:

HHT warrants that the Products and their Component Parts will be free from defects in materials and workmanship for the applicable period of Warranty coverage set forth in the table below (“Warranty Period”). If a Product or Component Parts are found to be defective in materials or workmanship during the applicable Warranty Period, HHT will, at its option, repair the applicable Component Part(s), replace the applicable Component Part(s), or refund the purchase price of the applicable Product(s). The maximum amount recoverable under this Warranty is limited to the purchase price of the Product. This Warranty is transferable from the original purchaser to subsequent owners, but the Warranty Period will not be extended in duration or expanded in coverage for any such transfer. This Warranty is subject to conditions, exclusions, and limitations as described below.

WARRANTY PERIOD:

Warranty coverage begins at the date of installation. In the case of new home constructions, Warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product(s) by an independent, authorized HHT dealer or distributor, whichever occurs earlier. However, the Warranty coverage shall commence no later than 24 months following the date of Product shipment from HHT, regardless of the installation or occupancy date.

The term “Lifetime” in the table below is defined as: 20 years from the beginning date of warranty coverage for gas appliances, 10 years from the beginning date of warranty coverage for wood and pellet appliances, and 5 years from the beginning of warranty coverage for standalone gas log sets. These time periods reflect the minimum expected useful lives of the designated Component Parts under normal operating conditions.

Warranty Period		HHT Manufactured Appliances and Venting					
Component Parts	Labor	Gas	Pellet	Wood	Electric	Venting	Component Parts Covered by this Warranty
1 Year		X	X	X		X	All parts including handles, external enameled components and other material except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 Years					X		All parts except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 years			X	X			Igniters, Auger Motors, Electronic Components, and Glass
		X					Electrical components limited to modules, remotes/wall switches, valves, pilots, blowers, junction boxes, wire harnesses, transformers and lights (excluding light bulbs)
		X		X			Molded Refractory Panels, Glass Liners
3 years			X				Firepots, burnpots, mechanical feeders/auger assemblies
5 years		X					Burners and logs for standalone gas log sets (Vented and Vent Free gas log sets not sold as components of the fireplace or stove)
5 years	1 year	X					Vent Free Burners and Vent Free Log components of HHT manufactured fireplaces or stoves
			X	X			Castings, Medallions and Baffles
6 years	3 years			X			Catalysts
7 years	3 years		X	X			Manifold tubes, HHT Chimney and Terminations
10 years	1 year	X					Burners, logs and refractory components of HHT manufactured fireplaces or stoves
Limited Lifetime	3 years	X	X	X			Firebox and heat exchanger, FlexBurn® System (engine, inner cover, access cover and fireback)
1 Year	None	X	X	X	X	X	All purchased replacement parts

WARRANTY CONDITIONS:

- Because HHT cannot control the quality of any Products sold by unauthorized sellers, this Warranty only covers Products that are purchased through an HHT authorized dealer or distributor unless otherwise prohibited by law; a list of HHT authorized dealers is available on the HHT branded websites.
- This Warranty is only valid while the applicable Product remains at the site of original installation.
- This Warranty is only valid in the country in which the HHT authorized dealer or distributor that sold the applicable Product is authorized to sell applicable Product.
- Contact your installing distributor or dealer for Warranty service. If the installing dealer or distributor is unable to provide necessary parts, contact the nearest HHT authorized dealer or supplier. Additional service fees may apply if you are seeking Warranty service from a dealer other than the dealer from whom you originally purchased the applicable Product.
- No HHT consumer should bear cost of warranty service or costs incurred while servicing warranty claims (i.e., travel, gas, or mileage) when the service is performed within the terms of this Warranty. Check with your dealer or distributor in advance for any costs to you when arranging a warranty call. Travel and shipping charges for parts are not covered by this Warranty.

WARRANTY EXCLUSIONS:

This Warranty does not cover the following:

- Changes in surface finishes as a result of normal use. As a heating appliance, some changes in color of interior and exterior surface finishes may occur. This is not a flaw and is not covered under the Warranty.
- Damage to printed, plated, or enameled surfaces caused by fingerprints, accidents, misuse, scratches, melted items or other external sources and residues left on the plated surfaces from the use of abrasive cleaners or polishes.
- Repair or replacement of parts that are subject to normal wear and tear during the Warranty Period are not covered. These parts include: paint, wood and pellet gaskets, firebricks, grates, flame guides, batteries and the discoloration of glass.
- Minor expansion, contraction, or movement of certain parts causing noise. These conditions are normal and complaints related to this noise are not covered by this Warranty.
- Damages resulting from: (1) failure to install, operate, or maintain the applicable Product in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the applicable Product; (2) failure to install the applicable Product in accordance with local building codes; (3) shipping or improper handling; (4) improper operation, abuse, misuse, continued operation with damaged, corroded or failed components, accident, or improperly/incorrectly performed repairs; (5) environmental conditions, inadequate ventilation, negative pressure, or drafting caused by tightly sealed constructions, insufficient make-up air supply, or handling devices such as exhaust fans or forced air furnaces or other such causes; (6) use of fuels other than those specified in the operation instructions; (7) installation or use of components not supplied with the applicable Product or any other components not expressly authorized and approved by HHT; (8) modification of the appliance not expressly authorized and approved by HHT in writing; and/or (9) interruptions or fluctuations of electrical power supply to the applicable Product.
- Non-HHT venting components, hearth connections or other accessories used in conjunction with the applicable Product.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas applicable Product is installed.
- HHT's obligation under this Warranty does not extend to the Product's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper Product for the application. Consideration must be given to the Product location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The applicable Product has been over-fired, operated in atmospheres contaminated by chlorine, fluorine, or other damaging chemicals. Over-firing can be identified by, but not limited to, warped plates or tubes, deformation/warping of interior cast iron structure or components, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The applicable Product is subjected to prolonged periods of dampness or condensation.
- There is any damage to the applicable Product due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF REMEDIES AND LIABILITY:

- **EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. The owner's exclusive remedy and HHT's sole obligation under this Warranty or in contract, tort or otherwise, shall be limited to replacement of the Component Part(s), repair of the Component Part(s), or refund of the original purchase price of the applicable Product(s), as specified above; provided, however, that (i) if HHT is unable to provide replacement of the Component Part(s) and repair of the Component Part(s) is not commercially practicable or cannot be timely made, or (ii) the customer is willing to accept a refund of the purchase price of the applicable Product(s), HHT may discharge all such obligations by refunding the purchase price of the applicable Product. In no event will HHT be liable for any incidental or consequential damages caused by defects in the applicable Product. Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights and you may also have other rights which vary from State to State. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE FOR THE APPLICABLE PRODUCT. Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.**

Installation Manual

Installation and Appliance Setup

INSTALLER: Leave this manual with party responsible for use and operation.

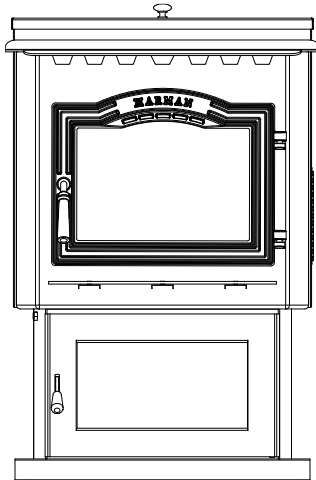
OWNER: Retain this manual for future reference.

NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):
P43-C, P61-C & P68-C
Freestanding Pellet Stove



WARNING



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

Failure to follow these instructions could result in property damage, bodily injury or even death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not overfire - If any external part starts to glow, you are overfiring. Reduce feed rate. Overfiring will void your warranty.
- Comply with all minimum clearances to combustibles as specified. Failure to comply may cause house fire.

WARNING



HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down.

Hot glass will cause burns.

- Do not touch glass until it is cooled
 - NEVER allow children to touch glass
 - Keep children away
 - CAREFULLY SUPERVISE children in same room as stove.
 - Alert children and adults to hazards of high temperatures.
- High temperatures may ignite clothing or other flammable materials.**
- Keep clothing, furniture, draperies and other flammable materials away.

CAUTION

Check building codes prior to installation.

- Installation **MUST** comply with local, regional, state and national codes and regulations.
- Contact local building or fire officials about restrictions and installation inspection requirements in your area.

NOTE

To obtain a French translation of this manual, please contact your dealer or visit www.harmanstoves.com

Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.harmanstoves.com

▲ Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Indicates practices which may cause damage to the stove or to property.

TABLE OF CONTENTS

Installation Standard Work Checklist	3	5 Appliance Setup	
1 Product Specific and Important Safety Information		A. Unpacking	22
A. Appliance Certification	4	B. Removing Rear Cover Panels	22
B. Glass Specifications	4	C. Firebrick	22
C. Mobile Home Approvals	4	D. Flame Guide	22
D. California Safety Information	4	E. Room Sensor	23
→ E. BTU Specifications	5	F. Low Draft Voltage Adjustment.	23
F. Non-Combustible Materials Specification	5	6 Reference Materials	
G. Combustible Materials Specification	5	A. Safety Reminders	24
H. Electrical Codes	5	B. Wiring Diagram	25
2 Getting Started			
A. Design and Installation Considerations	6		
B. Tools and Supplies Needed	7		
C. Inspect Appliance and Components	7		
3 Framing and Clearances			
A. Appliance Dimension Diagram	8		
B. Clearances to Combustibles	9		
C. Floor Protection	10		
D. Mobile Home Installation	10		
4 Termination Location and Vent Information			
A. Vent Termination Minimum Clearances	11		
B. Chimney Diagram	15		
C. Venting & Use of Elbows	16		
D. Outside Air	18		
E. Locating Your Appliance and Chimney	19		
F. Draft	19		
G. Negative Pressure	19		
H. Avoiding Smoke & Odors	20		
I. Fire Safety	21		
J. Inspect Appliance & Components	21		

→ = Contains updated information

Installation Standard Work Checklist

ATTENTION INSTALLER: Follow this Standard Work Checklist

This standard work checklist is to be used by the installer in conjunction with, not instead of, the instructions contained in this installation manual.

Customer: _____
 Lot/Address: _____

 Model: _____

Date Installed: _____
 Location of Stove: _____
 Installer: _____
 Dealer/Distributor Ph #: _____
 Serial Number: _____

 **WARNING! Risk of Fire or Explosion! Failure to install appliance to these instructions can lead to a fire or explosion.**

Appliance Install Section 3

Required non-combustible floor protection	<input type="checkbox"/>	IF NO, WHY?
Verified clearances to combustible.	<input type="checkbox"/>	_____
Unit is Leveled and secured.	<input type="checkbox"/>	_____

Venting/Chimney Section 4

Venting Configuration complies to vent diagrams.	<input type="checkbox"/>	_____
Venting installed, sealed and secured in place with proper clearances.	<input type="checkbox"/>	_____
Exterior wall/roof flashing installed and sealed	<input type="checkbox"/>	_____
Terminations installed and sealed.	<input type="checkbox"/>	_____

Electrical Section 1

120 VAC unswitched power provided to the appliance.	<input type="checkbox"/>	_____
Check outlet with multi-meter for proper voltage. (115-120 VAC)	<input type="checkbox"/>	_____
Record voltage reading: _____		

Appliance Setup Section 5

All packaging and protective materials are removed	<input type="checkbox"/>	_____
Accessories installed properly	<input type="checkbox"/>	_____
Manual bag and all it's contents are removed from inside the appliance and given to party responsible for use and operation	<input type="checkbox"/>	_____
Started appliance and verified that all motors and blowers operate as they should.	<input type="checkbox"/>	_____
Checked draft using a Manometer. Record readings: _____	<input type="checkbox"/>	_____
During operation, verify that the hopper lid switch (If applicable) and pressure switch are working properly by briefly opening the hopper lid and main door and verifying that the feed motor is interrupted.	<input type="checkbox"/>	_____

Hearth and Home Technologies recommends the following:
 Photographing the installation and copying this checklist for your file.
 This checklist remain visible at all times on the appliance until the installation is complete.

Comments: Further description of the issues, who is responsible (Installer/Builder/Other Trades, etc.) and corrective action needed _____

Comments communicated to party responsible _____ by _____ on _____
 (Builder / Gen Contractor) (Installer) (Date)

1 Product Specific and Important Safety Information

A. Appliance Certification

MODEL:	P43-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS023E / 0135PS023S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

MODEL:	P61-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS022E / 0135PS022S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

MODEL:	P68-C Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS013E / 0135PS013S
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 1509-04, ULC-S627-00, ASTM E 2515-11, ASTM E 2779-10

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2004, ULC-S627-00, ULC/ORD-C-1482-M1990, (UM) 84-HUD**

The P43-C, P61-C and P68-C is Certified to comply with 2020 particulate emission standards.



B. Glass Specifications

This appliance is equipped with 5mm mirrored ceramic glass. Replace glass only with 5mm ceramic glass. Please contact your dealer for replacement glass.

C. Mobile Home Approved

This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.

The structural integrity of the mobile home floor, ceiling, and walls must be maintained. The appliance must be properly grounded to the frame of the mobile home and use only listed pellet vent, Class "PL" connector pipe.

A Harman® Outside Air Kit must be installed in a mobile home installation.



WARNING

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

DO NOT INSTALL IN SLEEPING ROOM.

D. California Safety Information



WARNING

This product and the fuels used to operate this product (wood), and the products of combustion of such fuels, can expose you to chemicals including carbon black, which is known to the State of California to cause cancer, and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov

E. BTU & Efficiency Specifications

→ P43-C Freestanding Pellet Stove:

EPA Certification Number:	165-18
EPA Certified Emissions:	1.82 g/hr
*LHV Tested Efficiency:	78.5%
**HHV Tested Efficiency:	76.7%
***EPA BTU Output:	19,800 – 35,000
****BTU Input:	17,200 - 43,500
Vent Size:	3 Inch
Hopper Capacity:	50 lbs
Fuel	Wood Pellet

P61-C Freestanding Pellet Stove:

EPA Certification Number:	177-19
EPA Certified Emissions:	1.5 g/hr
*LHV Tested Efficiency:	85%
**HHV Tested Efficiency:	79%
***EPA BTU Output:	17,100 - 46,800
****BTU Input:	21,400 - 60,700
Vent Size:	3 Inch
Hopper Capacity:	72 lbs
Fuel	Wood Pellet

P68-C Freestanding Pellet Stove:

EPA Certification Number:	178-19
EPA Certified Emissions:	1.4 g/hr
*LHV Tested Efficiency:	85%
**HHV Tested Efficiency:	79.5%
***EPA BTU Output:	15,900 - 53,100
****BTU Input:	20,200 - 67,600
Vent Size:	3 Inch
Hopper Capacity:	76 lbs
Fuel	Wood Pellet

* Weighted average LHV efficiency using data collected during EPA emissions test.

**Weighted average HHV efficiency using data collected during EPA emissions test.

***A range of BTU outputs based on EPA Default Efficiency and the burn rates from the low and high EPA tests.

****Based on the maximum feed rate per hour multiplied by approximately 8,600 BTU's which is the average BTU's from a pound of pellets.

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

F. Non-Combustible Materials Specification

Material which will not ignite and burn. Such materials are those consisting entirely of steel, iron, brick, tile, concrete, slate, glass or plasters, or any combination thereof.

Materials that are reported as passing **ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C** and **UL763** shall be considered non-combustible materials.

G. Combustible Materials Specification

Materials made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that can ignite and burn, whether flame proofed or not, or plastered or unplastered shall be considered combustible materials.

H. Electrical Codes

120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps

NOTE: Some generator or battery back-up systems may not be compatible with the micro-processor electronics on this appliance. Please consult the power supply manufacturer for compatible systems.

WARNING! Risk of Fire! Hearth & Home Technologies disclaims any responsibility for, and the warranty and agency listing will be voided by the below actions.

DO NOT:

- Install or operate damaged appliance
- Modify appliance
- Install other than as instructed by Hearth & Home Technologies
- Operate the appliance without fully assembling all components
- Overfire
- Install any component not approved by Hearth & Home Technologies
- Install parts or components not Listed or approved.
- Disable safety switches

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

For assistance or additional information, consult a qualified installer, service agency or your dealer.

NOTE: Hearth & Home Technologies, manufacturer of this appliance, reserves the right to alter its products, their specifications and/or price without notice.

Harman® is a registered trademark of Hearth & Home Technologies.

2 Getting Started

A. Design and Installation Considerations

1. Appliance Location

NOTICE: Check building codes prior to installation.

- Installation MUST comply with local, regional, state and national codes and regulations.
- Consult insurance carrier, local building inspector, fire officials or authorities having jurisdiction over restrictions, installation inspection and permits.

It is a good idea to plan your installation on paper, using exact measurements for clearances and floor protection, before actually beginning the installation

Consideration must be given to:

- Safety, convenience, traffic flow
- Placement of the chimney and chimney connector.
- If you are not using an existing chimney, place the appliance where there will be a clear passage for a factory-built listed chimney through the ceiling and roof.
- Installing an optional outside air kit would affect the location of the vent termination.

Since pellet exhaust can contain ash, soot or sparks, you must consider the location of:

- Windows
- Air Intakes
- Air Conditioner
- Overhang, soffits, porch roofs, adjacent walls
- Landscaping, vegetation

When locating vent and venting termination, vent above roof line when possible.

Warning! Risk of Fire Damaged parts could impair safe operation. Do NOT install damaged, incomplete or substitute components.

NOTICE: Locating the appliance in a location of considerable air movement can cause intermittent smoke spillage from appliance. Do not locate appliance near:

- Frequently open doors
- Central heat outlets or returns

Installation and service of this appliance should be performed by qualified personnel. Hearth & Home Technologies recommends HHT Factory Trained or NFI certified professionals.

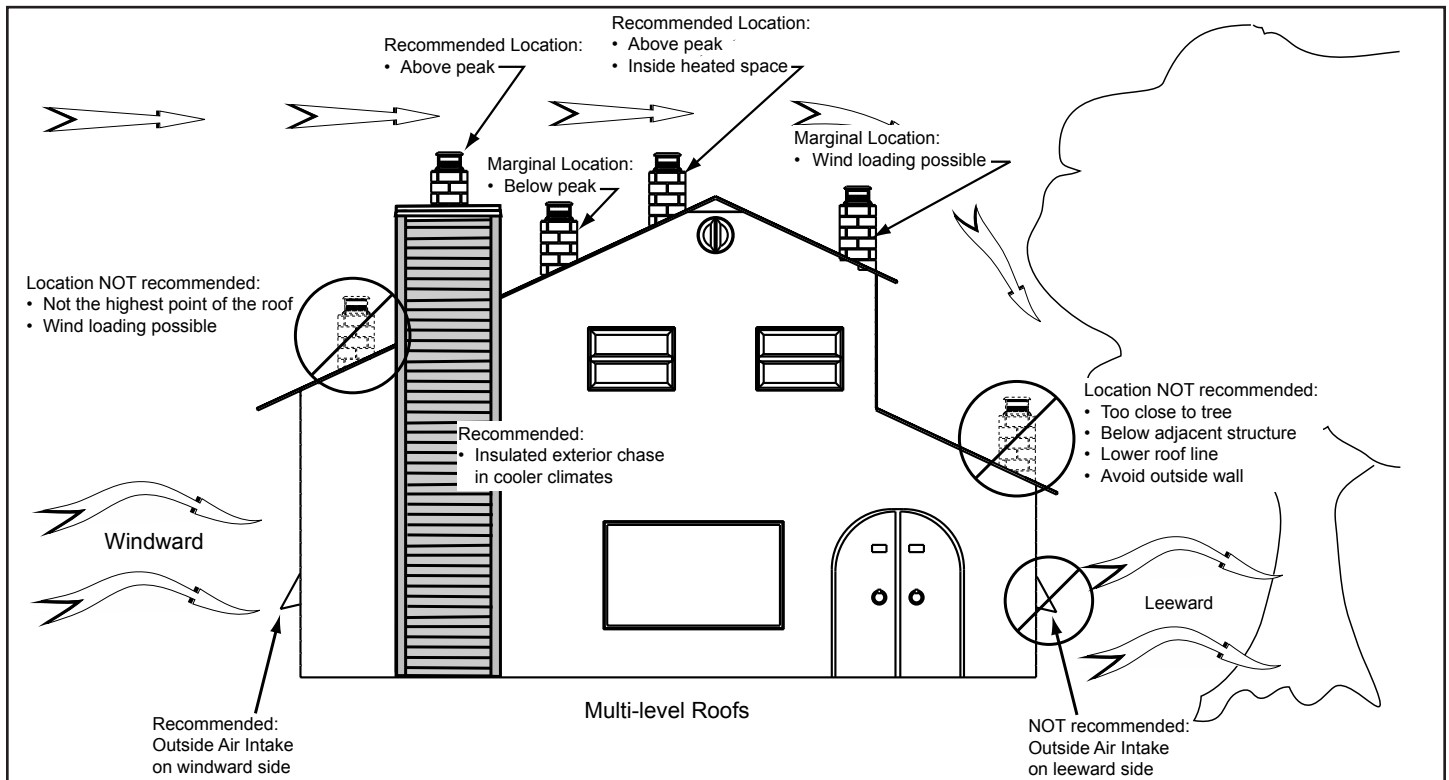


Figure 2.1

B. Tools And Supplies Needed

Tools and building supplies normally required for installation, unless installing into an existing masonry fireplace:

Reciprocating Saw	Gloves
Hammer	Safety Glasses
Phillips Screwdriver	Electric Drill & Bits
Tape Measure	
Level	<u>May also need:</u>
Non-Combustible Sealant Material	Vent Support Straps
	Venting Paint

C. Inspect Appliance and Components

- Carefully remove the appliance and components from the packaging.
- The vent system components and decorative doors and fronts may be shipped in separate packages.
- Report to your dealer any parts damaged in shipment, particularly the condition of the glass.
- **Read all of the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**



WARNING

RISK OF FIRE OR EXPLOSION! Damaged parts could impair safe operation. DO NOT install damaged, incomplete or substitute components. Keep appliance dry.

Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by the following actions:

- Installation and use of any damaged appliance or vent system component.
- Modification of the appliance or vent system.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.

Any such action may cause a fire hazard.



WARNING

Risk of Fire, Explosion or Electric Shock! DO NOT use this appliance if any part has been under water. Call a qualified service technician to inspect the appliance and to replace any part of the control system which has been under water.

INSTALL EXHAUST VENT AT CLEARANCES SPECIFIED BY THE MANUFACTURER.

Most pellet vent pipe requires a minimum of 1" of clearance to combustible materials although some can be installed at 1" clearance.

Follow these instructions along with all local codes regarding installation of this appliance.

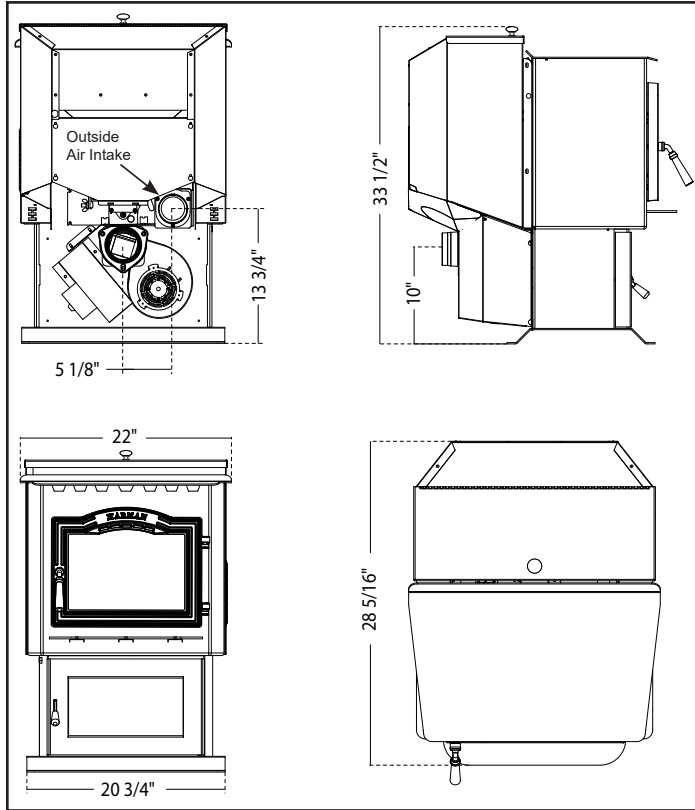
Do **NOT** use makeshift compromises when installing this appliance, serious consequences may result.

3 Clearances

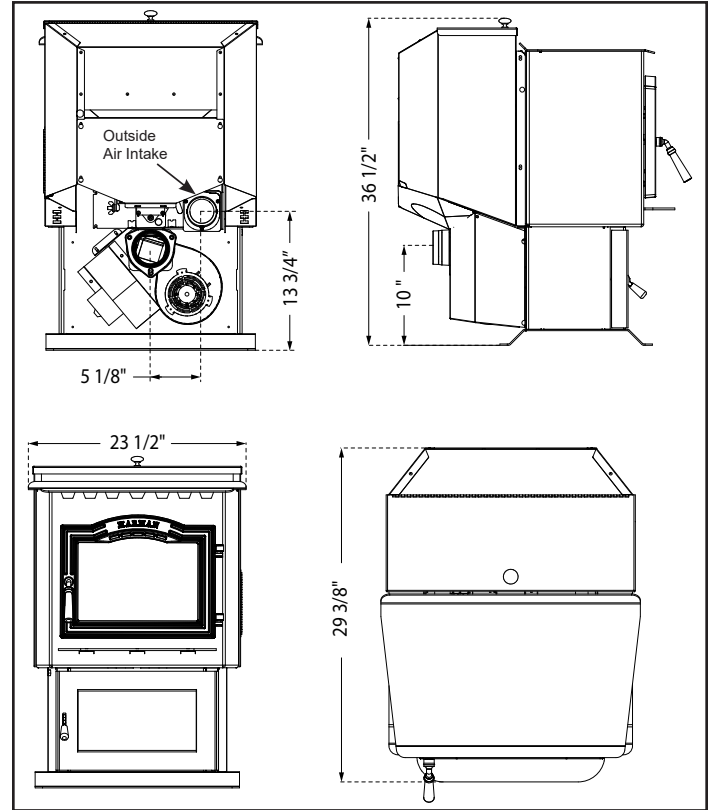
A. Appliance Dimension Diagram

Dimensions are actual appliance dimensions. Use for reference only.

P43-C Freestanding Pellet Stove



P61-C Freestanding Pellet Stove



P68-C Freestanding Pellet Stove

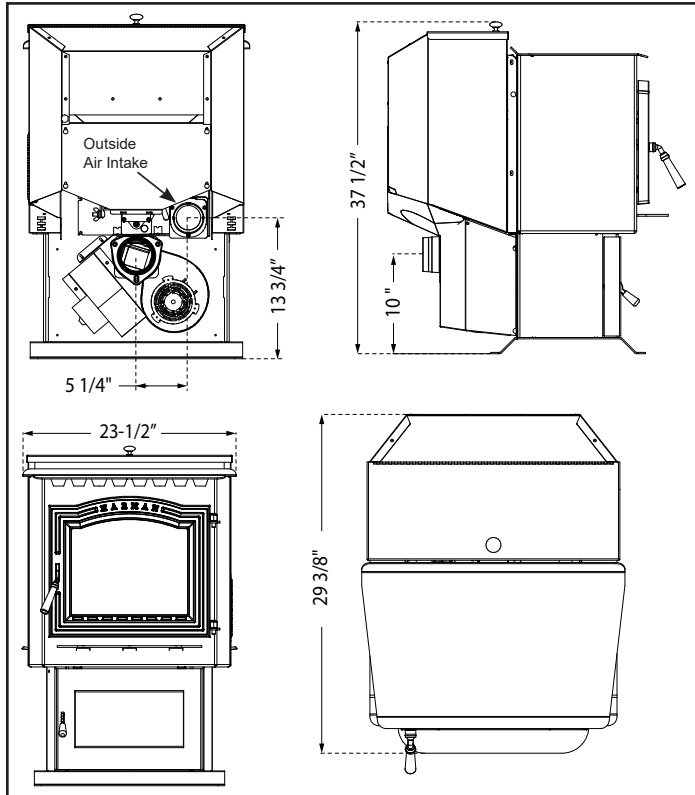


Figure 3.1

B. Clearances to Combustibles

When selecting a location for the appliance it is important to consider the required clearances to walls, Figure 3.2.

⚠ WARNING

RISK OF FIRE OR BURNS! Provide adequate clearance around air openings and for service access. Due to high temperatures, the appliance should be located out of traffic and away from furniture and draperies.

⚠ CAUTION

THIS APPLIANCE MUST BE VENTED TO THE OUTSIDE.

NOTICE: Illustrations reflect typical installations and are FOR DESIGN PURPOSES ONLY. Actual installation may vary due to individual design preference.

Place the stove away from combustible walls at least as far as shown in Figure 3.2. Please note the difference in side wall clearance with and without side shields.

Note that the clearances shown are minimum for safety but do not leave much room for access when cleaning or servicing. Please take this into account when placing the stove.

Due to high temperatures, the stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this unit.

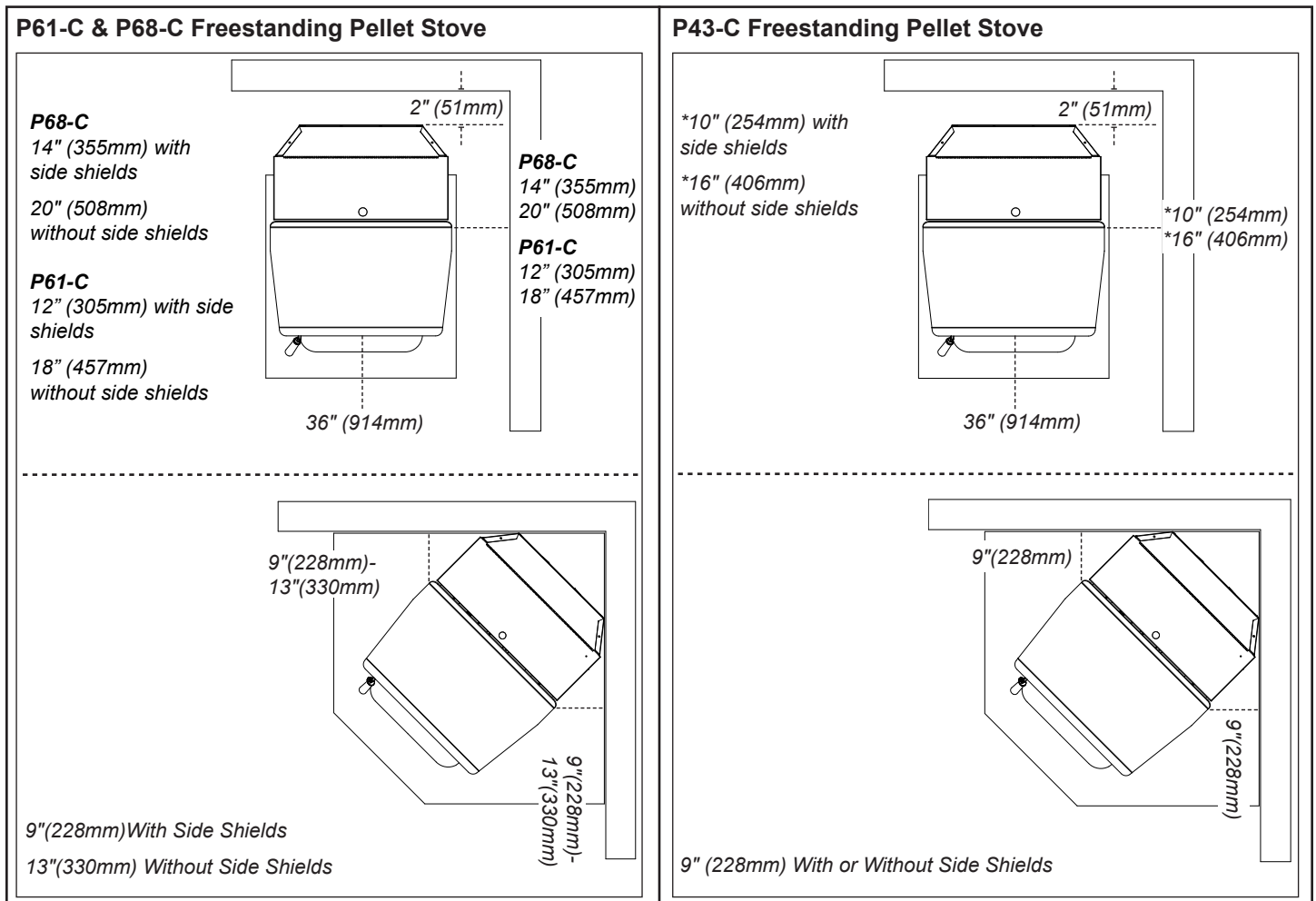


Figure 3.2

C. Floor Protection



CAUTION

Hearth and Home Technologies does not recommend adhesive based vinyl flooring due to thermal expansion. Floating-style flooring (LVP - luxury vinyl plank or LVT – luxury vinyl tile) can be used, but it will reach temperatures up to 110 °F in a room with ambient temperature of 70 °F. Consult flooring specifications to ensure compatibility.

HHT recommends wood stoves and inserts have 29 inches of alternative flooring in front of the stove before using LVP/LVT regardless if they sit flush on the floor or are elevated on a raised hearth.

For all other flooring, continue to follow clearance to combustible requirements in the installation manual.

NOTICE: Clearances that do not meet the minimum guidelines could result in damage or buckling to the vinyl flooring and is done at the installer's risk.

Parallel Installation:

Place the stove on a noncombustible type floor or floor protector that extends a minimum of 6 inches (152mm) to the front of the load door opening, 6 inches (152mm) to the sides of the door opening, and 6 inches to the rear.

The P-Series does not require R value floor protection.

The minimum floor protector material is 20 gauge sheet metal. Other floor protector materials that can be used include Type I hearth pads, ceramic tile, stone, brick, etc. Figure 3.3

*Floor protection dimensions for the front and sides are measured from the appliance door opening in The United States. In Canada, the side dimension is measured from the widest part of the appliance.

P43-C - Minimum size rectangular floor protection is 25-7/16" Wide by 26-3/4" Deep (646mm X 680mm).

P61-C - Minimum size rectangular floor protection is 25-1/8" Wide by 27-3/4" Deep (638mm X 705mm).

P68-C - Minimum size rectangular floor protection is 25-3/16" Wide by 27-3/4" Deep (640mm X 705mm).

Venting:

US - Follow PL vent manufacturers recommendations when configuring vent pipe installation.

Canada - Must extend 2" (51mm) beyond each side of any horizontal flue pipe.

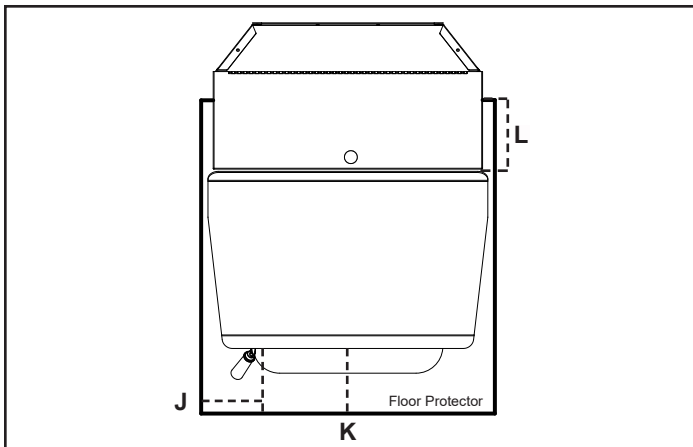


Figure 3.3

Floor Protection Requirements		US	Canada
J	Sides	6"	152mm
K	Front	6"	152mm
L	Rear	6"	152mm

Corner Installation:

Minimum size floor protection for a corner installation hearth pad is:

P43-C - Minimum size floor protection is 25-7/16" Wide by 26-3/4" Deep (646mm X 680mm).

P61-C - Minimum size floor protection is 25-1/8" Wide by 27-3/4" Deep (638mm X 705mm).

P68-C - Minimum size floor protection is 25-3/16" Wide by 27-3/4" Deep (640mm X 705mm).

Note: Floor protector **WILL NOT** touch the wall using minimum clearances.

If corner floor protection is desired to touch the wall, the floor protection will need to be at least 40" x 40" (1016mm x 1016mm). **Note:** This will allow the floor protection to touch the wall as shown. Figure 3.4.

Alternate floor protector dimension may be used as long as they satisfy the measurement requirements shown below.

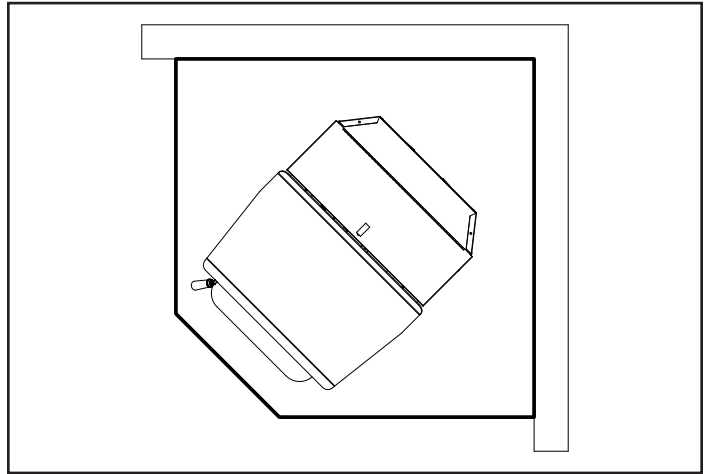


Figure 3.4

D. Mobile Home Installation

When installing this unit in a mobile home, several requirements must be followed:

1. The unit must be bolted to the floor. This can be done using an appropriate fastener for the application.
2. The unit must also be connected to outside air. See "Termination Location and Vent Information" Section D.
3. Floor protection and clearances must be followed as shown.
4. The appliance must be properly grounded to the frame of the mobile home using a minimum of 8 AWG copper solid or stranded, insulated or bare wire or equivalent.

4 Termination Location and Vent Information

A. Vent Termination Minimum Clearances

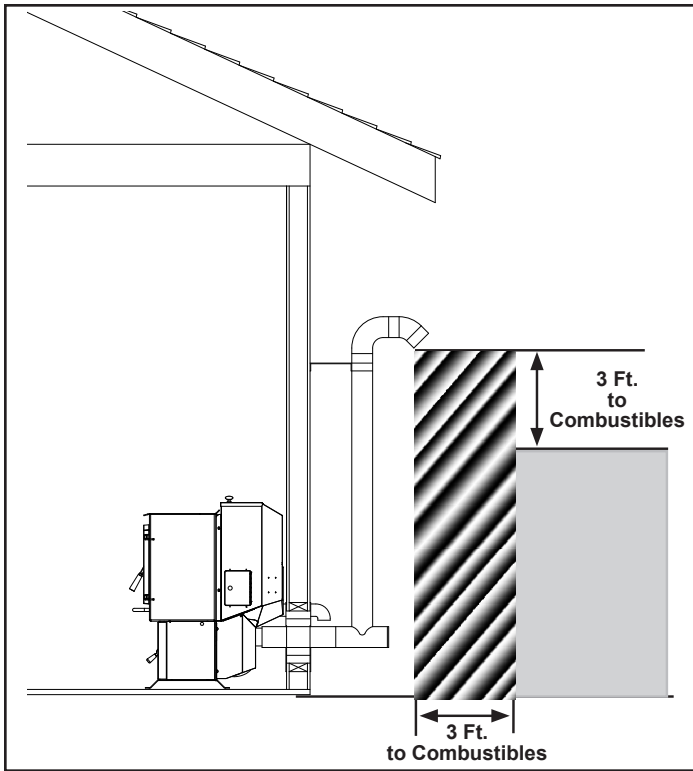


Figure 4.1

Note: Follow venting manufacturer's recommendations for sealing pipe joints.

#1 Preferred method (Figure 4.1)

This method provides excellent venting for normal operation and allows the stove to be installed closest to the wall. Two inches from the wall is safe; however, four inches allows better access to remove the rear panel. The vertical portion of the vent should be three to five feet high. This vertical section will help provide natural draft in the event of a power failure.

Do not place joints within wall pass-through.

