
Hearth & Home Technologies

Project # 21-677

Model: P40i-C

Type: Pellet-Fired Fireplace Insert

July 1, 2021

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

Contact: Mr. Corie Podschelne
352 Mountain House Road
Halifax, PA 17032
PodschelneC@hearthnhome.com
610-506-7338

Prepared by: Sebastian Button,
Laboratory Supervisor



11785 SE Highway 212 – Suite 305

Clackamas, OR 97015-9050

(503) 650-0088

WWW.PFSTECO.COM

This page intentionally left blank.

Contents

Affidavit	3
Introduction	4
Notes	4
Pellet Heater Identification and Testing	5
Test Procedures and Equipment	6
Results	7
Summary Table	7
Test Run Narrative	8
Run1	8
Test Conditions Summary	8
Appliance Operation and Test Settings	8
Settings & Run Notes	8
Appliance Description	9
Appliance Dimensions	9
Test Fuel Properties	12
Pellet Fuel Analysis	13
Sampling Locations and Descriptions	14
Sample Points	14
Sampling Methods	15
Analytical Methods Description	15
Calibration, Quality Control and Assurances	15
Appliance Sealing and Storage	15
Sealing Label	15
Sealed Unit	16
List of Appendices	17

Affidavit

PFS-TECO was contracted by Hearth & Home Technologies to provide testing services for the P40i-C Pellet-Fired Fireplace Insert per ASTM E2779, *Determining PM Emissions from Pellet Heaters*. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory on 6/25/2021. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed ASTM E2779. Particulate sampling was performed per ASTM E2515, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel*.

PFS-TECO is accredited by the U.S. Environmental Protection Agency for the certification and auditing of wood heaters pursuant to subpart AAA of 40 CFR Part 60, New Source Performance Standards for Residential Wood Heaters and subpart QQQQ of 40 CFR Part 60, Standards of Performance for New Hydronic Heaters and Forced Air Furnaces, Methods 28R, 28WHH, 28 WHH-PTS, and all methods listed in Sections 60.534 and 60.5476. PFS-TECO holds EPA Accreditation Certificate Numbers 4 and 4M (mobile). PFS-TECO is accredited by IAS to ISO 17020:2012 "Criteria for Bodies Performing Inspections", and ISO 17025:2005 "Requirements for Testing Laboratories." PFS-TECO is also accredited by Standards Council of Canada to ISO 17065:2012 "Requirements for Bodies Operating Product Certification Systems."

The following people were associated with the testing, analysis and report writing associated with this project.

A handwritten signature in black ink, appearing to read "Sebastian Button", written over a horizontal line.

Sebastian Button, Laboratory Supervisor

Introduction

Hearth & Home Technologies of Halifax, PA, contracted with PFS-TECO to perform EPA certification testing on P40i-C Pellet-Fired Fireplace Insert. All testing was performed at PFS-TECO's Portland Laboratory. Testing was performed by Mr. Sebastian Button.

Notes

- Prior to start of testing, 50 hours of conditioning was performed by the manufacturer, at medium heat setting per ASTM E2779.
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- Sample train A was changed out at one hour after the test began.
- One integrated test run was performed in accordance with ASTM E2779, as described below:
 - 1 Hour at Maximum Burn Setting
 - 2 Hours at Medium Burn Setting (Defined as <50% of Maximum Burn Rate)
 - 3 Hours at Minimum Burn Setting

Pellet Heater Identification and Testing

- Appliance Tested: **P40i-C**
- Serial Number: **Unserialized prototype – PFS Tracking #111**
- Catalyst: **No**
- Heat exchange blower: **Integral**
- Type: **Pellet Stove**
- Style: **Insert**
- Date Received: **Wednesday, June 16, 2021**
- Testing Period – **Friday, June 25, 2021**
- Test Location: **PFS-TECO Portland Laboratory, 11785 SE HWY 212 - Suite 305, Clackamas, OR 97015**
- Elevation: **≈131 Feet above sea level**
- Test Technician(s): **Sebastian Button**
- Observers: **N/A**

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Sebastian Button. All procedures used are directly from ASTM E2779 and ASTM E2515. See the list below for equipment used. See Appendix C submitted with this report for calibration data.

Equipment List:

Equipment ID#	Equipment Description
189	Mettler Toledo 3'x3' floor scale w/digital weight indicator
129	APEX XC-50-DIR Digital Emissions Sampling Box A
130	APEX XC-50-DIR Digital Emissions Sampling Box B
055	APEX-AK-600 Ambient Sample Meter
187	California Analytical ZRE CO2/CO/O2 IR ANALYZER
064	Digital Barometer
109A/B	Troemner 100mg/200mg Audit Weights
107	Sartorius Analytical Balance
051	10 lb audit weight
095	Anemometer
111	Microtector
SA18857	Gas Analyzer Calibration Span Gas
91005049	Gas Analyzer Calibration Mid Gas

Results

The integrated test run emission rate for test Run 1 was measured to be **0.7 g/hr** with a Higher Heating Values efficiency of **82%** and a CO emission rate of **0.3 g/min**. The calculated first hour particulate emission rate was **1.2 g/hr**. The Hearth & Home Technologies Model P40i-C Pellet-Fired Room Heater meets the 2020 PM emission standard of ≤ 2.0 g/hr per CFR 40 part 60, §60.532 (b).

Detailed individual run data can be found in Appendix A submitted with this report.

Summary Table

Run 1 Results											
Run Number	Date	Segments		Run Time (min)	Heat Output (BTU/hr)	1st Hr Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (%HHV)	Overall Heating Efficiency (%HHV)
		Setting	BR								
1	6/25/2021	H	2.20	60	33126	1.18	0.69	0.22	0.27	78.9%	81.5%
		M	1.02	120	15910			0.11		81.4%	
		L	0.91	180	14449			0.12		83.0%	
		OA	1.16	360	45249			0.27		81.5%	

Test Run Narrative

Run1

Run 1 was performed on 6/25/2021 as an attempted integrated test run per ASTM E2779. The overall test duration was 360 minutes. The particulate emissions rate for the integrated test run was 0.7 g/hr. The run had an overall HHV efficiency of 82%. The train A sample train was changed at 1 hr. All test results were appropriate and valid and the burn rate requirement for the integrated test run were achieved. There were no anomalies and all criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of ASTM E2779 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Runs	Ambient (°F)		Relative Humidity (%)		Average Barometric Pressure (In. Hg.)	Preburn Fuel Weight (lbs)	Test Fuel Weight (lbs)	Test Fuel Moisture (%DB)	Test Run Time (Min)
	Pre	Post	Pre	Post					
1	77	79	40.2	42.7	29.82	4.68	16.16	5.08	360

Appliance Operation and Test Settings

The appliance was operated according to procedures as described in the Operations Manual, found in Appendix B submitted with this report. Detailed run information can be found in Appendix A submitted with this report.

Settings & Run Notes

	Pre-Burn	Test Run
Run 1	Temperature Setting - 7 / Feed Limit - 6	High Segment: Temp Setting - 7 / Feed Limit - 6 Medium Segment: Temp Setting - 3 / Feed Limit - 2 Low Segment: Temp Setting - 1 / Feed Limit - 1

Appliance Description

Model(s): P40i-C

Appliance Type: Pellet-Fired Fireplace Insert

Air Introduction System: Air enters the burn chamber by being pulled through the firepot and air wash, via the exhaust blower, see air flow diagram in Appendix D.

Combustion Control: Feed rate is electronically controlled via user-selectable controls.

Flue Outlet: 4-inch exhaust outlet located on the top/rear of the appliance.

Appliance Dimensions

P40i-C Dimensions

Height	Width	Depth	Firebox Volume
23.5:	24"	26"	N/A – Pellet Stove

Appliance design drawings can be found in Appendix D submitted with the CBI copy of this report.

Appliance Front



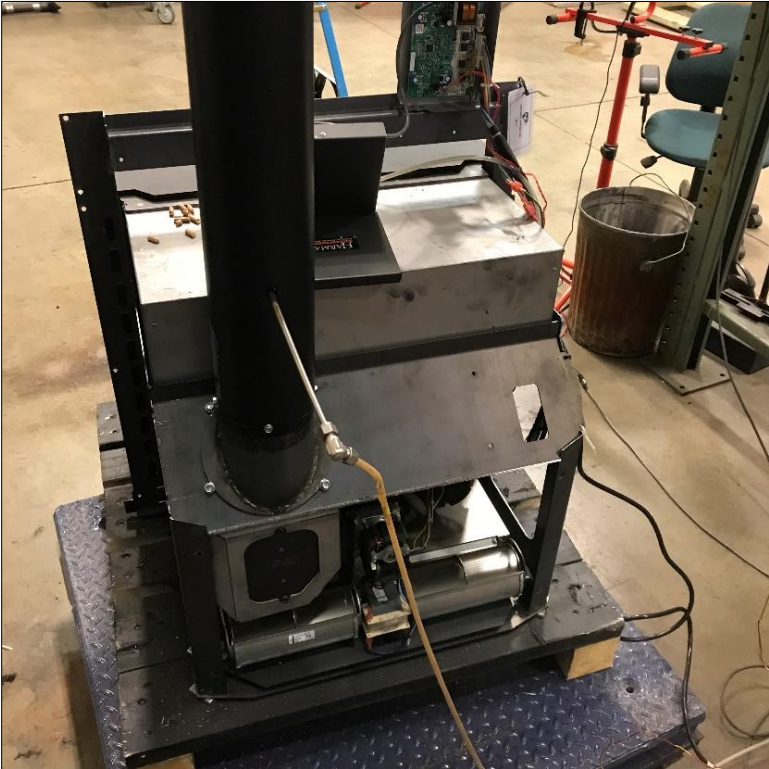
Appliance Left



Appliance Right



Appliance Rear



Test Fuel Properties



Test fuel used was Cascade Pellet Fuel, a PFI Certified Premium Pellet Brand. A sample of pellets was sent to Timber Products for analysis, see report below.