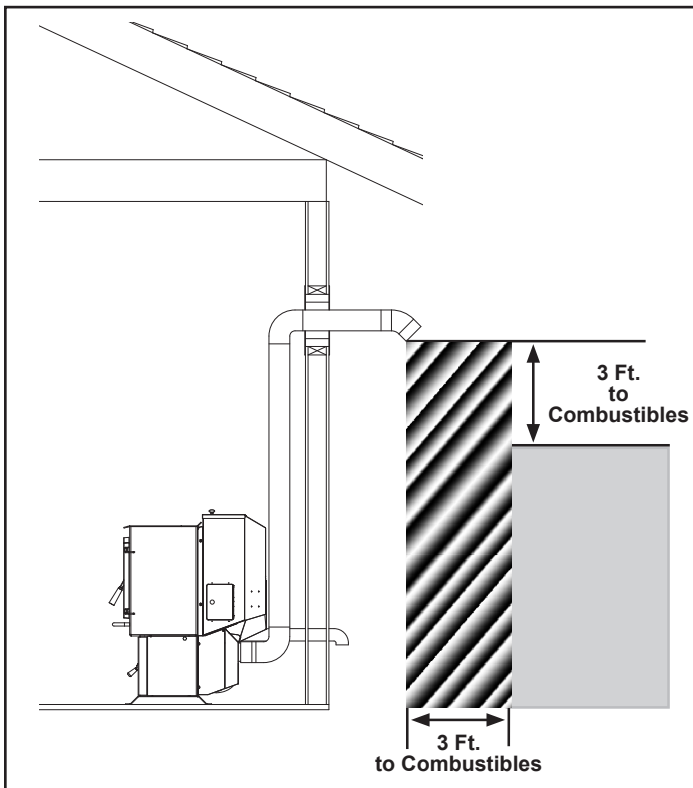



Figure 4.2

#2 Preferred method (Figure 4.2)

This method also provides excellent venting for normal operation but requires the stove to be installed farther from the wall. The vertical portion of the vent should be three to five feet high and at least 1" from a combustible wall. This vertical section will provide natural draft in the event of a power failure.

If the stove is installed below grade be sure the vent termination is at least 12" above grade. The outlet must also be 1 foot from the house/building.

Do not place joints within wall pass-through.

 CAUTION
Keep combustible materials (such as grass, leaves, etc.) at least 3 feet away from the flue outlet on the outside of the building.

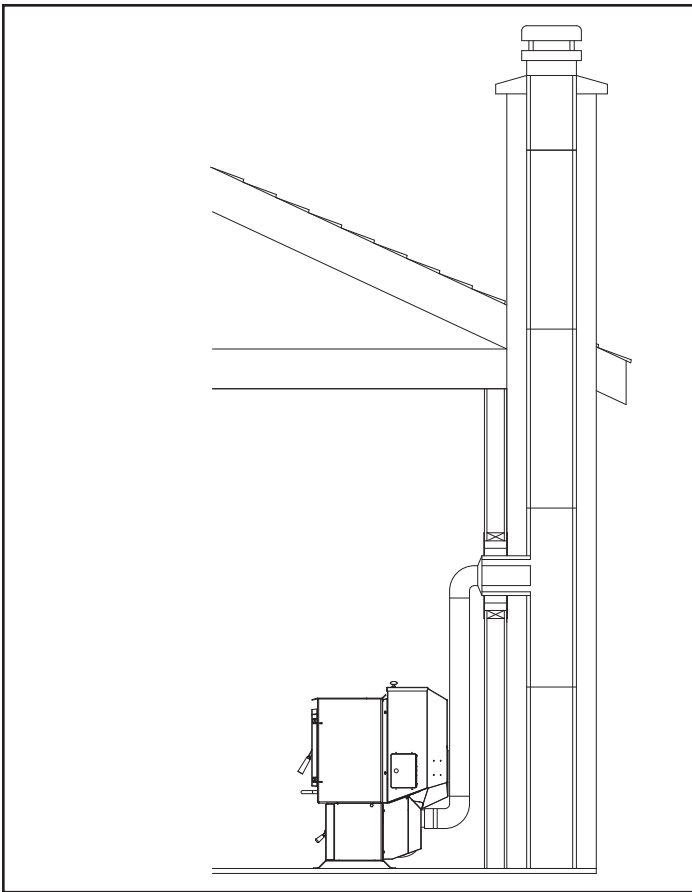


Figure 4.3

#3 Installing into an existing chimney (Figure 4.3)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #7.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. Refer to Method 6 & 7.

Be sure to design the venting so that it can be easily cleaned.

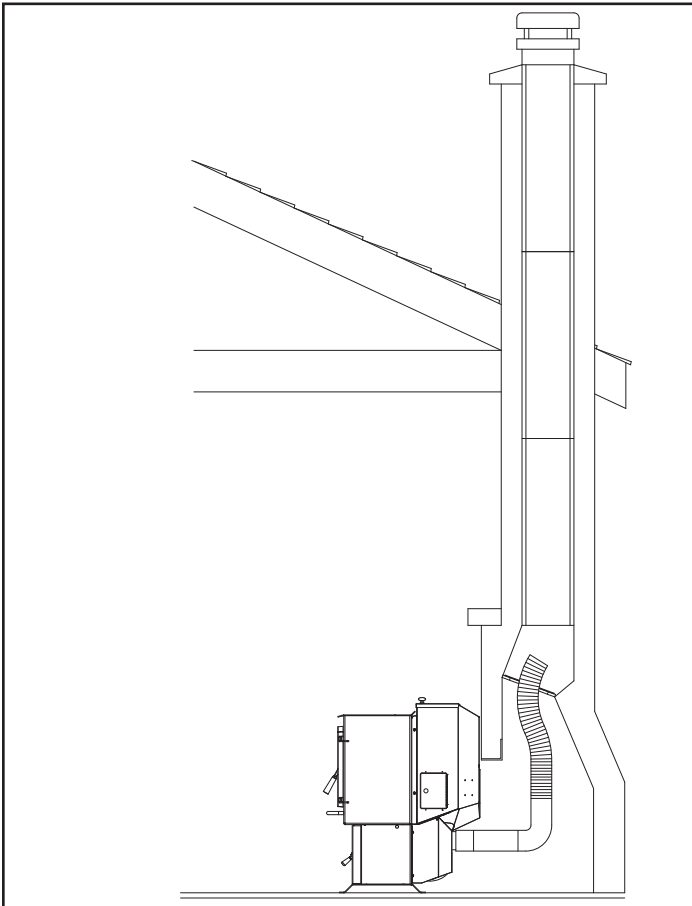


Figure 4.4

#4 Installing into an existing fireplace chimney (Figure 4.4)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #6.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. Refer to Method 5 & 6.

The chimney should be sealed at the damper using a steel plate. Kaowool, mineral wool or an equivalent non-combustible insulation is recommended to be installed on top of the sealing plate to reduce the possibility of condensation. The connector pipe should extend through the smoke chamber to the base or into the first flue tile.

Be sure to design the venting so that it can be easily cleaned.

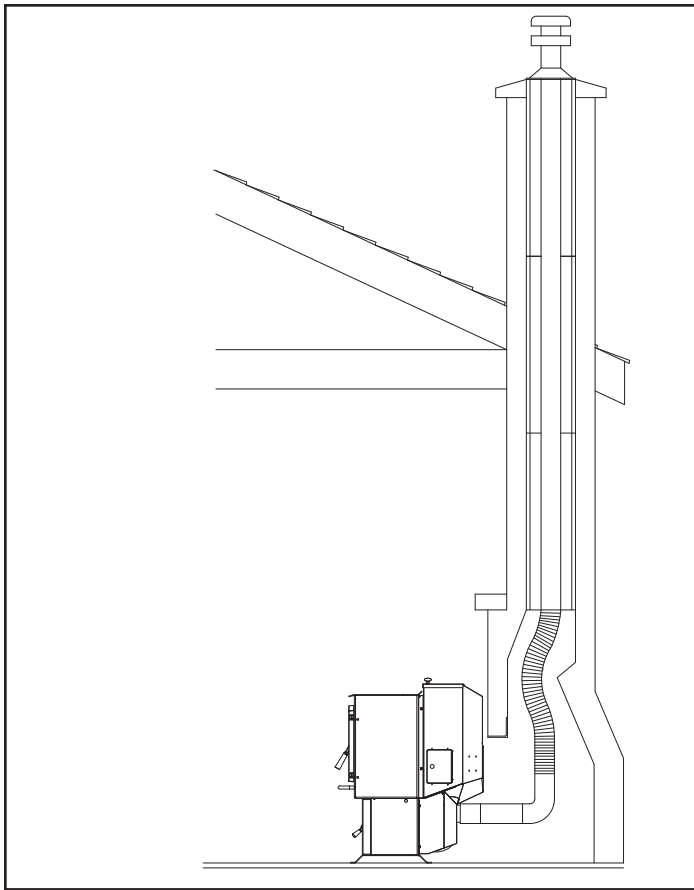


Figure 4.5

#5 Installing into an existing fireplace chimney (Figure 4.5) w/Full Liner

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney. The pipe or liner inside the chimney should be 4" diameter.

In this method a cap should also be installed on the chimney to keep out rain. Be sure to use approved pellet vent pipe fittings. Pipe size should be increased to 4" using this method.

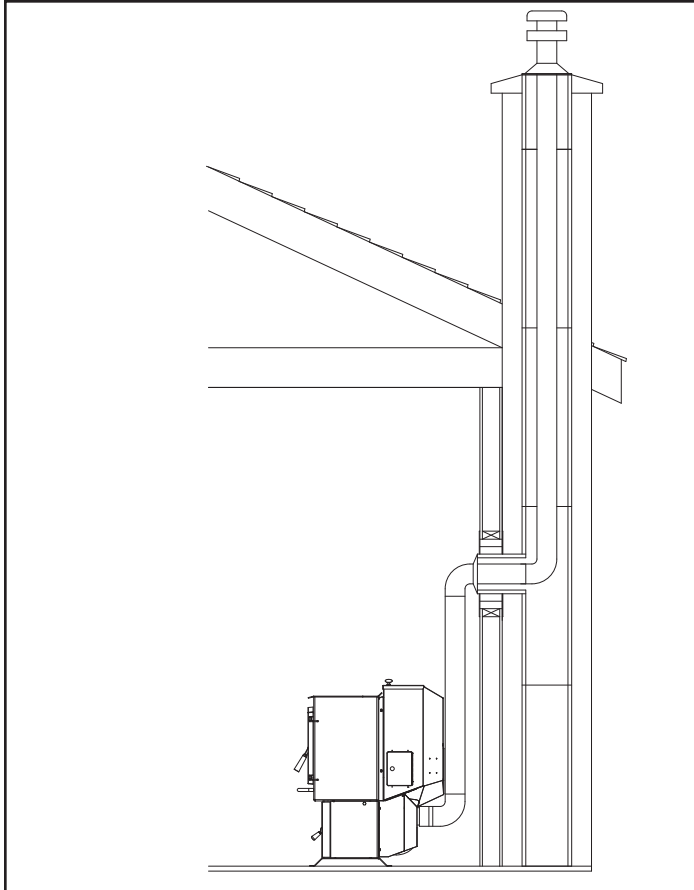


Figure 4.6

#6 Installing into an existing chimney (Figure 4.6) w/Full liner

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney. The pipe or liner inside the chimney should be 4" diameter.

In this method a cap should also be installed on the chimney to keep out rain.

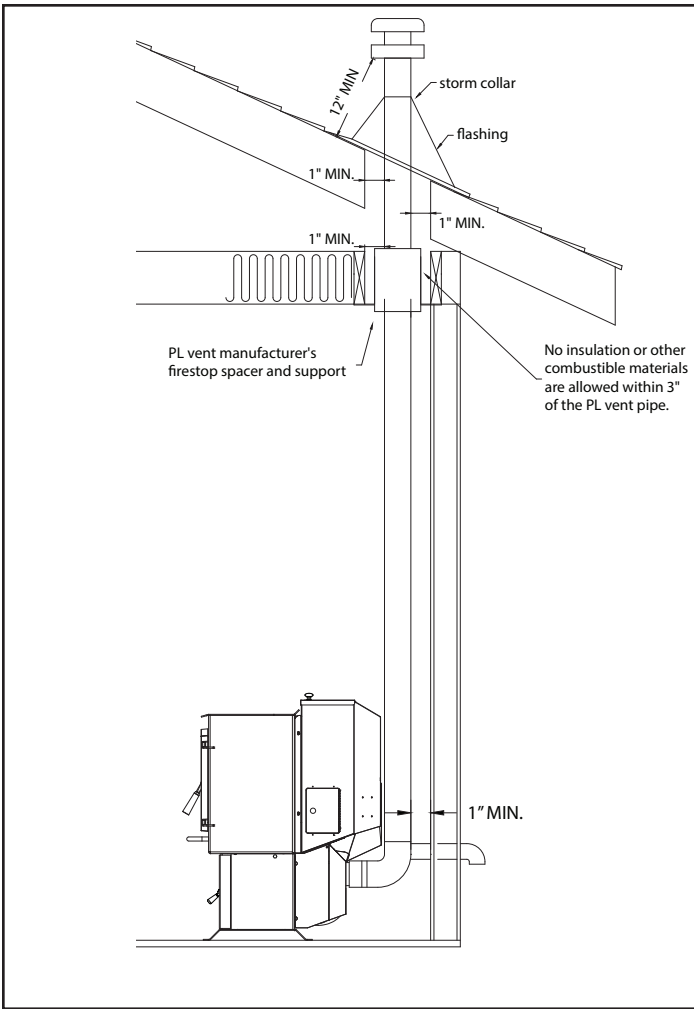


Figure 4.7

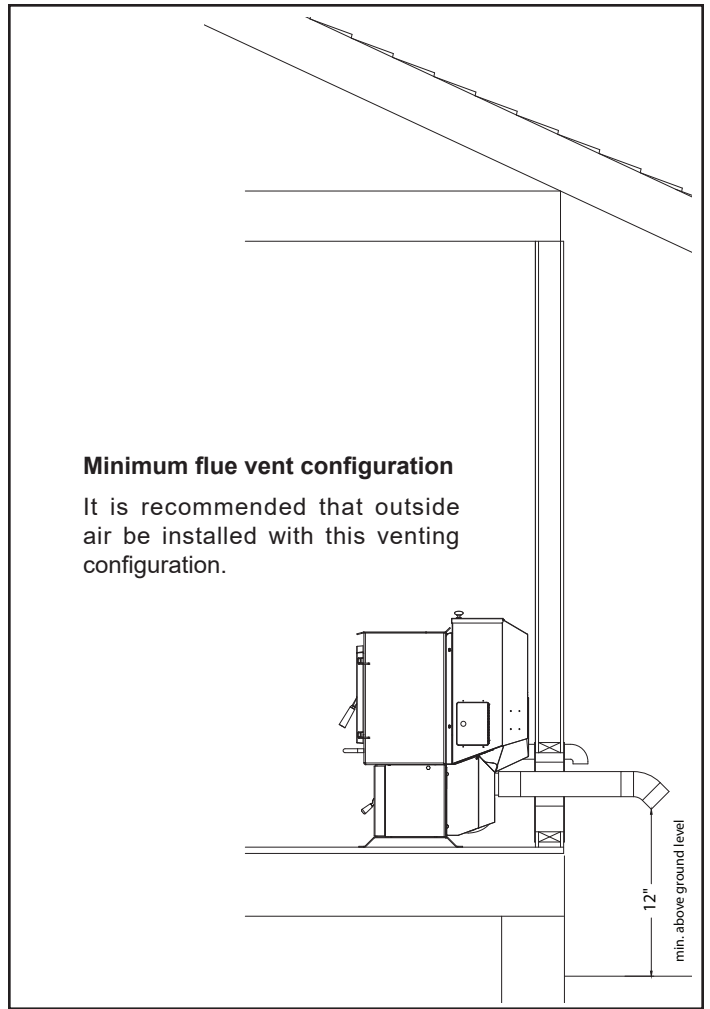


Figure 4.8

#7 Installing through the ceiling

Through the ceiling vent, follow PL vent manufacturers recommendations when using wall and ceiling pass through.

Do not place joints within wall pass-through.

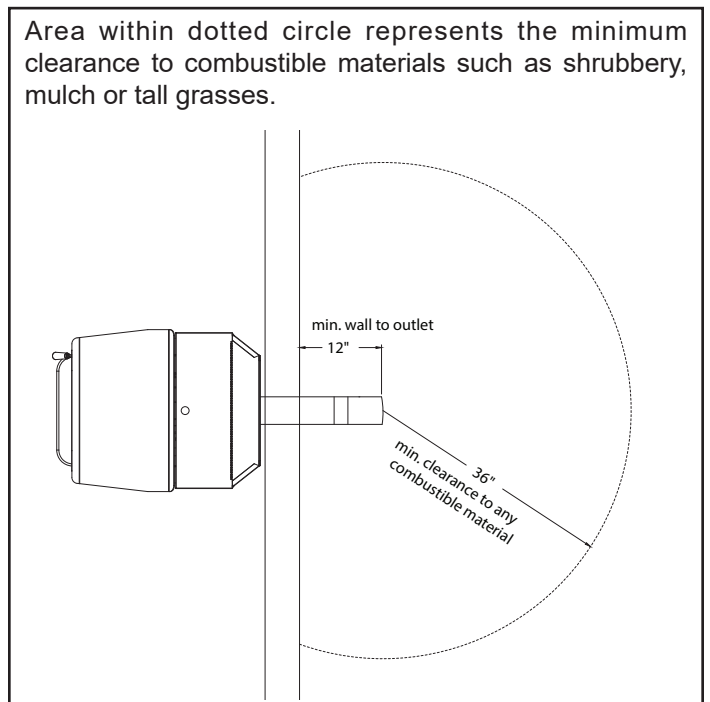


Figure 4.9

B. Chimney Diagram

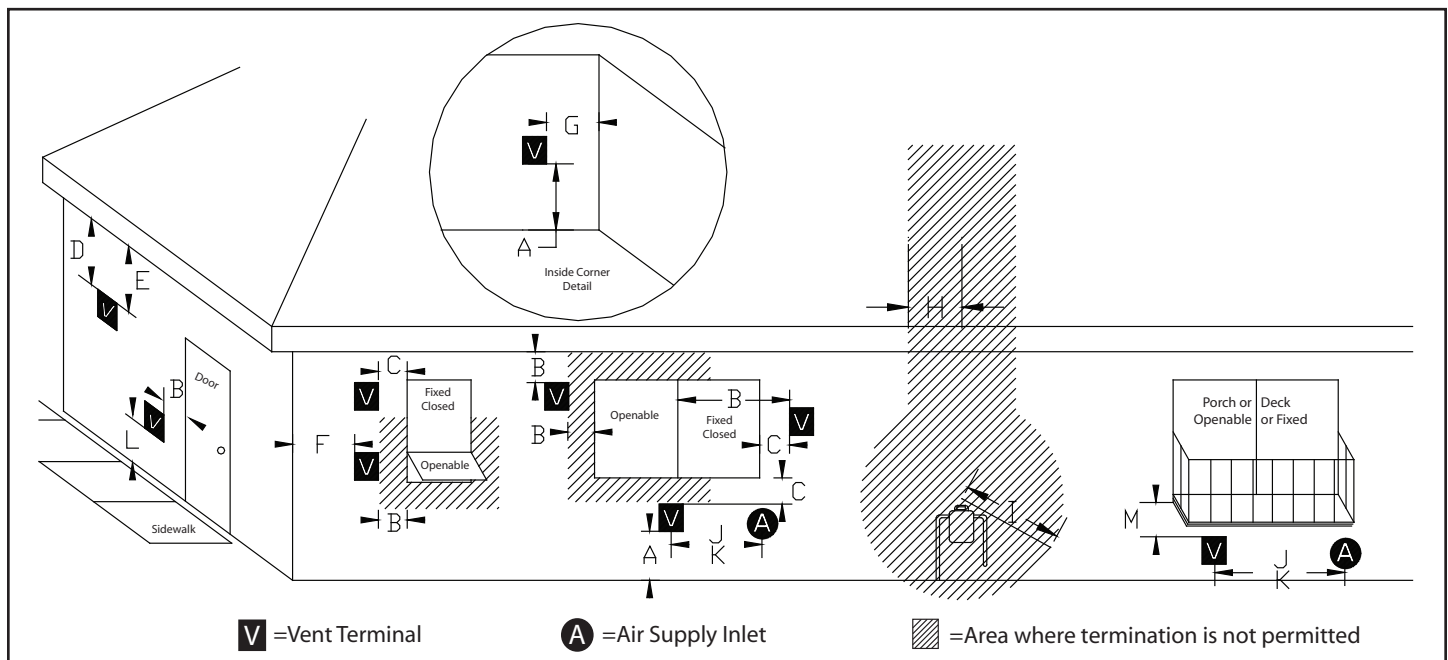


Figure 4.10

Requirements for Terminating the Venting

- Venting terminals must not be recessed into a wall or siding.
- Only PL vent pipe wall pass-through and fire stops should be used when venting through combustible materials.
- Always take into consideration the effect the prevailing wind direction or other wind currents will cause with flyash and /or smoke when placing the termination.

In addition, the following must be observed:

- The clearance above grade must be a minimum of 12".
- The clearance to a window or door that may be opened must be a minimum of 48" to the side and 48" below the window/door, and 12" above the window/door. (**with outside air installed, 12" to side and below**)
- A 12" clearance to a permanently closed window is recommended to prevent condensation on the window.
- The vertical clearance to a ventilated soffit located above the terminal within a horizontal distance of 2 feet (60 cm) from the center-line of the terminal must be a minimum of 18".
- The clearance to an unventilated soffit must be a minimum of 12".
- The clearance to an outside corner is 11" from center of pipe.
- The clearance to an inside corner is 12".
- A vent must not be installed within 3 feet (90 cm) above a gas meter/regulator assembly when measured from the horizontal center-line of the regulator.

- The clearance to service regulator vent outlet must be a minimum of 6 feet.
- The clearance to a non-mechanical air supply inlet to the building or the combustion air inlet to any other appliance must be a minimum of 48".
- The clearance to a mechanical air supply inlet must be a minimum of 10 feet. (**with outside air installed, 6 feet**)
- The clearance above a paved sidewalk or a paved driveway located on public property must be a minimum of 7 feet.
- The clearance under a veranda, porch, deck or balcony must be a minimum of 12 inches. (**B. also**)

Note: The clearance to vegetation and other exterior combustibles such as mulch is 36" as measured from the center of the outlet or cap. This 36" radius continues to grade.

Certain Canadian and or Local codes or regulations may require different clearances.

A vent shall not terminate directly above a side-walk or paved driveway which is located between two single family dwellings and serves both dwellings.

Only permitted if veranda, porch, deck, or balcony is fully open on a minimum of 2 sides beneath the floor.

See NFPA 211 for more installation clearance reductions when using outside air. Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365. (if in Canada)

C. Venting & Use of Elbows

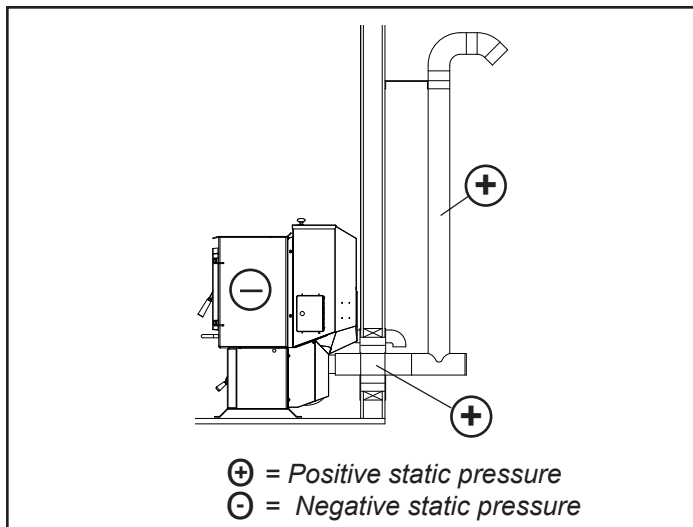


Figure 4.11

Harman pellet stoves depend on a combustion fan to pull air through the unit for combustion. The venting system restricts the ability of the combustion fan to move the required amount of air through the unit. A system with too much resistance will result in incomplete combustion, more frequent required cleaning and poor unit performance. It is always best to choose a location for the appliance that will result in a venting system with the shortest equivalent vent length (EVL).

It is best to have your venting system designed by a Harman authorized dealer before you finalize your purchase of an appliance.

Equivalent Vent Length: *The equivalent vent length for common pellet vent components are:*

- 90° Elbows or Tee: 5 EVL Units
- 45° elbow: 3 EVL Units
- Vertical Pipe or Liner: ½ EVL Unit
- Horizontal Pipe or liner: 1 EVL Unit

The total allowable equivalent vent length is:

- 20 EVL for 3" pellet vent pipe or liner
- 30 EVL for 4" pellet vent pipe or liner

Due to the potential for fly ash accumulation in horizontal venting sections, the maximum permissible horizontal venting length is:

- 4 ft. for 3" & 4" pellet vent pipe.

Example: First Floor Installation

A unit is to be installed using 3" Pellet Pipe with 3 feet of horizontal pipe, a Tee, 10 feet of vertical pipe, a 90° elbow and a termination cap.

The equivalent vent length is:

3 ft. of Horizontal Pipe (1 x 3 EVL)	= 3 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
10 ft. of Vertical Pipe (10 x .5 EVL)	= 5 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
<u>Termination Cap</u>	<u>= 0 EVL</u>
Equivalent Vent Length	= 18 EVL

In the example system detailed above, the EVL was 138 which is less than the maximum of 20 EVL for 3" pellet vent pipe, thus this is a satisfactory venting configuration.

Example: Connection to Masonry Chimney

A unit is to be installed using 3" Pellet Pipe with 2 feet of horizontal pipe, a Tee, 4 feet of vertical pipe, an elbow, a Tee, 21 feet of vertical liner, and a termination cap.

The equivalent vent length is:

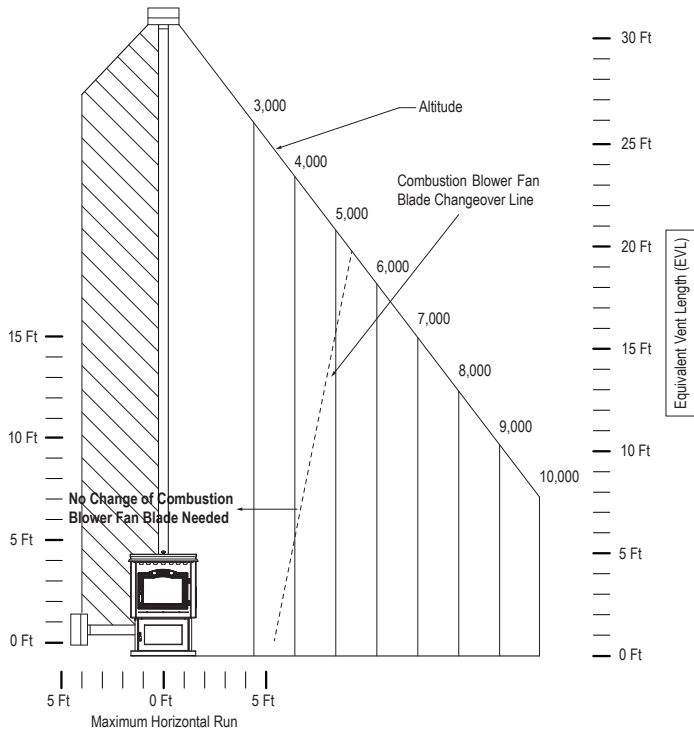
2 ft. of Horizontal Pipe (1 x 2 EVL)	= 2 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
4 ft. of Vertical Pipe (4 x .5 EVL)	= 2 EVL
90° Elbow (1 x 5 EVL)	= 5 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
21 ft. of Vertical Liner (21 x .5 EVL)	= 10.5 EVL
<u>Termination Cap</u>	<u>= 0 EVL</u>
Equivalent Vent Length	= 29.5 EVL

In the example system detailed above, the EVL was 29.5 which exceeds the maximum of 20 ft. for 3" pellet vent pipe, thus 3" vent pipe should not be used in this installation. However, since 4" pipe can support an EVL up to 30, the use of 4" pipe would create a satisfactory installation.

C. Venting & Use of Elbows *continued*

Note: When the amount of vertical pellet vent pipe in the system exceeds 15 feet, 4" pellet vent pipe should be used.

Note: Equivalent Venting Length decreases as altitude increases.



Example:

A unit with an EVL of 13, is to be installed at an altitude of 3,000 feet above sea level.

From the chart to the left, at 3,000 feet of altitude, the maximum permissible equivalent venting length is 26 feet. Therefore this would be an acceptable installation with no need to change the combustion blower fan.

However, if the same unit (EVL 13) was to be installed an altitude of 9,000 feet above sea level, the installation would no longer be acceptable and the equivalent vent length of the pipe would have to be reduced for proper unit operation.

- Long runs of flex or PL vent pipe installed directly vertical from the flue stub may require more frequent cleaning due to fly ash falling off inside and collecting directly above the combustion blower outlet.
- 4" stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood-burning fireplaces with Class A metal chimneys.
- All pellet vent pipe must be secured together either by means provided by pipe manufacturer or by 3 screws at each joint.
- Use only the specified venting components. Use of any other components will void the product warranty and may pose a hazard.
- Do Not Install a Flue Damper In The Exhaust Venting System of This Appliance.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
- **NOTE:** Simpson DuraVent PelletVent Pro Harman® Adapter Part #3PVP-ADHB and PelletVent Pro Harman® Adapter Inserter Part #3PVPX4ADHB are highly recommended to be installed on the starter collar to insure a proper pipe connection to the unit.
- **INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER**
- Use silicone to create an effective vapor barrier at the location where the chimney or outside air ducting passes through to the exterior of the structure

D. Outside Air

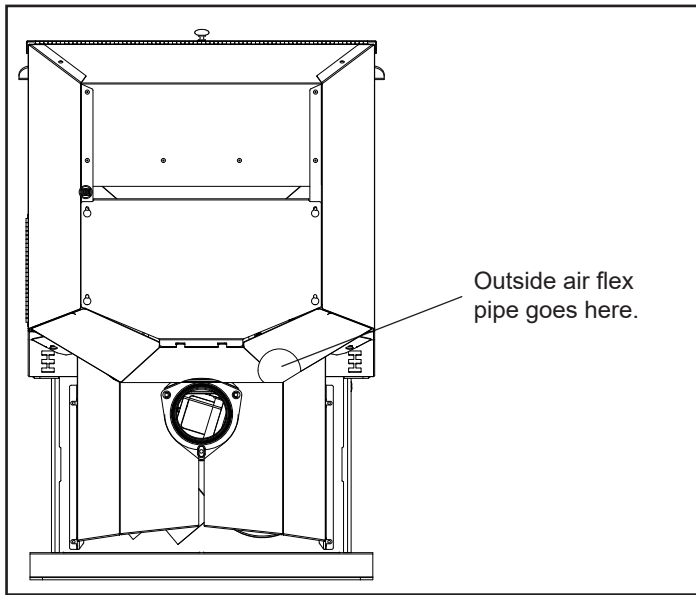


Figure 4.12

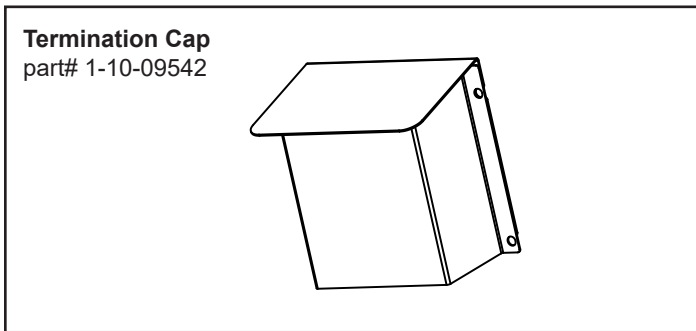


Figure 4.13

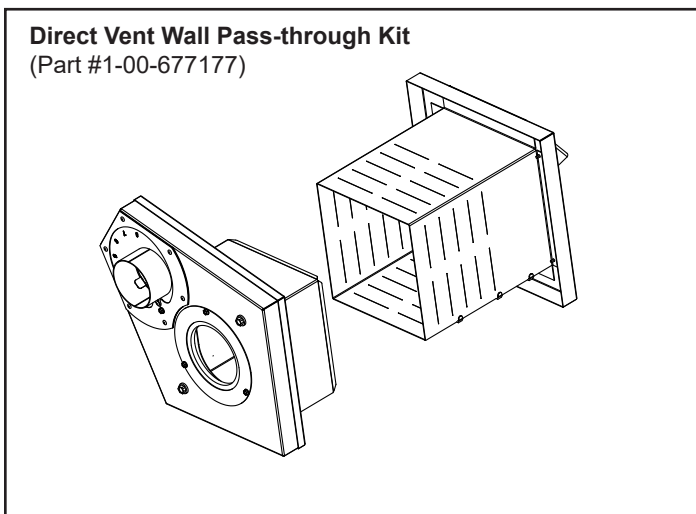


Figure 4.14

Outside Air:

Hearth & Home Technologies recommend attaching outside air in all installations, especially lower level and main floor locations.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands, may lead to back-drafting of those and other appliances.

When the appliance is side-wall vented: The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

When the appliance is roof vented: The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

The outside air connection will supply the demands of the pellet appliance, but consideration must be given to the total house demand. House demand may consume some air needed for the stove, especially during a power failure. It may be necessary to add additional ventilation to the space in which the pellet appliance is located. Consult with your local HVAC professional to determine the ventilation demands for your house.

To install outside air use 3". non-combustible flex pipe Figure 4.13. There is a break-away hole on the rear panel of the P-Series stove which must be removed before connecting the flex pipe. Figure 4.12. The pipe should be run outside and terminate to the side or below the vent pipe outlet so the flue outlet is more than 12" from the inlet cover. The Termination Cap should be used to keep birds, rodents, etc. out of the pipe Figure 4.13.

You may choose to use the optional Direct Vent Wall Pass-through Kit which incorporates the venting pass-through and outside air inlet into one component. Figure 4.14.

Use silicone to create an effective vapor barrier at the location where the chimney or outside air ducting passes through to the exterior of the structure.

E. Locating Your Appliance & Chimney

Location of the appliance and chimney will affect performance.

- Install through the warm airspace enclosed by the building envelope. This helps to produce more draft, especially during lighting and die-down of the fire.
- Penetrate the highest part of the roof. This minimizes the effects of wind loading.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.
- Minimize the use of chimney offsets.
- Consider the appliance location relative to floor and ceiling and attic joists.



CAUTION

- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.
- DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house

F. Draft

Draft is the pressure difference needed to vent appliances successfully. When an appliance is drafting successfully, all combustion by products are exiting the home through the chimney.

Considerations for successful draft include:

- Preventing negative pressure
- Location of appliance and chimney

To measure the draft or negative pressure on your appliance use a manahelic or a digital pressure gauge capable of reading 0 - 1 inches of water column (W.C.).

The appliance should be running on high for at least 15 minutes for the test.

With the stove running on high you should have a negative pressure equal to or greater than the number given in the chart below. If you have a lower reading than you find on the chart, your appliance does not have adequate draft to burn the fuel properly.

Minimum Vacuum Requirements:	.35 - .55
-------------------------------------	------------------

Prior to installing the flue pipe, connect a draft meter. (The draft meter must have a minimum range of 0 - .5") Record the first reading. Connect flue pipe to stove and be sure all doors and windows in the home are closed. Record the second draft reading _____. If the second reading is more than .05" lower than the first reading, check for possible restrictions or the need for outside air. For more information on the draft test procedure, refer to Page 21

G. Negative Pressure



WARNING

Risk of Asphyxiation! Negative pressure can cause spillage of combustion fumes and soot.

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

- Exhaust fans (kitchen, bath, etc.)
- Range hoods
- Combustion air requirements for furnaces, water heaters and other combustion appliances
- Clothes dryers
- Location of return-air vents to furnace or air conditioning
- Imbalances of the HVAC air handling system
- Upper level air leaks such as:
 - Recessed lighting
 - Attic hatch
 - Duct leaks

To minimize the effects of negative air pressure:

- Install the outside air kit with the intake facing prevailing winds during the heating season
- Ensure adequate outdoor air for all combustion appliances and exhaust equipment
- Ensure furnace and air conditioning return vents are not located in the immediate vicinity of the appliance
- Avoid installing the appliance near doors, walkways or small isolated spaces
- Recessed lighting should be a "sealed can" design
- Attic hatches weather stripped or sealed
- Attic mounted duct work and air handler joints and seams taped or sealed

NOTICE: *Hearth & Home Technologies assumes no responsibility for the improper performance of the chimney system caused by:*

- *Inadequate draft due to environmental conditions*
- *Downdrafts*
- *Tight sealing construction of the structure*
- *Mechanical exhausting devices*

H. Avoiding Smoke and Odors

Negative Pressure, Shut-down, and Power Failure:

To reduce the probability of back-drafting or burn-back in the pellet burning appliance during power failure or shut-down conditions, the stove must be able to draft naturally without exhaust blower operation. Negative pressure in the house will resist this natural draft if not accounted for in the pellet appliance installation.

Heat rises in the house and leaks out at upper levels. This air must be replaced with cold air from outdoors, which flows into lower levels of the house. Vents and chimneys into basements and lower levels of the house can become the conduit for air supply, and reverse under these conditions.

Outside Air

An outside air kit is recommended in all installations. The Outside Air Kit must be ordered separately.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands may lead to back drafting of those and other appliances.

When the appliance is roof vented (strongly recommended):

The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

When the appliance is side-wall vented:

The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

The outside air supply kit can supply most of the demands of the pellet appliance, but consideration must be given to the total house demand.

House demand may consume the air needed for the appliance. It may be necessary to add additional ventilation to the space in which the pellet appliance is located.

Consult with your local HVAC professional to determine the ventilation demands for your house.

Vent Pipe

Be sure to use approved pellet vent pipe wall and ceiling pass-through fittings to go through combustible walls and ceilings. Be sure to use a starting collar to attach the venting system to the stove. The starting collar must be secured to the flue stub with at least three screws, and sealed with high temp silicone caulking.

4" stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood burning fireplaces with class A metal chimneys.

Pellet venting pipe (also known as Type L vent) is constructed of two layers with air space between the layers. This air space acts as an insulator and reduces the outside surface temperature to allow a clearance to combustibles of only 1 inch. The sections of pipe lock together to form an air tight seal in most cases. Follow venting manufacturer's recommendations for sealing pipe joints.

Where passing through an exterior wall or roof, be sure to use the appropriate pass-through device providing an adequate vapor barrier. Venting manufacturers generally provide these pass-through devices.

Vent Configurations:

To reduce probability of reverse drafting during shut-down conditions, Hearth & Home Technologies strongly recommends:

- Installing the pellet vent with a minimum vertical run of five feet, preferably terminating above the roof line.
- Installing the outside air intake at least four feet below the vent termination.

To prevent soot damage to exterior walls of the house and to prevent re-entry of soot or ash into the house:

- Maintain specified clearances to windows, doors, and air inlets, including air conditioners.
- Vents should not be placed below ventilated soffits. Run the vent above the roof.
- Avoid venting into alcove locations.
- Vents should not terminate under overhangs, decks or onto covered porches.
- Maintain minimum clearance of 12 inches from the vent termination to the exterior wall. If you see deposits developing on the wall, you may need to extend this distance to accommodate your installation conditions.

Hearth & Home Technologies assumes no responsibility for, nor does the warranty extend to, smoke damage caused by reverse drafting of pellet appliances under shut-down or power failure conditions.

I. Fire Safety

To provide reasonable fire safety, the following should be given serious consideration:

- Install at least one smoke detector and CO detector on each floor of your home.
- Locate smoke detector away from the heating appliance and close to the sleeping areas.
- Follow the smoke detector manufacturer's placement and installation instructions and maintain regularly.
- Conveniently locate a Class A fire extinguisher to contend with small fires.
- In the event of a hopper fire:
 - Evacuate the house immediately.
 - Notify fire department.

WARNING



Fire Risk.
Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by the following actions:

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Do NOT Overfire.

Or any such action that may cause a fire hazard.

WARNING

THIS WOOD HEATER HAS A MANUFACTURER-SET MINIMUM LOW BURN RATE THAT MUST NOT BE ALTERED. IT IS AGAINST FEDERAL REGULATIONS TO ALTER THIS SETTING OR OTHERWISE OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

J. Inspect Appliance & Components

- Remove appliance and components from packaging and inspect for damage.
- Report to your dealer any parts damaged in shipment.
- **Read all the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**

WARNING



Inspect appliance and components for damage. Damaged parts may impair safe operation.