Pellet Fuel Analysis

1641 Sigman Road
 Conyers, GA 30012
 1-770-922-8000 ext 1510
 www.tpinspection.com



TIMBER PRODUCTS
 We Deliver Confidence. ®

Analytical Report


HEARTH & HOME TECHNOLOGIES
 352 Mountain House Rd
 Halifax, PA 17032

Company Contact: Charlie Maguire

TP ID Number:	DBL210090-1	Sample Weight (lbs):	40.48
Product Recognized As:	Wood Pellets	Sample Received:	3/8/2021
Sample Designation:	Cascade-PCP202012	Report Date:	3/19/2021
Sample Date:	3/4/2021	Purchase Order:	

Parameter	As-Received	Dry Basis	Analytical Method	ISO 17025
Total Moisture (%)	4.83		ASTM E871	Q
Ash (%)	0.14	0.15	ASTM D1102	Q
Volatiles (%)	80.16	84.23	CEN/EN 15148	Q
Fixed Carbon (%)	14.86	15.61	By Difference	
GCV (BTU/lb)	8248	8667	ASTM E711	Q
Carbon (%)	48.25	50.70	CEN/EN 15104	Q
Hydrogen (%)	5.99	6.29	CEN/EN 15104	Q
Nitrogen (%)	0.13	0.14	CEN/EN 15104	Q
Oxygen (%)	40.65	42.71	CEN/EN 15104	Q
Sulfur (%)	< 0.01	0.01	CEN/EN 15289	Q
Chlorine (ppm)	< 57	< 57	ASTM D4208	
Fluorine (mg/kg)	< 5.0	< 5.0	CEN/EN 15289	S
Parameter	Result		Analytical Method	ISO 17025
Bulk Density (lb/ft³)	45.8		PFI Specifications	Q
Length (%) > 1.5 Inches	0.14		PFI Specifications	Q
Diameter (mean)	0.253		PFI Specifications	Q
Durability Index	99.4		PFI Specifications	Q
Fines (%)	0.07		PFI Specifications	Q
Parameter	As-Received	Dry Basis	Analytical Method	ISO 17025
Mercury (Hg) mg/kg	0.000952	0.001	ASTM D6722	O



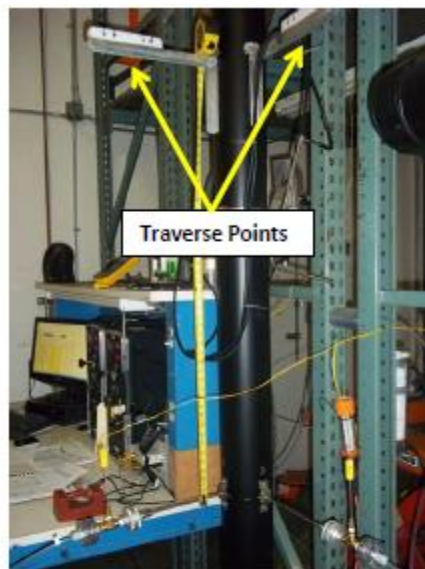
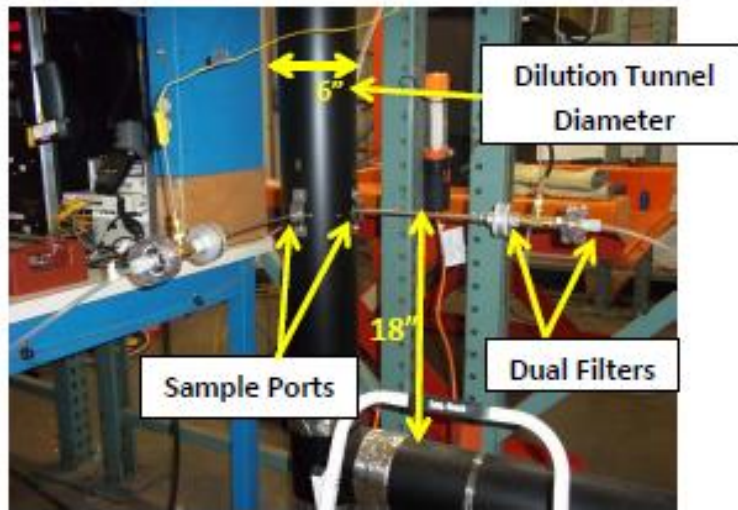
Prepared By: 
David Robles - Laboratory Manager

Findings are based on the sample submitted. TP Inspection is accredited by ALSC for the PFI/ALSC Densified fuel Standards Program. TP Inspection is accredited by the International Accreditation Service to ISO 17025. Specific test procedures included in TP Inspection's scope of accreditation are identified with a "Q". Test parameters performed by our sister laboratory, Technical Laboratory Rotterdam (TLR) are designated with an "S". TLR is an ISO 17025 accredited laboratory by the Dutch Accreditation Council RvA. Other outsourced parameters are designated with an "O". This report shall not be reproduced except in full without laboratory approval.

Sampling Locations and Descriptions

Sample ports are located 16.5 feet downstream from any disturbances and 1 foot upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 5.5 feet upstream from any disturbances. (See below).

Sample Points



Sampling Methods

ASTM E2515 was used in collecting particulate samples. The dilution tunnel is 12 inches in diameter. All sampling conditions per ASTM E2515 were followed. No alternate procedures were used.

Analytical Methods Description

All sample recovery and analysis procedures followed ASTM E2515 procedures. At the end of each test run, filters, O-Rings and probes were removed from their housings, dessicated for a minimum of 24 hours, and then weighed at 6 hour intervals to a constant weight per ASTM E2515-11 Section 10.

Calibration, Quality Control and Assurances

Calibration procedures and results were conducted per EPA Method 28R, ASTM E2515-11 and ASTM E2780-10. Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined.

Appliance Sealing and Storage

Upon completion of testing, the appliance was secured with metal strapping and the seal below was applied, the appliance was then returned to the manufacturer's location at: 352 Mountain House Road, Halifax, PA 17032 for archival.

Sealing Label

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED IN ACCORDANCE WITH REQUIREMENTS OF 40CFR
PART 60 SUBPART AAA §60.535 (a)(2)(vii)

REPORT # _____

DATE SEALED _____

MANUFACTURER _____

MODEL # _____

Sealed Unit



List of Appendices

The following appendices have been submitted electronically in conjunction with this report:

Appendix A – Test Run Data, Technician Notes, and Sample Analysis

Appendix B – Labels and Manuals

Appendix C – Equipment Calibration Records

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

Pre-Conditioning Data

Client: HHT	Job #: 21-667
Model: P40i-C	Tracking #: 111
Date(s): 3/30/2021 to 5/25/2021	Technician: HHT Staff

Elapsed Time (hrs)	Flue (°F)	Catalyst Exit (°F)	Notes: Indicate initial air setting and any changes in in setting during conditioning, as well as weight and average moisture content of all fuel additions.
0	364	N/A	18 lbs of fuel added
1	253	N/A	
2	226	N/A	
3	213	N/A	
4	215	N/A	
5	217	N/A	
6	223	N/A	
7	291	N/A	22.5 lbs of fuel added
8	366	N/A	
9	356	N/A	
10	237	N/A	
11	235	N/A	
12	218	N/A	
13	219	N/A	
14	364	N/A	19.6 lbs of fuel added
15	372	N/A	
16	285	N/A	
17	236	N/A	
18	225	N/A	
19	220	N/A	
20	310	N/A	24 lbs of fuel added
21	367	N/A	
22	300	N/A	
23	230	N/A	
24	222	N/A	
25	221	N/A	
26	219	N/A	
27	219	N/A	
28	359	N/A	30 lbs of fuel added
29	370	N/A	
30	297	N/A	
31	238	N/A	
32	225	N/A	
33	220	N/A	
34	221	N/A	
35	260	N/A	
36	360	N/A	
37	289	N/A	24 lbs of fuel added
38	365	N/A	
39	354	N/A	
40	245	N/A	
41	236	N/A	
42	221	N/A	
43	222	N/A	
44	224	N/A	
45	364	N/A	19 lbs of fuel added
46	371	N/A	
47	263	N/A	
48	232	N/A	
49	220	N/A	
50	219	N/A	

Manufacturer Test Instructions

Preset:

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

Install Flame Deflector steel plate:

wide end up, the bend on lower end away from firebox.

slide into upper firebox hooks.

lower onto lower hooks.

Install cast Flame guide onto burnpot

Fully insert ashpan until it is against firebox back.

Load 40 pound bag of Cascade Pellets, Push pellets toward rear when filling.

Press down on hopper handle to fully close hopper lid.

Do not open hopper lid during test.

Connect DDM to stove control board.

Set Mode knob to OFF before plugging in stove.

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.

Plug in stove to power supply.

Stove Draft adjust -41V (already set).

Stove Igniter switch to Auto.

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

Feed Adjuster knob: Full Clockwise #6 (screen d)

Temperature knob: Full Clockwise #7

Mode knob: Full Counter Clockwise (starts stove & ignition)

Medium<50%:

Temperature knob: Stove Setpoint 335F +/-1F (screen b)

Feed Adjuster knob: Max 27.5s (screen b)

Low:

Feed Adjuster knob: Max 17.5s (screen b)

Temperature knob: Max Counter Clockwise #1

End of Test:

Mode knob: OFF position.

PELLET TEST DATA PACKET
ASTM E2779/E2515



Run 1 Data Summary

Client: HHT
Model: P40i-C
Job #: 21-677
Tracking #: 111
Test Date: 6/25/2021



Techician Signature

6/30/2021

Date

TEST RESULTS - ASTM E2779 / ASTM E2515

Client: HHT

Model: P40i-C

Run #: 1

Job #: 21-677

Tracking #: 111

Technician: SJB

Date: 6/25/2021

Burn Rate Summary	
High Burn Rate (dry kg/hr)	2.20
Medium Burn Rate (dry kg/hr)	1.02
Low Burn Rate (dry kg/hr)	0.91
Overall Burn Rate (dry kg/hr)	1.16

46.6% of High Burn Rate

41.5% of High Burn Rate

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	59.606	111.338	110.318	18.635
Average Gas Velocity in Dilution Tunnel (ft/sec)	8.1			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	21715.3			
Average Gas Meter Temperature (°F)	76.6	86.3	80.7	78.6
Total Sample Volume (dscf)	59.001	108.350	108.028	18.396
Average Tunnel Temperature (°F)	87.1			
Total Time of Test (min)	360			
Total Particulate Catch (mg)	0.0	3.3	3.6	1.0
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000305	0.0000333	0.0000544
Total PM Emissions (g)	0.00	3.97	4.34	1.18
Particulate Emission Rate (g/hr)	0.00	0.66	0.72	1.18
Emissions Factor (g/kg)	-	0.57	0.62	0.54
Difference from Average Total Particulate Emissions (g)	-	0.19	0.19	-
Difference from Average Total Particulate Emissions (%)	-	4.5%	4.5%	-
Difference from Average Emissions Factor (g/kg)	-	0.03	0.03	-

Final Average Results	
Total Particulate Emissions (g)	4.16
Particulate Emission Rate (g/hr)	0.69
Emissions Factor (g/kg)	0.60
HHV Efficiency (%)	81.5%
LHV Efficiency (%)	87.4%
CO Emissions (g/min)	0.27

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	<90 °F	83.6	OK
Face Velocity	< 30 ft/min	17.1	OK
Leakage Rate	Less than 4% of average sample rate	0.003 cfm	OK
Ambient Temp	55-90 °F	Min: 74.6 / Max: 79.1	OK
Negative Probe Weight Evaluation	<5% of Total Catch	-3.0%	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Medium Burn Rate	< 50% of High	46.6%	OK

Overall Pellet Test Efficiency Results

Manufacturer: HHT
Model: P40i-C
Date: 06/25/21
Run: 1
Control #: 21-677
Test Duration: 360
Output Category: Integrated

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	81.5%	87.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	81.9%	87.8%

Output Rate (kJ/h)	47,700	45,249	(Btu/h)
Burn Rate (kg/h)	2.90	6.40	(lb/h)
Input (kJ/h)	58,514	55,507	(Btu/h)

Test Load Weight (dry kg)	17.43	38.41	dry lb
MC wet (%)	4.83		
MC dry (%)	5.08		
Particulate (g)	4.16		
CO (g)	96		
Test Duration (h)	6.00		

Emissions	Particulate	CO
g/MJ Output	0.01	0.33
g/kg Dry Fuel	0.24	5.50
g/h	0.69	15.96
g/min	0.01	0.27
lb/MM Btu Output	0.03	0.78

Air/Fuel Ratio (A/F)	19.64
-----------------------------	-------

VERSION:

2.2

12/14/2009

Max Burn Rate Segment Efficiency Results

Manufacturer: HHT
Model: P40i-C
Date: 06/25/21
Run: 1
Control #: 21-677
Test Duration: 60
Output Category: Maximum

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	78.9%	84.6%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	79.3%	85.0%

Output Rate (kJ/h)	34,921	33,126	(Btu/h)
Burn Rate (kg/h)	2.20	4.84	(lb/h)
Input (kJ/h)	44,277	42,001	(Btu/h)

Test Load Weight (dry kg)	2.20	4.84	dry lb
MC wet (%)	4.83		
MC dry (%)	5.08		
Particulate (g)	N/A		
CO (g)	13		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.38
g/kg Dry Fuel	N/A	5.97
g/h	N/A	13.11
g/min	N/A	0.22
lb/MM Btu Output	N/A	0.87

Air/Fuel Ratio (A/F)	13.65
-----------------------------	-------

VERSION:

2.2

12/14/2009

Medium Burn Rate Segment Efficiency Results

Manufacturer: HHT
Model: P40i-C
Date: 06/25/21
Run: 1
Control #: 21-677
Test Duration: 120
Output Category: Medium

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	81.4%	87.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	81.8%	87.7%

Output Rate (kJ/h)	16,772	15,910	(Btu/h)
Burn Rate (kg/h)	1.02	2.26	(lb/h)
Input (kJ/h)	20,616	19,557	(Btu/h)

Test Load Weight (dry kg)	2.05	4.51	dry lb
MC wet (%)	4.83		
MC dry (%)	5.08		
Particulate (g)	N/A		
CO (g)	13		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.40
g/kg Dry Fuel	N/A	6.49
g/h	N/A	6.64
g/min	N/A	0.11
lb/MM Btu Output	N/A	0.92

Air/Fuel Ratio (A/F)	20.76
-----------------------------	-------

VERSION:

2.2

12/14/2009

Minimum Burn Rate Segment Efficiency Results

Manufacturer: HHT
Model: P40i-C
Date: 06/25/21
Run: 1
Control #: 21-677
Test Duration: 180
Output Category: Minimum

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	83.0%	89.0%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	83.4%	89.4%

Output Rate (kJ/h)	15,231	14,449	(Btu/h)
Burn Rate (kg/h)	0.91	2.01	(lb/h)
Input (kJ/h)	18,354	17,411	(Btu/h)

Test Load Weight (dry kg)	2.73	6.02	dry lb
MC wet (%)	4.83		
MC dry (%)	5.08		
Particulate (g)	N/A		
CO (g)	21		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.47
g/kg Dry Fuel	N/A	7.80
g/h	N/A	7.10
g/min	N/A	0.12
lb/MM Btu Output	N/A	1.08

Air/Fuel Ratio (A/F)	22.08
-----------------------------	-------

VERSION:

2.2

12/14/2009

DILUTION TUNNEL & MISC. DATA - ASTM E2779 / E2515

Client: **HHT**
 Model: **P40i-C**
 Run #: **1**
 Test Start Time: **9:51**

Job #: **21-677**
 Tracking #: **111**
 Technician: **SJB**
 Date: **6/25/2021**

High Burn End Time (min): **60**
 Medium Burn End Time (min): **180**
 Total Sampling Time (min): **360**
 Recording Interval (min): **1**

Meter Box γ Factor: **1.003** (A)
 Meter Box γ Factor: **0.999** (B)
 Meter Box γ Factor: **1.010** (Ambient)

Induced Draft Check (in. H₂O): **0**
 Smoke Capture Check (%): **100%**
 Date Flue Pipe Last Cleaned: **6/25/2021**

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.86	29.77	29.82
Relative Humidity (%)	40.2	42.7	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	
Ambient Sample Volume:	59.606		ft ³

Sample Train Post-Test Leak Checks

(A)	0.003	cfm @	-18 in. Hg
(B)	0.001	cfm @	-19 in. Hg
(Ambient)	0.002	cfm @	-8 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.008	89
2	0.014	89
3	0.018	89
4	0.018	89
5	0.012	89
6	0.010	89
7	0.010	89
8	0.014	89
9	0.018	89
10	0.018	89
11	0.018	89
12	0.012	89
Center	0.019	89

Dilution Tunnel H₂O: **2.00** percent
 Tunnel Diameter: **12** inches
 Pitot Tube Cp: **0.99** [unitless]
 Dilution Tunnel MW(dry): **29.00** lb/lb-mole
 Dilution Tunnel MW(wet): **28.78** lb/lb-mole
 Tunnel Area: **0.7854** ft²

V_{strav} : **7.98** ft/sec
 V_{scent} : **9.33** ft/sec
 F_p : **0.856** [ratio]
 Initial Tunnel Flow: **353.5** scf/min

Static Pressure: **-0.060** in. H₂O

TEST FUEL PROPERTIES

Default Fuel Values

Fuel Type:	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

Actual Fuel Used Properties

Pellet Brand:	Cascade
Pellet Fuel Grade:	PFI Premium
HHV (kJ/kg)	20,146
%C	50.7
%H	6.29
%O	42.71
%Ash	0.15
MC (%DB)	5.08

PELLET STOVE PREBURN DATA - ASTM E2779

Client: HHT

Job #: 21-677

Model: P40i-C

Tracking #: 111

Run #: 1

Technician: SJB

Date: 6/25/2021

Recording Interval (min): 1
Run Time (min): 60

Elapsed Time (min)	Scale Reading (lbs)	Weight Change (lbs)	Average:		
			-0.061	311	73
			Flue Draft (in H ₂ O)	Flue (°F)	Ambient (°F)
0	45.1	-	-0.030	157	72
1	45.0	-0.05	-0.030	157	72
2	45.0	-0.05	-0.030	157	72
3	44.9	-0.05	-0.030	158	72
4	44.9	-0.05	-0.030	159	72
5	44.9	-0.04	-0.030	160	72
6	44.8	-0.05	-0.030	162	72
7	44.8	-0.04	-0.030	164	72
8	44.7	-0.04	-0.040	182	72
9	44.7	-0.03	-0.050	216	72
10	44.6	-0.05	-0.050	238	72
11	44.6	-0.05	-0.050	252	72
12	44.5	-0.07	-0.060	262	72
13	44.5	-0.06	-0.060	271	72
14	44.4	-0.06	-0.060	275	72
15	44.3	-0.06	-0.060	280	72
16	44.3	-0.08	-0.060	285	73
17	44.2	-0.07	-0.060	289	73
18	44.1	-0.08	-0.060	292	73
19	44.0	-0.07	-0.060	296	73
20	44.0	-0.09	-0.060	301	73
21	43.9	-0.09	-0.060	306	73
22	43.8	-0.08	-0.060	310	73
23	43.7	-0.1	-0.070	316	73
24	43.6	-0.08	-0.070	321	73
25	43.5	-0.09	-0.070	325	73
26	43.4	-0.09	-0.070	330	73
27	43.3	-0.09	-0.070	333	73
28	43.3	-0.08	-0.070	336	73
29	43.2	-0.09	-0.070	338	73
30	43.1	-0.09	-0.070	341	73
31	43.0	-0.08	-0.070	342	73
32	42.9	-0.09	-0.070	344	73
33	42.8	-0.08	-0.070	347	73
34	42.7	-0.09	-0.070	350	73
35	42.6	-0.1	-0.070	353	73
36	42.5	-0.09	-0.070	355	74
37	42.5	-0.09	-0.070	357	74
38	42.4	-0.09	-0.070	359	74
39	42.3	-0.1	-0.070	361	74
40	42.2	-0.08	-0.070	361	74
41	42.1	-0.09	-0.070	362	74
42	42.0	-0.09	-0.070	365	74
43	41.9	-0.1	-0.070	367	74
44	41.8	-0.1	-0.070	369	74
45	41.7	-0.08	-0.070	371	74
46	41.6	-0.09	-0.070	372	74

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.018	1.69	74.9	5.47		40.4		90	378	74	74.6
1	0.319	0.319	0.018	3.36	75	5.47	111	40.3	-0.1	90	378	76	74.6
2	0.635	0.316	0.018	3.32	75	5.47	110	40.2	-0.1	90	379	76	74.8
3	0.950	0.315	0.018	3.31	75.1	5.47	109	40.1	-0.1	90	377	77	74.8
4	1.264	0.314	0.018	3.29	75.1	5.47	109	40.0	-0.1	90	377	77	74.9
5	1.577	0.313	0.018	3.28	75.1	5.47	109	39.9	-0.1	91	377	77	74.6
6	1.891	0.314	0.019	3.27	75.3	5.47	106	39.9	-0.1	91	377	78	74.7
7	2.205	0.314	0.019	3.27	75.2	5.47	106	39.8	-0.1	91	379	78	74.7
8	2.517	0.312	0.019	3.26	75.4	5.47	106	39.7	-0.1	91	378	78	74.8
9	2.829	0.312	0.018	3.25	75.6	5.47	108	39.6	-0.1	91	379	78	74.6
10	3.140	0.311	0.018	3.25	75.7	5.47	108	39.5	-0.1	91	378	79	74.9
11	3.454	0.314	0.019	3.25	75.8	5.47	106	39.4	-0.1	91	378	79	74.8
12	3.765	0.311	0.019	3.24	75.9	5.47	105	39.3	-0.1	91	376	79	75
13	4.076	0.311	0.019	3.23	76	5.47	105	39.3	-0.1	91	375	79	75.1
14	4.387	0.311	0.019	3.23	76	5.47	105	39.2	-0.1	91	373	79	74.9
15	4.700	0.313	0.019	3.24	76.2	5.47	106	39.1	-0.1	91	372	79	74.8
16	5.010	0.310	0.019	3.23	76.3	5.47	105	39.0	-0.1	91	375	80	75.1
17	5.320	0.310	0.019	3.22	76.5	5.47	105	38.9	-0.1	91	375	80	74.8
18	5.632	0.312	0.019	3.22	76.7	5.47	105	38.8	-0.1	91	377	80	75
19	5.943	0.311	0.019	3.22	76.7	5.47	105	38.7	-0.1	91	378	80	75
20	6.253	0.310	0.019	3.22	76.8	5.47	105	38.7	-0.1	91	378	80	75
21	6.563	0.310	0.019	3.22	77	5.47	105	38.6	-0.1	91	378	80	74.9
22	6.876	0.313	0.019	3.21	77.2	5.47	106	38.5	-0.1	91	380	80	75
23	7.185	0.309	0.019	3.21	77.3	5.47	104	38.4	-0.1	91	379	80	75
24	7.495	0.310	0.019	3.21	77.4	5.47	105	38.3	-0.1	91	379	81	75.1
25	7.806	0.311	0.019	3.21	77.6	5.47	105	38.2	-0.1	91	380	81	75.2
26	8.117	0.311	0.019	3.21	77.8	5.47	105	38.1	-0.1	91	380	81	75.2
27	8.426	0.309	0.019	3.20	77.9	5.47	104	38.1	-0.1	91	380	81	75.2
28	8.736	0.310	0.019	3.20	78.2	5.47	104	38.0	-0.1	91	380	81	75.2
29	9.048	0.312	0.019	3.20	78.3	5.47	105	37.9	-0.1	91	379	81	75.5
30	9.357	0.309	0.019	3.20	78.4	5.47	104	37.8	-0.1	92	380	81	75.5
31	9.667	0.310	0.019	3.20	78.5	5.47	104	37.7	-0.1	92	379	81	75.5
32	9.978	0.311	0.019	3.20	78.8	5.47	105	37.6	-0.1	91	378	81	75.6