- Do NOT install damaged components.
- Do NOT install incomplete components.
- Do NOT install substitute components.

Report damaged parts to dealer.

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

5 Appliance Set-Up

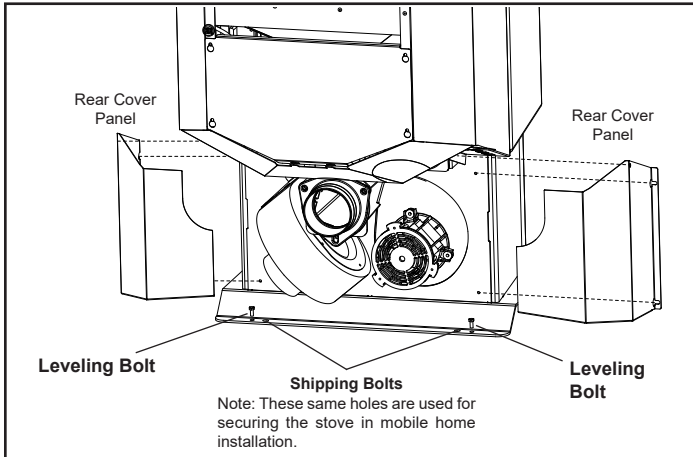


Figure 5.1

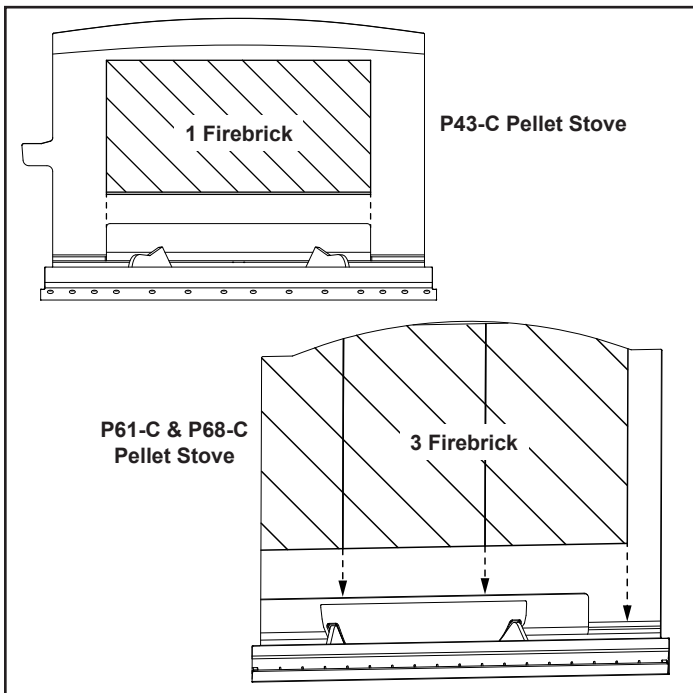


Figure 5.2

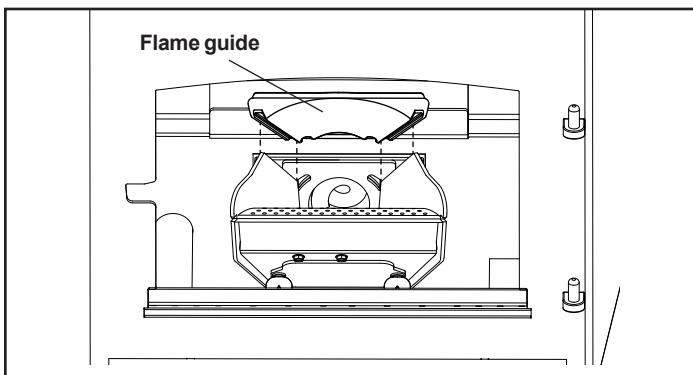


Figure 5.3

A. Unpacking

The P-Series is bolted (1/4 x 1" hex head bolts) to the skid to prevent movement during shipping.

To free the stove from the skid you must remove the hold-down bolts in the rear of the pedestal base using a 7/16" socket or wrench. Figure 5.1.

B. Removing Rear Cover Panels

The rear cover panels are secured to the stove with three screws each. Two of the screws need only be loosened, not removed, to remove the panels. It is recommended that the rear covers are installed using a 5/16" socket, wrench or nut driver after the unit is in place and the vent pipe is installed, to prevent contact with hot or moving parts.

If needed, install the (2) 5/16-18 X 3/4" leveling bolts located in the hardware kit. Figure 5.1.

C. Firebrick

The P43-C Pellet Stove has a single (1) firebrick that gets installed horizontally on the angle bracket above the burnpot. The P61-C and P68-C have three (3) firebrick that get installed vertically on the angle bracket. Figure 5.2.

D. Flame Guide

Install the cast iron flame guide on top of the burn pot. Make sure that the flame guide is fully seated on the vertical sides of the burn pot and that the back of the guide rests against the body of the stove. Figure 5.3.

E. Room Sensor Installation

The room sensor is a small temperature sensor on the end of a 60" wire. This sensor is installed much like a standard wall thermostat. There is a remote room sensor port on the rear of the unit for easy external connection. Use standard 18-2 thermostat wire to extend the sensor to the desired location (50' maximum). The room sensor should be installed in the location where you want to control the temperature.

NOTE: Distances of more than 25 feet from the unit or in another room are not recommended. The room sensor is essential for the P-Series excellent efficiency.

NOTE: It is recommended that the room sensor be installed, even if only installed on the rear of the unit as a return air sensor.

F. Low Draft Voltage Adjustment

These units are pre-tested at the factory with exactly 120 VAC, 60 Hz. They are checked and adjusted for firebox tightness, gasket leakage, motor operation and igniter operation. The P-Series is then factory set at a mid-point adjustment and in most cases will not need any adjustments.

NOTE: The factory low draft setting may not be correct for the unit's permanent installation conditions.

The control board on the P-Series is equipped with a low draft adjustment port located on the control face just to the right of the igniter light. Figure 5.4. This voltage adjustment is provided to allow the unit to be adjusted for the household voltage where the unit is going to be in permanent operation.

NOTE: The line voltage varies from area to area and often home to home.

The low draft voltage should be adjusted to achieve the most efficient burn on low burn or "maintenance". This voltage adjustment allows the installer to change the low voltage set point approximately 10 volts. This adjustment should be done by the installer during set up because a draft meter reading is **required** to insure proper set up.

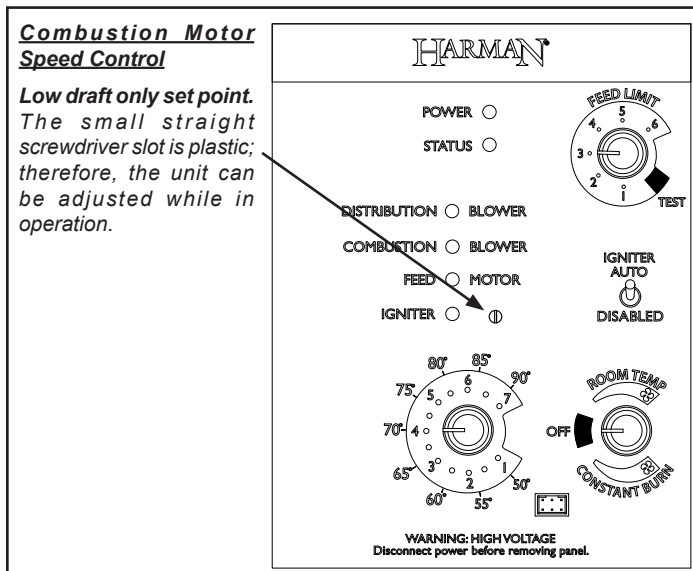


Figure 5.4

If the unit is not adjusted properly, it does not cause a safety concern. If the unit is adjusted too high, only efficiency is lost. If the unit is adjusted too low, the low draft pressure switch will not allow the feed motor or the igniter to operate.

A simple draft test should be performed after completing the flue pipe installation. To record the results for future reference:

1. Plug unit into a 120 VAC, 60 HZ outlet.
2. Close the hopper lid, front view door, and the ash pan door. Neither pellets or a fire are required for this test.
3. With the mode selector in the "OFF" position, turn the feed adjuster to "TEST".
4. Record the high draft _____ in W.C. (Normal is -.50 to -.60) The control will be on the High Draft for a total of 2 minutes.
5. After 1 minute, the combustion motor will go down to low draft and the distribution blower will go on high. Allow approximately 15 seconds to pass for the combustion motor to slow before checking the low draft.
6. If the low draft is between -.35 and -.45, record the reading _____ in W.C. If the reading is higher, slowly turn the set screw counter-clockwise until the draft lowers. If the reading is lower, very slowly turn the set screw clockwise until the draft increases.

NOTE: In some cases, the draft may not go as low as -.35 to -.45 even with the set screw completely counter-clockwise. Ideally, you should just set it as low as possible.

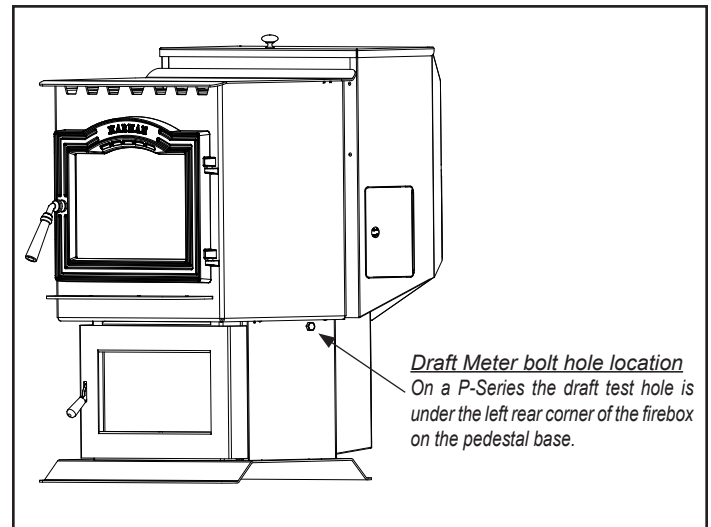


Figure 5.5

Connect the power cord to a 120 VAC, 60 Hz grounded receptacle. (A surge protector is recommended to protect the circuit board.) Also be sure that the polarity of the outlet that the stove is plugged into is correct.

6 Reference Material

A. Safety Reminders

When installing and operating your Harman® P-Series, respect basic safety standards. Read these instructions carefully before you attempt to install or operate the P-Series. Failure to do so may result in damage to property or personal injury and may void the product warranty.

Consult with your local building code agency and insurance representative before you begin your installation to ensure compliance with local codes, including the need for permits and follow-up inspections.

 CAUTION
This appliance must be vented to the outside.


Due to high temperatures, this stove should be placed out of traffic and away from furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burn to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this stove.

Installation and repair of this stove should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning may be required. It is imperative that control compartments, burners, and circulating air passageways of this stove be kept clean.


 CAUTION
WHEN THIS ROOM HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. TO REDUCE THE RISK OF FIRE, FOLLOW THE INSTALLATION INSTRUCTIONS. CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.


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

 CAUTION
THE STOVE IS HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

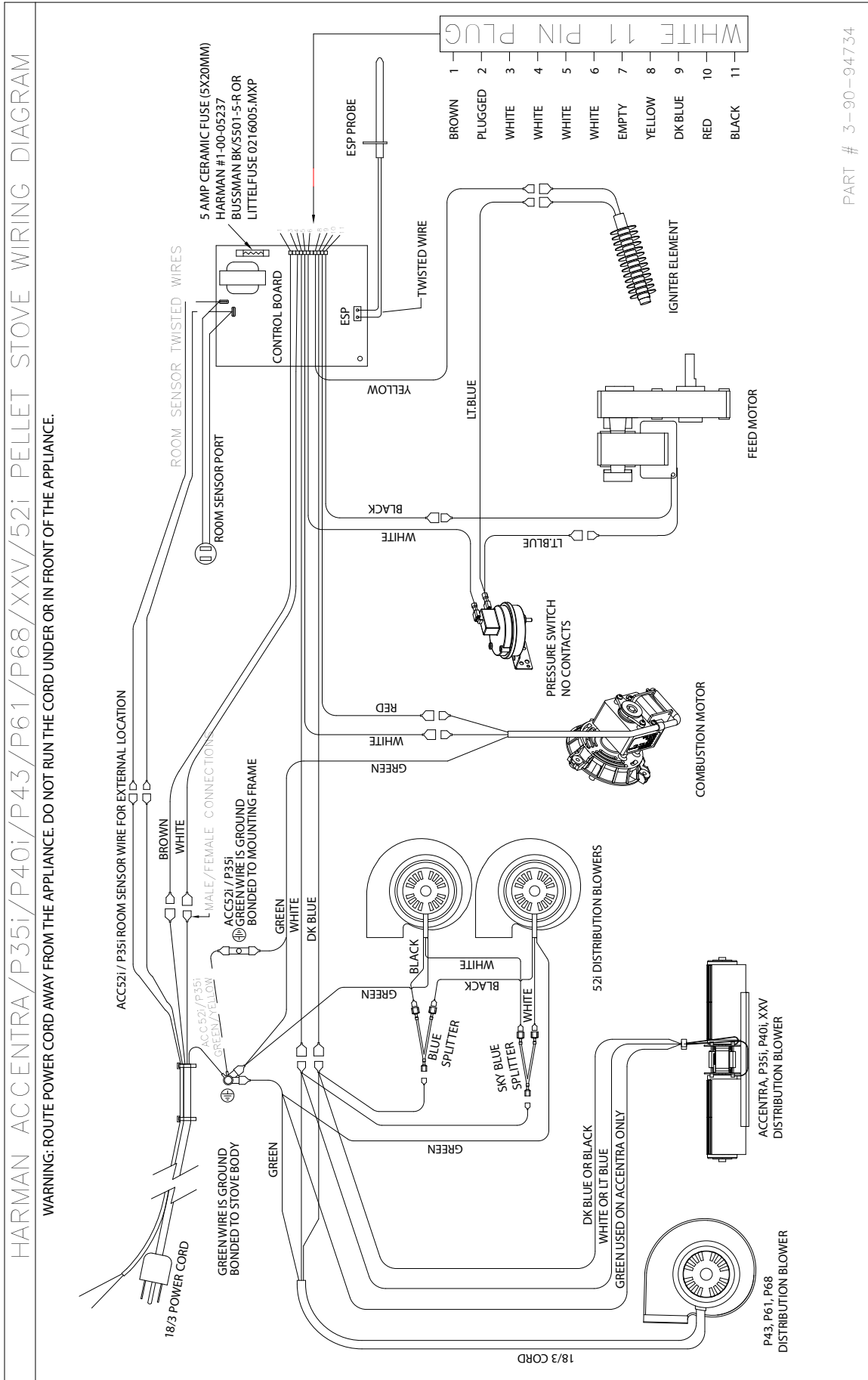
 WARNING
MOBILE/MANUFACTURED HOME GUIDELINES DO NOT ALLOW INSTALLATION IN A SLEEPING ROOM.

 WARNING
KEEP COMBUSTIBLE MATERIALS SUCH AS GRASS, LEAVES, ETC. AT LEAST 3 FEET AWAY FROM THE POINT DIRECTLY UNDER THE VENT TERMINATION.

 WARNING
USE OF IMPROPER FUELS, FIRESTARTERS OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND OPERATION GUIDELINES

 WARNING
BURNING COLORED PAPER, CARDBOARD, SOLVENTS, TRASH AND GARBAGE OR ALTERING THE STOVE FOR HIGHER HEAT OUTPUT MAY CAUSE DAMAGE TO THE STOVE AND COULD RESULT IN A HOUSE FIRE. USE ONLY APPROVED FUELS AND FOLLOW ONLY THESE OPERATION GUIDELINES.

B. Wiring Diagram



PART # 3-90-94734

HARMAN®

352 Mountain House Road, Halifax, PA 17032
www.harmanstoves.com

Please contact your Harman® dealer with any questions or concerns.
For the location of your nearest Harman® dealer,
please visit www.harmanstoves.com.

Printed in U.S.A

7. Appendixes

Appendix A. Invalid Run 1 Test Data (Test results not included in final results)

P43-C. Operating instructions.

High Burn: Auto/Manual switch to Auto.

115v set for all burn rates.

Feed 52.5s (5.00+- .02 on screen d)

Temperature Dial Full clockwise.

Medium Burn:

Only adjust Feed to 22.5s

Low Burn:

Mode Dial to lowest spot on green section. Or the "C" in Constant.

Feed 20.0s

Temperature Dial Low Full counterclockwise.

P43-C Conditioning Data (Data collected during medium burn rate)



Conditioning Hours	Exhaust Temperature	Fuel Added (lbs)	Date
0	289.00	40	6/19/2023
1	299.00		6/19/2023
2	286.00		6/19/2023
3	278.00		6/19/2023
4	282.00		6/19/2023
5	291.00		6/19/2023
6	276.00		6/19/2023
7	288.00		6/19/2023
8	296.00		6/19/2023
9	302.00	40	6/20/2023
10	301.00		6/20/2023
11	302.00		6/20/2023
12	304.00		6/20/2023
13	290.00		6/20/2023
14	286.00		6/20/2023
15	292.00		6/20/2023
16	301.00		6/20/2023
17	292.00		6/20/2023
18	292.00	40	6/21/2023
19	296.00		6/21/2023
20	306.00		6/21/2023
21	298.00		6/21/2023
22	289.00		6/21/2023
23	292.00		6/21/2023
24	293.00		6/21/2023
25	288.00		6/21/2023
26	292.00		6/21/2023
27	301.00	40	6/22/2023
28	308.00		6/22/2023
29	290.00		6/22/2023
30	285.00		6/22/2023
31	286.00		6/22/2023
32	299.00		6/22/2023
33	302.00		6/22/2023
34	306.00		6/22/2023
35	296.00		6/22/2023
36	284.00	40	6/26/2023
37	290.00		6/26/2023
38	295.00		6/26/2023
39	292.00		6/26/2023
40	302.00		6/26/2023
41	290.00		6/26/2023
42	298.00		6/26/2023
43	296.00		6/26/2023
44	290.00		6/26/2023
45	288.00	40	6/27/2023
46	278.00		6/27/2023
47	284.00		6/27/2023
48	291.00		6/27/2023
49	300.00		6/27/2023
50	290.00		6/27/2023

Data Collected By Lab Tech Steve Marshall

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 8/7/2023

PB Length: 81 min
 Recording Interval: 1 min

Averages:	464	84	-0.03	5.93	0.26
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Elapsed Time (min)	Scale Reading	Weight Change	Stack (F)	Ambient (F)	Draft ("H2O)	CO2 (%)	CO (%)
0	36.7	-	437	83	-0.027	0.09	0.00
1	36.6	-0.10	440	83	-0.028	0.09	0.00
2	36.5	-0.10	442	83	-0.029	0.08	0.00
3	36.3	-0.20	443	82	-0.029	0.09	0.00
4	36.2	-0.10	445	82	-0.032	0.09	0.00
5	36.1	-0.10	450	83	-0.031	0.09	0.00
6	36.0	-0.10	452	83	-0.029	0.09	0.00
7	35.9	-0.10	453	83	-0.032	0.09	0.00
8	35.8	-0.10	454	82	-0.032	0.09	0.00
9	35.7	-0.10	457	83	-0.033	0.09	0.00
10	35.6	-0.10	456	83	-0.032	0.09	0.00
11	35.5	-0.10	457	82	-0.031	0.09	0.00
12	35.3	-0.20	459	83	-0.033	0.09	0.00
13	35.2	-0.10	461	84	-0.032	0.09	0.00
14	35.1	-0.10	464	84	-0.032	0.09	0.00
15	35.0	-0.10	466	84	-0.033	0.08	0.00
16	34.9	-0.10	465	84	-0.033	0.08	0.00
17	34.8	-0.10	464	84	-0.033	0.09	0.00
18	34.7	-0.10	467	82	-0.032	0.09	0.00
19	34.6	-0.10	466	84	-0.033	0.00	0.00
20	34.4	-0.20	466	84	-0.032	0.00	0.00
21	34.3	-0.10	466	84	-0.034	0.00	0.00
22	34.2	-0.10	467	84	-0.033	0.03	0.00
23	34.1	-0.10	466	84	-0.033	0.08	0.00
24	34.0	-0.10	466	84	-0.033	0.11	0.00
25	33.9	-0.10	467	84	-0.030	16.82	4.40
26	33.8	-0.10	469	85	-0.033	16.86	4.39
27	33.6	-0.20	470	84	-0.033	14.76	2.27
28	33.5	-0.10	470	85	-0.033	15.02	0.05

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 8/7/2023

PB Length: 81 min
 Recording Interval: 1 min

Averages:	464	84	-0.03	5.93	0.26
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29	33.4	-0.10	469	85	-0.033	15.02	0.05
30	33.3	-0.10	468	84	-0.033	0.29	0.00
31	33.2	-0.10	469	84	-0.033	0.11	0.00
32	33.1	-0.10	471	84	-0.033	0.09	0.00
33	33.0	-0.10	468	85	-0.033	15.20	4.09
34	32.9	-0.10	466	85	-0.034	16.80	4.37
35	32.8	-0.10	467	84	-0.034	0.36	0.00
36	32.7	-0.10	467	84	-0.032	0.09	0.00
37	32.4	-0.30	469	84	-0.032	8.90	0.13
38	32.4	0.00	470	85	-0.034	4.50	0.08
39	32.3	-0.10	469	85	-0.033	0.23	0.00
40	32.2	-0.10	467	85	-0.032	7.46	0.01
41	32.2	0.00	468	85	-0.034	8.34	0.01
42	32.1	-0.10	467	84	-0.032	8.35	0.04
43	32.0	-0.10	466	85	-0.033	8.33	0.01
44	31.9	-0.10	467	85	-0.032	8.26	0.01
45	31.8	-0.10	467	85	-0.033	8.47	0.01
46	31.7	-0.10	468	83	-0.033	9.10	0.06
47	31.6	-0.10	467	85	-0.033	8.31	0.02
48	31.5	-0.10	466	85	-0.035	8.40	0.02
49	31.3	-0.20	469	85	-0.032	9.21	0.09
50	31.2	-0.10	468	85	-0.033	8.08	0.01
51	31.1	-0.10	469	85	-0.033	8.99	0.04
52	31.0	-0.10	469	86	-0.034	8.58	0.03
53	30.9	-0.10	468	86	-0.034	8.63	0.05
54	30.8	-0.10	466	86	-0.032	8.33	0.04
55	30.7	-0.10	468	86	-0.033	8.95	0.10
56	30.6	-0.10	466	85	-0.033	8.10	0.04
57	30.5	-0.10	467	85	-0.033	8.55	0.03
58	30.3	-0.20	468	85	-0.034	9.20	0.14
59	30.2	-0.10	468	84	-0.034	8.69	0.02

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Test Date: 8/7/2023

PB Length: 81 min
 Recording Interval: 1 min

Averages:	464	84	-0.03	5.93	0.26
-----------	-----	----	-------	------	------

60	30.1	-0.10	471	84	-0.034	9.62	0.11
61	30.0	-0.10	468	85	-0.033	8.36	0.02
62	29.9	-0.1	468	85	-0.03	8.84	0.05
63	29.8	-0.1	467	86	-0.03	8.76	0.06
64	29.7	-0.1	465	85	-0.03	8.15	0.02
65	29.6	-0.1	467	84	-0.03	9.22	0.11
66	29.4	-0.2	468	86	-0.03	8.88	0.02
67	29.3	-0.1	466	85	-0.03	8.26	0.01
68	29.2	-0.1	463	84	-0.03	7.80	0.01
69	29.1	-0.1	465	84	-0.03	8.31	0.03
70	29.0	-0.1	465	84	-0.03	8.81	0.06
71	28.9	-0.1	465	83	-0.03	8.66	0.05
72	28.8	-0.1	462	85	-0.03	7.50	0.01
73	28.7	-0.1	462	85	-0.03	8.39	0.02
74	28.6	-0.1	464	85	-0.03	8.56	0.05
75	28.5	-0.1	465	84	-0.03	8.39	0.07
76	28.4	-0.1	464	85	-0.03	8.88	0.08
77	28.3	-0.1	465	86	-0.03	8.53	0.02
78	28.2	-0.1	466	85	-0.03	9.34	0.05
79	28.1	-0.1	465	84	-0.03	8.07	0.01
80	27.9	-0.2	466	84	-0.03	8.75	0.01
81	27.8	-0.1	467	84	-0.03	8.82	0.07

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
0	0.000	0.000			1.16	86	1.83	0.86	88	1.40	114	0.097			27.7		468	81	63	82	47	85	-0.033	8.97	0.030
1	0.146	0.150	0.15	0.15	1.24	86	1.93	0.97	88	1.50	113	0.097	93	96	27.6	-0.1	466	82	63	83	43	85	-0.033	8.25	0.020
2	0.306	0.311	0.16	0.16	1.28	86	1.96	0.96	88	1.50	113	0.098	102	103	27.5	-0.1	467	83	63	83	43	85	-0.034	8.99	0.060
3	0.469	0.471	0.16	0.16	1.26	86	1.95	0.96	88	1.50	113	0.097	104	102	27.4	-0.1	466	83	63	83	44	86	-0.033	8.49	0.030
4	0.631	0.632	0.16	0.16	1.27	86	1.94	0.95	88	1.40	113	0.097	104	103	27.3	-0.1	467	84	62	84	44	84	-0.035	8.53	0.040
5	0.792	0.792	0.16	0.16	1.26	86	1.95	0.95	88	1.50	113	0.097	103	102	27.2	-0.1	467	84	62	84	44	85	-0.032	8.69	0.030
6	0.953	0.952	0.16	0.16	1.26	86	1.94	0.95	88	1.50	114	0.097	103	103	27.1	-0.1	466	84	62	84	44	85	-0.033	8.51	0.010
7	1.114	1.113	0.16	0.16	1.26	86	1.94	0.95	88	1.40	113	0.096	103	104	27.0	-0.1	465	85	62	84	44	84	-0.032	7.79	0.010
8	1.275	1.273	0.16	0.16	1.25	86	1.94	0.95	88	1.40	114	0.097	103	103	26.9	-0.1	466	85	62	84	45	86	-0.032	8.97	0.120
9	1.437	1.432	0.16	0.16	1.25	87	1.93	0.95	88	1.40	113	0.097	103	102	26.8	-0.1	466	85	62	84	45	84	-0.034	8.24	0.020
10	1.597	1.593	0.16	0.16	1.25	87	1.92	0.94	88	1.50	113	0.096	103	104	26.7	-0.1	466	85	62	85	45	85	-0.033	8.11	0.010
11	1.758	1.752	0.16	0.16	1.24	87	1.93	0.94	88	1.40	113	0.097	103	102	26.6	-0.1	464	85	62	85	45	84	-0.033	7.82	0.010
12	1.918	1.912	0.16	0.16	1.24	87	1.92	0.94	88	1.40	113	0.097	102	102	26.5	-0.1	465	86	62	85	46	86	-0.033	8.85	0.060
13	2.079	2.072	0.16	0.16	1.25	87	1.92	0.94	88	1.40	113	0.098	102	102	26.4	-0.1	464	86	62	85	46	86	-0.034	8.11	0.010
14	2.240	2.231	0.16	0.16	1.25	87	1.93	0.94	89	1.50	113	0.097	103	102	26.3	-0.1	466	86	62	85	46	85	-0.034	9.04	0.070
15	2.400	2.390	0.16	0.16	1.25	87	1.92	0.94	89	1.40	114	0.096	103	102	26.1	-0.2	467	86	62	85	46	84	-0.034	8.45	0.030
16	2.561	2.551	0.16	0.16	1.24	88	1.92	0.94	89	1.40	113	0.096	103	103	26.0	-0.1	466	86	62	86	47	84	-0.034	8.53	0.020
17	2.721	2.710	0.16	0.16	1.24	88	1.92	0.94	89	1.50	114	0.097	102	102	25.9	-0.1	467	86	62	86	47	85	-0.034	8.32	0.030
18	2.881	2.869	0.16	0.16	1.24	88	1.92	0.93	89	1.50	114	0.097	102	102	25.8	-0.1	466	86	62	86	47	85	-0.033	8.57	0.030
19	3.042	3.029	0.16	0.16	1.24	88	1.93	0.93	89	1.50	114	0.098	102	102	25.7	-0.1	464	86	62	86	48	85	-0.032	8.40	0.030
20	3.203	3.188	0.16	0.16	1.24	88	1.93	0.94	90	1.50	114	0.096	103	102	25.6	-0.1	466	87	62	86	48	86	-0.033	8.93	0.020
21	3.363	3.348	0.16	0.16	1.23	88	1.93	0.94	90	1.50	114	0.096	102	103	25.5	-0.1	468	87	62	86	48	86	-0.034	8.69	0.030
22	3.523	3.508	0.16	0.16	1.24	88	1.93	0.93	90	1.50	114	0.097	102	102	25.4	-0.1	469	87	62	86	49	84	-0.035	9.55	0.180
23	3.683	3.666	0.16	0.16	1.24	89	1.92	0.94	90	1.50	114	0.097	102	101	25.3	-0.1	468	87	61	86	50	86	-0.033	9.01	0.110
24	3.844	3.827	0.16	0.16	1.24	89	1.92	0.94	90	1.40	114	0.097	102	103	25.1	-0.2	469	86	60	85	50	86	-0.034	8.82	0.050
25	4.005	3.987	0.16	0.16	1.24	89	1.91	0.93	90	1.40	114	0.097	102	102	25.0	-0.1	467	85	59	85	50	86	-0.034	8.16	0.020
26	4.166	4.146	0.16	0.16	1.24	89	1.92	0.94	91	1.50	114	0.096	103	102	24.9	-0.1	465	85	59	85	50	86	-0.034	8.30	0.020
27	4.327	4.306	0.16	0.16	1.24	89	1.91	0.94	91	1.40	114	0.097	102	102	24.8	-0.1	465	85	59	85	50	87	-0.033	8.75	0.030
28	4.487	4.467	0.16	0.16	1.25	90	1.91	0.93	91	1.50	114	0.097	102	103	24.7	-0.1	468	85	58	85	51	86	-0.032	9.16	0.030
29	4.648	4.626	0.16	0.16	1.24	90	1.91	0.94	91	1.50	114	0.095	103	102	24.6	-0.1	467	84	58	85	51	87	-0.033	8.43	0.010
30	4.810	4.786	0.16	0.16	1.25	90	1.92	0.94	91	1.50	114	0.097	103	102	24.5	-0.1	468	84	58	84	51	86	-0.033	8.68	0.040
31	4.971	4.946	0.16	0.16	1.24	90	1.92	0.93	91	1.50	114	0.095	103	103	24.4	-0.1	468	84	58	84	51	86	-0.033	8.78	0.030
32	5.131	5.105	0.16	0.16	1.24	90	1.92	0.94	91	1.40	113	0.096	102	102	24.3	-0.1	466	84	58	84	52	84	-0.034	8.37	0.040
33	5.292	5.266	0.16	0.16	1.24	90	1.93	0.94	92	1.50	113	0.097	102	102	24.2	-0.1	464	84	58	84	52	85	-0.033	8.02	0.020
34	5.453	5.426	0.16	0.16	1.25	90	1.92	0.93	92	1.50	114	0.095	103	103	24.1	-0.1	465	84	58	84	52	84	-0.034	8.85	0.020
35	5.614	5.585	0.16	0.16	1.24	90	1.92	0.93	92	1.50	113	0.096	103	102	24.0	-0.1	468	84	57	84	52	85	-0.033	9.48	0.070
36	5.776	5.746	0.16	0.16	1.25	91	1.92	0.94	92	1.50	113	0.097	103	102	23.9	-0.1	466	84	57	84	53	86	-0.032	7.70	0.010
37	5.937	5.906	0.16	0.16	1.24	91	1.92	0.93	92	1.50	113	0.096	102	102	23.8	-0.1	468	83	57	84	53	85	-0.033	9.19	0.080
38	6.098	6.066	0.16	0.16	1.24	91	1.93	0.94	92	1.50	113	0.097	102	102	23.7	-0.1	469	83	57	84	53	84	-0.034	8.67	0.020
39	6.259	6.226	0.16	0.16	1.25	91	1.93	0.94	92	1.50	114	0.097	102	102	23.5	-0.2	469	83	57	84	53	84	-0.033	8.72	0.020
40	6.420	6.387	0.16	0.16	1.25	91	1.92	0.94	92	1.50	114	0.096	103	103	23.4	-0.1	469	83	57	84	54	86	-0.034	8.66	0.010
41	6.581	6.546	0.16	0.16	1.25	91	1.93	0.93	93	1.50	114	0.097	102	101	23.3	-0.1	466	84	57	84	54	86	-0.033	8.17	0.010
42	6.743	6.706	0.16	0.16	1.25	91	1.92	0.94	93	1.50	114	0.096	103	102	23.2	-0.1	463	83	57	84	54	86	-0.033	7.74	0.010

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
43	6.904	6.867	0.16	0.16	1.24	91	1.93	0.94	93	1.50	114	0.094	104	104	23.1	-0.1	462	84	57	84	54	86	-0.032	8.26	0.020
44	7.065	7.027	0.16	0.16	1.25	91	1.93	0.94	93	1.50	114	0.097	102	102	23.0	-0.1	461	84	57	84	54	86	-0.032	8.30	0.020
45	7.227	7.187	0.16	0.16	1.24	92	1.93	0.94	93	1.50	114	0.095	104	103	22.9	-0.1	463	84	57	84	55	86	-0.034	8.26	0.010
46	7.388	7.348	0.16	0.16	1.25	92	1.92	0.94	93	1.50	114	0.096	102	103	22.8	-0.1	460	84	57	84	55	87	-0.033	7.62	0.010
47	7.549	7.508	0.16	0.16	1.25	92	1.93	0.94	93	1.50	114	0.097	102	102	22.7	-0.1	461	84	57	84	55	86	-0.033	8.58	0.050
48	7.712	7.668	0.16	0.16	1.25	92	1.93	0.94	93	1.50	113	0.097	103	102	22.6	-0.1	463	84	57	84	55	85	-0.034	8.98	0.100
49	7.873	7.830	0.16	0.16	1.25	92	1.93	0.93	93	1.50	113	0.097	102	103	22.5	-0.1	463	84	57	84	56	85	-0.034	9.08	0.050
50	8.034	7.989	0.16	0.16	1.24	92	1.93	0.93	93	1.50	113	0.097	102	101	22.4	-0.1	463	84	57	84	56	86	-0.034	8.55	0.070
51	8.196	8.149	0.16	0.16	1.24	92	1.93	0.94	94	1.50	113	0.097	102	101	22.3	-0.1	463	84	57	84	56	86	-0.034	8.65	0.010
52	8.357	8.311	0.16	0.16	1.24	92	1.94	0.94	94	1.50	114	0.096	102	103	22.2	-0.1	465	84	57	84	56	86	-0.034	9.15	0.040
53	8.518	8.471	0.16	0.16	1.25	92	1.92	0.94	94	1.50	113	0.097	102	101	22.0	-0.2	466	84	57	84	56	85	-0.034	9.04	0.090
54	8.680	8.631	0.16	0.16	1.25	92	1.93	0.94	94	1.50	113	0.095	103	102	21.9	-0.1	467	84	57	84	57	86	-0.034	9.09	0.170
55	8.843	8.792	0.16	0.16	1.25	92	1.93	0.94	94	1.50	113	0.097	103	102	21.8	-0.1	466	84	57	84	57	86	-0.034	8.69	0.110
56	9.003	8.953	0.16	0.16	1.22	93	1.92	0.94	94	1.50	113	0.096	101	102	21.7	-0.1	466	84	57	84	57	85	-0.035	8.86	0.060
57	9.164	9.114	0.16	0.16	1.23	93	1.91	0.94	94	1.50	113	0.097	102	102	21.6	-0.1	467	84	58	84	57	86	-0.035	9.03	0.090
58	9.324	9.274	0.16	0.16	1.23	93	1.91	0.94	94	1.50	113	0.096	101	102	21.5	-0.1	467	84	58	84	57	86	-0.033	9.10	0.140
59	9.485	9.436	0.16	0.16	1.23	93	1.91	0.94	94	1.50	113	0.097	102	103	21.4	-0.1	468	84	58	84	58	85	-0.033	8.97	0.040
60	9.646	9.596	0.16	0.16	1.23	93	1.92	0.94	94	1.50	113	0.097	102	101	21.3	-0.1	469	84	58	84	58	85	-0.035	9.21	0.110
61	9.807	9.757	0.16	0.16	1.23	93	1.92	0.94	94	1.50	113	0.096	102	102	21.2	-0.1	468	84	58	84	58	84	-0.035	8.93	0.030
62	9.967	9.918	0.16	0.16	1.23	93	1.91	0.94	94	1.50	113	0.097	101	102	21.1	-0.1	467	84	58	84	58	85	-0.035	8.47	0.040
63	10.128	10.079	0.16	0.16	1.23	93	1.92	0.93	94	1.50	113	0.097	102	102	21.0	-0.1	466	84	58	84	58	84	-0.034	8.83	0.050
64	10.288	10.240	0.16	0.16	1.24	93	1.91	0.94	94	1.50	112	0.097	101	102	20.9	-0.1	455	84	58	84	59	85	-0.035	6.62	0.010
65	10.450	10.401	0.16	0.16	1.24	93	1.91	0.94	94	1.50	110	0.096	102	102	20.8	-0.1	436	84	58	83	59	85	-0.040	6.15	0.010
66	10.611	10.563	0.16	0.16	1.23	93	1.91	0.93	94	1.50	108	0.098	101	102	20.7	-0.1	422	84	58	83	59	85	-0.040	5.88	0.010
67	10.772	10.724	0.16	0.16	1.23	93	1.92	0.93	94	1.50	107	0.097	101	101	20.7	0.0	412	84	58	83	59	85	-0.039	5.65	0.010
68	10.933	10.885	0.16	0.16	1.23	93	1.91	0.94	94	1.50	106	0.097	101	101	20.6	-0.1	404	84	58	83	59	84	-0.037	5.22	0.010
69	11.093	11.046	0.16	0.16	1.24	93	1.92	0.94	94	1.50	106	0.097	100	101	20.6	0.0	397	83	58	83	59	84	-0.036	5.20	0.010
70	11.255	11.208	0.16	0.16	1.23	93	1.91	0.93	94	1.50	105	0.096	102	102	20.5	-0.1	390	83	58	83	59	84	-0.036	4.85	0.010
71	11.416	11.368	0.16	0.16	1.24	93	1.91	0.94	94	1.50	105	0.097	101	101	20.5	0.0	383	83	58	83	59	84	-0.035	4.77	0.020
72	11.578	11.530	0.16	0.16	1.23	93	1.92																		