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	10.288	0.310	0.019	3.20	79	5.47	104	37.6	-0.1	92	378	81	75.7
34	10.598	0.310	0.019	3.20	79.2	5.47	104	37.5	-0.1	92	377	81	75.7
35	10.909	0.311	0.019	3.20	79.3	5.47	105	37.4	-0.1	92	377	81	75.9
36	11.219	0.310	0.020	3.19	79.5	5.47	101	37.3	-0.1	92	378	81	76.1
37	11.528	0.309	0.019	3.19	79.6	5.47	104	37.2	-0.1	92	379	81	76.2
38	11.839	0.311	0.019	3.20	79.8	5.47	104	37.1	-0.1	92	382	81	76.2
39	12.150	0.311	0.019	3.19	80.1	5.47	104	37.0	-0.1	92	382	82	76.1
40	12.459	0.309	0.020	3.19	80	5.47	101	36.9	-0.1	92	381	82	76.3
41	12.769	0.310	0.019	3.19	80.2	5.47	104	36.9	-0.1	92	380	82	76.3
42	13.081	0.312	0.019	3.18	80.5	5.47	105	36.8	-0.1	92	381	82	76.3
43	13.390	0.309	0.020	3.19	80.7	5.47	101	36.7	-0.1	92	381	82	76.5
44	13.700	0.310	0.020	3.18	80.7	5.47	101	36.6	-0.1	92	381	82	76.3
45	14.012	0.312	0.019	3.19	80.8	5.47	105	36.5	-0.1	92	382	82	76.3
46	14.322	0.310	0.020	3.19	81	5.47	101	36.4	-0.1	92	382	82	76.4
47	14.632	0.310	0.020	3.19	81.2	5.47	101	36.3	-0.1	92	382	82	76.4
48	14.943	0.311	0.019	3.19	81.5	5.47	104	36.2	-0.1	92	382	82	76.4
49	15.254	0.311	0.020	3.18	81.6	5.47	101	36.2	-0.1	92	382	82	76.5
50	15.563	0.309	0.020	3.19	81.6	5.47	101	36.1	-0.1	92	384	82	76.7
51	15.874	0.311	0.020	3.18	81.6	5.47	101	36.0	-0.1	92	383	82	76.6
52	16.185	0.311	0.020	3.19	81.6	5.47	101	35.9	-0.1	92	382	82	76.5
53	16.495	0.310	0.020	3.19	82	5.47	101	35.8	-0.1	92	382	82	76.6
54	16.805	0.310	0.020	3.18	81.9	5.47	101	35.7	-0.1	93	380	82	76.5
55	17.117	0.312	0.020	3.19	82	5.47	102	35.7	-0.1	92	378	82	76.4
56	17.428	0.311	0.020	3.18	82.3	5.47	101	35.6	-0.1	92	377	82	76.4
57	17.737	0.309	0.020	3.19	82.3	5.47	101	35.5	-0.1	92	376	82	76.4
58	18.048	0.311	0.020	3.19	82.5	5.47	101	35.4	-0.1	92	377	82	76.4
59	18.360	0.312	0.020	3.18	82.4	5.47	102	35.4	-0.1	92	376	82	76.3
60	18.635	0.275	0.020	3.18	82.5	5.47	90	35.3	-0.1	92	376	77	76.3
61	18.946	0.311	0.020	3.19	82.7	5.47	101	35.2	-0.1	92	376	78	76.4
62	19.257	0.311	0.020	3.19	82.8	5.47	101	35.1	0.0	92	370	78	76.2
63	19.567	0.310	0.020	3.19	82.9	5.47	101	35.1	0.0	92	360	78	76.5
64	19.880	0.313	0.020	3.19	82.9	5.47	102	35.0	-0.1	90	347	78	76.3
65	20.191	0.311	0.020	3.18	82.9	5.47	101	35.0	-0.1	90	332	78	76.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHTJob #: 21-677Model: P40i-CTracking #: 111Run #: 1Technician: SJBDate: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	20.501	0.310	0.020	3.19	83	5.47	101	34.9	0.0	89	318	78	76.2
67	20.812	0.311	0.020	3.19	83.1	5.47	101	34.9	0.0	89	307	79	76.1
68	21.125	0.313	0.020	3.19	83.1	5.47	101	34.9	0.0	88	297	79	76.1
69	21.436	0.311	0.021	3.19	83.3	5.47	98	34.9	0.0	88	288	79	76
70	21.746	0.310	0.020	3.19	83.3	5.47	100	34.9	0.0	87	280	79	75.9
71	22.058	0.312	0.020	3.19	83.3	5.47	101	34.8	0.0	87	272	79	75.9
72	22.370	0.312	0.020	3.19	83.3	5.47	101	34.8	0.0	87	265	79	75.9
73	22.681	0.311	0.020	3.19	83.6	5.47	101	34.8	0.0	88	266	79	75.8
74	22.992	0.311	0.020	3.18	83.5	5.47	101	34.8	0.0	88	268	79	75.8
75	23.303	0.311	0.020	3.19	83.7	5.47	101	34.7	0.0	88	268	79	75.7
76	23.616	0.313	0.020	3.19	83.7	5.47	101	34.7	0.0	88	266	79	75.7
77	23.926	0.310	0.020	3.19	83.9	5.47	100	34.7	0.0	87	262	79	75.7
78	24.237	0.311	0.020	3.18	83.9	5.47	101	34.6	0.0	87	259	79	75.6
79	24.549	0.312	0.020	3.19	83.9	5.47	101	34.6	0.0	86	255	79	75.6
80	24.861	0.312	0.021	3.19	84	5.47	98	34.5	0.0	86	251	79	75.5
81	25.172	0.311	0.020	3.18	83.9	5.47	100	34.5	0.0	86	246	79	75.6
82	25.483	0.311	0.020	3.19	84.1	5.47	100	34.5	0.0	86	240	79	75.7
83	25.796	0.313	0.020	3.19	84.3	5.47	101	34.4	0.0	85	235	79	75.5
84	26.108	0.312	0.020	3.19	84.4	5.47	101	34.4	0.0	85	233	79	75.6
85	26.419	0.311	0.020	3.19	84.4	5.47	100	34.4	0.0	85	229	79	75.4
86	26.730	0.311	0.020	3.18	84.4	5.47	100	34.3	0.0	85	226	79	75.4
87	27.043	0.313	0.020	3.19	84.4	5.47	101	34.3	0.0	85	223	79	75.5
88	27.355	0.312	0.020	3.19	84.6	5.47	101	34.2	0.0	85	222	79	75.4
89	27.666	0.311	0.021	3.19	84.7	5.47	98	34.2	0.0	84	220	79	75.4
90	27.977	0.311	0.020	3.18	84.7	5.47	100	34.2	0.0	84	219	79	75.4
91	28.289	0.312	0.021	3.19	84.6	5.47	98	34.1	0.0	84	218	79	75.4
92	28.602	0.313	0.020	3.18	84.7	5.47	101	34.1	0.0	84	217	79	75.4
93	28.912	0.310	0.020	3.19	84.8	5.47	100	34.0	0.0	84	217	79	75.3
94	29.224	0.312	0.020	3.18	84.8	5.47	100	34.0	0.0	84	217	79	75.4
95	29.536	0.312	0.020	3.18	85	5.47	100	33.9	-0.1	84	216	79	75.4
96	29.848	0.312	0.020	3.18	85	5.47	100	33.9	0.0	84	216	79	75.3
97	30.159	0.311	0.021	3.19	85	5.47	98	33.9	0.0	84	216	79	75.3
98	30.470	0.311	0.020	3.18	85.1	5.47	100	33.8	0.0	84	216	79	75.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHTJob #: 21-677Model: P40i-CTracking #: 111Run #: 1Technician: SJBDate: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	30.782	0.312	0.020	3.19	85.2	5.47	100	33.8	0.0	84	216	79	75.4
100	31.095	0.313	0.020	3.18	85.2	5.47	101	33.8	0.0	84	217	79	75.5
101	31.406	0.311	0.020	3.18	85.1	5.47	100	33.7	0.0	84	216	79	75.3
102	31.717	0.311	0.020	3.18	85.3	5.47	100	33.7	0.0	84	216	79	75.4
103	32.029	0.312	0.020	3.18	85.2	5.47	100	33.6	-0.1	84	217	79	75.3
104	32.341	0.312	0.021	3.18	85.4	5.47	98	33.6	0.0	84	218	79	75.2
105	32.652	0.311	0.020	3.17	85.4	5.47	100	33.5	0.0	84	219	79	75.3
106	32.963	0.311	0.020	3.18	85.4	5.47	100	33.5	0.0	84	219	79	75.2
107	33.275	0.312	0.020	3.18	85.4	5.47	100	33.4	0.0	84	220	79	75.3
108	33.587	0.312	0.021	3.18	85.4	5.47	98	33.4	0.0	85	221	79	75.4
109	33.898	0.311	0.021	3.18	85.6	5.47	98	33.4	0.0	84	221	79	75.3
110	34.209	0.311	0.021	3.18	85.5	5.47	98	33.3	0.0	85	221	79	75.4
111	34.521	0.312	0.020	3.17	85.5	5.47	100	33.3	0.0	85	221	79	75.4
112	34.833	0.312	0.020	3.18	85.7	5.47	100	33.3	0.0	85	221	79	75.5
113	35.144	0.311	0.020	3.17	85.8	5.47	100	33.2	0.0	85	220	79	75.5
114	35.455	0.311	0.020	3.17	85.9	5.47	100	33.2	0.0	85	219	79	75.5
115	35.767	0.312	0.021	3.17	85.8	5.47	98	33.2	0.0	85	219	79	75.6
116	36.078	0.311	0.020	3.17	85.8	5.47	100	33.1	0.0	85	218	79	75.6
117	36.389	0.311	0.020	3.17	86.1	5.47	100	33.1	0.0	85	217	79	75.6
118	36.700	0.311	0.020	3.17	86	5.47	100	33.0	-0.1	85	217	79	75.7
119	37.013	0.313	0.020	3.17	86	5.47	101	33.0	0.0	85	217	79	75.7
120	37.323	0.310	0.021	3.17	86.2	5.47	97	33.0	0.0	85	217	79	75.7
121	37.634	0.311	0.020	3.17	86.2	5.47	100	32.9	0.0	85	217	79	75.8
122	37.945	0.311	0.020	3.17	86.3	5.47	100	32.9	0.0	85	217	79	75.8
123	38.258	0.313	0.020	3.17	86.5	5.47	101	32.9	0.0	85	217	79	75.9
124	38.568	0.310	0.020	3.17	86.5	5.47	100	32.8	0.0	85	218	79	75.9
125	38.879	0.311	0.021	3.17	86.5	5.47	97	32.8	0.0	85	217	79	75.9
126	39.191	0.312	0.020	3.17	86.6	5.47	100	32.7	0.0	85	217	79	76
127	39.503	0.312	0.020	3.17	86.6	5.47	100	32.7	0.0	85	217	79	76.1
128	39.813	0.310	0.020	3.17	86.4	5.47	100	32.7	0.0	85	218	79	76.1
129	40.124	0.311	0.020	3.16	86.5	5.47	100	32.6	0.0	85	219	79	76.1
130	40.436	0.312	0.020	3.16	86.6	5.47	100	32.6	0.0	85	219	79	76
131	40.748	0.312	0.020	3.16	86.8	5.47	100	32.5	0.0	85	219	79	76

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHTJob #: 21-677Model: P40i-CTracking #: 111Run #: 1Technician: SJBDate: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	41.058	0.310	0.020	3.17	86.6	5.47	100	32.5	0.0	85	220	79	76
133	41.369	0.311	0.020	3.17	86.7	5.47	100	32.4	-0.1	85	220	80	76.1
134	41.681	0.312	0.021	3.17	86.7	5.47	98	32.4	0.0	85	220	80	76
135	41.992	0.311	0.020	3.16	86.7	5.47	100	32.4	0.0	85	220	80	76.1
136	42.302	0.310	0.020	3.16	86.8	5.47	100	32.3	0.0	85	220	80	76
137	42.613	0.311	0.020	3.16	86.6	5.47	100	32.3	0.0	85	220	80	76.1
138	42.926	0.313	0.021	3.16	86.7	5.47	98	32.3	0.0	85	221	80	76
139	43.236	0.310	0.020	3.16	86.6	5.47	100	32.2	0.0	85	221	80	76.1
140	43.547	0.311	0.020	3.16	86.6	5.47	100	32.2	0.0	85	221	80	76.2
141	43.858	0.311	0.020	3.17	86.7	5.47	100	32.1	-0.1	85	221	80	76.1
142	44.170	0.312	0.020	3.16	86.8	5.47	100	32.1	0.0	85	222	80	76.1
143	44.480	0.310	0.020	3.16	86.8	5.47	100	32.0	0.0	85	222	80	76.1
144	44.791	0.311	0.020	3.16	86.9	5.47	100	32.0	0.0	85	222	80	76
145	45.103	0.312	0.020	3.16	86.8	5.47	100	32.0	0.0	85	222	80	76.1
146	45.413	0.310	0.020	3.16	86.8	5.47	100	31.9	0.0	85	221	80	76
147	45.724	0.311	0.021	3.16	87	5.47	97	31.9	0.0	85	221	80	76.1
148	46.035	0.311	0.020	3.16	86.9	5.47	100	31.8	0.0	85	222	80	76.2
149	46.347	0.312	0.020	3.16	86.9	5.47	100	31.8	0.0	85	222	80	76.1
150	46.657	0.310	0.020	3.16	87.1	5.47	100	31.8	0.0	85	221	80	76.1
151	46.967	0.310	0.020	3.16	87.1	5.47	100	31.7	0.0	85	221	80	76
152	47.279	0.312	0.020	3.16	87	5.47	100	31.7	0.0	85	221	80	76.1
153	47.590	0.311	0.021	3.16	87.1	5.47	97	31.7	0.0	85	221	80	76.2
154	47.900	0.310	0.021	3.16	87	5.47	97	31.6	0.0	85	221	80	76.3
155	48.211	0.311	0.021	3.16	87.1	5.47	97	31.6	0.0	85	222	80	76.1
156	48.523	0.312	0.020	3.16	87.1	5.47	100	31.5	0.0	85	223	80	76.1
157	48.832	0.309	0.020	3.16	87.1	5.47	99	31.5	-0.1	85	223	80	76
158	49.143	0.311	0.020	3.15	87.2	5.47	100	31.4	0.0	85	223	80	76.2
159	49.454	0.311	0.020	3.16	87.2	5.47	100	31.4	0.0	85	224	80	76.2
160	49.765	0.311	0.020	3.16	87.3	5.47	100	31.3	-0.1	85	224	80	76.2
161	50.075	0.310	0.020	3.15	87.2	5.47	99	31.3	0.0	85	224	80	76.2
162	50.385	0.310	0.020	3.16	87.4	5.47	99	31.3	0.0	85	223	80	76.1
163	50.697	0.312	0.020	3.15	87.3	5.47	100	31.2	0.0	85	224	80	76.1
164	51.007	0.310	0.020	3.15	87.3	5.47	100	31.2	-0.1	86	224	80	76.1

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	51.317	0.310	0.020	3.15	87.3	5.47	100	31.1	0.0	86	225	80	76.1
166	51.629	0.312	0.021	3.15	87.3	5.47	98	31.1	-0.1	86	225	80	76.2
167	51.939	0.310	0.020	3.14	87.5	5.47	99	31.1	0.0	86	225	80	76.2
168	52.248	0.309	0.020	3.15	87.4	5.47	99	31.0	0.0	86	225	80	76.2
169	52.559	0.311	0.020	3.15	87.3	5.47	100	31.0	0.0	86	225	80	76.3
170	52.870	0.311	0.020	3.14	87.5	5.47	100	30.9	0.0	86	225	80	76.3
171	53.179	0.309	0.020	3.15	87.5	5.47	99	30.9	0.0	86	226	80	76.2
172	53.489	0.310	0.020	3.14	87.4	5.47	100	30.9	0.0	86	225	80	76.2
173	53.801	0.312	0.020	3.15	87.4	5.47	100	30.8	0.0	86	225	80	76.3
174	54.110	0.309	0.020	3.14	87.5	5.47	99	30.8	0.0	86	226	80	76.3
175	54.420	0.310	0.020	3.14	87.5	5.47	99	30.7	0.0	86	226	80	76.3
176	54.731	0.311	0.020	3.14	87.5	5.47	100	30.7	0.0	86	226	80	76.4
177	55.041	0.310	0.020	3.14	87.7	5.47	99	30.6	0.0	86	226	80	76.3
178	55.350	0.309	0.020	3.14	87.5	5.47	99	30.6	0.0	86	226	80	76.4
179	55.662	0.312	0.020	3.14	87.6	5.47	100	30.6	0.0	86	226	80	76.5
180	55.971	0.309	0.020	3.14	87.6	5.47	99	30.5	0.0	86	226	80	76.4
181	56.281	0.310	0.020	3.14	87.6	5.47	99	30.5	0.0	86	225	80	76.5
182	56.592	0.311	0.020	3.14	87.7	5.47	100	30.5	0.0	86	226	80	76.4
183	56.901	0.309	0.020	3.14	87.6	5.47	99	30.4	0.0	86	224	80	76.3
184	57.210	0.309	0.020	3.14	87.5	5.47	99	30.4	0.0	86	223	80	76.4
185	57.521	0.311	0.020	3.14	87.7	5.47	100	30.4	0.0	86	221	80	76.3
186	57.832	0.311	0.020	3.15	87.6	5.47	100	30.3	0.0	86	220	80	76.3
187	58.141	0.309	0.020	3.14	87.7	5.47	99	30.3	0.0	86	220	80	76.4
188	58.451	0.310	0.021	3.15	87.8	5.47	97	30.3	0.0	86	218	80	76.4
189	58.762	0.311	0.021	3.15	87.7	5.47	97	30.2	0.0	86	217	80	76.5
190	59.072	0.310	0.020	3.15	87.7	5.47	99	30.2	0.0	86	216	80	76.3
191	59.381	0.309	0.020	3.14	87.7	5.47	99	30.2	0.0	86	214	80	76.3
192	59.692	0.311	0.020	3.14	87.8	5.47	100	30.2	0.0	86	213	80	76.3
193	60.002	0.310	0.020	3.14	87.8	5.47	99	30.1	0.0	85	212	80	76.3
194	60.311	0.309	0.020	3.14	87.8	5.47	99	30.1	0.0	85	212	80	76.3
195	60.623	0.312	0.021	3.14	87.7	5.47	98	30.1	0.0	85	211	80	76.2
196	60.932	0.309	0.021	3.14	87.8	5.47	97	30.0	0.0	85	208	80	76.3
197	61.241	0.309	0.021	3.13	87.8	5.47	97	30.0	0.0	85	207	80	76.4

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	61.553	0.312	0.020	3.14	87.6	5.47	100	30.0	0.0	85	206	80	76.3
199	61.862	0.309	0.020	3.14	87.7	5.47	99	29.9	0.0	85	206	80	76.3
200	62.171	0.309	0.020	3.14	87.7	5.47	99	29.9	0.0	85	205	80	76.3
201	62.482	0.311	0.020	3.14	87.6	5.47	100	29.9	0.0	85	204	80	76.3
202	62.792	0.310	0.020	3.14	87.6	5.47	99	29.8	0.0	85	203	80	76.3
203	63.101	0.309	0.020	3.14	87.7	5.47	99	29.8	0.0	85	201	80	76.3
204	63.412	0.311	0.020	3.14	87.7	5.47	100	29.8	0.0	85	200	80	76.3
205	63.722	0.310	0.021	3.14	87.8	5.47	97	29.8	0.0	85	200	80	76.3
206	64.031	0.309	0.020	3.13	87.7	5.47	99	29.7	0.0	85	199	80	76.3
207	64.341	0.310	0.020	3.13	87.8	5.47	99	29.7	0.0	85	199	80	76.3
208	64.651	0.310	0.020	3.13	87.8	5.47	99	29.7	0.0	85	198	80	76.3
209	64.960	0.309	0.021	3.13	88	5.47	97	29.6	-0.1	85	198	80	76.3
210	65.270	0.310	0.020	3.13	87.8	5.47	99	29.6	0.0	85	199	80	76.3
211	65.580	0.310	0.020	3.13	87.8	5.47	99	29.5	0.0	85	200	80	76.4
212	65.889	0.309	0.021	3.13	87.8	5.47	97	29.5	0.0	85	203	80	76.4
213	66.198	0.309	0.021	3.14	88	5.47	97	29.4	0.0	85	205	80	76.4
214	66.508	0.310	0.020	3.12	87.9	5.47	99	29.4	0.0	85	209	80	76.4
215	66.817	0.309	0.020	3.12	88	5.47	99	29.4	0.0	85	211	80	76.5
216	67.127	0.310	0.020	3.12	87.9	5.47	99	29.3	-0.1	85	213	80	76.4
217	67.436	0.309	0.020	3.13	88.1	5.47	99	29.3	0.0	85	215	80	76.4
218	67.744	0.308	0.020	3.12	88.2	5.47	99	29.2	-0.1	86	217	80	76.7
219	68.055	0.311	0.020	3.12	88.1	5.47	100	29.2	-0.1	86	220	80	76.7
220	68.363	0.308	0.020	3.12	88.2	5.47	99	29.1	0.0	86	221	80	76.7
221	68.671	0.308	0.020	3.12	88.3	5.47	99	29.1	0.0	86	220	80	76.7
222	68.981	0.310	0.020	3.11	88.2	5.47	99	29.1	0.0	86	221	80	76.7
223	69.289	0.308	0.020	3.12	88.3	5.47	99	29.0	0.0	86	221	80	76.7
224	69.597	0.308	0.020	3.12	88.4	5.47	99	29.0	0.0	86	221	80	76.8
225	69.907	0.310	0.020	3.12	88.4	5.47	99	29.0	0.0	86	221	80	76.8
226	70.215	0.308	0.021	3.12	88.2	5.47	96	28.9	0.0	86	221	80	76.7
227	70.524	0.309	0.020	3.12	88.3	5.47	99	28.9	0.0	86	220	80	76.7
228	70.834	0.310	0.020	3.11	88.3	5.47	99	28.9	0.0	86	218	80	76.8
229	71.141	0.307	0.020	3.11	88.4	5.47	98	28.9	0.0	86	217	80	76.6
230	71.452	0.311	0.020	3.12	88.2	5.47	100	28.8	0.0	86	215	80	76.8