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335](#), [00336](#), [00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
86	13.835	13.790	0.16	0.16	1.24	93	1.91	0.94	94	1.50	96	0.097	100	100	19.8	0.0	309	82	58	82	60	83	-0.033	4.49	0.020
87	13.996	13.951	0.16	0.16	1.24	93	1.91	0.94	94	1.50	96	0.098	100	100	19.7	-0.1	307	82	58	82	61	83	-0.033	4.61	0.030
88	14.157	14.113	0.16	0.16	1.24	93	1.92	0.93	94	1.50	96	0.098	100	101	19.7	0.0	305	82	59	82	61	83	-0.033	4.70	0.020
89	14.319	14.275	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.099	100	100	19.6	-0.1	305	82	59	82	61	83	-0.033	4.90	0.010
90	14.481	14.436	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.097	101	100	19.6	0.0	303	82	59	82	61	83	-0.033	4.55	0.010
91	14.642	14.598	0.16	0.16	1.23	93	1.92	0.94	94	1.50	95	0.097	100	101	19.6	0.0	300	82	59	82	61	83	-0.032	4.39	0.010
92	14.803	14.760	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.097	100	101	19.5	-0.1	300	82	59	81	61	83	-0.033	4.62	0.020
93	14.965	14.921	0.16	0.16	1.23	93	1.91	0.93	94	1.50	95	0.098	100	100	19.5	0.0	300	81	59	81	61	83	-0.033	4.88	0.010
94	15.126	15.083	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.099	99	100	19.4	-0.1	300	81	59	81	61	82	-0.032	4.78	0.010
95	15.287	15.244	0.16	0.16	1.24	93	1.92	0.94	94	1.50	95	0.098	99	100	19.4	0.0	300	81	58	81	61	82	-0.033	4.98	0.000
96	15.449	15.407	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.097	101	102	19.3	-0.1	300	81	58	81	61	83	-0.032	5.02	0.010
97	15.611	15.568	0.16	0.16	1.24	93	1.92	0.94	94	1.50	95	0.097	101	100	19.3	0.0	299	81	58	81	61	83	-0.032	4.78	0.010
98	15.773	15.729	0.16	0.16	1.23	93	1.91	0.94	94	1.50	95	0.099	100	99	19.2	-0.1	299	81	58	81	61	82	-0.032	4.90	0.000
99	15.934	15.891	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.099	99	100	19.2	0.0	298	81	58	81	61	82	-0.032	4.66	0.000
100	16.095	16.053	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.098	99	100	19.1	-0.1	298	81	58	81	61	82	-0.032	4.55	0.010
101	16.256	16.214	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.098	99	100	19.1	0.0	299	81	58	81	61	82	-0.033	4.73	0.010
102	16.418	16.376	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.096	101	101	19.0	-0.1	300	81	58	81	61	83	-0.033	5.36	0.010
103	16.580	16.538	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.098	100	100	19.0	0.0	301	81	58	81	61	82	-0.032	4.89	0.010
104	16.742	16.700	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.098	100	100	18.9	-0.1	300	81	58	81	61	82	-0.032	4.92	0.010
105	16.903	16.861	0.16	0.16	1.24	93	1.92	0.94	94	1.50	95	0.099	99	99	18.9	0.0	298	81	58	81	61	82	-0.032	4.70	0.020
106	17.064	17.023	0.16	0.16	1.24	93	1.91	0.94	94	1.50	95	0.099	99	100	18.9	0.0	297	81	58	81	61	82	-0.032	4.95	0.010
107	17.225	17.183	0.16	0.16	1.24	93	1.92	0.92	94	1.40	95	0.098	99	99	18.8	-0.1	297	81	58	81	61	82	-0.032	4.81	0.010
108	17.387	17.342	0.16	0.16	1.24	93	1.91	0.91	93	1.40	95	0.098	100	99	18.8	0.0	296	81	58	81	61	82	-0.032	4.81	0.020
109	17.549	17.501	0.16	0.16	1.23	93	1.91	0.92	93	1.40	95	0.097	101	99	18.7	-0.1	296	81	58	81	61	83	-0.032	4.77	0.010
110	17.711	17.662	0.16	0.16	1.24	93	1.91	0.92	93	1.40	95	0.098	100	100	18.7	0.0	299	81	58	81	61	83	-0.032	5.73	0.010
111	17.872	17.821	0.16	0.16	1.24	93	1.91	0.91	93	1.40	95	0.098	99	99	18.6	-0.1	300	81	58	81	61	83	-0.032	5.27	0.000
112	18.033	17.981	0.16	0.16	1.24	93	1.92	0.92	93	1.40	95	0.097	100	100	18.6	0.0	297	81	58	81	61	83	-0.032	4.41	0.000
113	18.195	18.141	0.16	0.16	1.23	93	1.91	0.91	93	1.40	95	0.098	100	99	18.5	-0.1	296	81	58	81	61	83	-0.032	4.50	0.010
114	18.356	18.300	0.16	0.16	1.24	93	1.91	0.92	93	1.40	95	0.098	99	99	18.5	0.0	296	81	58	81	61	82	-0.031	4.62	0.010
115	18.518	18.459	0.16	0.16	1.24	92	1.92	0.92	93	1.40	95	0.097	101	99	18.4	-0.1	295	81	58	81	61	82	-0.032	4.38	0.000
116	18.680	18.620	0.16	0.16	1.25	93	1.92	0.91	93	1.40	95	0.098	100	100	18.4	0.0	295	81	58	81	61	83	-0.032	4.84	0.000
117	18.839	18.779	0.16	0.16	1.22	92	1.91	0.92	93	1.40	94	0.098	98	99	18.4	0.0	296	81	58	80	61	82	-0.032	4.92	0.000
118	18.999	18.939	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	99	99	18.3	-0.1	296	81	58	80	61	82	-0.032	4.71	0.000
119	19.160	19.099	0.16	0.16	1.23	92	1.90	0.92	93	1.40	95	0.099	99	99	18.3	0.0	296	81	58	80	61	83	-0.031	4.52	0.000
120	19.321	19.258	0.16	0.16	1.23	92	1.90	0.92	93	1.40	95	0.098	100	99	18.2	-0.1	295	81	58	80	61	83	-0.031	4.29	0.010
121	19.482	19.417	0.16	0.16	1.23	92	1.90	0.92	93	1.40	95	0.098	100	99	18.2	0.0	295	81	58	80	61	82	-0.032	4.55	0.010
122	19.643	19.578	0.16	0.16	1.23	92	1.90	0.91	93	1.40	95	0.097	100	101	18.1	-0.1	295	81	58	80	61	82	-0.031	4.90	0.010
123	19.804	19.737	0.16	0.16	1.23	92	1.91	0.91	93	1.40	94	0.097	100	99	18.1	0.0	294	81	58	80	61	82	-0.031	4.70	0.010
124	19.965	19.896	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.097	100	99	18.1	0.0	292	81	59	80	62	82	-0.031	4.19	0.020
125	20.125	20.056	0.16	0.16	1.23	92	1.91	0.91	93	1.40	94	0.098	99	99	18.0	-0.1	291	81	58	80	61	82	-0.031	4.53	0.020
126	20.286	20.216	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	100	99	18.0	0.0	292	80	59	80	62	81	-0.031	4.67	0.010
127	20.448	20.375	0.16	0.16	1.23	92	1.90	0.91	93	1.40	94	0.098	100	99	17.9	-0.1	292	80	59	80	61	82	-0.032	4.86	0.010
128	20.609	20.536	0.16	0.16	1.22	92	1.91	0.92	93	1.40	94	0.098	100	100	17.9	0.0	291	80	59	80	62	82	-0.031	4.44	0.020

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335](#), [00336](#), [00371](#)

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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
129	20.769	20.695	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.099	98	98	17.9	0.0	291	80	58	80	62	82	-0.031	4.44	0.010
130	20.930	20.854	0.16	0.16	1.24	92	1.90	0.92	93	1.40	94	0.098	100	99	17.8	-0.1	293	80	58	80	62	82	-0.032	5.05	0.010
131	21.091	21.015	0.16	0.16	1.23	92	1.91	0.91	93	1.40	94	0.098	100	100	17.8	0.0	292	80	59	80	62	82	-0.032	4.70	0.000
132	21.252	21.174	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	100	99	17.7	-0.1	292	80	59	80	62	82	-0.030	4.77	0.010
133	21.413	21.333	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.099	99	98	17.7	0.0	292	80	59	80	62	82	-0.032	4.85	0.000
134	21.574	21.494	0.16	0.16	1.23	92	1.90	0.91	93	1.40	94	0.097	100	100	17.6	-0.1	291	80	59	80	62	82	-0.032	4.75	0.010
135	21.735	21.653	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	100	99	17.6	0.0	292	80	58	80	62	82	-0.031	4.75	0.010
136	21.895	21.812	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.098	99	99	17.5	-0.1	292	80	58	80	62	82	-0.032	4.75	0.010
137	22.056	21.972	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.098	100	99	17.5	0.0	291	80	59	80	62	82	-0.032	4.59	0.010
138	22.218	22.131	0.16	0.16	1.22	92	1.90	0.91	93	1.40	94	0.097	101	99	17.5	0.0	290	80	59	80	62	82	-0.032	4.21	0.010
139	22.379	22.291	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	100	99	17.4	-0.1	289	80	58	80	62	82	-0.032	4.28	0.000
140	22.539	22.451	0.16	0.16	1.23	92	1.91	0.91	93	1.40	94	0.098	99	99	17.4	0.0	289	80	59	80	62	81	-0.033	4.78	0.010
141	22.700	22.610	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.096	101	100	17.3	-0.1	290	80	59	80	62	82	-0.032	4.72	0.000
142	22.861	22.771	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.097	100	100	17.3	0.0	290	80	59	80	62	82	-0.032	5.09	0.000
143	23.022	22.930	0.16	0.16	1.23	92	1.91	0.91	93	1.40	94	0.096	101	100	17.3	0.0	292	80	59	80	62	82	-0.032	4.90	0.000
144	23.183	23.089	0.16	0.16	1.23	92	1.91	0.92	93	1.50	94	0.099	99	98	17.2	-0.1	292	80	58	80	62	81	-0.033	4.87	0.010
145	23.344	23.250	0.16	0.16	1.23	92	1.90	0.91	93	1.40	94	0.098	100	100	17.2	0.0	292	80	59	80	62	81	-0.032	4.66	0.010
146	23.504	23.409	0.16	0.16	1.23	92	1.90	0.91	93	1.40	94	0.098	99	99	17.1	-0.1	292	80	58	80	62	81	-0.032	4.66	0.000
147	23.665	23.568	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.097	100	99	17.1	0.0	292	80	59	80	62	83	-0.032	4.77	0.000
148	23.826	23.728	0.16	0.16	1.23	92	1.90	0.91	93	1.40	95	0.097	100	100	17.0	-0.1	294	80	59	80	62	83	-0.033	4.86	0.000
149	23.987	23.887	0.16	0.16	1.22	92	1.91	0.92	93	1.40	94	0.097	100	99	17.0	0.0	294	80	59	80	62	83	-0.033	4.72	0.000
150	24.148	24.047	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.098	100	99	16.9	-0.1	293	80	59	80	62	83	-0.033	4.72	0.000
151	24.308	24.207	0.16	0.16	1.22	92	1.90	0.91	93	1.40	94	0.099	98	99	16.9	0.0	294	80	59	80	62	83	-0.032	4.64	0.010
152	24.469	24.366	0.16	0.16	1.22	92	1.91	0.92	93	1.40	95	0.099	99	98	16.8	-0.1	295	80	59	80	62	82	-0.033	4.92	0.000
153	24.630	24.525	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.097	100	99	16.8	0.0	296	80	59	80	62	83	-0.033	5.14	0.000
154	24.791	24.685	0.16	0.16	1.23	92	1.91	0.91	93	1.40	95	0.098	100	99	16.8	0.0	296	80	59	80	62	83	-0.032	5.51	0.000
155	24.952	24.844	0.16	0.16	1.23	92	1.91	0.91	93	1.40	95	0.098	100	99	16.7	-0.1	296	80	59	80	62	83	-0.033	4.96	0.010
156	25.113	25.003	0.16	0.16	1.22	92	1.91	0.91	93	1.40	95	0.098	100	99	16.7	0.0	296	80	59	80	62	83	-0.033	4.73	0.000
157	25.273	25.163	0.16	0.16	1.23	92	1.91	0.91	93	1.40	95	0.097	100	100	16.6	-0.1	296	80	59	80	62	83	-0.033	4.59	0.010
158	25.434	25.322	0.16	0.16																					

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
172	27.685	27.554	0.16	0.16	1.22	92	1.90	0.92	93	1.40	95	0.098	99	99	15.9	-0.1	295	81	59	80	62	83	-0.033	5.27	0.010
173	27.846	27.713	0.16	0.16	1.23	92	1.90	0.92	93	1.40	95	0.097	100	99	15.9	0.0	295	81	59	80	62	83	-0.033	4.75	0.000
174	28.006	27.874	0.16	0.16	1.23	92	1.90	0.92	93	1.40	95	0.098	99	100	15.8	-0.1	295	81	59	80	62	83	-0.033	4.89	0.010
175	28.167	28.033	0.16	0.16	1.23	92	1.90	0.92	93	1.50	95	0.097	100	99	15.8	0.0	295	81	59	80	62	83	-0.033	4.94	0.010
176	28.328	28.193	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.098	100	99	15.7	-0.1	295	81	59	80	62	84	-0.033	4.90	0.010
177	28.489	28.353	0.16	0.16	1.22	92	1.91	0.92	93	1.40	95	0.098	100	99	15.7	0.0	294	81	59	80	62	83	-0.033	4.68	0.030
178	28.650	28.512	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.098	100	99	15.6	-0.1	295	81	59	80	62	84	-0.032	5.08	0.010
179	28.810	28.672	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.097	100	100	15.6	0.0	296	81	59	80	62	84	-0.033	4.92	0.020
180	28.971	28.833	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.098	100	100	15.5	-0.1	296	81	60	80	62	84	-0.033	4.93	0.000
181	29.132	28.992	0.16	0.16	1.23	92	1.90	0.92	93	1.50	95	0.098	100	99	15.5	0.0	295	81	60	80	62	84	-0.033	4.73	0.010
182	29.293	29.152	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.098	100	99	15.5	0.0	294	81	60	80	62	81	-0.033	4.57	0.000
183	29.454	29.312	0.16	0.16	1.22	92	1.91	0.92	93	1.50	95	0.099	99	99	15.4	-0.1	294	81	59	80	62	81	-0.032	4.54	0.000
184	29.614	29.471	0.16	0.16	1.22	92	1.90	0.92	93	1.50	95	0.098	99	99	15.4	0.0	293	81	59	80	62	82	-0.032	4.08	0.010
185	29.775	29.631	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.098	100	99	15.3	-0.1	292	81	60	80	62	83	-0.032	3.80	0.010
186	29.935	29.791	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.099	99	99	15.3	0.0	290	81	60	80	62	83	-0.032	3.68	0.010
187	30.097	29.950	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.099	100	98	15.3	0.0	287	81	60	81	62	82	-0.031	3.36	0.010
188	30.258	30.110	0.16	0.16	1.23	92	1.91	0.92	93	1.50	94	0.100	99	98	15.2	-0.1	287	81	60	81	62	81	-0.032	3.88	0.020
189	30.418	30.270	0.16	0.16	1.23	92	1.90	0.91	93	1.50	94	0.098	99	99	15.2	0.0	288	81	60	80	62	82	-0.033	3.84	0.010
190	30.578	30.430	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.099	98	99	15.1	-0.1	290	81	60	81	62	82	-0.033	4.75	0.010
191	30.739	30.589	0.16	0.16	1.23	92	1.90	0.92	93	1.40	94	0.098	100	99	15.1	0.0	291	81	60	81	62	81	-0.033	4.23	0.000
192	30.900	30.750	0.16	0.16	1.23	92	1.91	0.91	93	1.40	95	0.099	99	100	15.1	0.0	290	81	60	81	62	82	-0.031	3.91	0.000
193	31.061	30.909	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.099	99	98	15.0	-0.1	291	81	60	81	62	83	-0.031	4.16	0.000
194	31.222	31.069	0.16	0.16	1.22	92	1.91	0.92	93	1.40	95	0.099	99	99	15.0	0.0	292	81	60	81	62	83	-0.032	4.48	0.000
195	31.382	31.229	0.16	0.16	1.22	92	1.91	0.91	93	1.40	95	0.097	100	100	14.9	-0.1	292	81	59	81	62	82	-0.033	4.24	0.010
196	31.542	31.388	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.098	99	99	14.9	0.0	291	81	60	81	62	82	-0.032	4.28	0.000
197	31.703	31.548	0.16	0.16	1.23	92	1.91	0.92	93	1.40	95	0.097	100	100	14.8	-0.1	293	81	60	81	62	81	-0.032	5.00	0.000
198	31.865	31.707	0.16	0.16	1.22	92	1.91	0.92	93	1.50	95	0.098	100	99	14.8	0.0	292	81	60	81	62	81	-0.032	4.09	0.010
199	32.025	31.866	0.16	0.16	1.22	92	1.91	0.92	93	1.50	94	0.099	98	98	14.8	0.0	291	81	60	81	62	82	-0.032	3.74	0.000
200	32.185	32.027	0.16	0.16	1.23	92	1.91	0.92	93	1.50	95	0.098	99	100	14.7	-0.1	291	81	60	81	62	82	-0.032	4.33	0.000
201	32.346	32.186	0.16	0.16	1.23	92	1.90	0.92	93	1.50	94	0.097	100	99	14.7	0.0	291	81	60	81	62	82	-0.033	4.19	0.010
202	32.506	32.346	0.16	0.16	1.23	92	1.91	0.92	93	1.40	94	0.097	99	100	14.7	0.0	290	81	60	81	62	82	-0.032	3.95	0.010
203	32.668	32.506	0.16	0.16	1.22	93	1.91	0.92	93	1.40	95	0.098	100	99	14.6	-0.1	290	81	60	81	62	81	-0.032	3.94	0.010
204	32.829	32.665	0.16	0.16	1.22	93	1.91	0.91	93	1.50	94	0.098	99	99	14.6	0.0	289	81	60	81	62	82	-0.032	3.96	0.000
205	32.989	32.825	0.16	0.16	1.22	93	1.91	0.92	93	1.50	94	0.097	99	100	14.5	-0.1	290	81	60	81	61	81	-0.032	4.16	0.000
206	33.149	32.985	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	99	14.5	0.0	291	81	60	81	62	81	-0.032	4.22	0.000
207	33.310	33.144	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	99	14.5	0.0	292	81	60	81	62	81	-0.032	4.61	0.000
208	33.471	33.304	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.097	100	100	14.4	-0.1	292	81	60	81	61	81	-0.032	4.14	0.000
209	33.632	33.465	0.16	0.16	1.23	93	1.91	0.92	93	1.50	95	0.098	99	100	14.4	0.0	291	81	60	81	61	83	-0.033	4.21	0.000
210	33.793	33.623	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	98	14.3	-0.1	292	81	60	81	62	83	-0.033	4.20	0.000
211	33.953	33.783	0.16	0.16	1.22	93	1.90	0.92	93	1.40	95	0.097	99	100	14.3	0.0	292	81	60	81	62	82	-0.032	4.62	0.000
212	34.113	33.943	0.16	0.16	1.23	93	1.90	0.92	93	1.50	95	0.097	99	100	14.2	-0.1	294	81	60	81	61	82	-0.033	4.58	0.000
213	34.274	34.102	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	99	14.2	0.0	294	81	60	81	62	81	-0.033	4.68	0.000
214	34.436	34.262	0.16	0.16	1.23	93	1.91	0.92	93	1.40	95	0.098	100	99	14.1	-0.1	295	81	60	81	61	81	-0.033	4.75	0.000

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
215	34.596	34.422	0.16	0.16	1.22	93	1.91	0.91	93	1.50	95	0.098	99	99	14.1	0.0	294	81	60	81	61	82	-0.032	4.45	0.010
216	34.756	34.581	0.16	0.16	1.22	93	1.91	0.91	93	1.50	95	0.098	99	99	14.1	0.0	294	81	60	81	61	82	-0.032	4.46	0.000
217	34.917	34.741	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	99	14.0	-0.1	295	81	60	81	61	82	-0.032	4.33	0.000
218	35.077	34.901	0.16	0.16	1.23	93	1.91	0.92	93	1.50	95	0.098	99	99	14.0	0.0	295	81	60	81	61	81	-0.033	4.55	0.000
219	35.239	35.060	0.16	0.16	1.23	93	1.91	0.92	93	1.50	95	0.098	100	99	13.9	-0.1	295	81	60	81	61	82	-0.032	4.25	0.010
220	35.399	35.220	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.096	100	100	13.9	0.0	295	81	60	81	61	82	-0.032	4.63	0.000
221	35.560	35.380	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.097	100	100	13.8	-0.1	295	82	60	81	61	82	-0.032	4.65	0.000
222	35.720	35.539	0.16	0.16	1.22	93	1.91	0.91	93	1.50	95	0.097	99	99	13.8	0.0	295	82	60	81	61	82	-0.032	4.27	0.010
223	35.881	35.698	0.16	0.16	1.23	93	1.91	0.91	93	1.50	95	0.098	99	99	13.7	-0.1	296	82	60	81	61	82	-0.033	4.59	0.000
224	36.042	35.859	0.16	0.16	1.22	93	1.91	0.91	93	1.50	95	0.097	100	101	13.7	0.0	294	82	60	81	61	82	-0.032	4.06	0.010
225	36.203	36.018	0.16	0.16	1.23	93	1.91	0.92	93	1.50	95	0.097	100	99	13.7	0.0	294	82	60	81	61	82	-0.032	4.22	0.010
226	36.363	36.178	0.16	0.16	1.22	93	1.91	0.92	93	1.40	95	0.098	99	99	13.6	-0.1	295	82	60	81	61	83	-0.033	4.23	0.000
227	36.524	36.338	0.16	0.16	1.22	93	1.91	0.91	93	1.50	96	0.099	99	99	13.6	0.0	295	82	60	81	61	83	-0.032	4.47	0.010
228	36.684	36.497	0.16	0.16	1.22	93	1.91	0.92	93	1.50	96	0.098	99	99	13.5	-0.1	295	82	60	81	61	82	-0.032	4.31	0.000
229	36.845	36.656	0.16	0.16	1.23	93	1.90	0.91	93	1.50	96	0.098	100	99	13.5	0.0	294	82	60	81	62	84	-0.032	4.01	0.000
230	37.006	36.817	0.16	0.16	1.22	93	1.91	0.91	93	1.50	96	0.097	100	101	13.5	0.0	294	82	60	81	62	83	-0.033	3.96	0.010
231	37.167	36.975	0.16	0.16	1.22	93	1.91	0.91	93	1.50	96	0.098	100	98	13.4	-0.1	294	82	61	81	62	84	-0.032	4.33	0.000
232	37.327	37.136	0.16	0.16	1.23	93	1.91	0.92	93	1.50	95	0.099	98	100	13.4	0.0	294	82	61	81	62	84	-0.032	4.05	0.010
233	37.488	37.296	0.16	0.16	1.23	93	1.91	0.92	93	1.50	96	0.098	100	99	13.3	-0.1	293	82	61	81	62	83	-0.032	4.11	0.010
234	37.648	37.455	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.097	99	99	13.3	0.0	293	82	61	81	62	82	-0.032	4.36	0.010
235	37.810	37.615	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.099	100	99	13.3	0.0	293	82	61	81	62	82	-0.033	4.24	0.000
236	37.971	37.775	0.16	0.16	1.22	93	1.91	0.91	93	1.50	95	0.098	99	99	13.2	-0.1	292	82	61	81	62	83	-0.032	3.79	0.000
237	38.131	37.933	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	98	13.2	0.0	291	82	61	81	62	82	-0.033	4.09	0.000
238	38.291	38.094	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	99	100	13.1	-0.1	291	82	61	81	62	82	-0.031	4.38	0.010
239	38.452	38.253	0.16	0.16	1.23	93	1.91	0.91	93	1.50	96	0.096	101	100	13.1	0.0	292	82	61	81	62	82	-0.032	4.35	0.000
240	38.614	38.412	0.16	0.16	1.22	93	1.91	0.92	93	1.50	95	0.098	100	99	13.1	0.0	292	82	61	81	62	82	-0.032	4.30	0.000
241	38.775	38.573	0.16	0.16	1.23	93	1.91	0.91	94	1.50	95	0.098	99	100	13.0	-0.1	293	82	61	81	62	82	-0.032	4.49	0.000
242	38.935	38.732	0.16	0.16	1.22	93	1.91	0.92	93	1.50	96	0.097	99	99	13.0	0.0	292	82	61	81	62	81	-0.032	4.10	0.000
243	39.095	38.891	0.16	0.16	1.21	93	1.90	0.92	93	1.50	95	0.098	99	99	12.9	-0.1	291	82	61	81	61	82	-0.032	4.13	0.000
244	39.255	39.052	0.16	0.16	1.22	93	1.90	0.91																	

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335](#), [00336](#), [00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
258	41.496	41.286	0.16	0.16	1.21	93	1.90	0.92	94	1.50	96	0.096	100	100	12.3	0.0	293	82	61	82	61	82	-0.032	4.72	0.010
259	41.657	41.447	0.16	0.16	1.21	93	1.90	0.91	94	1.50	96	0.097	100	100	12.2	-0.1	294	82	61	82	61	82	-0.032	4.74	0.010
260	41.817	41.606	0.16	0.16	1.21	93	1.90	0.91	94	1.50	96	0.097	99	99	12.2	0.0	295	82	61	82	61	82	-0.033	4.62	0.010
261	41.976	41.765	0.16	0.16	1.21	94	1.91	0.91	94	1.50	96	0.098	98	99	12.2	0.0	295	82	61	82	61	82	-0.032	4.41	0.000
262	42.136	41.926	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.098	99	100	12.1	-0.1	295	82	61	82	61	82	-0.033	4.66	0.010
263	42.296	42.085	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.098	99	99	12.1	0.0	295	82	61	82	61	82	-0.032	4.56	0.000
264	42.458	42.244	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.098	100	99	12.0	-0.1	295	82	61	82	61	83	-0.032	4.41	0.010
265	42.617	42.404	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.097	99	100	12.0	0.0	295	82	62	82	61	83	-0.032	4.12	0.010
266	42.777	42.564	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.099	98	99	12.0	0.0	294	82	62	82	61	82	-0.032	4.03	0.010
267	42.937	42.723	0.16	0.16	1.21	94	1.91	0.92	94	1.50	96	0.098	99	99	11.9	-0.1	294	82	61	82	61	82	-0.032	3.94	0.000
268	43.097	42.884	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.100	98	99	11.9	0.0	294	82	62	82	61	82	-0.033	4.12	0.010
269	43.258	43.043	0.16	0.16	1.22	94	1.90	0.91	94	1.50	96	0.099	99	98	11.8	-0.1	295	82	62	82	61	82	-0.032	4.09	0.020
270	43.418	43.203	0.16	0.16	1.21	94	1.91	0.91	94	1.50	96	0.098	99	99	11.8	0.0	296	82	62	82	61	82	-0.033	4.59	0.010
271	43.577	43.362	0.16	0.16	1.21	94	1.91	0.91	94	1.50	96	0.097	99	99	11.7	-0.1	297	82	62	82	61	82	-0.033	4.33	0.010
272	43.737	43.522	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.096	100	100	11.7	0.0	296	82	62	82	61	82	-0.032	4.34	0.010
273	43.898	43.682	0.16	0.16	1.21	94	1.91	0.91	94	1.50	96	0.098	99	99	11.7	0.0	295	82	62	82	61	83	-0.032	4.01	0.020
274	44.058	43.841	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.097	99	99	11.6	-0.1	293	82	62	82	61	83	-0.032	3.75	0.010
275	44.218	44.000	0.16	0.16	1.21	94	1.90	0.92	94	1.50	96	0.098	99	99	11.6	0.0	291	82	62	82	61	82	-0.033	3.85	0.010
276	44.378	44.161	0.16	0.16	1.21	94	1.91	0.91	94	1.50	96	0.099	98	99	11.6	0.0	292	82	62	82	61	82	-0.031	4.33	0.010
277	44.538	44.320	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.097	99	99	11.5	-0.1	293	82	62	82	61	82	-0.032	4.49	0.000
278	44.699	44.479	0.16	0.16	1.21	94	1.91	0.92	94	1.50	96	0.098	99	99	11.5	0.0	296	82	62	82	61	83	-0.032	5.05	0.000
279	44.859	44.640	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.099	98	99	11.4	-0.1	296	82	62	82	61	82	-0.032	4.24	0.000
280	45.018	44.799	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.099	98	98	11.4	0.0	294	82	62	82	61	82	-0.032	3.94	0.000
281	45.178	44.959	0.16	0.16	1.21	94	1.91	0.92	94	1.50	96	0.097	99	100	11.3	-0.1	293	82	62	82	61	82	-0.032	3.83	0.000
282	45.338	45.119	0.16	0.16	1.21	94	1.91	0.92	94	1.50	96	0.095	100	101	11.3	0.0	292	82	62	82	61	82	-0.032	3.85	0.000
283	45.500	45.278	0.16	0.16	1.21	94	1.90	0.91	94	1.50	96	0.098	100	99	11.3	0.0	292	82	62	82	61	83	-0.032	4.30	0.010
284	45.659	45.438	0.16	0.16	1.20	94	1.90	0.91	94	1.50	96	0.097	99	100	11.2	-0.1	291	82	62	82	61	84	-0.032	4.08	0.010
285	45.819	45.598	0.16	0.16	1.21	94	1.91	0.91	94	1.50	98	0.098	99	99	11.2	0.0	302	82	62	82	62	83	-0.018	4.18	0.010
286	45.979	45.757	0.16	0.16	1.21	94	1.91	0.91	94	1.50	100	0.098	99	99	11.2	0.0	321	82	62	82	62	82	-0.031	4.14	0.030
287	46.139	45.917	0.16	0.16	1.21	94	1.90	0.91</																	

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
301	48.381	48.152	0.16	0.16	1.22	94	1.91	0.91	94	1.50	101	0.097	100	100	10.6	-0.1	303	83	62	82	61	82	-0.030	3.13	0.040
302	48.542	48.311	0.16	0.16	1.21	94	1.91	0.91	94	1.50	99	0.099	99	98	10.6	0.0	293	83	62	82	61	83	-0.031	2.91	0.040
303	48.702	48.471	0.16	0.16	1.21	94	1.90	0.91	94	1.50	98	0.098	99	99	10.5	-0.1	287	83	62	82	61	83	-0.029	2.88	0.040
304	48.862	48.631	0.16	0.16	1.21	94	1.90	0.91	94	1.50	100	0.098	99	100	10.5	0.0	291	83	62	82	61	83	-0.024	2.80	0.030
305	49.021	48.790	0.16	0.16	1.21	94	1.91	0.91	94	1.50	100	0.096	99	100	10.5	0.0	293	83	62	82	61	82	-0.028	2.96	0.040
306	49.182	48.950	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.098	100	100	10.5	0.0	293	83	62	82	61	82	-0.025	2.71	0.050
307	49.342	49.109	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.097	100	100	10.4	-0.1	294	83	63	82	61	83	-0.026	2.87	0.050
308	49.502	49.269	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.098	99	100	10.4	0.0	296	83	63	82	61	82	-0.025	3.05	0.030
309	49.661	49.428	0.16	0.16	1.21	94	1.90	0.90	94	1.50	101	0.098	99	99	10.3	-0.1	297	83	63	82	61	82	-0.029	2.93	0.050
310	49.821	49.587	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.098	99	99	10.3	0.0	295	83	63	82	61	82	-0.026	2.63	0.030
311	49.983	49.748	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.096	101	101	10.3	0.0	294	83	63	83	61	83	-0.024	2.66	0.060
312	50.142	49.907	0.16	0.16	1.20	94	1.91	0.91	94	1.50	99	0.097	99	99	10.3	0.0	285	83	63	83	61	83	-0.029	2.63	0.050
313	50.302	50.066	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.098	99	99	10.2	-0.1	290	83	63	83	61	83	-0.020	2.89	0.050
314	50.462	50.227	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.097	100	101	10.2	0.0	294	83	63	83	61	83	-0.024	2.85	0.050
315	50.622	50.385	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.098	99	98	10.1	-0.1	295	83	63	83	61	83	-0.028	3.11	0.040
316	50.783	50.545	0.16	0.16	1.21	94	1.90	0.91	94	1.50	101	0.098	100	100	10.1	0.0	294	83	63	83	61	83	-0.027	2.85	0.030
317	50.943	50.705	0.16	0.16	1.20	94	1.91	0.91	94	1.50	99	0.098	99	100	10.1	0.0	286	83	63	83	61	83	-0.029	3.11	0.030
318	51.102	50.863	0.16	0.16	1.21	94	1.90	0.91	94	1.50	100	0.097	99	99	10.0	-0.1	289	83	63	83	61	83	-0.025	2.89	0.050
319	51.262	51.023	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.098	99	100	10.0	0.0	293	83	63	83	61	82	-0.024	3.08	0.040
320	51.423	51.183	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.098	100	100	10.0	0.0	293	83	64	83	61	83	-0.023	2.81	0.050
321	51.583	51.342	0.16	0.16	1.21	94	1.90	0.91	94	1.50	102	0.098	99	99	9.9	-0.1	295	83	64	83	61	83	-0.018	2.83	0.040
322	51.742	51.501	0.16	0.16	1.21	94	1.91	0.91	94	1.50	101	0.097	99	100	9.9	0.0	296	83	64	83	61	83	-0.024	3.09	0.050
323	51.902	51.661	0.16	0.16	1.21	94	1.90	0.91	95	1.50	101	0.099	99	99	9.9	0.0	293	83	64	83	61	83	-0.027	2.55	0.060
324	52.062	51.820	0.16	0.16	1.21	94	1.90	0.91	95	1.50	102	0.097	100	100	9.8	-0.1	293	83	64	83	61	83	-0.019	2.85	0.030
325	52.223	51.980	0.16	0.16	1.21	94	1.91	0.91	95	1.50	99	0.097	100	100	9.8	0.0	286	83	64	83	61	83	-0.030	2.87	0.050
326	52.383	52.140	0.16	0.16	1.20	94	1.91	0.91	95	1.50	101	0.097	100	100	9.8	0.0	290	83	64	83	61	83	-0.023	2.92	0.070
327	52.542	52.298	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.096	100	99	9.7	-0.1	291	83	64	83	61	83	-0.024	3.02	0.050
328	52.702	52.458	0.16	0.16	1.21	94	1.90	0.91	95	1.50	101	0.098	99	100	9.7	0.0	291	83	64	83	61	83	-0.025	2.91	0.040
329	52.862	52.618	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.095	101	101	9.7	0.0	294	83	64	83	61	83	-0.020	3.02	0.050
330	53.023	52.776	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.097	100	99	9.6	-0.1	294	83	64	83	61	83	-0.030	3.00	0.030
331	53.183	52.937	0.16	0.16	1.21	94	1.90	0.90	95	1.50	102	0.097	100	101	9.6	0.0	298	83	64	83	61	83	-0.020	3.08	0.060
332	53.342	53.095	0.16	0.16	1.21	94	1.90	0.91	95	1.50	100	0.097	99	99	9.6	0.0	289	83	64	83	61	83	-0.030	2.75	0.040
333	53.502	53.255	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.098	99	100	9.5	-0.1	293	83	64	83	61	83	-0.027	3.19	0.040
334	53.663	53.415	0.16	0.16	1.21	94	1.91	0.90	95	1.50	101	0.097	100	100	9.5	0.0	297	83	64	83	61	83	-0.025	3.35	0.030
335	53.823	53.574	0.16	0.16	1.21	94	1.90	0.90	95	1.50	99	0.097	100	99	9.4	-0.1	289	83	64	83	61	83	-0.029	2.93	0.050
336	53.982	53.733	0.16	0.16	1.20	94	1.91	0.91	95	1.50	101	0.098	99	99	9.4	0.0	293	83	64	83	61	83	-0.024	3.09	0.030
337	54.142	53.893	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.098	99	100	9.4	0.0	293	83	64	83	61	83	-0.024	2.65	0.060
338	54.302	54.052	0.16	0.16	1.21	94	1.91	0.91	95	1.50	101	0.097	100	99	9.3	-0.1	295	83	64	83	61	83	-0.025	2.85	0.030
339	54.463	54.211	0.16	0.16	1.21	95	1.90	0.91	95	1.50	99	0.098	99	99	9.3	0.0	286	83	64	83	61	84	-0.030	2.85	0.070
340	54.623	54.371	0.16	0.16	1.20	95	1.91	0.91	95	1.50	101	0.098	99	100	9.3	0.0	287	83	64	83	61	83	-0.025	2.66	0.060
341	54.783	54.530	0.16	0.16	1.21	95	1.91	0.91	95	1.50	101	0.097	100	99	9.2	-0.1	291	83	64	83	61	83	-0.024	3.03	0.040
342	54.942	54.689	0.16	0.16	1.21	95	1.91	0.91	95	1.50	101	0.098	98	99	9.2	0.0	293	83	64	83	61	83	-0.027	3.12	0.040
343	55.103	54.849	0.16	0.16	1.21	95	1.91	0.90	95	1.50	101	0.097	100	100	9.2	0.0	292	83	64	83	61	83	-0.025	3.02	0.040

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: [Hearth & Home Technologies](#)
 Model: [P43-C](#)
 Tracking No.: [2470](#)
 Project No.: [0135PS023E REV002](#)
 Test Date: [07-Aug-23](#)
 Beginning Clock Time: [10:03](#)

High Burn End Time: [60](#)
 Medium Burn End Time: [180](#)
 Total Sampling Time: [360](#) min
 Recording Interval: [1](#) min
 Background Sample Volume: [57.244](#) cubic feet

Meter Box Y Factor: [1.007](#) (1) [1.015](#) (2) [1.012](#) (Amb)

Barometric Pressure:

Begin	Middle	End	Average
30.14	30.13	30.06	30.11 "Hg

PM Control Modules: [00335, 00336, 00371](#)
 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: [-0.360](#) "H₂O
 Tunnel Area: [0.1963](#) ft²
 Pitot Tube Cp: [0.99](#)

Avg. Tunnel Velocity: [18.68](#) ft/sec.
 Initial Tunnel Flow: [198.4](#) scfm
 Average Tunnel Flow: [204.4](#) scfm
 Post-Test Leak Check (1): [0.000](#) cfm @ [17](#) in. Hg
 Post-Test Leak Check (2): [0.000](#) cfm @ [19](#) in. Hg
 Fuel Moisture (%): [4.417](#) Dry Basis [4.230](#) Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.062	0.052	0.084	0.080	0.072	0.094
Temp:	112	112	113	113	113	113	113	113	113
	V _{strav} 18.55 ft/sec			V _{scnt} 21.10 ft/sec			F _p 0.879		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
344	55.263	55.008	0.16	0.16	1.21	95	1.90	0.91	95	1.50	101	0.098	99	99	9.1	-0.1	289	83	64	83	61	83	-0.021	2.44	0.050
345	55.423	55.168	0.16	0.16	1.21	95	1.91	0.90	95	1.50	101	0.095	101	101	9.1	0.0	290	83	64	83	61	83	-0.022	3.00	0.030
346	55.582	55.327	0.16	0.16	1.21	95	1.91	0.91	95	1.50	101	0.097	99	99	9.1	0.0	290	83	64	83	61	83	-0.027	3.20	0.030
347	55.742	55.486	0.16	0.16	1.21	95	1.91	0.91	95	1.50	101	0.097	100	99	9.0	-0.1	285	84	64	83	61	83	-0.024	2.33	0.040
348	55.903	55.646	0.16	0.16	1.21	95	1.91	0.90	95	1.50	101	0.098	100	100	9.0	0.0	287	84	64	83	61	83	-0.020	2.72	0.050
349	56.063	55.805	0.16	0.16	1.20	95	1.91	0.91	95	1.50	102	0.096	100	100	9.0	0.0	290	84	64	83	61	83	-0.018	2.83	0.030
350	56.223	55.964	0.16	0.16	1.21	95	1.91	0.91	95	1.50	102	0.096	100	100	8.9	-0.1	290	84	64	83	61	83	-0.017	2.96	0.040
351	56.383	56.125	0.16	0.16	1.21	95	1.91	0.90	95	1.50	102	0.097	100	101	8.9	0.0	291	84	64	83	61	83	-0.018	2.74	0.060
352	56.543	56.283	0.16	0.16	1.21	95	1.91	0.90	95	1.50	102	0.097	100	99	8.9	0.0	291	84	64	83	61	83	-0.019	2.90	0.050
353	56.704	56.442	0.16	0.16	1.20	95	1.91	0.91	95	1.50	102	0.098	100	99	8.8	-0.1	295	84	64	83	61	83	-0.019	3.21	0.030
354	56.864	56.603	0.16	0.16	1.21	95	1.92	0.92	95	1.50	102	0.095	101	102	8.9	0.1	298	84	64	83	61	83	-0.024	3.46	0.040
355	57.023	56.763	0.16	0.16	1.21	95	1.91	0.92	95	1.50	101	0.097	99	100	8.7	-0.2	296	84	64	83	61	83	-0.029	3.00	0.030
356	57.183	56.923	0.16	0.16	1.21	95	1.91	0.92	95	1.50	101	0.098	99	100	8.7	0.0	293	84	64	83	61	83	-0.027	2.52	0.070
357	57.344	57.084	0.16	0.16	1.21	95	1.90	0.92	95	1.50	102	0.097	100	101	8.7	0.0	290	84	64	83	61	83	-0.022	2.48	0.040
358	57.504	57.244	0.16	0.16	1.21	95	1.91	0.92	95	1.50	101	0.097	100	100	8.7	0.0	288	84	64	83	61	83	-0.025	2.58	0.040
359	57.664	57.404	0.16	0.16	1.20	95	1.91	0.92	95	1.50	102	0.099	99	99	8.6	-0.1	287	84	64	83	61	83	-0.023	2.60	0.040
360	57.823	57.565	0.16	0.16	1.21	95	1.91	0.92	95	1.50	102	0.097	99	101	8.6	0.0	288	84	64	83	61	83	-0.022	2.81	0.040
Avg/Tot	57.823	57.565	0.16	0.16	1.23	93	1.91	0.92	93	1.47	100	0.10	100	100			329	82	60	82	59	83	-0.031	4.94	0.021

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Run #: 1 Technician Signature: _____
 Date: 8/7/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
1 st hour Sub-Total, mg:					0.0

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F39	125.0	131.9	6.9
B. Rear filter catch	Filter	F40	122.7	122.8	0.1
C. Probe catch*	Probe	8	115596.1	115596.2	0.1
D. Filter seals catch*	Seals	S557	3388.5	3388.5	0.0
Sub-Total, mg:					7.1
Train 1 Aggregate, mg:					7.1

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F41	124.9	131.5	6.6
B. Rear filter catch	Filter	F42	123.0	122.2	-0.8
C. Probe catch*	Probe	30	114328.9	114328.9	0.0
D. Filter seals catch*	Seals	S558	4145.3	4146.3	1.0
Train 2 Aggregate, mg:					6.8

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter	F43	124.7	124.7	0.0
Ambient Aggregate, 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 included in O-ring seal weights.

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Uncorrected

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E REV002
 Run #: 1 Technician Signature: _____
 Date: 8/7/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
1 st hour Sub-Total, mg:					0.0

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F39	125.0	131.9	6.9
B. Rear filter catch	Filter	F40	122.7	122.8	0.1
C. Probe catch*	Probe	8	115596.1	115596.2	0.1
D. Filter seals catch*	Seals	S557	3388.5	3388.5	0.0
Sub-Total, mg:					7.1
Train 1 Aggregate, mg:					7.1

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F41	124.9	131.5	6.6
B. Rear filter catch	Filter	F42	123.0	122.2	0.0
C. Probe catch*	Probe	30	114328.9	114328.9	0.0
D. Filter seals catch*	Seals	S558	4145.3	4146.3	1.0
Train 2 Aggregate, mg:					7.6

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter	F43	124.7	124.7	0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Project No.: 0135PS023E REV002
 Tracking No.: 2470
 Run: 1
 Test Date: 08/07/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	1.52 g/hr
Total Particulate Emissions - E _T	9.10 g
Emissions Factor	1.10 g/kg
CSA B415 Efficiency	72.8% HHV

First Hour Emissions	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg

Burn Rate (Composite)	1.38 kg/hr dry
Burn Rate (High)	2.78 kg/hr dry
Burn Rate (Medium)	1.26 kg/hr dry
Burn Rate (Low)	1.00 kg/hr dry
Average Tunnel Temperature	100 degrees F
Avg.Velocity in Dilution Tunnel - v _s	18.68 ft/second
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12264.7 dscf/hour
Average Δp	0.097 inches H2O
Average ΔH	1.23 inches H2O
Total Time of Test	360 minutes

<Average of High and Low

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E REV002

Tracking No.: 2470

Run: 1

Technician Signature: _____

Test Date: 08/07/23

	1 st Hour	Sample Train 1	Sample Train 2	Sample	Unit
Total Sample Volume - V_m		57.823	57.565	57.244	ft ³
Average Gas Meter Temperature		92.51	93.20	83	°F
Sample Volume (Std. Conditions) - V_{mstd}		56.143	56.225	56.659	dsf ³
Total Particulates - m_n		7.1	6.8	0	mg
Particulate Concentration - C_r/C_s	#DIV/0!	1.26E-04	1.21E-04	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	#DIV/0!	9.31	8.90	0.00	g
Particulate Emission Rate	#DIV/0!	1.55	1.48	0.00	g/hr
Emissions Factor	#DIV/0!	1.12	1.07		g/kg
Delta from Avg. Particulate Emissions		0.20	0.20		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	OK	Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK	Dual Train Comparison	OK

ASTM E2779 / ASTM E2515 Emissions Results

Uncorrected

Manufacturer: Hearth & Home Technologies
 Model: P43-C
 Project No.: 0135PS023E REV002
 Tracking No.: 2470
 Run: 1
 Test Date: 08/07/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	1.60 g/hr
Total Particulate Emissions - E _T	9.63 g
Emissions Factor	1.16 g/kg
CSA B415 Efficiency	#REF! HHV

First Hour Emissions	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg

Burn Rate (Composite)	1.38 kg/hr dry
Burn Rate (High)	2.78 kg/hr dry
Burn Rate (Medium)	1.26 kg/hr dry
Burn Rate (Low)	1.00 kg/hr dry
Average Tunnel Temperature	100 degrees F
Avg.Velocity in Dilution Tunnel - v _s	18.68 ft/second
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12264.7 dscf/hour
Average Δp	0.097 inches H2O
Average ΔH	1.23 inches H2O
Total Time of Test	360 minutes

<Average of High and Low

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E REV002

Tracking No.: 2470

Run: 1

Technician Signature: _____

Test Date: 08/07/23

	1 st Hour	Sample Train 1	Sample Train 2	Sample	Unit
Total Sample Volume - V_m		57.823	57.565	57.244	ft ³
Average Gas Meter Temperature		92.51	93.20	83	°F
Sample Volume (Std. Conditions) - V_{mstd}		56.143	56.225	56.659	dsf ³
Total Particulates - m_n		7.1	7.6	0	mg
Particulate Concentration - C_r/C_s	#DIV/0!	1.26E-04	1.35E-04	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	#DIV/0!	9.31	9.95	0.00	g
Particulate Emission Rate	#DIV/0!	1.55	1.66	0.00	g/hr
Emissions Factor	#DIV/0!	1.12	1.20		g/kg
Delta from Avg. Particulate Emissions		0.32	0.32		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	OK	Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK	Dual Train Comparison	3.33%
		Train Precision g/kg	0.08

CSA B415.1 Results - Overall & By Category

Manufacturer: Hearth & Home Technologies

Model:

Date: 08/07/23

Run: 1

Control #:

Test Duration: 360 mins

Results in Accordance with CSA B415 Version 2.4 - Overall			
	HHV Basis	LHV Basis	
Overall Efficiency	72.8%	78.5%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	73.2%	78.9%	
Output Rate (kJ/h)	19,903	18,880	(Btu/h)
Burn Rate (kg/h)	1.38	3.05	(lb/h)
Input (kJ/h)	27,326	25,921	(Btu/h)
Test Load Weight (dry kg)	8.30	18.29	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	9.10		
CO (g)	45		
Test Duration (h)	6.00		
Emissions	Particulate	CO	
g/MJ Output	0.08	0.38	
g/kg Dry Fuel	1.10	5.41	
g/h	1.52	7.48	
lb/MM Btu Output	0.18	0.87	
Air/Fuel Ratio (A/F)	21.17		

Results in Accordance with CSA B415 Version 2.4 - Maximum			
	HHV Basis	LHV Basis	
Overall Efficiency	74.2%	80.0%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	74.6%	80.4%	
Output Rate (kJ/h)	40,780	38,684	(Btu/h)
Burn Rate (kg/h)	2.78	6.13	(lb/h)
Input (kJ/h)	54,937	52,114	(Btu/h)
Test Load Weight (dry kg)	2.78	6.13	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	2.88		
CO (g)	17		
Test Duration (h)	1.00		
Emissions	Particulate	CO	
g/MJ Output	0.07	0.41	
g/kg Dry Fuel	1.04	6.00	
g/h	2.88	16.68	
lb/MM Btu Output	0.16	0.95	
Air/Fuel Ratio (A/F)	12.89		

Results in Accordance with CSA B415 Version 2.4 - Medium			
	HHV Basis	LHV Basis	
Overall Efficiency	73.9%	79.7%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	74.3%	80.1%	
Output Rate (kJ/h)	18,408	17,462	(Btu/h)
Burn Rate (kg/h)	1.26	2.78	(lb/h)
Input (kJ/h)	24,894	23,614	(Btu/h)
Test Load Weight (dry kg)	2.52	5.55	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0.00		
CO (g)	6.25		
Test Duration (h)	2.00		
Emissions	Particulate	CO	
g/MJ Output	-	0.17	
g/kg Dry Fuel	-	2.48	
g/h	-	3.13	
lb/MM Btu Output	-	0.39	
Air/Fuel Ratio (A/F)	21.21		

Results in Accordance with CSA B415 Version 2.4 - Minimum			
	HHV Basis	LHV Basis	
Overall Efficiency	70.3%	75.7%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	70.6%	76.1%	
Output Rate (kJ/h)	13,875	13,162	(Btu/h)
Burn Rate (kg/h)	1.00	2.20	(lb/h)
Input (kJ/h)	19,743	18,728	(Btu/h)
Test Load Weight (dry kg)	3.00	6.61	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0.00		
CO (g)	22		
Test Duration (h)	3.00		
Emissions	Particulate	CO	
g/MJ Output	-	0.53	
g/kg Dry Fuel	-	7.39	
g/h	-	7.38	
lb/MM Btu Output	-	1.24	
Air/Fuel Ratio (A/F)	26.84		

Table 1.1 - Particulate Emissions

	One-Hour Filter	Integrated Total
Emission Rate (g/hr)	2.880	1.517
Emission Factor (g/dry kg)	1.040	1.097

Table 1.2 - Efficiency and CO

Time (minutes)	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
Time (minutes)	60	120	180	360 mins
Burn Rate (dry kg/hr)	2.781	1.260	0.999	1.383
Heat Input Rate (BTU/hr, HHV)	52,114	23,614	18,728	25,921
Heat Output Rate (BTU/hr, HHV)	38,684	17,462	13,162	18,880
Efficiency (% HHV)	74.2%	73.9%	70.3%	72.8%
Efficiency (% LHV)	80.0%	79.7%	75.7%	78.5%
CO Emission Rate (g/min)	0.278	0.052	0.123	0.125

Table 1.3 - Test Facility Conditions

	Initial	Middle	Final
Room Temperature (° F)	74	78	76
Barometric Pressure (in Hg)	30.14	30.13	30.06
Air Velocity (ft/min)	<50	<50	<50
Induced Draft (in H2O)	∅	∅	∅

EPA Application Format - Tables 1.1 & 1.2

Run #	Date	Setting	Burn Rate (dry kg/h)	Time (min)	Heat Input (Btu/hr)	Heat Output (Btu/hr)	1 st Hour PM (g/hr)	Total PM (g/hr)	CO Emissions (g/min)	Overall CO (g/hr)	Heating Efficiency (% HHV)	Overall Heating Efficiency (% HHV)	
1	8/7/2023	H	2.78	60	52,114	38,684	2.88	1.517	0.278	7.477	74.2%	72.8%	
		M	1.26	120	23,614	17,462					0.052		73.9%
		L	1.00	180	18,728	13,162					0.123		70.3%
		OA	1.38	360 mins	25,921	18,880					0.125		72.8%

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

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: Hearth & Home Technologies
 Model: _____
 Tracking No.: 2470
 Project No.: 0135PS023E
 Test Date: 07-Aug-23
 Beginning Clock Time: 10:03

High Burn End Time: 60
 Medium Burn End Time: _____
 Total Sampling Time: 60 min
 Recording Interval: 1 min
 Background Sample Volume: 9.491 cubic feet

Meter Box Y Factor: 1.014 (1) _____ (2) 1.012 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
<u>30.14</u>	<u>30.13</u>	<u>30.06</u>	<u>30.11</u> "Hg

PM Control Modules: 371
 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: -0.360 "H₂O
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.82 ft/sec.
 Initial Tunnel Flow: 198.4 scfm
 Average Tunnel Flow: 201.0 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 15 in. Hg
 Post-Test Leak Check (2): _____ cfm @ _____ in. Hg
 Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	<u>0.062</u>	<u>0.086</u>	<u>0.088</u>	<u>0.062</u>	<u>0.052</u>	<u>0.084</u>	<u>0.080</u>	<u>0.072</u>	<u>0.094</u>
Temp:	<u>112</u>	<u>112</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>
	V _{strav} <u>18.55</u> ft/sec			V _{scnt} <u>21.10</u> ft/sec			F _p <u>0.879</u>		

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
0	0.000				2.16	82	-2.23				114	0.097			27.7		468	80	72			85	-0.033	8.97	0.030
1	0.138		0.14		2.20	82	-2.34				113	0.097	86		27.6	-0.1	466	82	71			85	-0.033	8.25	0.020
2	0.299		0.16		2.19	82	-1.96				113	0.098	99		27.5	-0.1	467	82	71			85	-0.034	8.99	0.060
3	0.460		0.16		2.17	82	-2.03				113	0.097	100		27.4	-0.1	466	83	71			86	-0.033	8.49	0.030
4	0.622		0.16		2.26	82	-2.26				113	0.097	101		27.3	-0.1	467	83	71			84	-0.035	8.53	0.040
5	0.785		0.16		2.25	82	-2.36				113	0.097	101		27.2	-0.1	467	84	71			85	-0.032	8.69	0.030
6	0.949		0.16		2.24	82	-2.00				114	0.097	102		27.1	-0.1	466	84	71			85	-0.033	8.51	0.010
7	1.110		0.16		2.21	82	-1.97				113	0.096	101		27.0	-0.1	465	84	71			84	-0.032	7.79	0.010
8	1.272		0.16		2.21	82	-2.47				114	0.097	101		26.9	-0.1	466	84	70			86	-0.032	8.97	0.120
9	1.434		0.16		2.20	82	-2.42				113	0.097	101		26.8	-0.1	466	85	70			84	-0.034	8.24	0.020
10	1.595		0.16		2.20	82	-1.95				113	0.096	101		26.7	-0.1	466	85	70			85	-0.033	8.11	0.010
11	1.758		0.16		2.25	82	-2.15				113	0.097	101		26.6	-0.1	464	85	70			84	-0.033	7.82	0.010
12	1.921		0.16		2.26	82	-2.08				113	0.097	101		26.5	-0.1	465	85	70			86	-0.033	8.85	0.060
13	2.084		0.16		2.22	82	-2.13				113	0.098	101		26.4	-0.1	464	85	70			86	-0.034	8.11	0.010
14	2.246		0.16		2.21	82	-2.10				113	0.097	101		26.3	-0.1	466	86	70			85	-0.034	9.04	0.070
15	2.407		0.16		2.21	82	-2.49				114	0.096	101		26.1	-0.2	467	86	70			84	-0.034	8.45	0.030
16	2.569		0.16		2.21	82	-2.45				113	0.096	101		26.0	-0.1	466	86	70			84	-0.034	8.53	0.020
17	2.731		0.16		2.19	82	-2.12				114	0.097	101		25.9	-0.1	467	86	70			85	-0.034	8.32	0.030
18	2.892		0.16		2.20	82	-2.43				114	0.097	100		25.8	-0.1	466	86	70			85	-0.033	8.57	0.030
19	3.054		0.16		2.19	82	-2.41				114	0.098	100		25.7	-0.1	464	86	70			85	-0.032	8.40	0.030
20	3.215		0.16		2.18	82	-1.99				114	0.096	101		25.6	-0.1	466	86	70			86	-0.033	8.93	0.020
21	3.376		0.16		2.19	83	-2.34				114	0.096	100		25.5	-0.1	468	86	70			86	-0.034	8.69	0.030
22	3.536		0.16		2.19	83	-2.16				114	0.097	99		25.4	-0.1	469	86	70			84	-0.035	9.55	0.180
23	3.697		0.16		2.20	83	-2.41				114	0.097	100		25.3	-0.1	468	85	70			86	-0.033	9.01	0.110
24	3.859		0.16		2.18	83	-2.19				114	0.097	101		25.1	-0.2	469	85	70			86	-0.034	8.82	0.050
25	4.020		0.16		2.18	83	-2.44				114	0.097	100		25.0	-0.1	467	85	70			86	-0.034	8.16	0.020
26	4.182		0.16		2.18	83	-2.18				114	0.096	101		24.9	-0.1	465	84	70			86	-0.034	8.30	0.020
27	4.342		0.16		2.19	83	-2.05				114	0.097	99		24.8	-0.1	465	84	70			87	-0.033	8.75	0.030
28	4.503		0.16		2.19	83	-2.43				114	0.097	100		24.7	-0.1	468	84	70			86	-0.032	9.16	0.030
29	4.664		0.16		2.15	83	-2.06				114	0.095	101		24.6	-0.1	467	84	70			87	-0.033	8.43	0.010
30	4.825		0.16		2.19	83	-2.31				114	0.097	100		24.5	-0.1	468	84	70			86	-0.033	8.68	0.040
31	4.986		0.16		2.18	83	-2.31				114	0.095	101		24.4	-0.1	468	84	70			86	-0.033	8.78	0.030
32	5.146		0.16		2.17	83	-2.45				113	0.096	100		24.3	-0.1	466	83	70			84	-0.034	8.37	0.040
33	5.308		0.16		2.18	83	-1.94				113	0.097	100		24.2	-0.1	464	83	70			85	-0.033	8.02	0.020
34	5.468		0.16		2.18	83	-2.12				114	0.095	100		24.1	-0.1	465	83	70			84	-0.034	8.85	0.020
35	5.629		0.16		2.18	83	-2.44				113	0.096	100		24.0	-0.1	468	83	70			85	-0.033	9.48	0.070
36	5.790		0.16		2.15	83	-2.02				113	0.097	100		23.9	-0.1	466	83	70			86	-0.032	7.70	0.010
37	5.950		0.16		2.18	83	-2.46				113	0.096	100		23.8	-0.1	468	83	70			85	-0.033	9.19	0.080
38	6.111		0.16		2.17	83	-2.08				113	0.097	100		23.7	-0.1	469	83	70			84	-0.034	8.67	0.020
39	6.271		0.16		2.17	83	-1.94				114	0.097	99		23.5	-0.2	469	83	70			84	-0.033	8.72	0.020
40	6.433		0.16		2.18	83	-1.92				114	0.096	101		23.4	-0.1	469	83	70			86	-0.034	8.66	0.010
41	6.593		0.16		2.17	83	-2.12				114	0.097	99		23.3	-0.1	466	83	70			86	-0.033	8.17	0.010
42	6.754		0.16		2.18	83	-2.22				114	0.096	100		23.2	-0.1	463	83	70			86	-0.033	7.74	0.010

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **1**

Manufacturer: Hearth & Home Technologies
 Model: _____
 Tracking No.: 2470
 Project No.: 0135PS023E
 Test Date: 07-Aug-23
 Beginning Clock Time: 10:03

High Burn End Time: 60
 Medium Burn End Time: _____
 Total Sampling Time: 60 min
 Recording Interval: 1 min
 Background Sample Volume: 9.491 cubic feet

Meter Box Y Factor: 1.014 (1) _____ (2) 1.012 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
<u>30.14</u>	<u>30.13</u>	<u>30.06</u>	<u>30.11</u> "Hg

PM Control Modules: 371
 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: -0.360 "H₂O
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.82 ft/sec.
 Initial Tunnel Flow: 198.4 scfm
 Average Tunnel Flow: 201.0 scfm
 Post-Test Leak Check (1): 0.000 cfm @ 15 in. Hg
 Post-Test Leak Check (2): _____ cfm @ _____ in. Hg
 Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	<u>0.062</u>	<u>0.086</u>	<u>0.088</u>	<u>0.062</u>	<u>0.052</u>	<u>0.084</u>	<u>0.080</u>	<u>0.072</u>	<u>0.094</u>	"H ₂ O
Temp:	<u>112</u>	<u>112</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	<u>113</u>	°F
	V _{strav} <u>18.55</u> ft/sec			V _{scnt} <u>21.10</u> ft/sec			F _p <u>0.879</u>			

Elapsed Time (min)	Particulate Sampling Data												Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data				
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
43	6.914		0.16		2.16	83	-2.12				114	0.094	101		23.1	-0.1	462	83	70			86	-0.032	8.26	0.020
44	7.075		0.16		2.18	83	-2.41				114	0.097	100		23.0	-0.1	461	83	70			86	-0.032	8.30	0.020
45	7.236		0.16		2.16	83	-2.07				114	0.095	101		22.9	-0.1	463	83	70			86	-0.034	8.26	0.010
46	7.396		0.16		2.17	83	-2.17				114	0.096	100		22.8	-0.1	460	83	70			87	-0.033	7.62	0.010
47	7.558		0.16		2.16	83	-2.45				114	0.097	101		22.7	-0.1	461	83	70			86	-0.033	8.58	0.050
48	7.718		0.16		2.16	83	-2.18				113	0.097	99		22.6	-0.1	463	83	70			85	-0.034	8.98	0.100
49	7.879		0.16		2.18	83	-2.36				113	0.097	100		22.5	-0.1	463	83	70			85	-0.034	9.08	0.050
50	8.039		0.16		2.16	83	-2.26				113	0.097	99		22.4	-0.1	463	83	70			86	-0.034	8.55	0.070
51	8.200		0.16		2.18	83	-1.97				113	0.097	100		22.3	-0.1	463	83	70			86	-0.034	8.65	0.010
52	8.361		0.16		2.15	83	-2.16				114	0.096	100		22.2	-0.1	465	83	70			86	-0.034	9.15	0.040
53	8.521		0.16		2.17	83	-2.41				113	0.097	99		22.0	-0.2	466	83	70			85	-0.034	9.04	0.090
54	8.682		0.16		2.17	83	-2.24				113	0.095	101		21.9	-0.1	467	83	70			86	-0.034	9.09	0.170
55	8.843		0.16		2.17	83	-2.38				113	0.097	100		21.8	-0.1	466	83	70			86	-0.034	8.69	0.110
56	9.004		0.16		2.18	83	-2.25				113	0.096	100		21.7	-0.1	466	83	70			85	-0.035	8.86	0.060
57	9.164		0.16		2.17	83	-2.45				113	0.097	99		21.6	-0.1	467	83	70			86	-0.035	9.03	0.090
58	9.325		0.16		2.18	83	-2.06				113	0.096	100		21.5	-0.1	467	83	70			86	-0.033	9.10	0.140
59	9.486		0.16		2.15	83	-2.01				113	0.097	100		21.4	-0.1	468	83	70			85	-0.033	8.97	0.040
60	9.646		0.16		2.18	83	-2.45				113	0.097	99		21.3	-0.1	469	83	70			85	-0.035	9.21	0.110
Avg/Tot	9.646	0.000	0.16	#DIV/0!	2.19	83	-2.22	#DIV/0!	#DIV/0!	#DIV/0!	113	0.10	100	#DIV/0!			466	84	70	#DIV/0!	#DIV/0!	85	-0.033	8.62	0.045

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Hearth & Home Technologies Equipment Numbers: _____
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E
 Run #: 1 Technician Signature: _____
 Date: 8/7/23

FIRST HOUR EMISSIONS

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F37	117.4	119.6	2.2
B. Rear filter catch	Filter	F38	116.4	116.4	0.0
C. Probe catch*	Probe	68	116878.8	116878.8	0.0
D. Filter seals catch*	Seals	S556	3389.5	3389.6	0.1
1 st hour Sub-Total, mg:					2.3

TRAIN 1

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Sub-Total, mg:					0.0
Train 1 Aggregate, mg:					2.3

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Train 2 Aggregate, mg:					0.0

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter				0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies
 Model: 0
 Project No.: 0135PS023E
 Tracking No.: 2470
 Run: 1
 Test Date: 08/07/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg
CSA B415 Efficiency	#REF! HHV

First Hour Emissions	
Particulate Emission Rate	2.88 g/hr
Total Particulate Emissions - E _T	2.88 g
Emissions Factor	1.04 g/kg

Burn Rate (Composite)	2.78 kg/hr dry
Burn Rate (High)	2.78 kg/hr dry
Burn Rate (Medium)	#VALUE! kg/hr dry
Burn Rate (Low)	#VALUE! kg/hr dry
Average Tunnel Temperature	113 degrees F
Avg.Velocity in Dilution Tunnel - v _s	18.82 ft/second
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12062.3 dscf/hour
Average Δp	0.097 inches H2O
Average ΔH	2.19 inches H2O
Total Time of Test	60 minutes

#VALUE!
#VALUE!

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: Hearth & Home Technologies

Model: P43-C

Project No.: 0135PS023E

Tracking No.: 2470

Run: 1

Technician Signature: _____

Test Date: 08/07/23

	1 st Hour	1 st Hour	Sample Train 2	Sample	Unit
Total Sample Volume - V_m	9.646	9.646	0.000	9.491	ft ³
Average Gas Meter Temperature	82.66	82.66	#DIV/0!	85	°F
Sample Volume (Std. Conditions) - V_{mstd}	9.625	9.625	#DIV/0!	9.354	dsf ³
Total Particulates - m_n	2.3	2.3	0.0	0	mg
Particulate Concentration - C_r/C_s	2.390E-04	2.39E-04	#DIV/0!	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	2.88	2.88	#DIV/0!	0.00	g
Particulate Emission Rate	2.88	2.88	#DIV/0!	0.00	g/hr
Emissions Factor	1.04	1.04	#DIV/0!		g/kg
Delta from Avg. Particulate Emissions		#DIV/0!	#DIV/0!		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	#DIV/0!	Pro-Rate Variation	OK
Medium Burn Rate < 50%	#VALUE!	Dual Train Comparison	#DIV/0!

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/7/2023

Run: 1

Control #: 2470

Test Duration: 360

Output Category: Overall

Wood Moisture (% wet): 4.23

Load Weight (lb wet): 19.10

Burn Rate (dry kg/h): 1.38

Total Particulate Emissions: 9.1 g

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

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

Fuel Data

HHV: 19,755 kJ/kg
%C: 50
%H: 6.6
%O: 42.84
%Ash: 0.56

Default Fuel Values

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

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

Averages 0.02 4.94 #DIV/0! 328.83 83.06

Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp	Room Temp
		CO	CO ₂	O ₂		

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

0	19.10	0.03	8.97		468.0	85.0
1	19.00	0.02	8.25		466.0	85.0
2	18.90	0.06	8.99		467.0	85.0
3	18.80	0.03	8.49		466.0	86.0
4	18.70	0.04	8.53		467.0	84.0
5	18.60	0.03	8.69		467.0	85.0
6	18.50	0.01	8.51		466.0	85.0
7	18.40	0.01	7.79		465.0	84.0
8	18.30	0.12	8.97		466.0	86.0
9	18.20	0.02	8.24		466.0	84.0
10	18.10	0.01	8.11		466.0	85.0
11	18.00	0.01	7.82		464.0	84.0
12	17.90	0.06	8.85		465.0	86.0
13	17.80	0.01	8.11		464.0	86.0
14	17.70	0.07	9.04		466.0	85.0
15	17.50	0.03	8.45		467.0	84.0
16	17.40	0.02	8.53		466.0	84.0
17	17.30	0.03	8.32		467.0	85.0
18	17.20	0.03	8.57		466.0	85.0

19	17.10	0.03	8.40		464.0	85.0
20	17.00	0.02	8.93		466.0	86.0
21	16.90	0.03	8.69		468.0	86.0
22	16.80	0.18	9.55		469.0	84.0
23	16.70	0.11	9.01		468.0	86.0
24	16.50	0.05	8.82		469.0	86.0
25	16.40	0.02	8.16		467.0	86.0
26	16.30	0.02	8.30		465.0	86.0
27	16.20	0.03	8.75		465.0	87.0
28	16.10	0.03	9.16		468.0	86.0
29	16.00	0.01	8.43		467.0	87.0
30	15.90	0.04	8.68		468.0	86.0
31	15.80	0.03	8.78		468.0	86.0
32	15.70	0.04	8.37		466.0	84.0
33	15.60	0.02	8.02		464.0	85.0
34	15.50	0.02	8.85		465.0	84.0
35	15.40	0.07	9.48		468.0	85.0
36	15.30	0.01	7.70		466.0	86.0
37	15.20	0.08	9.19		468.0	85.0
38	15.10	0.02	8.67		469.0	84.0
39	14.90	0.02	8.72		469.0	84.0
40	14.80	0.01	8.66		469.0	86.0
41	14.70	0.01	8.17		466.0	86.0
42	14.60	0.01	7.74		463.0	86.0
43	14.50	0.02	8.26		462.0	86.0
44	14.40	0.02	8.30		461.0	86.0
45	14.30	0.01	8.26		463.0	86.0
46	14.20	0.01	7.62		460.0	87.0
47	14.10	0.05	8.58		461.0	86.0
48	14.00	0.10	8.98		463.0	85.0
49	13.90	0.05	9.08		463	85
50	13.80	0.07	8.55		463	86
51	13.70	0.01	8.65		463	86
52	13.60	0.04	9.15		465	86
53	13.40	0.09	9.04		466	85
54	13.30	0.17	9.09		467	86
55	13.20	0.11	8.69		466	86
56	13.10	0.06	8.86		466	85
57	13.00	0.09	9.03		467	86

58	12.90	0.14	9.1	467	86
59	12.80	0.04	8.97	468	85
60	12.70	0.11	9.21	469	85
61	12.60	0.03	8.93	468	84
62	12.50	0.04	8.47	467	85
63	12.40	0.05	8.83	466	84
64	12.30	0.01	6.62	455	85
65	12.20	0.01	6.15	436	85
66	12.10	0.01	5.88	422	85
67	12.10	0.01	5.65	412	85
68	12.00	0.01	5.22	404	84
69	12.00	0.01	5.2	397	84
70	11.90	0.01	4.85	390	84
71	11.90	0.02	4.77	383	84
72	11.80	0.01	4.22	375	84
73	11.80	0.01	4.44	369	84
74	11.70	0.02	4.46	363	84
75	11.70	0.02	4.84	352	84
76	11.60	0.04	4.76	343	83
77	11.60	0.02	4.69	335	84
78	11.50	0.01	5.05	332	83
79	11.50	0.03	4.57	327	84
80	11.40	0.01	4.48	323	83
81	11.40	0.01	5	321	83
82	11.40	0.01	4.64	317	83
83	11.30	0.02	4.46	314	83
84	11.30	0.01	4.4	312	83
85	11.20	0.01	4.99	311	83
86	11.20	0.02	4.49	309	83
87	11.10	0.03	4.61	307	83
88	11.10	0.02	4.7	305	83
89	11.00	0.01	4.9	305	83
90	11.00	0.01	4.55	303	83
91	11.00	0.01	4.39	300	83
92	10.90	0.02	4.62	300	83
93	10.90	0.01	4.88	300	83
94	10.80	0.01	4.78	300	82
95	10.80	0	4.98	300	82
96	10.70	0.01	5.02	300	83

97	10.70	0.01	4.78	299	83
98	10.60	0	4.9	299	82
99	10.60	0	4.66	298	82
100	10.50	0.01	4.55	298	82
101	10.50	0.01	4.73	299	82
102	10.40	0.01	5.36	300	83
103	10.40	0.01	4.89	301	82
104	10.30	0.01	4.92	300	82
105	10.30	0.02	4.7	298	82
106	10.30	0.01	4.95	297	82
107	10.20	0.01	4.81	297	82
108	10.20	0.02	4.81	296	82
109	10.10	0.01	4.77	296	83
110	10.10	0.01	5.73	299	83
111	10.00	0	5.27	300	83
112	10.00	0	4.41	297	83
113	9.90	0.01	4.5	296	83
114	9.90	0.01	4.62	296	82
115	9.80	0	4.38	295	82
116	9.80	0	4.84	295	83
117	9.80	0	4.92	296	82
118	9.70	0	4.71	296	82
119	9.70	0	4.52	296	83
120	9.60	0.01	4.29	295	83
121	9.60	0.01	4.55	295	82
122	9.50	0.01	4.9	295	82
123	9.50	0.01	4.7	294	82
124	9.50	0.02	4.19	292	82
125	9.40	0.02	4.53	291	82
126	9.40	0.01	4.67	292	81
127	9.30	0.01	4.86	292	82
128	9.30	0.02	4.44	291	82
129	9.30	0.01	4.44	291	82
130	9.20	0.01	5.05	293	82
131	9.20	0	4.7	292	82
132	9.10	0.01	4.77	292	82
133	9.10	0	4.85	292	82
134	9.00	0.01	4.75	291	82
135	9.00	0.01	4.75	292	82

136	8.90	0.01	4.75		292	82
137	8.90	0.01	4.59		291	82
138	8.90	0.01	4.21		290	82
139	8.80	0	4.28		289	82
140	8.80	0.01	4.78		289	81
141	8.70	0	4.72		290	82
142	8.70	0	5.09		290	82
143	8.70	0	4.9		292	82
144	8.60	0.01	4.87		292	81
145	8.60	0.01	4.66		292	81
146	8.50	0	4.66		292	81
147	8.50	0	4.77		292	83
148	8.40	0	4.86		294	83
149	8.40	0	4.72		294	83
150	8.30	0	4.72		293	83
151	8.30	0.01	4.64		294	83
152	8.20	0	4.92		295	82
153	8.20	0	5.14		296	83
154	8.20	0	5.51		296	83
155	8.10	0.01	4.96		296	83
156	8.10	0	4.73		296	83
157	8.00	0.01	4.59		296	83
158	8.00	0.01	5.15		297	83
159	7.90	0.01	4.99		298	83
160	7.90	0	4.75		297	84
161	7.80	0	4.65		296	83
162	7.80	0.01	4.83		295	82
163	7.70	0	5.12		296	83
164	7.70	0	4.79		296	83
165	7.60	0	4.35		294	84
166	7.60	0.01	4.48		293	83
167	7.60	0.01	5.09		295	83
168	7.50	0.01	4.63		294	84
169	7.50	0.01	4.73		294	83
170	7.40	0.01	4.83		294	83
171	7.40	0.01	4.73		294	83
172	7.30	0.01	5.27		295	83
173	7.30	0	4.75		295	83
174	7.20	0.01	4.89		295	83

175	7.20	0.01	4.94	295	83
176	7.10	0.01	4.9	295	84
177	7.10	0.03	4.68	294	83
178	7.00	0.01	5.08	295	84
179	7.00	0.02	4.92	296	84
180	6.90	0	4.93	296	84
181	6.90	0.01	4.73	295	84
182	6.90	0	4.57	294	81
183	6.80	0	4.54	294	81
184	6.80	0.01	4.08	293	82
185	6.70	0.01	3.8	292	83
186	6.70	0.01	3.68	290	83
187	6.70	0.01	3.36	287	82
188	6.60	0.02	3.88	287	81
189	6.60	0.01	3.84	288	82
190	6.50	0.01	4.75	290	82
191	6.50	0	4.23	291	81
192	6.50	0	3.91	290	82
193	6.40	0	4.16	291	83
194	6.40	0	4.48	292	83
195	6.30	0.01	4.24	292	82
196	6.30	0	4.28	291	82
197	6.20	0	5	293	81
198	6.20	0.01	4.09	292	81
199	6.20	0	3.74	291	82
200	6.10	0	4.33	291	82
201	6.10	0.01	4.19	291	82
202	6.10	0.01	3.95	290	82
203	6.00	0.01	3.94	290	81
204	6.00	0	3.96	289	82
205	5.90	0	4.16	290	81
206	5.90	0	4.22	291	81
207	5.90	0	4.61	292	81
208	5.80	0	4.14	292	81
209	5.80	0	4.21	291	83
210	5.70	0	4.2	292	83
211	5.70	0	4.62	292	82
212	5.60	0	4.58	294	82
213	5.60	0	4.68	294	81

214	5.50	0	4.75		295	81
215	5.50	0.01	4.45		294	82
216	5.50	0	4.46		294	82
217	5.40	0	4.33		295	82
218	5.40	0	4.55		295	81
219	5.30	0.01	4.25		295	82
220	5.30	0	4.63		295	82
221	5.20	0	4.65		295	82
222	5.20	0.01	4.27		295	82
223	5.10	0	4.59		296	82
224	5.10	0.01	4.06		294	82
225	5.10	0.01	4.22		294	82
226	5.00	0	4.23		295	83
227	5.00	0.01	4.47		295	83
228	4.90	0	4.31		295	82
229	4.90	0	4.01		294	84
230	4.90	0.01	3.96		294	83
231	4.80	0	4.33		294	84
232	4.80	0.01	4.05		294	84
233	4.70	0.01	4.11		293	83
234	4.70	0.01	4.36		293	82
235	4.70	0	4.24		293	82
236	4.60	0	3.79		292	83
237	4.60	0	4.09		291	82
238	4.50	0.01	4.38		291	82
239	4.50	0	4.35		292	82
240	4.50	0	4.3		292	82
241	4.40	0	4.49		293	82
242	4.40	0	4.1		292	81
243	4.30	0	4.13		291	82
244	4.30	0	4.44		292	82
245	4.20	0	4.35		292	82
246	4.20	0	4.51		292	82
247	4.10	0.01	4.52		293	82
248	4.10	0.01	4.55		293	82
249	4.10	0.01	4.41		293	82
250	4.00	0.01	4.58		294	82
251	4.00	0.01	4.13		294	82
252	3.90	0.01	4.17		293	82

253	3.90	0.01	4.25		292	82
254	3.90	0.01	4.01		291	82
255	3.80	0	4.24		291	82
256	3.80	0	4.33		291	82
257	3.70	0	4.41		292	82
258	3.70	0.01	4.72		293	82
259	3.60	0.01	4.74		294	82
260	3.60	0.01	4.62		295	82
261	3.60	0	4.41		295	82
262	3.50	0.01	4.66		295	82
263	3.50	0	4.56		295	82
264	3.40	0.01	4.41		295	83
265	3.40	0.01	4.12		295	83
266	3.40	0.01	4.03		294	82
267	3.30	0	3.94		294	82
268	3.30	0.01	4.12		294	82
269	3.20	0.02	4.09		295	82
270	3.20	0.01	4.59		296	82
271	3.10	0.01	4.33		297	82
272	3.10	0.01	4.34		296	82
273	3.10	0.02	4.01		295	83
274	3.00	0.01	3.75		293	83
275	3.00	0.01	3.85		291	82
276	3.00	0.01	4.33		292	82
277	2.90	0	4.49		293	82
278	2.90	0	5.05		296	83
279	2.80	0	4.24		296	82
280	2.80	0	3.94		294	82
281	2.70	0	3.83		293	82
282	2.70	0	3.85		292	82
283	2.70	0.01	4.3		292	83
284	2.60	0.01	4.08		291	84
285	2.60	0.01	4.18		302	83
286	2.60	0.03	4.14		321	82
287	2.50	0.04	3.47		320	83
288	2.50	0.03	3.5		322	83
289	2.40	0.03	3.14		311	83
290	2.40	0.03	3.15		304	83
291	2.40	0.04	2.99		298	83

292	2.30	0.05	2.69	293	83
293	2.30	0.05	2.76	289	82
294	2.30	0.04	2.9	294	82
295	2.20	0.02	3.23	290	83
296	2.20	0.04	3.15	298	83
297	2.20	0.05	3.02	297	83
298	2.10	0.03	3.11	302	82
299	2.10	0.04	3.61	299	82
300	2.10	0.05	3.4	302	83
301	2.00	0.04	3.13	303	82
302	2.00	0.04	2.91	293	83
303	1.90	0.04	2.88	287	83
304	1.90	0.03	2.8	291	83
305	1.90	0.04	2.96	293	82
306	1.90	0.05	2.71	293	82
307	1.80	0.05	2.87	294	83
308	1.80	0.03	3.05	296	82
309	1.70	0.05	2.93	297	82
310	1.70	0.03	2.63	295	82
311	1.70	0.06	2.66	294	83
312	1.70	0.05	2.63	285	83
313	1.60	0.05	2.89	290	83
314	1.60	0.05	2.85	294	83
315	1.50	0.04	3.11	295	83
316	1.50	0.03	2.85	294	83
317	1.50	0.03	3.11	286	83
318	1.40	0.05	2.89	289	83
319	1.40	0.04	3.08	293	82
320	1.40	0.05	2.81	293	83
321	1.30	0.04	2.83	295	83
322	1.30	0.05	3.09	296	83
323	1.30	0.06	2.55	293	83
324	1.20	0.03	2.85	293	83
325	1.20	0.05	2.87	286	83
326	1.20	0.07	2.92	290	83
327	1.10	0.05	3.02	291	83
328	1.10	0.04	2.91	291	83
329	1.10	0.05	3.02	294	83
330	1.00	0.03	3	294	83