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHTJob #: 21-677Model: P40i-CTracking #: 111Run #: 1Technician: SJBDate: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	71.759	0.307	0.021	3.11	88.2	5.47	96	28.8	0.0	86	213	80	76.7
232	72.067	0.308	0.021	3.11	88.2	5.47	96	28.8	0.0	86	212	80	76.8
233	72.377	0.310	0.020	3.11	88.3	5.47	99	28.8	0.0	86	211	80	76.7
234	72.685	0.308	0.020	3.12	88.2	5.47	99	28.7	0.0	86	210	80	76.7
235	72.994	0.309	0.020	3.11	88.2	5.47	99	28.7	0.0	86	208	80	76.7
236	73.303	0.309	0.020	3.11	88.3	5.47	99	28.7	0.0	86	207	80	76.7
237	73.611	0.308	0.020	3.11	88.1	5.47	99	28.6	0.0	86	206	80	76.7
238	73.920	0.309	0.020	3.12	88.2	5.47	99	28.6	0.0	86	205	80	76.7
239	74.228	0.308	0.021	3.11	88.3	5.47	96	28.6	0.0	86	205	80	76.7
240	74.536	0.308	0.020	3.11	88.2	5.47	99	28.5	0.0	86	204	80	76.7
241	74.846	0.310	0.020	3.11	88.3	5.47	99	28.5	0.0	86	204	80	76.7
242	75.153	0.307	0.020	3.11	88.2	5.47	98	28.5	0.0	86	203	80	76.7
243	75.462	0.309	0.020	3.11	88.2	5.47	99	28.4	0.0	86	203	80	76.7
244	75.771	0.309	0.020	3.11	88.3	5.47	99	28.4	0.0	86	203	80	76.8
245	76.078	0.307	0.020	3.11	88.4	5.47	98	28.4	0.0	86	203	80	76.8
246	76.388	0.310	0.020	3.11	88.3	5.47	99	28.3	0.0	86	203	80	76.8
247	76.695	0.307	0.020	3.11	88.3	5.47	98	28.3	0.0	86	203	80	76.8
248	77.003	0.308	0.020	3.11	88.3	5.47	99	28.3	0.0	86	206	80	76.9
249	77.312	0.309	0.020	3.10	88.3	5.47	99	28.2	-0.1	86	207	80	76.9
250	77.619	0.307	0.020	3.10	88.4	5.47	98	28.2	0.0	86	209	80	76.9
251	77.929	0.310	0.020	3.10	88.5	5.47	99	28.1	-0.1	86	211	80	76.9
252	78.236	0.307	0.020	3.10	88.4	5.47	98	28.1	-0.1	86	213	80	76.9
253	78.543	0.307	0.020	3.10	88.5	5.47	98	28.0	0.0	86	214	80	77
254	78.852	0.309	0.020	3.10	88.5	5.47	99	28.0	0.0	86	216	80	77
255	79.159	0.307	0.020	3.10	88.5	5.47	98	27.9	-0.1	86	217	80	77.1
256	79.468	0.309	0.020	3.10	88.5	5.47	99	27.9	0.0	86	219	81	77.1
257	79.775	0.307	0.020	3.09	88.5	5.47	98	27.8	-0.1	86	220	81	77
258	80.082	0.307	0.020	3.09	88.8	5.47	98	27.8	0.0	86	220	81	77.1
259	80.391	0.309	0.020	3.10	88.8	5.47	99	27.8	0.0	86	221	81	77.2
260	80.698	0.307	0.020	3.09	88.7	5.47	98	27.7	0.0	87	221	81	77.4
261	81.007	0.309	0.020	3.10	88.7	5.47	99	27.7	0.0	87	221	81	77.4
262	81.314	0.307	0.019	3.09	88.6	5.47	101	27.7	0.0	87	220	81	77.2
263	81.621	0.307	0.020	3.09	88.7	5.47	98	27.7	0.0	87	219	81	77.3

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	81.929	0.308	0.020	3.09	89	5.47	99	27.6	0.0	87	219	81	77.3
265	82.236	0.307	0.020	3.09	88.9	5.47	98	27.6	0.0	87	218	81	77.3
266	82.545	0.309	0.020	3.09	89	5.47	99	27.6	0.0	87	216	81	77.4
267	82.851	0.306	0.020	3.09	89.2	5.47	98	27.6	0.0	87	215	81	77.5
268	83.160	0.309	0.020	3.10	89.2	5.47	99	27.5	0.0	87	213	81	77.5
269	83.467	0.307	0.020	3.09	89.3	5.47	98	27.5	0.0	87	212	81	77.5
270	83.773	0.306	0.020	3.09	89.4	5.47	98	27.5	0.0	87	211	81	77.6
271	84.082	0.309	0.020	3.08	89.4	5.47	99	27.5	0.0	87	210	81	77.5
272	84.389	0.307	0.019	3.09	89.5	5.47	101	27.4	0.0	87	209	81	77.6
273	84.697	0.308	0.020	3.09	89.4	5.47	99	27.4	0.0	87	208	81	77.6
274	85.003	0.306	0.020	3.09	89.4	5.47	98	27.3	0.0	86	208	81	77.6
275	85.311	0.308	0.020	3.09	89.5	5.47	99	27.3	0.0	87	208	81	77.6
276	85.618	0.307	0.020	3.09	89.6	5.47	98	27.3	0.0	86	207	81	77.6
277	85.925	0.307	0.019	3.09	89.6	5.47	101	27.2	0.0	87	209	81	77.6
278	86.233	0.308	0.020	3.09	89.5	5.47	99	27.2	0.0	87	210	81	77.7
279	86.540	0.307	0.020	3.08	89.5	5.47	98	27.1	-0.1	87	211	81	77.7
280	86.848	0.308	0.020	3.08	89.6	5.47	99	27.1	0.0	87	212	81	77.8
281	87.154	0.306	0.020	3.09	89.6	5.47	98	27.1	-0.1	87	213	81	77.8
282	87.462	0.308	0.020	3.09	89.6	5.47	99	27.0	0.0	87	215	81	77.8
283	87.768	0.306	0.019	3.08	89.7	5.47	100	27.0	-0.1	87	216	81	77.9
284	88.075	0.307	0.019	3.08	89.7	5.47	101	26.9	-0.1	87	217	81	77.9
285	88.383	0.308	0.019	3.08	89.7	5.47	101	26.9	-0.1	87	218	81	77.9
286	88.689	0.306	0.020	3.08	89.7	5.47	98	26.8	0.0	87	219	81	77.9
287	88.997	0.308	0.020	3.08	89.7	5.47	99	26.8	0.0	87	221	81	77.9
288	89.302	0.305	0.020	3.08	89.8	5.47	98	26.8	0.0	87	222	82	77.9
289	89.610	0.308	0.019	3.08	89.7	5.47	101	26.7	0.0	87	223	82	78
290	89.916	0.306	0.020	3.08	89.8	5.47	98	26.7	0.0	87	223	82	77.9
291	90.224	0.308	0.019	3.08	89.8	5.47	101	26.7	0.0	88	222	82	78
292	90.530	0.306	0.019	3.08	89.8	5.47	100	26.6	0.0	87	222	82	78
293	90.836	0.306	0.019	3.07	89.9	5.47	100	26.6	0.0	88	221	82	78
294	91.143	0.307	0.020	3.08	89.8	5.47	98	26.6	0.0	88	220	82	78
295	91.449	0.306	0.019	3.08	89.9	5.47	100	26.5	0.0	87	220	82	78.1
296	91.757	0.308	0.020	3.07	90	5.47	99	26.5	0.0	88	218	82	78.1

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHTJob #: 21-677Model: P40i-CTracking #: 111Run #: 1Technician: SJBDate: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	92.063	0.306	0.020	3.07	89.9	5.47	98	26.5	0.0	87	216	82	78.1
298	92.370	0.307	0.020	3.08	90	5.47	98	26.5	0.0	87	216	82	78.1
299	92.676	0.306	0.020	3.08	89.9	5.47	98	26.4	0.0	88	215	82	78.1
300	92.984	0.308	0.020	3.07	89.9	5.47	99	26.4	0.0	87	214	82	78.1
301	93.289	0.305	0.020	3.07	89.9	5.47	98	26.4	0.0	87	214	82	78.1
302	93.597	0.308	0.020	3.08	89.9	5.47	99	26.3	0.0	87	214	82	78.2
303	93.903	0.306	0.019	3.07	89.9	5.47	100	26.3	0.0	87	213	82	78.1
304	94.209	0.306	0.020	3.08	89.9	5.47	98	26.3	0.0	87	213	82	78.2
305	94.516	0.307	0.020	3.07	90	5.47	98	26.2	0.0	87	212	82	78.2
306	94.822	0.306	0.020	3.08	89.9	5.47	98	26.2	0.0	87	212	82	78.2
307	95.130	0.308	0.019	3.07	90.1	5.47	101	26.2	0.0	87	211	82	78.2
308	95.436	0.306	0.019	3.08	90.2	5.47	100	26.1	0.0	88	212	82	78.2
309	95.743	0.307	0.019	3.08	90.1	5.47	101	26.1	0.0	88	211	82	78.2
310	96.049	0.306	0.020	3.07	90.2	5.47	98	26.1	0.0	87	211	82	78.3
311	96.357	0.308	0.019	3.07	90.1	5.47	101	26.0	0.0	88	212	82	78.2
312	96.662	0.305	0.020	3.07	90.2	5.47	98	26.0	0.0	88	213	82	78.3
313	96.969	0.307	0.020	3.07	90.1	5.47	98	26.0	0.0	87	213	82	78.3
314	97.275	0.306	0.020	3.07	90.2	5.47	98	25.9	-0.1	88	214	82	78.3
315	97.582	0.307	0.020	3.07	90.3	5.47	98	25.9	0.0	88	215	82	78.3
316	97.888	0.306	0.019	3.07	90.3	5.47	100	25.8	-0.1	88	216	82	78.4
317	98.194	0.306	0.019	3.07	90.1	5.47	100	25.8	0.0	88	216	82	78.4
318	98.500	0.306	0.020	3.06	90.3	5.47	98	25.8	0.0	88	217	82	78.5
319	98.806	0.306	0.020	3.06	90.2	5.47	98	25.7	-0.1	88	218	82	78.4
320	99.113	0.307	0.020	3.07	90.3	5.47	98	25.7	0.0	88	220	82	78.4
321	99.418	0.305	0.020	3.07	90.2	5.47	98	25.6	0.0	88	221	82	78.4
322	99.725	0.307	0.020	3.06	90.1	5.47	98	25.6	-0.1	88	221	82	78.5
323	100.030	0.305	0.020	3.06	90.3	5.47	98	25.5	0.0	88	222	82	78.5
324	100.337	0.307	0.020	3.06	90.3	5.47	98	25.5	-0.1	88	223	82	78.5
325	100.642	0.305	0.020	3.06	90.2	5.47	98	25.5	0.0	88	223	82	78.5
326	100.949	0.307	0.019	3.06	90.3	5.47	101	25.4	0.0	88	223	82	78.6
327	101.254	0.305	0.020	3.06	90.3	5.47	98	25.4	0.0	88	223	82	78.6
328	101.561	0.307	0.020	3.06	90.5	5.47	98	25.4	0.0	88	222	82	78.6
329	101.866	0.305	0.020	3.06	90.5	5.47	98	25.3	0.0	88	221	82	78.6