331	1.00	0.06	3.08		298	83
332	1.00	0.04	2.75		289	83
333	0.90	0.04	3.19		293	83
334	0.90	0.03	3.35		297	83
335	0.80	0.05	2.93		289	83
336	0.80	0.03	3.09		293	83
337	0.80	0.06	2.65		293	83
338	0.70	0.03	2.85		295	83
339	0.70	0.07	2.85		286	84
340	0.70	0.06	2.66		287	83
341	0.60	0.04	3.03		291	83
342	0.60	0.04	3.12		293	83
343	0.60	0.04	3.02		292	83
344	0.50	0.05	2.44		289	83
345	0.50	0.03	3		290	83
346	0.50	0.03	3.2		290	83
347	0.40	0.04	2.33		285	83
348	0.40	0.05	2.72		287	83
349	0.40	0.03	2.83		290	83
350	0.30	0.04	2.96		290	83
351	0.30	0.06	2.74		291	83
352	0.30	0.05	2.9		291	83
353	0.20	0.03	3.21		295	83
354	0.30	0.04	3.46		298	83
355	0.10	0.03	3		296	83
356	0.10	0.07	2.52		293	83
357	0.10	0.04	2.48		290	83
358	0.10	0.04	2.58		288	83
359	0.00	0.04	2.6		287	83
360	0.00	0.04	2.81		288	83

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologie:
Model: P43-C
Date: 08/07/23
Run: 1
Control #: 2470
Test Duration: 360
Output Category: Overall

Technicians: _____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.8%	78.5%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	78.9%

Output Rate (kJ/h)	19,903	18,880	(Btu/h)
Burn Rate (kg/h)	1.38	3.05	(lb/h)
Input (kJ/h)	27,326	25,921	(Btu/h)

Test Load Weight (dry kg)	8.30	18.29	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	9.1		
CO (g)	45		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.08	0.38
g/kg Dry Fuel	1.10	5.41
g/h	1.52	7.48
lb/MM Btu Output	0.18	0.87

Air/Fuel Ratio (A/F)	21.17
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/7/2023

Run: 1

Control #: 2470

Test Duration: 60

Output Category: High

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 6.40
Burn Rate (dry kg/h): 2.78
Total Particulate Emissions: 2.88 g

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

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

Averages 0.04 8.62 #DIV/0! 465.90 85.38
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	6.40	0.03	8.97		468.0	85.0
1	6.30	0.02	8.25		466.0	85.0
2	6.20	0.06	8.99		467.0	85.0
3	6.10	0.03	8.49		466.0	86.0
4	6.00	0.04	8.53		467.0	84.0
5	5.90	0.03	8.69		467.0	85.0
6	5.80	0.01	8.51		466.0	85.0
7	5.70	0.01	7.79		465.0	84.0
8	5.60	0.12	8.97		466.0	86.0
9	5.50	0.02	8.24		466.0	84.0
10	5.40	0.01	8.11		466.0	85.0
11	5.30	0.01	7.82		464.0	84.0
12	5.20	0.06	8.85		465.0	86.0
13	5.10	0.01	8.11		464.0	86.0
14	5.00	0.07	9.04		466.0	85.0
15	4.80	0.03	8.45		467.0	84.0
16	4.70	0.02	8.53		466.0	84.0
17	4.60	0.03	8.32		467.0	85.0
18	4.50	0.03	8.57		466.0	85.0

19	4.40	0.03	8.40		464.0	85.0
20	4.30	0.02	8.93		466.0	86.0
21	4.20	0.03	8.69		468.0	86.0
22	4.10	0.18	9.55		469.0	84.0
23	4.00	0.11	9.01		468.0	86.0
24	3.80	0.05	8.82		469.0	86.0
25	3.70	0.02	8.16		467.0	86.0
26	3.60	0.02	8.30		465.0	86.0
27	3.50	0.03	8.75		465.0	87.0
28	3.40	0.03	9.16		468.0	86.0
29	3.30	0.01	8.43		467.0	87.0
30	3.20	0.04	8.68		468.0	86.0
31	3.10	0.03	8.78		468.0	86.0
32	3.00	0.04	8.37		466.0	84.0
33	2.90	0.02	8.02		464.0	85.0
34	2.80	0.02	8.85		465.0	84.0
35	2.70	0.07	9.48		468.0	85.0
36	2.60	0.01	7.70		466.0	86.0
37	2.50	0.08	9.19		468.0	85.0
38	2.40	0.02	8.67		469.0	84.0
39	2.20	0.02	8.72		469.0	84.0
40	2.10	0.01	8.66		469.0	86.0
41	2.00	0.01	8.17		466.0	86.0
42	1.90	0.01	7.74		463.0	86.0
43	1.80	0.02	8.26		462.0	86.0
44	1.70	0.02	8.30		461.0	86.0
45	1.60	0.01	8.26		463.0	86.0
46	1.50	0.01	7.62		460.0	87.0
47	1.40	0.05	8.58		461.0	86.0
48	1.30	0.10	8.98		463.0	85.0
49	1.20	0.05	9.08		463	85
50	1.10	0.07	8.55		463	86
51	1.00	0.01	8.65		463	86
52	0.90	0.04	9.15		465	86
53	0.70	0.09	9.04		466	85
54	0.60	0.17	9.09		467	86
55	0.50	0.11	8.69		466	86
56	0.40	0.06	8.86		466	85
57	0.30	0.09	9.03		467	86

58	0.20	0.14	9.1		467	86
59	0.10	0.04	8.97		468	85
60	0.00	0.11	9.21		469	85

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologie:
Model: P43-C
Date: 08/07/23
Run: 1
Control #: 2470
Test Duration: 60
Output Category: High

Technicians: _____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.2%	80.0%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75%	80.4%

Output Rate (kJ/h)	40,780	38,684	(Btu/h)
Burn Rate (kg/h)	2.78	6.13	(lb/h)
Input (kJ/h)	54,937	52,114	(Btu/h)

Test Load Weight (dry kg)	2.78	6.13	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	2.88		
CO (g)	17		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.07	0.41
g/kg Dry Fuel	1.04	6.00
g/h	2.88	16.68
lb/MM Btu Output	0.16	0.95

Air/Fuel Ratio (A/F)	12.89
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/7/2023

Run: 1

Control #: 2470

Test Duration: 120

Output Category: Medium

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 5.80
Burn Rate (dry kg/h): 1.26
Total Particulate Emissions: 0 g

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

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

Averages 0.01 4.95 #DIV/0! 313.60 82.85
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	5.80	0.11	9.21		469.0	85.0
1	5.70	0.03	8.93		468.0	84.0
2	5.60	0.04	8.47		467.0	85.0
3	5.50	0.05	8.83		466.0	84.0
4	5.40	0.01	6.62		455.0	85.0
5	5.30	0.01	6.15		436.0	85.0
6	5.20	0.01	5.88		422.0	85.0
7	5.20	0.01	5.65		412.0	85.0
8	5.10	0.01	5.22		404.0	84.0
9	5.10	0.01	5.20		397.0	84.0
10	5.00	0.01	4.85		390.0	84.0
11	5.00	0.02	4.77		383.0	84.0
12	4.90	0.01	4.22		375.0	84.0
13	4.90	0.01	4.44		369.0	84.0
14	4.80	0.02	4.46		363.0	84.0
15	4.80	0.02	4.84		352.0	84.0
16	4.70	0.04	4.76		343.0	83.0
17	4.70	0.02	4.69		335.0	84.0
18	4.60	0.01	5.05		332.0	83.0

19	4.60	0.03	4.57		327.0	84.0
20	4.50	0.01	4.48		323.0	83.0
21	4.50	0.01	5.00		321.0	83.0
22	4.50	0.01	4.64		317.0	83.0
23	4.40	0.02	4.46		314.0	83.0
24	4.40	0.01	4.40		312.0	83.0
25	4.30	0.01	4.99		311.0	83.0
26	4.30	0.02	4.49		309.0	83.0
27	4.20	0.03	4.61		307.0	83.0
28	4.20	0.02	4.70		305.0	83.0
29	4.10	0.01	4.90		305.0	83.0
30	4.10	0.01	4.55		303.0	83.0
31	4.10	0.01	4.39		300.0	83.0
32	4.00	0.02	4.62		300.0	83.0
33	4.00	0.01	4.88		300.0	83.0
34	3.90	0.01	4.78		300.0	82.0
35	3.90	0.00	4.98		300.0	82.0
36	3.80	0.01	5.02		300.0	83.0
37	3.80	0.01	4.78		299.0	83.0
38	3.70	0.00	4.90		299.0	82.0
39	3.70	0.00	4.66		298.0	82.0
40	3.60	0.01	4.55		298.0	82.0
41	3.60	0.01	4.73		299.0	82.0
42	3.50	0.01	5.36		300.0	83.0
43	3.50	0.01	4.89		301.0	82.0
44	3.40	0.01	4.92		300.0	82.0
45	3.40	0.02	4.70		298.0	82.0
46	3.40	0.01	4.95		297.0	82.0
47	3.30	0.01	4.81		297.0	82.0
48	3.30	0.02	4.81		296.0	82.0
49	3.20	0.01	4.77		296	83
50	3.20	0.01	5.73		299	83
51	3.10	0	5.27		300	83
52	3.10	0	4.41		297	83
53	3.00	0.01	4.5		296	83
54	3.00	0.01	4.62		296	82
55	2.90	0	4.38		295	82
56	2.90	0	4.84		295	83
57	2.90	0	4.92		296	82

58	2.80	0	4.71		296	82
59	2.80	0	4.52		296	83
60	2.70	0.01	4.29		295	83
61	2.70	0.01	4.55		295	82
62	2.60	0.01	4.9		295	82
63	2.60	0.01	4.7		294	82
64	2.60	0.02	4.19		292	82
65	2.50	0.02	4.53		291	82
66	2.50	0.01	4.67		292	81
67	2.40	0.01	4.86		292	82
68	2.40	0.02	4.44		291	82
69	2.40	0.01	4.44		291	82
70	2.30	0.01	5.05		293	82
71	2.30	0	4.7		292	82
72	2.20	0.01	4.77		292	82
73	2.20	0	4.85		292	82
74	2.10	0.01	4.75		291	82
75	2.10	0.01	4.75		292	82
76	2.00	0.01	4.75		292	82
77	2.00	0.01	4.59		291	82
78	2.00	0.01	4.21		290	82
79	1.90	0	4.28		289	82
80	1.90	0.01	4.78		289	81
81	1.80	0	4.72		290	82
82	1.80	0	5.09		290	82
83	1.80	0	4.9		292	82
84	1.70	0.01	4.87		292	81
85	1.70	0.01	4.66		292	81
86	1.60	0	4.66		292	81
87	1.60	0	4.77		292	83
88	1.50	0	4.86		294	83
89	1.50	0	4.72		294	83
90	1.40	0	4.72		293	83
91	1.40	0.01	4.64		294	83
92	1.30	0	4.92		295	82
93	1.30	0	5.14		296	83
94	1.30	0	5.51		296	83
95	1.20	0.01	4.96		296	83
96	1.20	0	4.73		296	83

97	1.10	0.01	4.59		296	83
98	1.10	0.01	5.15		297	83
99	1.00	0.01	4.99		298	83
100	1.00	0	4.75		297	84
101	0.90	0	4.65		296	83
102	0.90	0.01	4.83		295	82
103	0.80	0	5.12		296	83
104	0.80	0	4.79		296	83
105	0.70	0	4.35		294	84
106	0.70	0.01	4.48		293	83
107	0.70	0.01	5.09		295	83
108	0.60	0.01	4.63		294	84
109	0.60	0.01	4.73		294	83
110	0.50	0.01	4.83		294	83
111	0.50	0.01	4.73		294	83
112	0.40	0.01	5.27		295	83
113	0.40	0	4.75		295	83
114	0.30	0.01	4.89		295	83
115	0.30	0.01	4.94		295	83
116	0.20	0.01	4.9		295	84
117	0.20	0.03	4.68		294	83
118	0.10	0.01	5.08		295	84
119	0.10	0.02	4.92		296	84
120	0.00	0	4.93		296	84

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologie:
Model: P43-C
Date: 08/07/23
Run: 1
Control #: 2470
Test Duration: 120
Output Category: Medium

Technicians: _____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	73.9%	79.7%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74%	80.1%

Output Rate (kJ/h)	18,408	17,462	(Btu/h)
Burn Rate (kg/h)	1.26	2.78	(lb/h)
Input (kJ/h)	24,894	23,614	(Btu/h)

Test Load Weight (dry kg)	2.52	5.55	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0		
CO (g)	6		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.00	0.17
g/kg Dry Fuel	0.00	2.48
g/h	0.00	3.13
lb/MM Btu Output	0.00	0.39

Air/Fuel Ratio (A/F)	21.21
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/7/2023

Run: 1

Control #: 2470

Test Duration: 180

Output Category: Low

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 6.90
Burn Rate (dry kg/h): 1.00
Total Particulate Emissions: 0 g

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

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

Averages 0.02 3.73 #DIV/0! 293.41 82.44
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp. (°F)	Room Temp
		CO	CO ₂	O ₂		
0	6.90	0.00	4.93		296.0	84.0
1	6.90	0.01	4.73		295.0	84.0
2	6.90	0.00	4.57		294.0	81.0
3	6.80	0.00	4.54		294.0	81.0
4	6.80	0.01	4.08		293.0	82.0
5	6.70	0.01	3.80		292.0	83.0
6	6.70	0.01	3.68		290.0	83.0
7	6.70	0.01	3.36		287.0	82.0
8	6.60	0.02	3.88		287.0	81.0
9	6.60	0.01	3.84		288.0	82.0
10	6.50	0.01	4.75		290.0	82.0
11	6.50	0.00	4.23		291.0	81.0
12	6.50	0.00	3.91		290.0	82.0
13	6.40	0.00	4.16		291.0	83.0
14	6.40	0.00	4.48		292.0	83.0
15	6.30	0.01	4.24		292.0	82.0
16	6.30	0.00	4.28		291.0	82.0
17	6.20	0.00	5.00		293.0	81.0
18	6.20	0.01	4.09		292.0	81.0

19	6.20	0.00	3.74		291.0	82.0
20	6.10	0.00	4.33		291.0	82.0
21	6.10	0.01	4.19		291.0	82.0
22	6.10	0.01	3.95		290.0	82.0
23	6.00	0.01	3.94		290.0	81.0
24	6.00	0.00	3.96		289.0	82.0
25	5.90	0.00	4.16		290.0	81.0
26	5.90	0.00	4.22		291.0	81.0
27	5.90	0.00	4.61		292.0	81.0
28	5.80	0.00	4.14		292.0	81.0
29	5.80	0.00	4.21		291.0	83.0
30	5.70	0.00	4.20		292.0	83.0
31	5.70	0.00	4.62		292.0	82.0
32	5.60	0.00	4.58		294.0	82.0
33	5.60	0.00	4.68		294.0	81.0
34	5.50	0.00	4.75		295.0	81.0
35	5.50	0.01	4.45		294.0	82.0
36	5.50	0.00	4.46		294.0	82.0
37	5.40	0.00	4.33		295.0	82.0
38	5.40	0.00	4.55		295.0	81.0
39	5.30	0.01	4.25		295.0	82.0
40	5.30	0.00	4.63		295.0	82.0
41	5.20	0.00	4.65		295.0	82.0
42	5.20	0.01	4.27		295.0	82.0
43	5.10	0.00	4.59		296.0	82.0
44	5.10	0.01	4.06		294.0	82.0
45	5.10	0.01	4.22		294.0	82.0
46	5.00	0.00	4.23		295.0	83.0
47	5.00	0.01	4.47		295.0	83.0
48	4.90	0.00	4.31		295.0	82.0
49	4.90	0	4.01		294	84
50	4.90	0.01	3.96		294	83
51	4.80	0	4.33		294	84
52	4.80	0.01	4.05		294	84
53	4.70	0.01	4.11		293	83
54	4.70	0.01	4.36		293	82
55	4.70	0	4.24		293	82
56	4.60	0	3.79		292	83
57	4.60	0	4.09		291	82

58	4.50	0.01	4.38	291	82
59	4.50	0	4.35	292	82
60	4.50	0	4.3	292	82
61	4.40	0	4.49	293	82
62	4.40	0	4.1	292	81
63	4.30	0	4.13	291	82
64	4.30	0	4.44	292	82
65	4.20	0	4.35	292	82
66	4.20	0	4.51	292	82
67	4.10	0.01	4.52	293	82
68	4.10	0.01	4.55	293	82
69	4.10	0.01	4.41	293	82
70	4.00	0.01	4.58	294	82
71	4.00	0.01	4.13	294	82
72	3.90	0.01	4.17	293	82
73	3.90	0.01	4.25	292	82
74	3.90	0.01	4.01	291	82
75	3.80	0	4.24	291	82
76	3.80	0	4.33	291	82
77	3.70	0	4.41	292	82
78	3.70	0.01	4.72	293	82
79	3.60	0.01	4.74	294	82
80	3.60	0.01	4.62	295	82
81	3.60	0	4.41	295	82
82	3.50	0.01	4.66	295	82
83	3.50	0	4.56	295	82
84	3.40	0.01	4.41	295	83
85	3.40	0.01	4.12	295	83
86	3.40	0.01	4.03	294	82
87	3.30	0	3.94	294	82
88	3.30	0.01	4.12	294	82
89	3.20	0.02	4.09	295	82
90	3.20	0.01	4.59	296	82
91	3.10	0.01	4.33	297	82
92	3.10	0.01	4.34	296	82
93	3.10	0.02	4.01	295	83
94	3.00	0.01	3.75	293	83
95	3.00	0.01	3.85	291	82
96	3.00	0.01	4.33	292	82

97	2.90	0	4.49		293	82
98	2.90	0	5.05		296	83
99	2.80	0	4.24		296	82
100	2.80	0	3.94		294	82
101	2.70	0	3.83		293	82
102	2.70	0	3.85		292	82
103	2.70	0.01	4.3		292	83
104	2.60	0.01	4.08		291	84
105	2.60	0.01	4.18		302	83
106	2.60	0.03	4.14		321	82
107	2.50	0.04	3.47		320	83
108	2.50	0.03	3.5		322	83
109	2.40	0.03	3.14		311	83
110	2.40	0.03	3.15		304	83
111	2.40	0.04	2.99		298	83
112	2.30	0.05	2.69		293	83
113	2.30	0.05	2.76		289	82
114	2.30	0.04	2.9		294	82
115	2.20	0.02	3.23		290	83
116	2.20	0.04	3.15		298	83
117	2.20	0.05	3.02		297	83
118	2.10	0.03	3.11		302	82
119	2.10	0.04	3.61		299	82
120	2.10	0.05	3.4		302	83
121	2.00	0.04	3.13		303	82
122	2.00	0.04	2.91		293	83
123	1.90	0.04	2.88		287	83
124	1.90	0.03	2.8		291	83
125	1.90	0.04	2.96		293	82
126	1.90	0.05	2.71		293	82
127	1.80	0.05	2.87		294	83
128	1.80	0.03	3.05		296	82
129	1.70	0.05	2.93		297	82
130	1.70	0.03	2.63		295	82
131	1.70	0.06	2.66		294	83
132	1.70	0.05	2.63		285	83
133	1.60	0.05	2.89		290	83
134	1.60	0.05	2.85		294	83
135	1.50	0.04	3.11		295	83

136	1.50	0.03	2.85		294	83
137	1.50	0.03	3.11		286	83
138	1.40	0.05	2.89		289	83
139	1.40	0.04	3.08		293	82
140	1.40	0.05	2.81		293	83
141	1.30	0.04	2.83		295	83
142	1.30	0.05	3.09		296	83
143	1.30	0.06	2.55		293	83
144	1.20	0.03	2.85		293	83
145	1.20	0.05	2.87		286	83
146	1.20	0.07	2.92		290	83
147	1.10	0.05	3.02		291	83
148	1.10	0.04	2.91		291	83
149	1.10	0.05	3.02		294	83
150	1.00	0.03	3		294	83
151	1.00	0.06	3.08		298	83
152	1.00	0.04	2.75		289	83
153	0.90	0.04	3.19		293	83
154	0.90	0.03	3.35		297	83
155	0.80	0.05	2.93		289	83
156	0.80	0.03	3.09		293	83
157	0.80	0.06	2.65		293	83
158	0.70	0.03	2.85		295	83
159	0.70	0.07	2.85		286	84
160	0.70	0.06	2.66		287	83
161	0.60	0.04	3.03		291	83
162	0.60	0.04	3.12		293	83
163	0.60	0.04	3.02		292	83
164	0.50	0.05	2.44		289	83
165	0.50	0.03	3		290	83
166	0.50	0.03	3.2		290	83
167	0.40	0.04	2.33		285	83
168	0.40	0.05	2.72		287	83
169	0.40	0.03	2.83		290	83
170	0.30	0.04	2.96		290	83
171	0.30	0.06	2.74		291	83
172	0.30	0.05	2.9		291	83
173	0.20	0.03	3.21		295	83
174	0.30	0.04	3.46		298	83

175	0.10	0.03	3		296	83
176	0.10	0.07	2.52		293	83
177	0.10	0.04	2.48		290	83
178	0.10	0.04	2.58		288	83
179	0.00	0.04	2.6		287	83
180	0.00	0.04	2.81		288	83

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologie:
Model: P43-C
Date: 08/07/23
Run: 1
Control #: 2470
Test Duration: 180
Output Category: Low

Technicians: _____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	70.3%	75.7%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	71%	76.1%

Output Rate (kJ/h)	13,875	13,162	(Btu/h)
Burn Rate (kg/h)	1.00	2.20	(lb/h)
Input (kJ/h)	19,743	18,728	(Btu/h)

Test Load Weight (dry kg)	3.00	6.61	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0		
CO (g)	22		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.00	0.53
g/kg Dry Fuel	0.00	7.39
g/h	0.00	7.38
lb/MM Btu Output	0.00	1.24

Air/Fuel Ratio (A/F)	26.84
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VERSION:

2.4

4/15/2010

ASTM E2779 Pellet Heater Run Sheets

Client: Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 1

Model: P43-C Tracking Number: 2470 Date: 08/07/2023

Test Crew: Tony Tong

OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

Tony Tong

Date/Time in Dessicator:

08/07/23 16:35

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>08/10/23 16:40</u>	Date/Time: <u>08/14/2023 7:35</u>	Date/Time:	Date/Time:	Date/Time:
R/H %: <u>7.9</u>	R/H %: <u>9.0</u>	R/H %:	R/H %:	R/H %:
Temp: <u>77.9</u>	Temp: <u>80.2</u>	Temp:	Temp:	Temp:
200 mg Audit: <u>200.1</u>	200 mg Audit: <u>200.1</u>	200 mg Audit:	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2000.3</u>	2 g Audit: <u>2000.3</u>	2 g Audit:	2 g Audit:	2 g Audit:
100 g Audit: <u>99998.2</u>	100 g Audit: <u>99997.9</u>	100 g Audit:	100 g Audit:	100 g Audit:
Initials: <u>TT</u>	Initials: <u>TT</u>	Initials:	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	F37	117.4	119.6	119.6			
	Rear Filter	F38	116.4	116.4	116.4			
	Probe	68	116878.8	116879.0	116878.8			
	O-Ring Set	S556	3389.5	3389.6	3389.6			
A	Front Filter	F39	125.0	131.8	131.9			
	Rear Filter	F40	122.7	122.8	122.8			
	Probe	8	115596.1	115596.3	115596.2			
	O-Ring Set	S557	3388.5	3388.5	3388.5			
B	Front Filter	F41	124.9	131.5	131.5			
	Rear Filter	F42	123.0	122.2	122.2			
	Probe	30	114328.9	114328.9	114328.9			
	O-Ring Set	S558	4145.3	4146.3	4146.3			
BG	Filter	F43	124.7	124.7	124.7			

Technician Signature: Tony Tong

Date: 08/14/2023

ASTM E2779 Pellet Heater Run Sheets

Client Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 1

Model: P43-C Tracking Number: 2470 Date: 08/07/2023

Test Crew: Tony Tong

OMNI Equipment ID numbers: _____

Pellet Heater Run Notes

Air Control Settings

High Burn Rate Target: Maximum

Settings: Feed rate 52.55
(5.01 on screen)

Temperature Dial Full clockwise
90° (7)

Medium Burn Rate Target: <50% of Maximum

Settings: Feed rate 22.55

Low Burn Rate Target: Feed rate 20.05

Settings: _____

Temperature Dial Full
Counterclockwise 50° (1)

Additional Settings Notes:

Preburn Notes

Time	Notes
8:40	started Pre-burn at high burn setting

Test Notes

Time	Notes
10:03	started sampling at high burn setting
11:03	1st hour sampling stopped, turned high burn to medium burn
13:03	medium burn changed to low burn.
16:03	Test completed

Pellet Moisture Content: 4.23% WB
4.42% DB

Technician Signature: Tony Tong
Control No. P-SFDL-0001, Effective Date: 6/8/2015

Date: 08/07/2023
Page 1 of 3

ASTM E2779 Pellet Heater Run Sheets

Client Hearth & Home Technologies Project Number: 0135PS023E REV002 Run Number: 1

Model: P43-C Tracking Number: 2470 Date: 08/07/2023

Test Crew: Tony Tong

OMNI Equipment ID numbers: _____

Pellet Heater Supplemental Data

Start Time: 10:03

Booth #: 1

Stop Time: 16:03

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.000 @ 17.7"Hg
B: 0.000 @ 18.5"Hg

1.1 0.000 @ 14.60"Hg

Calibrations: Span Gas

CO₂: 16.84% CO: 4.38% CO: 500 ppm

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	9:00	9:02	16:07	16:08
CO ₂ %	0.00	16.84	0.00	16.77
CO %	0.00	4.40	0.00	4.38

CO ppm 0.0 503.3 0.0

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10 Final: 10

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 3

Induced Draft: 0.022

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 08/03/23 Initials: _____

	Initial	Middle	Ending
P _b (in/Hg)	30.14	30.13	30.06
Ambient (°F)	85	82	83

Tunnel Traverse			
Microtector Reading	dP (in H ₂ O)	T(°F)	
1	-0.31	0.062	112
2	-0.43	-0.086	112
3	-0.44	-0.088	113
4	-0.081	-0.062	113
5	-0.026	-0.052	113
6	-0.042	-0.084	113
7	-0.040	-0.080	113
8	-0.036	-0.072	113
Center:			
-0.047	-0.047	-0.094	113
Static:			
-0.36	-0.36	-0.36	

Background Filter Volume: 57.244 cft

Technician Signature: Tony Tong
Control No. P-SFDL-0001, Effective Date: 6/8/2015

Date: 08/07/2023
Page 2 of 3

Tare Sheet: (check one) Probes 47mm Filters 100mm Filters O-Ring Pair
 Prepared By: Tomy Tony Balance ID #: 00637 Thermohygrometer ID #: 00709 Audit Weight ID #/Mass: 00283A 1200mg

Placed in Dessicator: Date: <u>07/17/23</u> Time: <u>16:00</u>	Date: <u>07/18/23</u> Time: <u>16:30</u> RH %: <u>21.7</u> T (°F): <u>78.9</u> Audit: <u>200.1</u>	Date: <u>07/19/23</u> Time: <u>14:00</u> RH %: <u>22.6</u> T (°F): <u>78.6</u> Audit: <u>200.1</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
	ID #						
F21	116.1	116.1			07/20/23	0546PS001E	2
F22	118.0	117.9					
F23	118.1	118.2					
F24	117.1	117.2					
F25	117.0	116.9					
F26	116.5	116.5					
F27	117.2	117.3					
F28	116.2	116.3					
F29	117.8	117.7			07/24/23	0546PS001E	3
F30	116.2	116.2					
F31	118.4	118.6			Not used		
F32	116.0	116.1					
F33	117.5	117.5			07/24/23	0546PS001E	3
F34	116.6	116.6					
F35	117.8	118.0			08/07/23	0135PS023E	1
F36	116.6	116.6					
F37	117.4	117.4					
F38	116.3	116.4					
F39	124.8	125.0					
F40	122.6	122.7					
Initials: <u>TT</u>	Initials: <u>TT</u>	Initials: _____	Initials: _____				

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

Date: 07/19/2023
 282

Evaluator signature: H. J. Moign

Tare Sheet: (check one)

Probes _____

47mm Filters

100mm Filters _____

O-Ring Pair _____

Prepared By: Tony Tong

Balance ID #: 00637

Thermohygrometer ID #: 00709

Audit Weight ID #/Mass: 00283A / 200mg

Placed in Dessicator: Date: <u>07/17/23</u> Time: <u>16:00</u>	Date: <u>07/18/23</u> Time: <u>16:30</u> RH %: <u>21.7</u> T (°F): <u>78.9</u> Audit: <u>200.1</u>	Date: <u>07/19/23</u> Time: <u>14:00</u> RH %: <u>22.6</u> T (°F): <u>78.6</u> Audit: <u>200.1</u>	Date: <u>07/20/23</u> Time: <u>7:30</u> RH %: <u>17.9</u> T (°F): <u>78.0</u> Audit: <u>200.0</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
	ID #						
F41	124.8	124.9			08/07/23	0135PS023E	1
F42	123.0	123.0			↓	↓	↓
F43	124.5	124.7			↓	↓	↓
F44	124.8	124.9					
F45	123.1	123.2					
F46	123.2	123.3					
F47	123.6	123.6					
F48	124.9	124.9					
F49	122.8	123.1	123.0				
F50	125.1	125.1					
F51	123.3	123.4					
F52	124.6	124.5					
F53	124.5	124.6					
F54	122.1	122.2					
F55	122.3	122.3					
F56	124.8	124.7					
F57	124.7	124.8					
F58	122.4	122.5					
F59	124.5	124.6					
F60	122.3	122.3					
Initials: <u>TT</u>	Initials: <u>TT</u>	Initials: <u>TT</u>	Initials: _____				

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

Date: 07/20/23

Evaluator signature: Jh. J. W. J.

Tare Sheet: (check one)

Probes _____

47mm Filters _____

100mm Filters _____

O-Ring Pair

Prepared By: Tony Tony

Balance ID #: 00637

Thermohyrometer ID #: 00709

Audit Weight ID #/Mass: 00283A 15g

Placed in Dessicator: Date: <u>06/29/23</u> Time: <u>13:00</u>	Date: <u>07/17/23</u> Time: <u>15:00</u> RH %: <u>10.9</u> T (°F): <u>78.2</u> Audit: <u>5000.0</u>	Date: <u>07/18/23</u> Time: <u>14:45</u> RH %: <u>22.5</u> T (°F): <u>78.2</u> Audit: <u>5000.1</u>	Date: <u>07/19/23</u> Time: <u>14:30</u> RH %: <u>22.6</u> T (°F): <u>78.6</u> Audit: <u>5000.0</u>	Date: <u>07/20/23</u> Time: <u>7:30</u> RH %: <u>79.9</u> T (°F): <u>78.0</u> Audit: <u>5000.1</u>	Date Used	Project Number	Run No.
	ID #						
S549	3334.2	3334.1			07/24/23		
S550	3330.9	3330.9			07/20/23	0546PS001E	2
S551	3426.7	3426.6			↓	↓	↓
S552	3370.6	3370.5			↓	↓	↓
S553	3359.5	3359.3			07/24/23	0546PS001E	3
S554	3350.1	3350.1			↓	↓	↓
S555	3417.6	3417.3	3417.4		↓	↓	↓
S556	3389.3	3389.5			08/07/23	0135PS023E	1
S557	3388.4	3388.5			↓	↓	↓
S558	4145.1	4145.3			↓	↓	↓
S559	3389.0	3389.1					
S560	4120.6	4120.6					
S561	3348.5	3348.8	3348.6				
S562	3372.7	3372.8					
S563	3373.5	3373.5					
S564	3424.2	3424.5	3424.5				
S565	3440.4	3440.6					
S566	3434.4	3434.6					
S567	3327.8	3328.2	3327.9	3327.7			
S568	3372.8	3372.8					

Initials: TT Initials: TT Initials: TT Initials: TT

Final Technician Signature: Tony Tony
Control No. P-SFDP-0002.xls, Effective Date: 2/1/2017

Date: 07/20/23

Evaluator signature: K. J. Morgan

Tare Sheet: (check one)

Probes X

47mm Filters _____

100mm Filters _____

O-Ring Pair _____

Prepared By: Riley Tieggs

Balance ID #: _____

Thermohyrometer ID #: _____

Audit Weight ID #/Mass: 1

ID #	Date: <u>7-17-23</u> Time: <u>1200</u>		Date: <u>07/19/23</u> Time: <u>14:50</u>		Date: _____	Date: _____	Date Used	Project Number	Run No.
	RH %: <u>16.4</u> T (°F): <u>77.5</u> Audit: <u>99997.9</u>	RH %: <u>16.9</u> T (°F): <u>78.4</u> Audit: <u>99997.9</u>	RH %: _____ T (°F): _____ Audit: _____	RH %: _____ T (°F): _____ Audit: _____					
68	116878.9	116878.8					08/07/23	0135PS023E	1
28	114751.2	114751.2					07/24/23	0546PS001E	3
3	116011.5	116011.3					07/24/23	↓	↓
8	115576.1	115596.1					08/07/23	0135PS023E	1
25	114299.7	114299.6					07/24/23	0546PS001E	3
32	114743.0	114743.1							
74	117665.2	117665.2							
76	116961.5	116961.4					07/20/23	0546PS001E	2
16	114266.7	114266.9					↓	↓	↓
81	111860.6	111860.5							
78	117461.0	117460.8					07/24/23		
30	114328.7	114328.9					08/07/23	0135PS023E	1
12	114284.8	114284.9							
66	118455.7	118455.6							
33	113944.1	113944.0							
62	117662.7	117662.8					07/20/23	0546PS001E	2

Initials: RD

Initials: TT

Initials: _____

Initials: _____

Final Technician Signature: [Signature]

Date: 07/19/2023

Evaluator signature: [Signature]

Control No. P-SFDP-0002.xls, Effective date: 2/3/2017

Equipment Used and Calibrated at Run 1

ASTM E2515, ASTM E2779

ID #	Lab Name/Purpose	Log Name	Attachment Type
255	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate (07/06/2021)
185	Platform Scale	WI-127	Calibration Certificate 09/01/2022
716	Digital Barometer	Traceable Barometer	Calibration Certificate (04/19/2022)
283A	Audit Weights	Troemner 21pc Msas Set	Calibration Certificate (10/26/2018)
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023)
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023)
410	Microtector	Dwyer Microtector	Calibration Certificate (03/01/2022)
721	Dwyer Anemometer	Dwyer Anemometer	Calibration Certificate (12/05/2022)
709	RH-81 Humidity Meter	RH-81 Humidity Meter	Calibration Log (03/06/2023)
594	Combustion Gas Analyzer	CAI Gas Analyzer	See Run Sheet (VBU)
637	Milligram Balance	Analytical Balance - Mettler - Toledo	Calibration Certificate (08/10/2023)
371	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (04/27/2023)
372	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (05/01/2023)

Appendix B. Invalid Run 2 Test Data

(Test results not included in final results)

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: HHT
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E.REV002
 Test Date: 8/28/2023

PB Length: 105 min
 Recording Interval: 1 min

Averages:	449	81	-0.05	8.35	0.03
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Elapsed Time (min)	Scale Reading	Weight Change	Stack (F)	Ambient (F)	Draft ("H2O)	CO2 (%)	CO (%)
0	37.6	-	427	78	-0.04	7.39	0.01
1	37.5	-0.1	429	78	-0.04	7.84	0.00
2	37.4	-0.1	432	78	-0.04	8.23	0.00
3	37.3	-0.1	435	77	-0.04	8.41	0.00
4	37.2	-0.1	434	77	-0.04	7.25	0.00
5	37.1	-0.1	432	78	-0.04	6.93	0.00
6	37.0	-0.1	434	78	-0.04	7.91	0.00
7	36.9	-0.1	435	79	-0.04	7.71	0.00
8	36.8	-0.1	436	81	-0.04	8.08	0.00
9	36.7	-0.1	437	81	-0.04	7.56	0.01
10	36.6	-0.1	436	80	-0.04	7.14	0.01
11	36.5	-0.1	435	79	-0.04	7.48	0.00
12	36.4	-0.1	435	78	-0.04	7.22	0.01
13	36.3	-0.1	438	80	-0.04	7.97	0.00
14	36.2	-0.1	441	81	-0.05	8.52	0.01
15	36.1	-0.1	441	81	-0.05	7.84	0.00
16	36.0	-0.1	442	81	-0.05	8.76	0.04
17	35.9	-0.1	441	80	-0.05	7.84	0.00
18	35.8	-0.1	445	79	-0.05	8.70	0.03
19	35.7	-0.1	447	80	-0.05	8.86	0.02
20	35.5	-0.2	446	80	-0.05	7.86	0.01
21	35.4	-0.1	447	82	-0.05	8.66	0.01
22	35.3	-0.1	449	81	-0.05	9.33	0.05
23	35.2	-0.1	450	81	-0.05	8.54	0.03
24	35.1	-0.1	450	81	-0.05	8.54	0.01
25	35.0	-0.1	449	79	-0.05	8.11	0.01
26	34.9	-0.1	447	79	-0.05	7.75	0.01
27	34.8	-0.1	447	80	-0.05	8.04	0.01
28	34.7	-0.1	447	81	-0.05	8.11	0.01

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: HHT
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E.REV002
 Test Date: 8/28/2023

PB Length: 105 min
 Recording Interval: 1 min

Averages:	449	81	-0.05	8.35	0.03
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29	34.6	-0.1	450	81	-0.05	8.36	0.01
30	34.5	-0.1	453	81	-0.05	8.91	0.02
31	34.3	-0.2	453	79	-0.05	8.11	0.01
32	34.2	-0.1	454	81	-0.05	8.65	0.03
33	34.1	-0.1	455	79	-0.05	8.83	0.01
34	34.0	-0.1	454	80	-0.05	8.73	0.03
35	33.9	-0.1	455	80	-0.05	8.50	0.01
36	33.8	-0.1	455	80	-0.05	9.02	0.01
37	33.7	-0.1	455	80	-0.05	8.20	0.00
38	33.6	-0.1	455	80	-0.05	8.36	0.01
39	33.5	-0.1	456	79	-0.05	8.32	0.00
40	33.4	-0.1	456	79	-0.05	8.50	0.00
41	33.2	-0.2	456	80	-0.05	8.43	0.01
42	33.2	0	455	80	-0.05	7.84	0.01
43	33.0	-0.2	456	80	-0.05	8.78	0.01
44	32.9	-0.1	454	80	-0.05	7.77	0.01
45	32.8	-0.1	453	81	-0.05	7.94	0.01
46	32.7	-0.1	452	79	-0.05	7.91	0.01
47	32.6	-0.1	452	81	-0.05	8.27	0.01
48	32.5	-0.1	450	80	-0.05	8.00	0.00
49	32.4	-0.1	453	81	-0.05	9.04	0.03
50	32.3	-0.1	452	79	-0.05	7.80	0.01
51	32.2	-0.1	452	80	-0.05	7.80	0.00
52	32.1	-0.1	455	79	-0.05	8.66	0.01
53	32.0	-0.1	457	80	-0.05	8.84	0.02
54	31.9	-0.1	459	80	-0.05	9.06	0.02
55	31.8	-0.1	460	79	-0.05	9.01	0.05
56	31.6	-0.2	460	81	-0.05	9.41	0.05
57	31.5	-0.1	455	82	-0.05	7.88	0.03
58	31.4	-0.1	455	81	-0.05	8.85	0.03
59	31.3	-0.1	453	80	-0.05	8.00	0.01

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: HHT
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E.REV002
 Test Date: 8/28/2023

PB Length: 105 min
 Recording Interval: 1 min

Averages:	449	81	-0.05	8.35	0.03
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60	31.2	-0.1	452	80	-0.05	8.02	0.01
61	31.1	-0.1	453	82	-0.05	8.39	0.02
62	31.0	-0.1	454	83	-0.05	8.74	0.05
63	30.9	-0.1	454	80	-0.05	8.48	0.01
64	30.8	-0.1	452	80	-0.05	7.34	0.01
65	30.7	-0.1	452	81	-0.05	8.15	0.03
66	30.6	-0.1	454	80	-0.05	9.32	0.11
67	30.5	-0.1	455	81	-0.05	8.89	0.04
68	30.4	-0.1	455	81	-0.05	8.95	0.10
69	30.3	-0.1	453	80	-0.05	8.67	0.05
70	30.2	-0.1	451	81	-0.05	7.99	0.02
71	30.1	-0.1	450	79	-0.05	8.11	0.01
72	30.0	-0.1	450	80	-0.05	7.99	0.01
73	29.9	-0.1	452	81	-0.05	8.82	0.02
74	29.7	-0.2	452	80	-0.05	8.23	0.02
75	29.6	-0.1	453	81	-0.05	8.47	0.01
76	29.5	-0.1	453	80	-0.05	8.97	0.10
77	29.4	-0.1	454	83	-0.05	9.13	0.07
78	29.3	-0.1	455	82	-0.05	8.92	0.06
79	29.2	-0.1	450	82	-0.05	7.75	0.01
80	29.1	-0.1	448	82	-0.05	7.88	0.01
81	29.0	-0.1	450	81	-0.05	8.94	0.05
82	28.9	-0.1	449	82	-0.05	8.33	0.03
83	28.8	-0.1	450	82	-0.05	8.73	0.11
84	28.7	-0.1	449	82	-0.05	8.65	0.13
85	28.6	-0.1	450	83	-0.05	8.96	0.18
86	28.5	-0.1	452	82	-0.05	8.69	0.12
87	28.3	-0.2	449	83	-0.05	7.95	0.04
88	28.2	-0.1	450	82	-0.05	8.91	0.06
89	28.1	-0.1	452	82	-0.05	8.54	0.04
90	28.0	-0.1	452	81	-0.05	7.92	0.02

Pellet Heater Preburn Data - ASTM E2779

Manufacturer: HHT
 Model: P43-C
 Tracking No.: 2470
 Project No.: 0135PS023E.REV002
 Test Date: 8/28/2023

PB Length: 105 min
 Recording Interval: 1 min

Averages:	449	81	-0.05	8.35	0.03
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91	27.9	-0.1	454	82	-0.05	9.33	0.09
92	27.8	-0.1	452	82	-0.05	8.45	0.02
93	27.7	-0.1	454	82	-0.05	9.34	0.08
94	27.6	-0.1	453	82	-0.05	8.22	0.04
95	27.5	-0.1	454	82	-0.05	8.78	0.05
96	27.4	-0.1	452	82	-0.05	7.96	0.01
97	27.3	-0.1	451	81	-0.05	7.81	0.01
98	27.2	-0.1	453	81	-0.05	9.72	0.23
99	27.1	-0.1	451	82	-0.05	8.05	0.02
100	27.0	-0.1	448	82	-0.05	6.94	0.01
101	26.9	-0.1	449	81	-0.05	8.16	0.02
102	26.8	-0.1	450	81	-0.05	8.69	0.03
103	26.7	-0.1	452	81	-0.05	8.91	0.07
104	26.5	-0.2	452	82	-0.05	9.00	0.15
105	26.4	-0.1	452	82	-0.05	8.98	0.13

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 2

Manufacturer: HHT High Burn End Time: 60
Model: P43-C Medium Burn End Time: 180
Tracking No.: 2470 Total Sampling Time: 360 min
Project No.: 0135PS023E.REV002 Recording Interval: 1 min
Test Date: 28-Aug-23
Beginning Clock Time: 12:14 Background Sample Volume: 77.803 cubic feet

Meter Box Y Factor: 1.007 (1) 1.015 (2) 1.012 (Amb)

Barometric Pressure: Begin Middle End Average
30.13 30.09 30.11 Hg

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: -0.380 H2O
Tunnel Area: 0.1963 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.88 ft/sec.
Initial Tunnel Flow: 205.1 scfm
Average Tunnel Flow: 206.6 scfm
Post-Test Leak Check (1): 0.002 cfm @ 10 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

Velocity Traverse Data table with columns Pt.1 to Pt.8 and Center, rows Initial dP and Temp, and calculated values for Vstrav, Vscnt, and Fp.