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	102.173	0.307	0.020	3.06	90.4	5.47	98	25.3	0.0	88	220	82	78.6
331	102.478	0.305	0.020	3.05	90.3	5.47	98	25.3	0.0	88	219	82	78.6
332	102.785	0.307	0.020	3.05	90.3	5.47	98	25.3	0.0	88	219	82	78.6
333	103.089	0.304	0.020	3.06	90.3	5.47	97	25.2	0.0	88	218	82	78.6
334	103.397	0.308	0.019	3.06	90.4	5.47	101	25.2	0.0	88	216	82	78.7
335	103.701	0.304	0.019	3.06	90.7	5.47	100	25.2	0.0	88	216	82	78.7
336	104.008	0.307	0.020	3.06	90.6	5.47	98	25.1	0.0	88	216	82	78.7
337	104.313	0.305	0.019	3.06	90.7	5.47	100	25.1	0.0	88	215	82	78.7
338	104.620	0.307	0.020	3.06	90.6	5.47	98	25.1	0.0	88	215	82	78.7
339	104.924	0.304	0.019	3.05	90.8	5.47	100	25.0	0.0	88	215	82	78.7
340	105.231	0.307	0.019	3.05	90.7	5.47	101	25.0	0.0	88	214	82	78.7
341	105.536	0.305	0.019	3.05	90.7	5.47	100	25.0	0.0	88	213	82	78.7
342	105.842	0.306	0.020	3.06	90.8	5.47	98	24.9	0.0	88	213	82	78.8
343	106.147	0.305	0.020	3.05	90.6	5.47	98	24.9	0.0	88	213	82	78.9
344	106.453	0.306	0.020	3.06	90.8	5.47	98	24.8	-0.1	88	213	82	78.9
345	106.758	0.305	0.019	3.05	90.7	5.47	100	24.8	0.0	88	213	82	78.9
346	107.064	0.306	0.020	3.05	90.8	5.47	98	24.8	0.0	88	214	82	78.9
347	107.369	0.305	0.019	3.05	90.7	5.47	100	24.7	0.0	88	214	82	78.9
348	107.675	0.306	0.019	3.05	90.7	5.47	100	24.7	0.0	88	214	82	78.9
349	107.980	0.305	0.019	3.04	90.8	5.47	100	24.6	-0.1	89	215	82	79
350	108.286	0.306	0.019	3.05	90.7	5.47	100	24.6	0.0	88	217	82	78.9
351	108.591	0.305	0.019	3.05	90.7	5.47	100	24.6	-0.1	88	217	83	78.9
352	108.897	0.306	0.019	3.05	90.7	5.47	100	24.5	0.0	88	218	82	79
353	109.201	0.304	0.019	3.05	90.9	5.47	100	24.5	-0.1	88	220	82	78.9
354	109.508	0.307	0.020	3.05	90.6	5.47	98	24.4	0.0	88	221	83	79
355	109.811	0.303	0.020	3.05	90.8	5.47	97	24.4	0.0	89	222	83	78.9
356	110.118	0.307	0.019	3.05	90.9	5.47	101	24.3	-0.1	89	223	83	79
357	110.422	0.304	0.020	3.04	91	5.47	97	24.3	0.0	89	224	83	79
358	110.728	0.306	0.019	3.04	91.1	5.47	100	24.3	0.0	89	225	83	79.1
359	111.032	0.304	0.019	3.04	91.2	5.47	100	24.2	0.0	89	225	83	79.1
360	111.338	0.306	0.020	3.04	91	5.47	98	24.2	0.0	89	224	83	79.1

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
Avg/Tot	111.338	0.309	0.020	3.13	86	5.47	100			87	248	80	77

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.002		1.60	75.1	1.19		76	-0.070	9.31	0.07
1	0.308	0.306	3.22	75.1	1.19	106	77	-0.070	8.48	0.02
2	0.612	0.304	3.18	75.2	1.19	106	77	-0.070	9.03	0.06
3	0.914	0.302	3.17	75.2	1.19	105	77	-0.070	9.02	0.04
4	1.214	0.300	3.15	75.3	1.19	104	78	-0.070	8.75	0.04
5	1.516	0.302	3.14	75.3	1.19	105	78	-0.070	8.91	0.05
6	1.817	0.301	3.14	75.4	1.19	102	78	-0.070	8.71	0.05
7	2.117	0.300	3.13	75.4	1.18	101	79	-0.070	9.28	0.06
8	2.416	0.299	3.12	75.5	1.18	101	79	-0.070	9.34	0.07
9	2.715	0.299	3.12	75.5	1.19	104	79	-0.070	9.35	0.06
10	3.015	0.300	3.11	75.6	1.19	104	80	-0.070	8.93	0.05
11	3.315	0.300	3.11	75.7	1.19	101	80	-0.070	9.38	0.04
12	3.614	0.299	3.10	75.8	1.17	101	80	-0.070	8.21	0.03
13	3.913	0.299	3.10	75.8	1.2	101	80	-0.070	7.51	0.02
14	4.210	0.297	3.10	76	1.18	100	80	-0.070	7.35	0.02
15	4.508	0.298	3.09	76	1.19	101	80	-0.070	7.87	0.02
16	4.814	0.306	3.27	76.1	1.21	103	81	-0.070	8.52	0.03
17	5.121	0.307	3.26	76.2	1.19	104	81	-0.070	9.41	0.06
18	5.429	0.308	3.26	76.3	1.18	104	81	-0.070	10.13	0.10
19	5.736	0.307	3.26	76.4	1.19	104	81	-0.070	9.85	0.07
20	6.044	0.308	3.25	76.5	1.19	104	81	-0.070	9.32	0.09
21	6.350	0.306	3.25	76.6	1.21	103	81	-0.070	8.85	0.03
22	6.658	0.308	3.24	76.7	1.2	104	81	-0.070	9.42	0.04
23	6.965	0.307	3.24	76.8	1.21	104	82	-0.070	9.12	0.03
24	7.272	0.307	3.24	77	1.19	103	82	-0.070	8.79	0.04
25	7.579	0.307	3.24	77	1.2	103	82	-0.070	9.33	0.04
26	7.886	0.307	3.23	77.1	1.19	103	82	-0.070	9.24	0.03
27	8.193	0.307	3.23	77.2	1.2	103	82	-0.070	8.93	0.11
28	8.499	0.306	3.23	77.2	1.18	103	82	-0.070	8.91	0.03
29	8.807	0.308	3.23	77.3	1.18	104	82	-0.070	8.82	0.03
30	9.113	0.306	3.23	77.4	1.2	103	82	-0.070	8.49	0.03
31	9.421	0.308	3.23	77.5	1.18	104	82	-0.070	8.69	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
32	9.726	0.305	3.23	77.7	1.18	103	82	-0.070	7.97	0.02
33	10.034	0.308	3.23	77.7	1.18	104	82	-0.070	8.73	0.04
34	10.339	0.305	3.22	77.8	1.2	103	82	-0.070	9.24	0.07
35	10.647	0.308	3.23	77.9	1.2	104	82	-0.070	9.11	0.06
36	10.953	0.306	3.22	78	1.2	100	82	-0.070	9.18	0.03
37	11.261	0.308	3.22	78.2	1.19	104	83	-0.070	9.08	0.03
38	11.566	0.305	3.22	78.2	1.18	103	83	-0.070	9.77	0.03
39	11.874	0.308	3.22	78.3	1.18	104	83	-0.070	9.90	0.06
40	12.180	0.306	3.22	78.4	1.19	100	83	-0.070	9.33	0.02
41	12.488	0.308	3.22	78.4	1.18	104	83	-0.070	8.51	0.04
42	12.794	0.306	3.21	78.6	1.19	103	83	-0.070	9.16	0.03
43	13.101	0.307	3.22	78.7	1.2	101	83	-0.070	8.80	0.03
44	13.408	0.307	3.22	78.7	1.19	101	83	-0.070	9.46	0.08
45	13.715	0.307	3.22	78.9	1.18	103	83	-0.070	9.85	0.14
46	14.023	0.308	3.22	78.9	1.2	101	83	-0.070	9.88	0.12
47	14.329	0.306	3.22	79	1.18	100	83	-0.070	9.30	0.06
48	14.637	0.308	3.22	79	1.18	104	83	-0.070	9.22	0.05
49	14.943	0.306	3.21	79.1	1.19	100	83	-0.070	8.89	0.04
50	15.251	0.308	3.21	79.1	1.18	101	83	-0.070	8.94	0.03
51	15.557	0.306	3.21	79.2	1.21	100	83	-0.070	9.18	0.04
52	15.865	0.308	3.21	79.2	1.18	101	83	-0.070	8.51	0.05
53	16.171	0.306	3.21	79.3	1.21	100	83	-0.070	9.03	0.04
54	16.479	0.308	3.21	79.4	1.2	101	83	-0.070	8.49	0.03
55	16.785	0.306	3.21	79.4	1.19	100	83	-0.070	8.00	0.03
56	17.094	0.309	3.21	79.4	1.18	101	83	-0.070	8.43	0.03
57	17.399	0.305	3.21	79.4	1.21	100	83	-0.070	7.89	0.02
58	17.708	0.309	3.21	79.3	1.17	101	83	-0.070	8.52	0.02
59	18.014	0.306	3.21	79.2	1.2	100	83	-0.070	8.38	0.02
60	18.323	0.309	3.21	79.2	1.19	101	83	-0.070	8.49	0.02
61	18.629	0.306	3.20	79.3	1.2	100	83	-0.070	8.46	0.03
62	18.938	0.309	3.21	79.2	1.2	101	83	-0.070	6.78	0.03
63	19.244	0.306	3.21	79.4	1.17	100	83	-0.070	3.65	0.02