Main data table with columns: 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), Tunnel Center dP, Pro. Rate 1, Pro. Rate 2, Scale Reading, Weight Change, Stack, Filter 1, Dryer 1, Filter 2, Dryer 2, Ambient, Draft (H2O), CO2 (%), CO (%).

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 2

Manufacturer: HHT High Burn End Time: 60
Model: P43-C Medium Burn End Time: 180
Tracking No.: 2470 Total Sampling Time: 360 min
Project No.: 0135PS023E.REV002 Recording Interval: 1 min
Test Date: 28-Aug-23
Beginning Clock Time: 12:14 Background Sample Volume: 77.803 cubic feet

Meter Box Y Factor: 1.007 (1) 1.015 (2) 1.012 (Amb)

Barometric Pressure: Begin Middle End Average
30.13 30.09 30.11 "Hg

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: -0.380 "H2O
Tunnel Area: 0.1963 ft^2
Pitot Tube Cp: 0.99
Avg. Tunnel Velocity: 18.88 ft/sec.
Initial Tunnel Flow: 205.1 scfm
Average Tunnel Flow: 206.6 scfm
Post-Test Leak Check (1): 0.002 cfm @ 10 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

Table with 10 columns: Pt.1, Pt.2, Pt.3, Pt.4, Pt.5, Pt.6, Pt.7, Pt.8, Center. Rows include Initial dP, Temp, Vstrav, Vscnt, and Fp.

Main data table with columns: Elapsed Time (min), Gas Meter 1/2 (ft^3), Sample Rate 1/2 (cfm), Orifice dH 1/2 (H2O), Meter Temp 1/2 (F), Meter Vacuum 1/2 (Hg), Dilution Tunnel (F), Tunnel Center dP, Pro. Rate 1/2, Scale Reading, Weight Change, Stack, Filter 1, Dryer 1, Filter 2, Dryer 2, Ambient, Draft (H2O), CO2 (%), CO (%).

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 2

Manufacturer: HHT High Burn End Time: 60
 Model: P43-C Medium Burn End Time: 180
 Tracking No.: 2470 Total Sampling Time: 360 min
 Project No.: 0135PS023E.REV002 Recording Interval: 1 min
 Test Date: 28-Aug-23
 Beginning Clock Time: 12:14 Background Sample Volume: 77.803 cubic feet

Meter Box Y Factor: 1.007 (1) 1.015 (2) 1.012 (Amb)

Barometric Pressure: Begin Middle End Average
30.13 30.09 30.11 "Hg

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: -0.380 "H₂O
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 18.88 ft/sec.
 Initial Tunnel Flow: 205.1 scfm
 Average Tunnel Flow: 206.6 scfm
 Post-Test Leak Check (1): 0.002 cfm @ 10 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.090	0.060	0.084	0.088	0.070	0.096
Temp:	116	116	116	116	116	116	116	116	116
	V _{strav} 19.28 ft/sec			V _{scnt} 21.38 ft/sec			F _p 0.902		

Elapsed Time (min)	Particulate Sampling Data											Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data					
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
344	56.236	56.218	0.16	0.16	1.27	92	1.99	0.95	92	1.50	96	0.095	99	100	0.6	-0.1	285	82	68	83	63	83	-0.045	4.24	0.010
345	56.400	56.381	0.16	0.16	1.27	92	1.99	0.95	92	1.50	96	0.095	99	99	0.6	0.0	285	82	68	83	63	82	-0.045	4.13	0.010
346	56.565	56.545	0.16	0.16	1.27	92	1.98	0.95	92	1.50	96	0.094	101	100	0.5	-0.1	286	82	68	83	63	82	-0.046	4.23	0.010
347	56.728	56.709	0.16	0.16	1.27	92	1.99	0.95	92	1.50	96	0.095	99	100	0.5	0.0	286	82	68	83	63	82	-0.045	4.06	0.010
348	56.892	56.872	0.16	0.16	1.27	92	1.99	0.94	92	1.50	96	0.095	99	99	0.5	0.0	286	82	68	83	63	82	-0.046	4.16	0.010
349	57.056	57.036	0.16	0.16	1.27	92	1.99	0.95	92	1.50	96	0.095	99	100	0.4	-0.1	284	82	68	83	63	81	-0.045	3.60	0.010
350	57.221	57.199	0.16	0.16	1.27	92	1.98	0.95	92	1.50	96	0.095	100	99	0.4	0.0	284	82	68	83	63	81	-0.045	3.86	0.010
351	57.385	57.362	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.096	99	98	0.4	0.0	282	82	68	83	63	81	-0.045	3.83	0.010
352	57.549	57.527	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.095	99	100	0.3	-0.1	281	82	68	83	63	81	-0.045	3.57	0.010
353	57.713	57.691	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.095	99	99	0.3	0.0	280	82	68	83	64	81	-0.045	3.72	0.010
354	57.878	57.854	0.16	0.16	1.28	92	1.98	0.95	92	1.50	95	0.094	100	99	0.3	0.0	281	82	68	83	64	81	-0.045	3.94	0.010
355	58.042	58.017	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.096	99	98	0.2	-0.1	281	82	68	83	64	81	-0.045	3.84	0.010
356	58.206	58.181	0.16	0.16	1.27	92	1.99	0.95	92	1.50	95	0.097	98	98	0.1	-0.1	281	82	68	83	64	81	-0.045	3.90	0.010
357	58.371	58.344	0.16	0.16	1.27	92	1.99	0.95	92	1.50	95	0.095	100	99	0.1	0.0	280	82	68	83	64	81	-0.046	3.72	0.010
358	58.535	58.509	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.095	99	100	0.1	0.0	281	82	68	83	64	81	-0.044	3.80	0.010
359	58.700	58.672	0.17	0.16	1.27	92	1.98	0.94	92	1.50	95	0.093	101	100	0.1	0.0	279	82	68	83	64	81	-0.044	3.62	0.010
360	58.864	58.835	0.16	0.16	1.27	92	1.98	0.95	92	1.50	95	0.095	99	99	0.0	-0.1	279	82	68	83	64	82	-0.045	3.81	0.010
Avg/Tot	58.864	58.835	0.16	0.16	1.27	90	1.97	0.95	91	1.50	100	0.09	100	100			316	82	65	82	60	80	-0.046	4.92	0.018

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer:	HHT	Equipment Numbers:	_____
Model:	P43-C		
Tracking No.:	2470		
Project No.:	0135PS023E.REV002		
Run #:	0	Technician Signature:	_____
Date:	8/28/23		

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
1 st hour Sub-Total, mg:					0.0

TRAIN 1 (Remainder of Test)

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F53	124.6	130.5	5.9
B. Rear filter catch	Filter	F54	122.2	122.2	0.0
C. Probe catch*	Probe	12	114284.9	114285.0	0.1
D. Filter seals catch*	Seals	S542	3312.5	3312.5	0.0
Remainder Sub-Total, mg:					6.0
Train 1 Aggregate, mg:					6.0

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F55	122.3	128.0	5.7
B. Rear filter catch	Filter	F56	124.7	124.8	0.1
C. Probe catch*	Probe	66.0	118455.6	118455.8	0.2
D. Filter seals catch*	Seals	S543	3385.2	3385.3	0.1
Train 2 Aggregate, mg:					6.1

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter	F57	124.8	124.8	0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: HHT
 Model: P43-C
 Project No.: 0135PS023E.REV002
 Tracking No.: 2470
 Run: 0
 Test Date: 08/28/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	1.30 g/hr
Total Particulate Emissions - E _T	7.82 g
Emissions Factor	0.93 g/kg
CSA B415 Efficiency	73.7% HHV

First Hour Emissions	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg

Burn Rate (Composite)	1.40 kg/hr dry	
Burn Rate (High)	2.78 kg/hr dry	
Burn Rate (Medium)	1.24 kg/hr dry	44.5% Of High
Burn Rate (Low)	1.06 kg/hr dry	38.0% Of High
Average Tunnel Temperature	100 degrees F	
Avg.Velocity in Dilution Tunnel - v _s	18.88 ft/second	
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12397.3 dscf/hour	
Average Δp	0.095 inches H2O	
Average ΔH	1.27 inches H2O	
Total Time of Test	360 minutes	

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: HHT
 Model: P43-C
 Project No.: 0135PS023E.REV002
 Tracking No.: 2470
 Run: 2
 Test Date: 08/28/23

Technician Signature: _____

	1 st Hour	Sample Train 1	Sample Train 2	Sample	Unit
Total Sample Volume - V_m		58.864	58.835	77.803	ft ³
Average Gas Meter Temperature		89.94	90.75	80	°F
Sample Volume (Std. Conditions) - V_{mstd}		57.427	57.726	77.443	dsf ³
Total Particulates - m_n		6.0	6.1	0	mg
Particulate Concentration - C_r/C_s	#DIV/0!	1.04E-04	1.06E-04	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	#DIV/0!	7.77	7.86	0.00	g
Particulate Emission Rate	#DIV/0!	1.30	1.31	0.00	g/hr
Emissions Factor	#DIV/0!	0.92	0.93		g/kg
Delta from Avg. Particulate Emissions		0.04	0.04		g

Quality Checks

Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	OK	Pro-Rate Variation	OK
Medium Burn Rate < 50%	OK	Dual Train Comparison	0.57%
		Train Precision g/kg	0.01

CSA B415.1 Results - Overall & By Category

Manufacturer: HHT
 Model: P43-C
 Date: 08/28/23

Run: Run: 2
 Control #: #REF!
 Test Duration: 360 mins

Test Results in Accordance with CSA B415.1-09 - Overall			
	HHV Basis	LHV Basis	
Overall Efficiency	73.7%	79.4%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	74%	79.8%	
Output Rate (kJ/h)	20,442	19,392	(Btu/h)
Burn Rate (kg/h)	1.40	3.10	(lb/h)
Input (kJ/h)	27,755	26,328	(Btu/h)
Test Load Weight (dry kg)	8.43	18.58	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	7.82		
CO (g)	37.42		
Test Duration (h)	6.00		
Emissions	Particulate	CO	
g/MJ Output	0.06	0.31	
g/kg Dry Fuel	0.93	4.44	
g/h	1.30	6.24	
lb/MM Btu Output	0.15	0.71	
Air/Fuel Ratio (A/F)	21.29		

Test Results in Accordance with CSA B415.1-09 - Maximum			
	HHV Basis	LHV Basis	
Overall Efficiency	74.5%	80.3%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	75%	80.7%	
Output Rate (kJ/h)	40,935	38,831	(Btu/h)
Burn Rate (kg/h)	2.78	6.13	(lb/h)
Input (kJ/h)	54,937	52,114	(Btu/h)
Test Load Weight (dry kg)	2.78	6.13	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	2.05		
CO (g)	21.53		
Test Duration (h)	1.00		
Emissions	Particulate	CO	
g/MJ Output	0.05	0.53	
g/kg Dry Fuel	0.74	7.74	
g/h	2.05	21.53	
lb/MM Btu Output	0.12	1.22	
Air/Fuel Ratio (A/F)	12.99		

Test Results in Accordance with CSA B415.1-09 - Medium			
	HHV Basis	LHV Basis	
Overall Efficiency	74.1%	79.9%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	74%	80.3%	
Output Rate (kJ/h)	18,129	17,197	(Btu/h)
Burn Rate (kg/h)	1.24	2.73	(lb/h)
Input (kJ/h)	24,464	23,207	(Btu/h)
Test Load Weight (dry kg)	2.48	5.47	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	-		
CO (g)	6.62		
Test Duration (h)	2.00		
Emissions	Particulate	CO	
g/MJ Output	-	0.18	
g/kg Dry Fuel	-	2.67	
g/h	-	3.31	
lb/MM Btu Output	-	0.42	
Air/Fuel Ratio (A/F)	22.34		

Test Results in Accordance with CSA B415.1-09 - Minimum			
	HHV Basis	LHV Basis	
Overall Efficiency	72.2%	77.9%	
Combustion Efficiency	99.5%	99.5%	
Heat Transfer Efficiency	73%	78.2%	
Output Rate (kJ/h)	15,090	14,315	(Btu/h)
Burn Rate (kg/h)	1.06	2.33	(lb/h)
Input (kJ/h)	20,888	19,814	(Btu/h)
Test Load Weight (dry kg)	3.17	6.99	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	-		
CO (g)	9.75		
Test Duration (h)	3.00		
Emissions	Particulate	CO	
g/MJ Output	-	0.22	
g/kg Dry Fuel	-	3.07	
g/h	-	3.25	
lb/MM Btu Output	-	0.50	
Air/Fuel Ratio (A/F)	26.01		

#REF! 2-2 12/14/2009

Modified to fit this Format

Table 1.1 - Particulate Emissions

	One-Hour Filter	Integrated Total
Emission Rate (g/hr)	2.050	1.303
Emission Factor (g/dry kg)	0.740	0.927

Table 1.2 - Efficiency and CO

	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
Time (minutes)	60	120	180	360 mins
Burn Rate (dry kg/hr)	2.780	1.240	1.060	1.400
Heat Input Rate (BTU/hr, HHV)	52,114	23,207	19,814	26,328
Heat Output Rate (BTU/hr, HHV)	38,831	17,197	14,315	19,392
Efficiency (% HHV)	74.5%	74.1%	72.2%	73.7%
Efficiency (% LHV)	80.3%	79.9%	77.9%	79.4%
CO Emission Rate (g/min)	0.36	0.06	0.05	0.104

Table 1.3 - Test Facility Conditions

	Initial	Middle	Final
Room Temperature (°F)	74	78	76
Barometric Pressure (in Hg)	30.13	0.00	30.09
Air Velocity (ft/min)	<50	<50	<50
Induced Draft (in H2O)	∅	∅	∅

EPA Application Format - Tables 1.1 & 1.2

Run #	Date	Setting	Burn Rate (dry kg/h)	Time (min)	Heat Output (Btu/hr)	Hourly PM ₁₀ (g/hr)	Total PM ₁₀ (g/hr)	CO Emissions (g/min)	Overall CO (g/hr)	Heating Efficiency (% HHV)	Overall Heating Efficiency (% HHV)
Run: 2	8/28/2023	H	2.78	60	38,831	2.05	1.303	0.36	6.237	74.5%	73.7%
		M	1.24	120	17,197			0.06		74.1%	
		L	1.06	180	14,315			0.05		72.2%	
		OA	1.40	360 mins	19,392			0.10		73.7%	

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

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: **2**

Manufacturer: HHT High Burn End Time: 60
 Model: P43-C Medium Burn End Time: _____
 Tracking No.: 2470 Total Sampling Time: 60 min
 Project No.: 0135PS023E.REV002 Recording Interval: 1 min
 Test Date: 28-Aug-23
 Beginning Clock Time: 12:14 Background Sample Volume: 77.803 cubic feet

Meter Box Y Factor: 1.014 (1) _____ (2) 1.012 (Amb)

Barometric Pressure: Begin Middle End Average
30.13 _____ 30.09 30.11 "Hg

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: -0.380 "H₂O
 Tunnel Area: 0.1963 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 19.09 ft/sec.
 Initial Tunnel Flow: 205.1 scfm
 Average Tunnel Flow: 202.9 scfm
 Post-Test Leak Check (1): 0.002 cfm @ 10 in. Hg
 Post-Test Leak Check (2): 0.000 cfm @ 7 in. Hg
 Fuel Moisture (%): 4.417 Dry Basis 4.230 Wet Basis

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.062	0.086	0.088	0.090	0.060	0.084	0.088	0.070	0.096
Temp:	116	116	116	116	116	116	116	116	116
	V _{strav} 19.28 ft/sec			V _{scnt} 21.38 ft/sec			F _p 0.902		

Elapsed Time (min)	Particulate Sampling Data											Fuel Weight (lb)		Temperature Data (°F)						Stack Gas Data					
	Gas Meter 1 (ft ³)	Gas Meter 2 (ft ³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H ₂ O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H ₂ O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Dryer 1	Filter 2	Dryer 2	Ambient	Draft ("H ₂ O)	CO ₂ (%)	CO (%)
43	9.335		0.22		2.18	80	1.71				117	0.093	100		21.8	-0.1	456	84	69			79	-0.050	8.97	0.070
44	9.552		0.22		2.16	80	1.91				117	0.093	100		21.7	-0.1	455	85	69			79	-0.051	8.33	0.020
45	9.768		0.22		2.18	80	1.75				117	0.093	100		21.6	-0.1	454	85	69			79	-0.050	8.26	0.010
46	9.986		0.22		2.17	80	1.77				117	0.095	100		21.5	-0.1	454	85	70			80	-0.048	8.93	0.110
47	10.202		0.22		2.18	80	1.40				117	0.095	99		21.4	-0.1	456	85	70			80	-0.049	9.63	0.240
48	10.419		0.22		2.18	80	1.91				117	0.095	99		21.2	-0.2	456	85	70			80	-0.050	9.08	0.180
49	10.636		0.22		2.17	80	1.88				117	0.096	99		21.1	-0.1	454	85	70			81	-0.050	8.49	0.030
50	10.853		0.22		2.18	80	1.50				117	0.092	101		21.0	-0.1	452	85	70			80	-0.050	7.93	0.010
51	11.070		0.22		2.17	80	1.43				116	0.095	99		20.9	-0.1	451	85	70			80	-0.050	7.99	0.010
52	11.286		0.22		2.18	80	1.65				116	0.093	100		20.8	-0.1	449	85	70			79	-0.050	7.87	0.020
53	11.504		0.22		2.16	80	1.47				116	0.094	100		20.7	-0.1	451	85	71			80	-0.048	8.90	0.130
54	11.720		0.22		2.17	80	1.83				117	0.093	100		20.6	-0.1	451	85	71			79	-0.050	8.67	0.020
55	11.937		0.22		2.18	80	1.89				116	0.095	99		20.5	-0.1	451	85	71			80	-0.050	8.24	0.020
56	12.154		0.22		2.15	80	1.41				116	0.095	99		20.4	-0.1	448	85	71			79	-0.049	7.39	0.010
57	12.371		0.22		2.19	81	1.70				116	0.093	100		20.3	-0.1	449	85	71			79	-0.049	8.35	0.020
58	12.588		0.22		2.17	80	1.91				116	0.094	100		20.2	-0.1	449	85	71			80	-0.051	8.52	0.040
59	12.804		0.22		2.18	81	1.75				116	0.093	100		20.1	-0.1	449	85	71			80	-0.050	8.47	0.030
60	13.022		0.22		2.18	81	1.81				116	0.094	100		20.0	-0.1	449	85	71			80	-0.049	8.00	0.010
Avg/Tot	13.022	0.000	0.22	#DIV/0!	2.16	79	1.65	#DIV/0!	#DIV/0!	#DIV/0!	116	0.09	100	#DIV/0!			453	83	66	#DIV/0!	#DIV/0!	80	-0.050	8.54	0.056

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer:	HHT	Equipment Numbers:	_____
Model:	P43-C		
Tracking No.:	2470		
Project No.:	0135PS023E.REV002		
Run #:	2	Technician Signature:	_____
Date:	8/28/23		

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter	F51	123.4	125.5	2.1
B. Rear filter catch	Filter	F52	124.5	124.6	0.1
C. Probe catch*	Probe	33.0	113944.0	113943.9	0.0
D. Filter seals catch*	Seals	S541	3399.9	3399.9	0.0
1 st hour Sub-Total, mg:					2.2

TRAIN 1 (Remainder of Test)

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Remainder Sub-Total, mg:					0.0
Train 1 Aggregate, mg:					0.0

TRAIN 2

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch	Filter				0.0
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0
Train 2 Aggregate, mg:					0.0

AMBIENT

Sample Component	Reagent	Filter, Probe or Seal #	Mass Readings		
			Tare, mg	Final, mg	Particulate, mg
A. Front filter catch*	Filter				0.0
Ambient Aggregate, 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 included in O-ring seal weights.

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: HHT
 Model: P43-C
 Project No.: 0135PS023E.REV002
 Tracking No.: 2470
 Run: 2
 Test Date: 08/28/23

Technician Signature: _____

Integrated Test Run	
Particulate Emission Rate	#DIV/0! g/hr
Total Particulate Emissions - E _T	#DIV/0! g
Emissions Factor	#DIV/0! g/kg
CSA B415 Efficiency	#DIV/0! HHV

First Hour Emissions	
Particulate Emission Rate	2.05 g/hr
Total Particulate Emissions - E _T	2.05 g
Emissions Factor	0.74 g/kg

Burn Rate (Composite)	2.78 kg/hr dry	
Burn Rate (High)	2.78 kg/hr dry	
Burn Rate (Medium)	#VALUE! kg/hr dry	#VALUE!
Burn Rate (Low)	#VALUE! kg/hr dry	#VALUE!
Average Tunnel Temperature	116 degrees F	
Avg.Velocity in Dilution Tunnel - v _s	19.09 ft/second	
Avg.Flow Rate in Dilution Tunnel - Q _{sd}	12173.8 dscf/hour	
Average Δp	0.094 inches H2O	
Average ΔH	2.16 inches H2O	
Total Time of Test	60 minutes	

ASTM E2779 / ASTM E2515 Emissions Results

Manufacturer: HHT
 Model: P43-C
 Project No.: 0135PS023E.REV002
 Tracking No.: 2470
 Run: 2
 Test Date: 08/28/23

Technician Signature: _____

	1 st Hour	1 st Hour	Sample Train 2	Sample	Unit
Total Sample Volume - V_m	13.022	13.022	0.000	77.803	ft ³
Average Gas Meter Temperature	79.49	79.49	#DIV/0!	80	°F
Sample Volume (Std. Conditions) - V_{mstd}	13.068	13.068	#DIV/0!	77.419	dsf ³
Total Particulates - m_n	2.2	0.0	0.0	0	mg
Particulate Concentration - C_r/C_s	1.683E-04	0.00E+00	#DIV/0!	0.00E+00	g/dsf ³
Total Particulate Emissions - E_T	2.05	0.00	#DIV/0!	0.00	g
Particulate Emission Rate	2.05	0.00	#DIV/0!	0.00	g/hr
Emissions Factor	0.74	0.00	#DIV/0!		g/kg
Delta from Avg. Particulate Emissions		#DIV/0!	#DIV/0!		g

Quality Checks			
Filter Temps < 90 °F	OK	Ambient Temp (55-90°F)	OK
Filter Face Velocity	OK	Negative Probe Weight	OK
Leakage Rate	#DIV/0!	Pro-Rate Variation	OK
Medium Burn Rate < 50%	#VALUE!	Dual Train Comparison	#DIV/0!

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/28/2023

Run: 2

Control #: 2470

Test Duration: 360

Output Category: Overall

Wood Moisture (% wet): 4.23

Load Weight (lb wet): 19.40

Burn Rate (dry kg/h): 1.40

Total Particulate Emissions: 7.82 g

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

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

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

Default Fuel Values

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

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

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Averages			#DIV/0!	316.28	80.01
		0.02	4.92	Temp. (°F)			
		Flue Gas Composition (%)			Flue Gas	Room Temp	
		CO	CO ₂	O ₂			
0	19.40	0.06	8.56		451.0	82.0	
1	19.30	0.03	8.44		452.0	81.0	
2	19.20	0.08	8.87		454.0	81.0	
3	19.10	0.07	9.09		455.0	80.0	
4	19.00	0.03	8.22		453.0	81.0	
5	18.90	0.03	8.23		452.0	82.0	
6	18.80	0.02	8.31		451.0	80.0	
7	18.60	0.08	8.79		452.0	82.0	
8	18.50	0.10	8.67		452.0	83.0	
9	18.40	0.12	8.69		451.0	80.0	
10	18.30	0.07	8.58		450.0	81.0	
11	18.20	0.12	8.87		451.0	82.0	
12	18.10	0.13	9.09		452.0	82.0	
13	18.00	0.11	8.97		453.0	82.0	
14	17.90	0.14	9.15		452.0	80.0	
15	17.80	0.02	8.97		454.0	81.0	
16	17.70	0.08	8.56		452.0	80.0	
17	17.60	0.04	8.37		452.0	81.0	
18	17.40	0.10	8.99		454.0	81.0	

19	17.30	0.04	8.21		453.0	80.0
20	17.20	0.02	8.52		454.0	80.0
21	17.10	0.03	7.87		453.0	80.0
22	17.00	0.02	7.63		450.0	80.0
23	16.90	0.11	8.61		451.0	81.0
24	16.80	0.07	7.93		449.0	80.0
25	16.70	0.05	8.54		452.0	79.0
26	16.60	0.04	9.04		454.0	81.0
27	16.50	0.02	8.34		454.0	79.0
28	16.40	0.02	8.93		455.0	80.0
29	16.30	0.02	8.28		453.0	79.0
30	16.20	0.05	8.51		453.0	79.0
31	16.10	0.01	8.23		454.0	80.0
32	16.00	0.09	8.67		454.0	80.0
33	15.90	0.02	8.15		454.0	79.0
34	15.70	0.06	9.04		455.0	80.0
35	15.60	0.03	8.58		455.0	80.0
36	15.50	0.08	8.93		455.0	80.0
37	15.40	0.06	8.76		455.0	80.0
38	15.30	0.06	8.51		455.0	79.0
39	15.20	0.02	7.89		454.0	80.0
40	15.10	0.04	8.55		455.0	80.0
41	15.00	0.02	9.08		459.0	80.0
42	14.90	0.02	8.62		457.0	79.0
43	14.80	0.07	8.97		456.0	79.0
44	14.70	0.02	8.33		455.0	79.0
45	14.60	0.01	8.26		454.0	79.0
46	14.50	0.11	8.93		454.0	80.0
47	14.40	0.24	9.63		456.0	80.0
48	14.20	0.18	9.08		456.0	80.0
49	14.10	0.03	8.49		454	81
50	14.00	0.01	7.93		452	80
51	13.90	0.01	7.99		451	80
52	13.80	0.02	7.87		449	79
53	13.70	0.13	8.9		451	80
54	13.60	0.02	8.67		451	79
55	13.50	0.02	8.24		451	80
56	13.40	0.01	7.39		448	79
57	13.30	0.02	8.35		449	79

58	13.20	0.04	8.52	449	80
59	13.10	0.03	8.47	449	80
60	13.00	0.01	8	449	80
61	12.90	0.02	8.23	448	81
62	12.80	0.01	7.38	442	80
63	12.70	0	6.26	426	82
64	12.70	0	5.82	412	79
65	12.60	0	5.32	402	79
66	12.60	0	5.17	393	79
67	12.50	0.01	4.37	383	80
68	12.40	0.01	4.6	377	80
69	12.40	0.01	4.52	370	82
70	12.40	0.01	4.58	366	82
71	12.30	0.02	4.12	359	81
72	12.30	0.01	4.18	355	81
73	12.20	0.01	4.32	347	82
74	12.20	0.01	4.31	336	83
75	12.10	0.01	4.42	329	80
76	12.10	0.01	4.4	323	82
77	12.00	0.01	4.75	319	82
78	12.00	0.02	4.44	315	81
79	11.90	0.01	4.69	312	82
80	11.90	0.01	5.01	310	81
81	11.80	0.01	4.79	308	80
82	11.80	0.01	4.79	307	81
83	11.70	0.02	4.67	305	82
84	11.70	0.01	4.74	304	81
85	11.60	0.01	4.77	303	82
86	11.60	0.02	4.51	301	82
87	11.60	0.01	4.49	298	81
88	11.50	0.02	4.18	296	80
89	11.50	0.01	4.45	295	80
90	11.40	0.02	4.72	295	82
91	11.40	0.01	5.07	296	81
92	11.30	0.01	4.66	295	79
93	11.30	0.01	4.56	293	79
94	11.20	0.01	4.49	292	81
95	11.20	0.01	4.25	291	80
96	11.10	0.01	4.66	290	81

97	11.10	0.01	4.33	289	80
98	11.10	0.01	4.23	287	79
99	11.00	0.01	4.62	286	80
100	11.00	0.01	4.3	285	79
101	10.90	0.01	4.47	285	80
102	10.90	0.01	4.81	286	81
103	10.90	0.01	4.62	285	81
104	10.80	0.01	4.93	286	80
105	10.70	0.01	4.89	287	79
106	10.70	0.01	4.88	286	81
107	10.60	0.01	4.64	286	80
108	10.60	0.01	4.44	286	79
109	10.60	0.01	4.68	285	80
110	10.50	0.02	4.24	284	81
111	10.50	0.01	4.42	283	78
112	10.40	0.01	4.27	281	80
113	10.40	0.01	4.39	281	79
114	10.30	0.01	4.54	280	80
115	10.30	0.02	4.9	281	81
116	10.20	0.01	4.72	280	82
117	10.20	0.01	4.14	278	81
118	10.20	0.01	4.13	277	80
119	10.10	0.01	4.26	276	80
120	10.10	0.01	4.18	274	79
121	10.00	0.01	4.4	273	78
122	10.00	0.01	4.68	274	79
123	9.90	0.01	4.75	275	78
124	9.90	0.01	4.26	274	79
125	9.90	0.01	4.22	273	79
126	9.80	0.01	4.34	272	79
127	9.80	0.01	4.54	273	78
128	9.70	0.01	4.49	273	78
129	9.70	0.01	4.67	275	78
130	9.60	0.01	4.6	275	78
131	9.60	0.01	4.79	277	78
132	9.50	0.01	4.57	276	78
133	9.50	0.01	4.53	275	78
134	9.40	0.01	4.32	275	78
135	9.40	0.01	4.73	275	79

136	9.30	0.01	4.57		276	79
137	9.30	0.01	4.31		275	78
138	9.30	0.01	4.58		276	78
139	9.20	0.01	4.14		275	78
140	9.20	0.01	4.38		276	79
141	9.10	0.01	4.92		278	79
142	9.10	0.01	4.61		279	78
143	9.00	0.01	4.56		279	78
144	9.00	0.01	4.24		278	79
145	8.90	0.01	4.24		277	78
146	8.90	0.01	4.36		277	78
147	8.90	0.01	4.45		277	79
148	8.80	0.01	4.95		278	78
149	8.70	0.01	4.9		280	78
150	8.70	0	5.09		281	78
151	8.60	0.01	5.24		282	79
152	8.60	0.01	4.26		281	79
153	8.60	0.01	4.34		280	79
154	8.50	0.01	4.87		281	80
155	8.50	0	5.06		282	78
156	8.40	0.01	4.88		283	78
157	8.40	0.01	4.85		283	78
158	8.30	0.01	4.67		283	78
159	8.30	0.02	4.72		283	79
160	8.20	0.02	4.65		283	79
161	8.20	0.02	4.82		284	79
162	8.10	0.01	4.73		283	78
163	8.10	0.01	4.6		282	79
164	8.00	0.01	4.34		282	79
165	8.00	0.01	4.33		281	78
166	7.90	0.01	4.05		279	79
167	7.90	0.01	4.15		278	79
168	7.80	0	4.65		278	80
169	7.80	0.01	4.32		277	79
170	7.80	0.01	4.32		276	78
171	7.70	0	4.21		275	79
172	7.70	0.01	4.09		274	79
173	7.60	0.01	4.49		273	79
174	7.60	0.01	4.7		273	79

175	7.50	0.01	4.38	273	80
176	7.50	0.02	4.9	274	79
177	7.40	0.01	4.59	273	79
178	7.40	0	4.44	273	79
179	7.40	0.01	4.5	273	79
180	7.30	0.01	4.35	272	79
181	7.20	0.02	4.44	294	79
182	7.20	0.04	4.99	317	79
183	7.10	0.04	4.62	328	79
184	7.10	0.04	3.87	322	80
185	7.10	0.03	3.27	306	80
186	7.00	0.02	3.01	295	81
187	7.00	0.03	3.04	289	80
188	6.90	0.02	3.23	285	80
189	6.90	0.02	3.18	282	79
190	6.90	0.02	3.49	282	79
191	6.80	0.02	3.46	281	79
192	6.80	0.02	3.14	279	79
193	6.80	0.02	3.35	278	79
194	6.70	0.02	3.56	277	79
195	6.70	0.02	3.44	276	79
196	6.70	0.01	3.64	276	80
197	6.60	0.01	3.68	277	79
198	6.60	0.01	3.88	278	80
199	6.50	0.01	3.94	278	80
200	6.50	0.01	4.55	281	79
201	6.40	0.01	4.2	282	80
202	6.40	0.02	3.79	282	81
203	6.40	0.02	3.71	282	79
204	6.30	0.01	4.12	282	79
205	6.30	0.01	3.93	283	80
206	6.20	0.01	3.81	283	79
207	6.20	0.01	3.96	283	81
208	6.10	0.01	4.07	284	80
209	6.10	0.01	4.34	285	79
210	6.10	0.01	4.18	286	80
211	6.00	0.01	3.71	284	79
212	6.00	0.01	3.81	284	80
213	5.90	0.01	3.92	284	79

214	5.90	0.01	4.1		283	80
215	5.90	0.01	4.14		284	79
216	5.80	0.01	4.03		283	80
217	5.80	0.01	4.27		283	79
218	5.70	0.01	4.66		285	80
219	5.70	0	4.43		286	80
220	5.60	0.01	4.08		286	79
221	5.60	0.01	4.34		287	79
222	5.50	0.01	4.12		286	79
223	5.50	0.02	4.03		286	81
224	5.50	0.02	3.7		285	79
225	5.50	0.01	3.59		284	81
226	5.40	0.01	3.68		284	80
227	5.30	0.01	3.47		283	80
228	5.30	0.01	4.05		284	81
229	5.30	0.01	3.82		283	83
230	5.30	0.01	3.6		282	81
231	5.20	0.01	3.79		282	82
232	5.20	0.01	3.87		282	84
233	5.10	0.01	3.77		283	80
234	5.10	0.01	3.92		283	82
235	5.00	0.01	4.14		283	80
236	5.00	0.01	4.05		284	82
237	4.90	0.01	3.95		284	81
238	4.90	0.01	3.85		283	81
239	4.90	0.01	3.86		283	81
240	4.80	0.01	3.81		282	81
241	4.80	0.01	3.85		282	81
242	4.70	0.01	3.79		282	80
243	4.70	0.01	3.73		282	82
244	4.70	0.01	3.97		282	82
245	4.60	0.01	3.8		281	82
246	4.60	0.01	3.88		281	83
247	4.50	0.01	4.12		282	82
248	4.50	0.01	4.08		282	82
249	4.50	0.01	3.74		282	82
250	4.40	0.01	3.83		282	81
251	4.40	0.01	3.75		281	80
252	4.30	0.01	3.81		280	79

253	4.30	0.01	3.94	279	80
254	4.30	0.01	3.74	279	80
255	4.20	0	4.17	279	80
256	4.20	0.01	4.02	279	79
257	4.10	0.01	4.24	280	80
258	4.10	0	4.31	281	79
259	4.00	0	3.94	281	80
260	4.00	0.01	3.6	281	79
261	4.00	0.01	3.93	281	80
262	3.90	0	4.39	283	79
263	3.90	0.01	4.84	286	80
264	3.80	0	4.33	287	80
265	3.80	0	3.73	285	79
266	3.70	0	3.73	283	79
267	3.70	0.01	3.7	282	80
268	3.70	0.01	3.51	281	80
269	3.60	0	3.66	279	80
270	3.60	0	3.62	278	80
271	3.60	0	3.72	279	79
272	3.50	0	4.18	279	79
273	3.50	0	4.07	280	80
274	3.40	0	3.83	280	80
275	3.40	0.01	3.9	280	80
276	3.30	0	3.9	280	79
277	3.30	0	4.12	281	80
278	3.30	0	4.23	283	79
279	3.20	0.01	3.83	283	80
280	3.20	0.01	3.94	283	79
281	3.20	0.01	3.79	284	80
282	3.10	0.01	3.85	284	80
283	3.10	0.01	3.92	284	80
284	3.00	0.01	3.77	284	80
285	3.00	0.01	3.92	285	80
286	3.00	0.01	4.11	286	80
287	2.90	0.01	3.72	286	80
288	2.90	0.01	3.79	285	79
289	2.80	0.01	3.93	286	80
290	2.80	0.01	3.85	286	79
291	2.80	0.01	3.98	286	79

292	2.70	0.01	3.61	285	79
293	2.70	0.01	3.72	284	80
294	2.70	0.01	3.9	285	80
295	2.60	0.01	3.61	285	80
296	2.60	0.01	3.82	285	80
297	2.50	0.01	3.7	285	79
298	2.50	0.01	3.7	284	79
299	2.40	0.01	3.53	283	79
300	2.40	0.01	3.67	283	80
301	2.40	0.01	3.47	282	80
302	2.30	0.01	3.74	282	80
303	2.30	0.01	3.77	282	80
304	2.20	0.01	3.94	282	80
305	2.20	0.01	4.17	283	79
306	2.20	0.01	3.97	282	79
307	2.10	0	3.9	282	80
308	2.10	0.01	3.86	282	79
309	2.10	0.01	3.88	282	80
310	2.00	0.01	3.8	281	80
311	2.00	0	3.75	282	80
312	1.90	0.01	3.74	282	80
313	1.90	0.01	3.93	283	81
314	1.90	0.01	3.81	283	80
315	1.90	0.01	3.86	283	81
316	1.80	0.01	3.96	284	81
317	1.70	0.01	3.82	284	81
318	1.70	0.01	4.33	286	81
319	1.70	0.01	4.14	287	80
320	1.60	0.01	3.81	287	83
321	1.60	0.01	3.57	286	82
322	1.50	0.01	3.54	285	83
323	1.50	0.01	3.53	283	82
324	1.50	0.01	3.59	282	82
325	1.40	0.01	3.55	281	82
326	1.40	0.01	3.84	281	82
327	1.30	0.01	3.87	281	81
328	1.30	0.01	3.78	282	81
329	1.30	0.01	3.75	281	80
330	1.20	0.01	3.98	281	81

331	1.20	0.01	4.19		282	81
332	1.10	0.01	3.88		282	80
333	1.10	0.01	3.96		283	80
334	1.10	0.01	3.97		283	80
335	1.00	0.01	3.85		283	80
336	1.00	0	3.76		282	80
337	0.90	0.01	4.2		283	80
338	0.90	0.01	4		283	81
339	0.90	0.01	4		283	80
340	0.80	0.01	4.28		284	80
341	0.80	0.01	3.83		284	80
342	0.70	0.01	4.07		284	80
343	0.70	0.01	4.11		285	81
344	0.60	0.01	4.24		285	83
345	0.60	0.01	4.13		285	82
346	0.50	0.01	4.23		286	82
347	0.50	0.01	4.06		286	82
348	0.50	0.01	4.16		286	82
349	0.40	0.01	3.6		284	81
350	0.40	0.01	3.86		284	81
351	0.40	0.01	3.83		282	81
352	0.30	0.01	3.57		281	81
353	0.30	0.01	3.72		280	81
354	0.30	0.01	3.94		281	81
355	0.20	0.01	3.84		281	81
356	0.10	0.01	3.9		281	81
357	0.10	0.01	3.72		280	81
358	0.10	0.01	3.8		281	81
359	0.10	0.01	3.62		279	81
360	0.00	0.01	3.81		279	82

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 08/28/23
Run: 2
Control #: 2470
Test Duration: 360
Output Category: Overall

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	73.7%	79.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74%	79.8%

Output Rate (kJ/h)	20,442	19,392	(Btu/h)
Burn Rate (kg/h)	1.40	3.10	(lb/h)
Input (kJ/h)	27,755	26,328	(Btu/h)

Test Load Weight (dry kg)	8.43	18.58	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	7.82		
CO (g)	37		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.06	0.31
g/kg Dry Fuel	0.93	4.44
g/h	1.30	6.24
lb/MM Btu Output	0.15	0.71

Air/Fuel Ratio (A/F)	21.29
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/28/2023

Run: 2

Control #: 2470

Test Duration: 60

Output Category: High

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 6.40
Burn Rate (dry kg/h): 2.78
Total Particulate Emissions: 2.05 g

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

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

Averages 0.06 8.54 #DIV/0! 452.79 80.18
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp. (°F)	Room Temp
		CO	CO ₂	O ₂		
0	6.40	0.06	8.56		451.0	82.0
1	6.30	0.03	8.44		452.0	81.0
2	6.20	0.08	8.87		454.0	81.0
3	6.10	0.07	9.09		455.0	80.0
4	6.00	0.03	8.22		453.0	81.0
5	5.90	0.03	8.23		452.0	82.0
6	5.80	0.02	8.31		451.0	80.0
7	5.60	0.08	8.79		452.0	82.0
8	5.50	0.10	8.67		452.0	83.0
9	5.40	0.12	8.69		451.0	80.0
10	5.30	0.07	8.58		450.0	81.0
11	5.20	0.12	8.87		451.0	82.0
12	5.10	0.13	9.09		452.0	82.0
13	5.00	0.11	8.97		453.0	82.0
14	4.90	0.14	9.15		452.0	80.0
15	4.80	0.02	8.97		454.0	81.0
16	4.70	0.08	8.56		452.0	80.0
17	4.60	0.04	8.37		452.0	81.0
18	4.40	0.10	8.99		454.0	81.0

19	4.30	0.04	8.21		453.0	80.0
20	4.20	0.02	8.52		454.0	80.0
21	4.10	0.03	7.87		453.0	80.0
22	4.00	0.02	7.63		450.0	80.0
23	3.90	0.11	8.61		451.0	81.0
24	3.80	0.07	7.93		449.0	80.0
25	3.70	0.05	8.54		452.0	79.0
26	3.60	0.04	9.04		454.0	81.0
27	3.50	0.02	8.34		454.0	79.0
28	3.40	0.02	8.93		455.0	80.0
29	3.30	0.02	8.28		453.0	79.0
30	3.20	0.05	8.51		453.0	79.0
31	3.10	0.01	8.23		454.0	80.0
32	3.00	0.09	8.67		454.0	80.0
33	2.90	0.02	8.15		454.0	79.0
34	2.70	0.06	9.04		455.0	80.0
35	2.60	0.03	8.58		455.0	80.0
36	2.50	0.08	8.93		455.0	80.0
37	2.40	0.06	8.76		455.0	80.0
38	2.30	0.06	8.51		455.0	79.0
39	2.20	0.02	7.89		454.0	80.0
40	2.10	0.04	8.55		455.0	80.0
41	2.00	0.02	9.08		459.0	80.0
42	1.90	0.02	8.62		457.0	79.0
43	1.80	0.07	8.97		456.0	79.0
44	1.70	0.02	8.33		455.0	79.0
45	1.60	0.01	8.26		454.0	79.0
46	1.50	0.11	8.93		454.0	80.0
47	1.40	0.24	9.63		456.0	80.0
48	1.20	0.18	9.08		456.0	80.0
49	1.10	0.03	8.49		454	81
50	1.00	0.01	7.93		452	80
51	0.90	0.01	7.99		451	80
52	0.80	0.02	7.87		449	79
53	0.70	0.13	8.9		451	80
54	0.60	0.02	8.67		451	79
55	0.50	0.02	8.24		451	80
56	0.40	0.01	7.39		448	79
57	0.30	0.02	8.35		449	79

58	0.20	0.04	8.52		449	80
59	0.10	0.03	8.47		449	80
60	0.00	0.01	8		449	80

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologie:
Model: P43-C
Date: 08/28/23
Run: 2
Control #: 2470
Test Duration: 60
Output Category: High

Technicians: _____

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.5%	80.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75%	80.7%

Output Rate (kJ/h)	40,935	38,831	(Btu/h)
Burn Rate (kg/h)	2.78	6.13	(lb/h)
Input (kJ/h)	54,937	52,114	(Btu/h)

Test Load Weight (dry kg)	2.78	6.13	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	2.05		
CO (g)	22		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	0.05	0.53
g/kg Dry Fuel	0.74	7.74
g/h	2.05	21.53
lb/MM Btu Output	0.12	1.22

Air/Fuel Ratio (A/F)	12.99
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/28/2023

Run: 2

Control #: 2470

Test Duration: 120

Output Category: Medium

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 5.70
Burn Rate (dry kg/h): 1.24
Total Particulate Emissions: 0 g

Fuel Data

HHV	19,755	kJ/kg
%C	50	
%H	6.6	
%O	42.84	
%Ash	0.56	

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

Averages 0.01 4.66 #DIV/0! 297.25 79.56
Temp. (°F)

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	5.70	0.01	8.00		449.0	80.0
1	5.60	0.02	8.23		448.0	81.0
2	5.50	0.01	7.38		442.0	80.0
3	5.40	0.00	6.26		426.0	82.0
4	5.40	0.00	5.82		412.0	79.0
5	5.30	0.00	5.32		402.0	79.0
6	5.30	0.00	5.17		393.0	79.0
7	5.20	0.01	4.37		383.0	80.0
8	5.10	0.01	4.60		377.0	80.0
9	5.10	0.01	4.52		370.0	82.0
10	5.10	0.01	4.58		366.0	82.0
11	5.00	0.02	4.12		359.0	81.0
12	5.00	0.01	4.18		355.0	81.0
13	4.90	0.01	4.32		347.0	82.0
14	4.90	0.01	4.31		336.0	83.0
15	4.80	0.01	4.42		329.0	80.0
16	4.80	0.01	4.40		323.0	82.0
17	4.70	0.01	4.75		319.0	82.0
18	4.70	0.02	4.44		315.0	81.0

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

19	4.60	0.01	4.69		312.0	82.0
20	4.60	0.01	5.01		310.0	81.0
21	4.50	0.01	4.79		308.0	80.0
22	4.50	0.01	4.79		307.0	81.0
23	4.40	0.02	4.67		305.0	82.0
24	4.40	0.01	4.74		304.0	81.0
25	4.30	0.01	4.77		303.0	82.0
26	4.30	0.02	4.51		301.0	82.0
27	4.30	0.01	4.49		298.0	81.0
28	4.20	0.02	4.18		296.0	80.0
29	4.20	0.01	4.45		295.0	80.0
30	4.10	0.02	4.72		295.0	82.0
31	4.10	0.01	5.07		296.0	81.0
32	4.00	0.01	4.66		295.0	79.0
33	4.00	0.01	4.56		293.0	79.0
34	3.90	0.01	4.49		292.0	81.0
35	3.90	0.01	4.25		291.0	80.0
36	3.80	0.01	4.66		290.0	81.0
37	3.80	0.01	4.33		289.0	80.0
38	3.80	0.01	4.23		287.0	79.0
39	3.70	0.01	4.62		286.0	80.0
40	3.70	0.01	4.30		285.0	79.0
41	3.60	0.01	4.47		285.0	80.0
42	3.60	0.01	4.81		286.0	81.0
43	3.60	0.01	4.62		285.0	81.0
44	3.50	0.01	4.93		286.0	80.0
45	3.40	0.01	4.89		287.0	79.0
46	3.40	0.01	4.88		286.0	81.0
47	3.30	0.01	4.64		286.0	80.0
48	3.30	0.01	4.44		286.0	79.0
49	3.30	0.01	4.68		285	80
50	3.20	0.02	4.24		284	81
51	3.20	0.01	4.42		283	78
52	3.10	0.01	4.27		281	80
53	3.10	0.01	4.39		281	79
54	3.00	0.01	4.54		280	80
55	3.00	0.02	4.9		281	81
56	2.90	0.01	4.72		280	82
57	2.90	0.01	4.14		278	81

58	2.90	0.01	4.13		277	80
59	2.80	0.01	4.26		276	80
60	2.80	0.01	4.18		274	79
61	2.70	0.01	4.4		273	78
62	2.70	0.01	4.68		274	79
63	2.60	0.01	4.75		275	78
64	2.60	0.01	4.26		274	79
65	2.60	0.01	4.22		273	79
66	2.50	0.01	4.34		272	79
67	2.50	0.01	4.54		273	78
68	2.40	0.01	4.49		273	78
69	2.40	0.01	4.67		275	78
70	2.30	0.01	4.6		275	78
71	2.30	0.01	4.79		277	78
72	2.20	0.01	4.57		276	78
73	2.20	0.01	4.53		275	78
74	2.10	0.01	4.32		275	78
75	2.10	0.01	4.73		275	79
76	2.00	0.01	4.57		276	79
77	2.00	0.01	4.31		275	78
78	2.00	0.01	4.58		276	78
79	1.90	0.01	4.14		275	78
80	1.90	0.01	4.38		276	79
81	1.80	0.01	4.92		278	79
82	1.80	0.01	4.61		279	78
83	1.70	0.01	4.56		279	78
84	1.70	0.01	4.24		278	79
85	1.60	0.01	4.24		277	78
86	1.60	0.01	4.36		277	78
87	1.60	0.01	4.45		277	79
88	1.50	0.01	4.95		278	78
89	1.40	0.01	4.9		280	78
90	1.40	0	5.09		281	78
91	1.30	0.01	5.24		282	79
92	1.30	0.01	4.26		281	79
93	1.30	0.01	4.34		280	79
94	1.20	0.01	4.87		281	80
95	1.20	0	5.06		282	78
96	1.10	0.01	4.88		283	78

97	1.10	0.01	4.85		283	78
98	1.00	0.01	4.67		283	78
99	1.00	0.02	4.72		283	79
100	0.90	0.02	4.65		283	79
101	0.90	0.02	4.82		284	79
102	0.80	0.01	4.73		283	78
103	0.80	0.01	4.6		282	79
104	0.70	0.01	4.34		282	79
105	0.70	0.01	4.33		281	78
106	0.60	0.01	4.05		279	79
107	0.60	0.01	4.15		278	79
108	0.50	0	4.65		278	80
109	0.50	0.01	4.32		277	79
110	0.50	0.01	4.32		276	78
111	0.40	0	4.21		275	79
112	0.40	0.01	4.09		274	79
113	0.30	0.01	4.49		273	79
114	0.30	0.01	4.7		273	79
115	0.20	0.01	4.38		273	80
116	0.20	0.02	4.9		274	79
117	0.10	0.01	4.59		273	79
118	0.10	0	4.44		273	79
119	0.10	0.01	4.5		273	79
120	0.00	0.01	4.35		272	79

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 08/28/23
Run: 2
Control #: 2470
Test Duration: 120
Output Category: Medium

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.1%	79.9%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74%	80.3%

Output Rate (kJ/h)	18,129	17,197	(Btu/h)
Burn Rate (kg/h)	1.24	2.73	(lb/h)
Input (kJ/h)	24,464	23,207	(Btu/h)

Test Load Weight (dry kg)	2.48	5.46	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0		
CO (g)	7		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	0.00	0.18
g/kg Dry Fuel	0.00	2.67
g/h	0.00	3.31
lb/MM Btu Output	0.00	0.42

Air/Fuel Ratio (A/F)	22.34
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VERSION:

2.4

4/15/2010

VERSION: 2.4 4/15/2010

Manufacturer: Hearth & Home Technologies

Model: P43-C

Date: 8/28/2023

Run: 2

Control #: 2470

Test Duration: 180

Output Category: Low

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

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

Default Fuel Values

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

Wood Moisture (% wet): 4.23
Load Weight (lb wet): 7.30
Burn Rate (dry kg/h): 1.06
Total Particulate Emissions: 0 g

Fuel Data

HHV 19,755 kJ/kg
%C 50
%H 6.6
%O 42.84
%Ash 0.56

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

Averages 0.01 3.88 #DIV/0! 283.49 80.25
Temp. (°F)

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

Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%)			Flue Gas Temp.	Room Temp
		CO	CO ₂	O ₂		
0	7.30	0.01	4.35		272.0	79.0
1	7.20	0.02	4.44		294.0	79.0
2	7.20	0.04	4.99		317.0	79.0
3	7.10	0.04	4.62		328.0	79.0
4	7.10	0.04	3.87		322.0	80.0
5	7.10	0.03	3.27		306.0	80.0
6	7.00	0.02	3.01		295.0	81.0
7	7.00	0.03	3.04		289.0	80.0
8	6.90	0.02	3.23		285.0	80.0
9	6.90	0.02	3.18		282.0	79.0
10	6.90	0.02	3.49		282.0	79.0
11	6.80	0.02	3.46		281.0	79.0
12	6.80	0.02	3.14		279.0	79.0
13	6.80	0.02	3.35		278.0	79.0
14	6.70	0.02	3.56		277.0	79.0
15	6.70	0.02	3.44		276.0	79.0
16	6.70	0.01	3.64		276.0	80.0
17	6.60	0.01	3.68		277.0	79.0
18	6.60	0.01	3.88		278.0	80.0

19	6.50	0.01	3.94		278.0	80.0
20	6.50	0.01	4.55		281.0	79.0
21	6.40	0.01	4.20		282.0	80.0
22	6.40	0.02	3.79		282.0	81.0
23	6.40	0.02	3.71		282.0	79.0
24	6.30	0.01	4.12		282.0	79.0
25	6.30	0.01	3.93		283.0	80.0
26	6.20	0.01	3.81		283.0	79.0
27	6.20	0.01	3.96		283.0	81.0
28	6.10	0.01	4.07		284.0	80.0
29	6.10	0.01	4.34		285.0	79.0
30	6.10	0.01	4.18		286.0	80.0
31	6.00	0.01	3.71		284.0	79.0
32	6.00	0.01	3.81		284.0	80.0
33	5.90	0.01	3.92		284.0	79.0
34	5.90	0.01	4.10		283.0	80.0
35	5.90	0.01	4.14		284.0	79.0
36	5.80	0.01	4.03		283.0	80.0
37	5.80	0.01	4.27		283.0	79.0
38	5.70	0.01	4.66		285.0	80.0
39	5.70	0.00	4.43		286.0	80.0
40	5.60	0.01	4.08		286.0	79.0
41	5.60	0.01	4.34		287.0	79.0
42	5.50	0.01	4.12		286.0	79.0
43	5.50	0.02	4.03		286.0	81.0
44	5.50	0.02	3.70		285.0	79.0
45	5.50	0.01	3.59		284.0	81.0
46	5.40	0.01	3.68		284.0	80.0
47	5.30	0.01	3.47		283.0	80.0
48	5.30	0.01	4.05		284.0	81.0
49	5.30	0.01	3.82		283	83
50	5.30	0.01	3.6		282	81
51	5.20	0.01	3.79		282	82
52	5.20	0.01	3.87		282	84
53	5.10	0.01	3.77		283	80
54	5.10	0.01	3.92		283	82
55	5.00	0.01	4.14		283	80
56	5.00	0.01	4.05		284	82
57	4.90	0.01	3.95		284	81

58	4.90	0.01	3.85	283	81
59	4.90	0.01	3.86	283	81
60	4.80	0.01	3.81	282	81
61	4.80	0.01	3.85	282	81
62	4.70	0.01	3.79	282	80
63	4.70	0.01	3.73	282	82
64	4.70	0.01	3.97	282	82
65	4.60	0.01	3.8	281	82
66	4.60	0.01	3.88	281	83
67	4.50	0.01	4.12	282	82
68	4.50	0.01	4.08	282	82
69	4.50	0.01	3.74	282	82
70	4.40	0.01	3.83	282	81
71	4.40	0.01	3.75	281	80
72	4.30	0.01	3.81	280	79
73	4.30	0.01	3.94	279	80
74	4.30	0.01	3.74	279	80
75	4.20	0	4.17	279	80
76	4.20	0.01	4.02	279	79
77	4.10	0.01	4.24	280	80
78	4.10	0	4.31	281	79
79	4.00	0	3.94	281	80
80	4.00	0.01	3.6	281	79
81	4.00	0.01	3.93	281	80
82	3.90	0	4.39	283	79
83	3.90	0.01	4.84	286	80
84	3.80	0	4.33	287	80
85	3.80	0	3.73	285	79
86	3.70	0	3.73	283	79
87	3.70	0.01	3.7	282	80
88	3.70	0.01	3.51	281	80
89	3.60	0	3.66	279	80
90	3.60	0	3.62	278	80
91	3.60	0	3.72	279	79
92	3.50	0	4.18	279	79
93	3.50	0	4.07	280	80
94	3.40	0	3.83	280	80
95	3.40	0.01	3.9	280	80
96	3.30	0	3.9	280	79

97	3.30	0	4.12		281	80
98	3.30	0	4.23		283	79
99	3.20	0.01	3.83		283	80
100	3.20	0.01	3.94		283	79
101	3.20	0.01	3.79		284	80
102	3.10	0.01	3.85		284	80
103	3.10	0.01	3.92		284	80
104	3.00	0.01	3.77		284	80
105	3.00	0.01	3.92		285	80
106	3.00	0.01	4.11		286	80
107	2.90	0.01	3.72		286	80
108	2.90	0.01	3.79		285	79
109	2.80	0.01	3.93		286	80
110	2.80	0.01	3.85		286	79
111	2.80	0.01	3.98		286	79
112	2.70	0.01	3.61		285	79
113	2.70	0.01	3.72		284	80
114	2.70	0.01	3.9		285	80
115	2.60	0.01	3.61		285	80
116	2.60	0.01	3.82		285	80
117	2.50	0.01	3.7		285	79
118	2.50	0.01	3.7		284	79
119	2.40	0.01	3.53		283	79
120	2.40	0.01	3.67		283	80
121	2.40	0.01	3.47		282	80
122	2.30	0.01	3.74		282	80
123	2.30	0.01	3.77		282	80
124	2.20	0.01	3.94		282	80
125	2.20	0.01	4.17		283	79
126	2.20	0.01	3.97		282	79
127	2.10	0	3.9		282	80
128	2.10	0.01	3.86		282	79
129	2.10	0.01	3.88		282	80
130	2.00	0.01	3.8		281	80
131	2.00	0	3.75		282	80
132	1.90	0.01	3.74		282	80
133	1.90	0.01	3.93		283	81
134	1.90	0.01	3.81		283	80
135	1.90	0.01	3.86		283	81

136	1.80	0.01	3.96	284	81
137	1.70	0.01	3.82	284	81
138	1.70	0.01	4.33	286	81
139	1.70	0.01	4.14	287	80
140	1.60	0.01	3.81	287	83
141	1.60	0.01	3.57	286	82
142	1.50	0.01	3.54	285	83
143	1.50	0.01	3.53	283	82
144	1.50	0.01	3.59	282	82
145	1.40	0.01	3.55	281	82
146	1.40	0.01	3.84	281	82
147	1.30	0.01	3.87	281	81
148	1.30	0.01	3.78	282	81
149	1.30	0.01	3.75	281	80
150	1.20	0.01	3.98	281	81
151	1.20	0.01	4.19	282	81
152	1.10	0.01	3.88	282	80
153	1.10	0.01	3.96	283	80
154	1.10	0.01	3.97	283	80
155	1.00	0.01	3.85	283	80
156	1.00	0	3.76	282	80
157	0.90	0.01	4.2	283	80
158	0.90	0.01	4	283	81
159	0.90	0.01	4	283	80
160	0.80	0.01	4.28	284	80
161	0.80	0.01	3.83	284	80
162	0.70	0.01	4.07	284	80
163	0.70	0.01	4.11	285	81
164	0.60	0.01	4.24	285	83
165	0.60	0.01	4.13	285	82
166	0.50	0.01	4.23	286	82
167	0.50	0.01	4.06	286	82
168	0.50	0.01	4.16	286	82
169	0.40	0.01	3.6	284	81
170	0.40	0.01	3.86	284	81
171	0.40	0.01	3.83	282	81
172	0.30	0.01	3.57	281	81
173	0.30	0.01	3.72	280	81
174	0.30	0.01	3.94	281	81

175	0.20	0.01	3.84		281	81
176	0.10	0.01	3.9		281	81
177	0.10	0.01	3.72		280	81
178	0.10	0.01	3.8		281	81
179	0.10	0.01	3.62		279	81
180	0.00	0.01	3.81		279	82

OMNI-Test Laboratories, Inc.

Manufacturer: & Home Technologies
Model: P43-C
Date: 08/28/23
Run: 2
Control #: 2470
Test Duration: 180
Output Category: Low

Technicians:

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	72.2%	77.9%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	73%	78.2%

Output Rate (kJ/h)	15,090	14,315	(Btu/h)
Burn Rate (kg/h)	1.06	2.33	(lb/h)
Input (kJ/h)	20,888	19,814	(Btu/h)

Test Load Weight (dry kg)	3.17	6.99	dry lb
MC wet (%)	4.23		
MC dry (%)	4.42		
Particulate (g)	0		
CO (g)	10		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	0.00	0.22
g/kg Dry Fuel	0.00	3.07
g/h	0.00	3.25
lb/MM Btu Output	0.00	0.50

Air/Fuel Ratio (A/F)	26.01
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VERSION:

2.4

4/15/2010

ASTM E2780 Wood Heater Run Sheets

Client: HHT Project Number: 0135P50230 Run Number: 2
 Model: P43C Tracking Number: 2470 Date: 8-28-2023
 Test Crew: BT
 OMNI Equipment ID numbers: _____

Wood Heater Supplemental Data

Start Time: 12:14 Booth #: 1
11:14

Stop Time: 18:14

Stack Gas Leak Check:

Initial: ✓ Final: ✓

Sample Train Leak Check:

A: 0.002 @ 9.9"Hg

B: 0.00 @ 7.9"Hg

1st hour 0.004 17.00

Calibrations: Span Gas CO₂: 16.84 CO: 4.38 ppm 500

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	<u>0958</u>	<u>0959</u>	<u>1816</u>	<u>1819</u>
CO ₂	<u>0</u>	<u>16.84</u>	<u>0.00</u>	<u>16.79</u>
CO	<u>0</u>	<u>4.379</u>	<u>0.002</u>	<u>4.377</u>

ppm 0 499.3 1 501.9

Air Velocity (ft/min): Initial: 10.0 ✓ Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: ✓ Final: ✓

Stack Diameter (in): PV

Induced Draft: 0

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 08-03-23 Initials: 100

	Initial	Middle	Ending
P ₀ (in/Hg)	<u>30.13</u>		<u>30.09</u>
RH (%)	<u>54</u>		<u>49</u>
Ambient (°F)	<u>80</u>		<u>80</u>

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
<u>0.048</u> ⁰³¹	<u>.062</u>	<u>116</u>
<u>.043</u>	<u>.086</u>	<u>116</u>
<u>.044</u>	<u>.088</u>	<u>116</u>
<u>.045</u>	<u>.090</u>	<u>116</u>
<u>.030</u>	<u>.060</u>	<u>116</u>
<u>0.037</u> ⁰⁴²	<u>.084</u>	<u>116</u>
<u>.044</u>	<u>.088</u>	<u>116</u>
<u>.035</u>	<u>.070</u>	<u>116</u>
Center:		
<u>.048</u>	<u>.096</u>	<u>116</u>

Background Filter Volume: 77.803

Technician Signature: [Signature]

Tunnel Static Pressure (in H ₂ O):	
Beginning of Test	End of Test
<u>-0.38</u>	<u>-0.38</u>

Date: 08-28-2023

ASTM E2780 Wood Heater Run Sheets

Client: HHT Project Number: 0135P5023E Run Number: 2
 Model: P43C Tracking Number: 2470 Date: 08-28-23
 Test Crew: PT
 OMNI Equipment ID numbers: _____

Wood Heater Run Notes

Air Control Settings

Primary:

Secondary:

N/A

Tertiary/Pilot:

Fan:

Preburn Notes

Time	Notes

Test Notes

Sketch test fuel configuration:

N/A

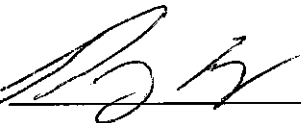
Start up procedures & Timeline:

Bypass: N/A
 Fuel loaded by: _____
 Door closed at: _____
 Primary air: _____

Notes:

Time	Notes
<u>1314</u>	<u>High Burn ended</u>
<u>1514</u>	<u>Medium Burn End</u>
<u>1814</u>	<u>Test complete</u>

Technician Signature: _____



Date: 08-28-2023

ASTM E2780 Wood Heater Run Sheets

Client: HHT Project Number: 0135PS023E Run Number: 2
 Model: P43 Tracking Number: _____ Date: 8/28/2023
 Test Crew: RT KM
 OMNI Equipment ID numbers: _____

ASTM E2515 Lab Sheet

Assembled By:

Riley Tieg

Date/Time in Dessicator:

08/28/2023 1400 (First hour)
08/28/2023 1830 (Train A+B)

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time: <u>08-29-2023</u>	Date/Time: <u>08-29-2023</u>	Date/Time: <u>09-05-23</u>	Date/Time:	Date/Time:
R/H %: <u>14.5</u>	R/H %: <u>15.5</u>	R/H %: <u>16.6</u>	R/H %:	R/H %:
Temp: <u>78.1</u>	Temp: <u>75.1</u>	Temp: <u>73.7</u>	Temp:	Temp:
200 mg Audit: <u>200.1</u>	200 mg Audit: <u>200.0</u>	200 mg Audit: <u>200.1</u>	200 mg Audit:	200 mg Audit:
2 g Audit: <u>2000.4</u>	2 g Audit: <u>2000.3</u>	2 g Audit: <u>2000.3</u>	2 g Audit:	2 g Audit:
100 g Audit: <u>99998.0</u>	100 g Audit: <u>99998.1</u>	100 g Audit: <u>99997.9</u>	100 g Audit:	100 g Audit:
Initials: <u>RT</u>	Initials: <u>RT</u>	Initials: <u>RT</u>	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	<u>F51</u>	<u>123.4</u> ✓	<u>125.5</u>	<u>125.5</u> ✓			
	Rear Filter	<u>F52</u>	<u>124.5</u> ✓	<u>124.6</u>	<u>124.6</u> ✓			
	Probe	<u>33</u>	<u>113944.0</u> ✓	<u>113943.9</u>	<u>113943.9</u> ✓			
	O-Ring Set	<u>5541</u>	<u>3399.9</u> ✓	<u>3403.1</u>	<u>3399.9</u>	<u>3399.9</u> ✓		
A (Remainder)	Front Filter	<u>F53</u>	<u>124.6</u> ✓	<u>130.5</u>	<u>130.5</u> ✓			
	Rear Filter	<u>F54</u>	<u>122.2</u> ✓	<u>122.4</u>	<u>122.2</u> ✓			
	Probe	<u>12</u>	<u>114284.9</u> ✓	<u>114285.1</u>	<u>114285.0</u> ✓			
	O-Ring Set	<u>5542</u>	<u>3312.5</u> ✓	<u>3315.8</u>	<u>3312.5</u>	<u>3312.5</u> ✓		
B	Front Filter	<u>F55</u>	<u>122.3</u> ✓	<u>128.0</u>	<u>128.0</u> ✓			
	Rear Filter	<u>F56</u>	<u>124.7</u> ✓	<u>129.9</u>	<u>124.8</u> ✓			
	Probe	<u>66</u>	<u>118455.6</u> ✓	<u>118455.9</u>	<u>118455.8</u> ✓			
	O-Ring Set	<u>5543</u>	<u>3385.2</u> ✓	<u>3389.3</u>	<u>3385.3</u>	<u>3385.3</u> ✓		
BG	Filter	<u>F57</u>	<u>124.8</u> ✓	<u>124.8</u>	<u>124.8</u> ✓			

Technician Signature: [Signature]

Date: 09-05-2023

Tare Sheet: (check one)

Probes _____

47mm Filters

100mm Filters _____

O-Ring Pair _____

Prepared By: Tony Tony

Balance ID #: 00637

Thermohyrometer ID #: 00709

Audit Weight ID #/Mass: 002834 / 200mg

Placed in Dessicator:

Date: 07/17/23

Time: 16:00

ID #	Date: <u>07/18/23</u> Time: <u>16:30</u> RH %: <u>21.7</u> T (°F): <u>78.9</u> Audit: <u>200.1</u>	Date: <u>07/19/23</u> Time: <u>14:00</u> RH %: <u>22.6</u> T (°F): <u>78.6</u> Audit: <u>200.1</u>	Date: <u>07/20/23</u> Time: <u>7:30</u> RH %: <u>17.9</u> T (°F): <u>78.0</u> Audit: <u>200.0</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
F41	124.8	124.9			08/07/23	0135PS023E	1
F42	123.0	123.0					
F43	124.5	124.7					
F44	124.8	124.9			08-15-25	055ZU5003E	6
F45	123.1	123.2					
F46	123.2	123.3					
F47	123.6	123.6					
F48	124.9	124.9					
F49	122.8	123.1	123.0				
F50	125.1	125.1					
F51	123.3	123.4					
F52	124.6	124.5			08-28-2022	0135PS023E	2
F53	124.5	124.6					
F54	122.1	122.2					
F55	122.3	122.3					
F56	124.8	124.7					
F57	124.7	124.8					
F58	122.4	122.5			NOT used		
F59	124.5	124.6					
F60	122.3	122.3					

Initials:	TT	TT	TT	TT
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Final Technician Signature: Tony Tony
Control No. P-SFDP-0002.xls, Effective date: 2/19/017

Date: 07/20/23

Evaluator signature: [Signature]

Tare Sheet: (check one) Probes Balance ID #: 47mm Filters Thermohyrometer ID #: 100mm Filters O-Ring Pair 1
 Prepared By: Riley Tiggs

Placed in	Date: <u>7-17-23</u>		Date: <u>07/19/23</u>		Date: _____		Date Used	Project Number	Run No.
	Time: <u>1200</u>	Time: <u>14:50</u>	Time: _____	Time: _____	Time: _____				
Desiccator: <u>62723</u>	RH %: <u>16.4</u>	RH %: <u>16.9</u>	RH %: _____	RH %: _____	RH %: _____				
Date: <u>7-17-23</u>	T (°F): <u>77.5</u>	T (°F): <u>78.4</u>	T (°F): _____	T (°F): _____	T (°F): _____				
Time: <u>12050900</u>	Audit: <u>99997.9</u>	Audit: <u>99997.9</u>	Audit: _____	Audit: _____	Audit: _____				

ID #	Date: _____	Date: _____	Date: _____	Date: _____	Date Used	Project Number	Run No.
68	116878.9	116878.8	116878.8	116878.8	08/07/23	0135PS023E	1
28	114751.2	114751.2	114751.2	114751.2	07/24/23	0526PS001E	3
3	116011.5	116011.3	116011.3	116011.3	07/24/23	0526PS001E	3
8	115576.1	115596.1	115596.1	115596.1	08/07/23	0135PS023E	1
25	114299.7	114299.6	114299.6	114299.6	07/24/23	0526PS001E	3
32	114743.0	114743.1	114743.1	114743.1	08/15/23	0522WS003E	6
74	117665.2	117665.2	117665.2	117665.2	07/20/23	0526PS001E	2
76	116961.5	116961.4	116961.4	116961.4	07/20/23	0526PS001E	2
16	114266.7	114266.9	114266.9	114266.9	08/15/23	0522WS003E	3
81	111860.6	111860.5	111860.5	111860.5	07/24/23	0526PS001E	1
78	117461.0	117460.8	117460.8	117460.8	08/28/23	0135PS023E	2
30	114328.7	114328.9	114328.9	114328.9	07/20/23	0526PS001E	2
12	114284.8	114284.9	114284.9	114284.9	07/20/23	0526PS001E	2
66	118455.7	118455.6	118455.6	118455.6			
33	113944.1	113944.0	113944.0	113944.0			
62	117662.7	117662.8	117662.8	117662.8			

Initials: RD Initials: TT Initials: _____ Initials: _____

Final Technician Signature: [Signature] Date: 07/19/2023 Evaluator signature: [Signature]
 Control No. P-SFDP-0002.Xls, Effective Date: 2/1/2017

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

Prepared By: _____ Balance ID #: _____ Thermohygrometer ID #: _____ Audit Weight ID #/Mass: _____ /

Placed in Dessicator: _____ Date: 7-5-23 Time: 0945 RH %: 9.5 T (°F): 72.9 Audit: 5900.0

ID #	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: <u>7-6-23</u> Time: <u>0900</u> RH %: <u>12.2</u> T (°F): <u>75.9</u> Audit: <u>4999.9</u>	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date: _____ Time: _____ RH %: _____ T (°F): _____ Audit: _____	Date Used	Project Number	Run No.
SS29	3424.2	3424.3 ✓			7-12-23	055205003E	2
SS30	3301.8	3301.8 ✓			✓		2
SS31	3435.3	3435.2 ✓			✓		3
SS32	3380.8	3381.0 ✓			✓		3
SS33	3362.7	3362.8 ✓			✓		4
SS34	3290.2	3290.2 ✓			7-13-2023		4
SS35	3350.2	3350.3 ✓			✓		4
SS36	4147.3	4147.4 ✓			✓		5
SS37	3332.4	3332.8 ✓		NOT USED	7-17-23		5
SS38	3277.3	3277.3 ✓			✓		5
SS39	3350.8	3350.8 ✓			✓		5
SS40	3314.2	3314.3 ✓			7-17-23		5
SS41	3399.9	3399.9 ✓			7-28-2023	0135P5023E	2
SS42	3312.4	3312.5 ✓			✓		2
SS43	3385.1	3385.2 ✓			✓		2
SS44	4093.3	4093.3 ✓			Not used		
SS45	4125.3	4125.5 ✓			✓		
SS46	3422.6	3422.7 ✓			✓		
SS47	3370.9	3370.9 ✓			✓		
SS48	3371.2 ✓	3371.4 ✓			✓		

Final Technician Signature: _____ Date: 11-08-2023
 Control No. P-SFDP-0002.xls, Effective date: 2/1/2017
 Evaluator signature: _____

Equipment Used and Calibrated at Run 2

ASTM E2515, ASTM E2779

ID #	Lab Name/Purpose	Log Name	Attachment Type
255	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate (07/06/2021)
185	Platform Scale	WI-127	Calibration Certificate 09/01/2022
716	Digital Barometer	Traceable Barometer	Calibration Certificate (04/19/2022)
283A	Audit Weights	Troemner 21pc Msas Set	Calibration Certificate (10/26/2018)
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023)
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (10/25/2022), (04/27/2023)
410	Microtector	Dwyer Microtector	Calibration Certificate (03/01/2022)
721	Dwyer Anemometer	Dwyer Anemometer	Calibration Certificate (12/05/2022)
709	RH-81 Humidity Meter	RH-81 Humidity Meter	Calibration Log (03/06/2023)
594	Combustion Gas Analyzer	CAI Gas Analyzer	See Run Sheet (VBU)
637	Milligram Balance	Analytical Balance - Mettler - Toledo	Calibration Certificate (08/10/2023)
371	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (04/27/2023)
372	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log (05/01/2023)

Appendix C. Memorandum



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

02/02/2022

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

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

STEFFAN
JOHNSON

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

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

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

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

TABLE 1

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

Appendix D. Pellet Analysis Report



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:W223-0562-01
Issue No:

Analytical Test Report

Client: Hearth & Home Technologies
 352 Mountain House Road
 Halifax, PA 17032
Attention: Bud Fongeallaz
PO No:

Signed:

 Date of Issue:
 THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details
Sample Log No: W223-0562-01 **Sample Date:**
Sample Designation: Energex **Sample Time:**
Sample Recognized As: Wood Pellets **Arrival Date:** 10/9/2023

Test Results				
	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		4.34
Ash	ASTM D1102	wt. %	0.55	0.53
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3172	wt. %		
Sulfur	ASTM D4239	wt. %	0.030	0.029
SO ₂	Calculated	lb/mmbtu		0.072
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne		
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8435	8069
Carbon	ASTM D5373	wt. %		
Hydrogen*	ASTM D5373	wt. %		
Nitrogen	ASTM D5373	wt. %		
Oxygen*	ASTM D3176	wt. %		
*Note: As received values do not include hydrogen and oxygen in the total moisture.				
Chlorine	ASTM D6721	mg/kg	0	0
Fluorine	ASTM D3761	mg/kg		
Mercury	ASTM D6722	mg/kg		
Bulk Density	ASTM E873	lbs/ft ³		43.97
Fines (Less than 1/8")	TPT CH-P-06	wt. %		0.17
Durability Index	Kansas State	PDI		99.0
Sample Above 1.50"	TPT CH-P-06	wt. %		0.0
Maximum Length (Single Pellet)	TPT CH-P-06	inch		0.853
Diameter, Range	TPT CH-P-05	inch	0.252 to	0.260
Diameter, Average	TPT CH-P-05	inch		0.256
Stated Bag Weight	TPT CH-P-01	lbs		40.0
Actual Bag Weight	TPT CH-P-01	lbs		40.4

Comments:



Accreditation #60243

Results issued on this report only reflect the analysis of the sample submitted. Our reports and letters are for the exclusive and confidential use of our clients and may not be reproduced, except in their entirety, without the written approval of Twin Ports Testing. Twin Ports Testing Laboratory is accredited to the ISO/IEC 17025:2017 standard by PJLA.

8. Revision History

Date	Project No.	Tech. & Evaluator	Report Sect.	Summary of Changes
4/14/2014	135-S-23-8.3	S Button J Clark	ALL	Initial Report – Tested for phase 1 compliance of new NSPS
11/21/2018	0135PS023E.REV001	A Kravitz K Morgan	ALL	Testing for phase 2 compliance of new NSPS
08/15/2023	0135PS023E. REV002 (Edition 000)	Tony Tong Ken Morgan	ALL	Re-test for recertification
11/08/2023	0135PS023E. REV002 (Edition 001)	Tony Tong Ken Morgan	ALL	Re-test for recertification
01/05/2024	0135PS023E.REV002 (Edition 002)	Riley Tiegs Ken Morgan	3	Run descriptions moved from introduction to Section 3. Anomalies are addressed, and run validity and appropriateness Pg11
				Corrected/Uncorrected definitions were corrected in the summary tables. Pg13
			4	Run 1-3 dual train comparison results added. Pg32, 244,303
01/18/2024	0135PS023E.REV002 (Edition 003)	Riley Tiegs Ken Morgan	Cover	Updated Cover page to reflect original 8/15/23 issue date along with subsequent report revision dates