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
64	19.553	0.309	3.21	79.4	1.19	101	83	-0.060	3.17	0.02
65	19.859	0.306	3.21	79.4	1.2	100	83	-0.060	2.35	0.03
66	20.168	0.309	3.21	79.4	1.18	101	83	-0.060	2.14	0.02
67	20.475	0.307	3.21	79.4	1.21	100	83	-0.060	2.51	0.02
68	20.784	0.309	3.21	79.5	1.2	101	83	-0.050	2.68	0.02
69	21.091	0.307	3.21	79.5	1.19	98	83	-0.050	2.86	0.02
70	21.400	0.309	3.21	79.5	1.18	101	83	-0.050	3.01	0.02
71	21.707	0.307	3.21	79.5	1.21	100	82	-0.050	3.23	0.02
72	22.016	0.309	3.21	79.6	1.18	101	82	-0.050	4.05	0.03
73	22.323	0.307	3.21	79.5	1.19	100	82	-0.050	3.42	0.03
74	22.632	0.309	3.21	79.5	1.21	101	82	-0.050	3.40	0.02
75	22.940	0.308	3.21	79.6	1.19	100	82	-0.050	3.67	0.03
76	23.248	0.308	3.21	79.5	1.21	100	82	-0.050	3.83	0.03
77	23.556	0.308	3.21	79.6	1.19	100	82	-0.050	4.06	0.03
78	23.864	0.308	3.21	79.6	1.18	100	82	-0.050	5.00	0.04
79	24.173	0.309	3.21	79.6	1.18	101	82	-0.050	4.95	0.03
80	24.480	0.307	3.22	79.7	1.17	97	82	-0.050	5.38	0.04
81	24.790	0.310	3.21	79.7	1.21	101	82	-0.040	5.84	0.04
82	25.098	0.308	3.22	79.7	1.19	100	82	-0.040	5.53	0.02
83	25.408	0.310	3.21	79.6	1.2	101	81	-0.040	5.30	0.02
84	25.715	0.307	3.21	79.7	1.18	100	81	-0.040	5.70	0.02
85	26.026	0.311	3.22	79.7	1.2	101	81	-0.040	5.81	0.01
86	26.334	0.308	3.22	79.7	1.2	100	81	-0.040	5.09	0.02
87	26.643	0.309	3.22	79.7	1.2	100	81	-0.040	5.46	0.02
88	26.952	0.309	3.21	79.8	1.2	100	81	-0.040	5.62	0.04
89	27.259	0.307	3.21	79.8	1.21	97	81	-0.040	6.34	0.03
90	27.570	0.311	3.21	79.7	1.17	101	81	-0.040	6.52	0.10
91	27.877	0.307	3.21	79.6	1.2	97	81	-0.040	6.47	0.04
92	28.188	0.311	3.21	79.7	1.21	101	81	-0.040	6.79	0.08
93	28.495	0.307	3.21	79.7	1.2	100	81	-0.040	6.34	0.03
94	28.805	0.310	3.21	79.7	1.19	101	81	-0.040	6.95	0.06
95	29.114	0.309	3.21	79.7	1.19	100	81	-0.040	6.78	0.08

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
96	29.422	0.308	3.21	79.7	1.18	100	81	-0.040	6.88	0.03
97	29.732	0.310	3.22	79.7	1.18	98	80	-0.040	6.28	0.03
98	30.040	0.308	3.21	79.7	1.2	100	80	-0.040	5.96	0.03
99	30.350	0.310	3.21	79.7	1.2	101	80	-0.040	6.09	0.03
100	30.658	0.308	3.21	79.7	1.21	100	80	-0.040	5.90	0.03
101	30.968	0.310	3.21	79.8	1.2	101	80	-0.040	6.20	0.02
102	31.276	0.308	3.21	79.9	1.18	100	80	-0.040	6.62	0.02
103	31.585	0.309	3.21	79.8	1.18	100	80	-0.040	7.55	0.05
104	31.894	0.309	3.20	79.8	1.19	98	80	-0.040	7.46	0.07
105	32.202	0.308	3.21	79.8	1.18	100	80	-0.040	6.99	0.06
106	32.512	0.310	3.20	79.8	1.18	101	80	-0.040	6.89	0.04
107	32.819	0.307	3.20	79.9	1.18	100	80	-0.040	6.81	0.04
108	33.129	0.310	3.20	79.9	1.21	98	80	-0.040	6.29	0.03
109	33.437	0.308	3.20	79.8	1.2	98	80	-0.040	5.72	0.04
110	33.747	0.310	3.20	79.9	1.2	98	80	-0.040	5.45	0.02
111	34.055	0.308	3.20	79.8	1.18	100	80	-0.040	5.93	0.01
112	34.365	0.310	3.20	79.7	1.19	101	80	-0.040	5.40	0.02
113	34.673	0.308	3.20	79.7	1.21	100	80	-0.040	5.45	0.03
114	34.981	0.308	3.20	79.6	1.19	100	80	-0.040	5.66	0.02
115	35.290	0.309	3.20	79.8	1.19	98	80	-0.040	5.65	0.02
116	35.598	0.308	3.20	79.7	1.18	100	80	-0.040	5.43	0.02
117	35.908	0.310	3.20	79.8	1.17	101	80	-0.040	5.50	0.03
118	36.215	0.307	3.20	79.8	1.19	100	80	-0.040	5.80	0.04
119	36.525	0.310	3.20	79.9	1.21	101	80	-0.040	5.85	0.04
120	36.832	0.307	3.20	79.9	1.2	97	80	-0.040	6.14	0.02
121	37.142	0.310	3.20	79.9	1.18	101	80	-0.040	6.42	0.06
122	37.449	0.307	3.20	79.9	1.2	100	80	-0.040	6.32	0.07
123	37.759	0.310	3.20	79.9	1.19	101	80	-0.040	6.01	0.04
124	38.067	0.308	3.20	80	1.21	100	80	-0.040	6.62	0.04
125	38.376	0.309	3.19	80	1.19	98	80	-0.040	5.86	0.02
126	38.685	0.309	3.20	80	1.21	100	81	-0.040	6.42	0.03
127	38.992	0.307	3.19	80	1.2	100	81	-0.040	6.45	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
128	39.302	0.310	3.19	80	1.18	101	81	-0.040	6.79	0.04
129	39.609	0.307	3.19	80	1.19	100	81	-0.040	6.70	0.02
130	39.919	0.310	3.19	80.1	1.18	101	81	-0.040	6.72	0.02
131	40.226	0.307	3.19	80.2	1.18	100	81	-0.040	5.94	0.03
132	40.536	0.310	3.19	80.2	1.18	101	81	-0.040	6.10	0.02
133	40.843	0.307	3.19	80.2	1.2	100	81	-0.040	6.21	0.05
134	41.153	0.310	3.19	80.2	1.19	98	81	-0.040	6.15	0.01
135	41.461	0.308	3.19	80.2	1.2	100	81	-0.040	5.52	0.02
136	41.769	0.308	3.20	80.2	1.18	100	81	-0.040	6.53	0.01
137	42.077	0.308	3.19	80.3	1.19	100	81	-0.040	6.23	0.01
138	42.385	0.308	3.19	80.2	1.2	98	81	-0.040	6.04	0.01
139	42.694	0.309	3.19	80.3	1.21	100	81	-0.040	6.16	0.01
140	43.002	0.308	3.19	80.3	1.2	100	81	-0.040	6.41	0.02
141	43.312	0.310	3.19	80.4	1.18	101	81	-0.040	6.73	0.01
142	43.619	0.307	3.19	80.3	1.18	100	81	-0.040	6.77	0.08
143	43.928	0.309	3.19	80.3	1.21	100	81	-0.040	6.36	0.01
144	44.235	0.307	3.19	80.4	1.19	100	81	-0.040	6.30	0.01
145	44.545	0.310	3.19	80.5	1.19	101	81	-0.040	5.78	0.02
146	44.852	0.307	3.18	80.5	1.21	100	81	-0.040	6.32	0.04
147	45.162	0.310	3.19	80.5	1.2	98	81	-0.040	6.12	0.03
148	45.469	0.307	3.19	80.5	1.18	100	81	-0.040	6.45	0.03
149	45.778	0.309	3.18	80.6	1.19	100	81	-0.040	6.38	0.05
150	46.086	0.308	3.18	80.7	1.21	100	81	-0.040	6.11	0.02
151	46.394	0.308	3.18	80.6	1.19	100	81	-0.040	6.31	0.02
152	46.702	0.308	3.18	80.6	1.21	100	81	-0.040	6.13	0.07
153	47.010	0.308	3.18	80.7	1.21	98	81	-0.040	6.01	0.04
154	47.319	0.309	3.18	80.7	1.19	98	81	-0.040	5.93	0.02
155	47.626	0.307	3.18	80.8	1.18	97	81	-0.040	6.58	0.07
156	47.935	0.309	3.18	80.8	1.2	100	81	-0.040	6.55	0.02
157	48.242	0.307	3.17	80.8	1.21	100	81	-0.040	6.93	0.09
158	48.551	0.309	3.18	80.9	1.18	100	81	-0.040	6.54	0.03
159	48.858	0.307	3.18	80.9	1.21	100	81	-0.040	6.66	0.08

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
160	49.167	0.309	3.17	80.9	1.18	100	81	-0.040	6.44	0.01
161	49.474	0.307	3.18	81	1.21	100	81	-0.040	5.58	0.02
162	49.783	0.309	3.18	81	1.21	100	81	-0.040	5.54	0.02
163	50.090	0.307	3.17	81.1	1.19	100	81	-0.040	6.18	0.01
164	50.399	0.309	3.18	81	1.18	100	81	-0.040	7.18	0.08
165	50.705	0.306	3.17	81.2	1.19	99	81	-0.040	6.96	0.02
166	51.015	0.310	3.17	81.1	1.22	98	81	-0.040	6.46	0.02
167	51.321	0.306	3.17	81.1	1.2	99	81	-0.040	6.31	0.05
168	51.630	0.309	3.17	81.2	1.19	100	81	-0.040	6.32	0.03
169	51.937	0.307	3.17	81.1	1.2	100	81	-0.040	6.05	0.02
170	52.245	0.308	3.17	81.1	1.21	100	81	-0.040	6.59	0.02
171	52.552	0.307	3.16	81.1	1.21	100	81	-0.040	6.32	0.01
172	52.861	0.309	3.17	81.2	1.22	100	81	-0.040	6.04	0.03
173	53.167	0.306	3.16	81.2	1.22	99	81	-0.040	6.43	0.03
174	53.476	0.309	3.17	81.3	1.19	100	81	-0.040	6.54	0.03
175	53.782	0.306	3.17	81.3	1.19	99	81	-0.040	6.73	0.06
176	54.091	0.309	3.17	81.2	1.22	100	81	-0.040	6.40	0.03
177	54.397	0.306	3.16	81.3	1.18	99	81	-0.040	5.94	0.04
178	54.705	0.308	3.17	81.3	1.21	100	81	-0.040	6.18	0.02
179	55.011	0.306	3.17	81.2	1.2	99	81	-0.040	6.27	0.03
180	55.320	0.309	3.16	81.1	1.18	100	81	-0.040	5.80	0.02
181	55.626	0.306	3.16	81.2	1.19	99	81	-0.040	5.96	0.07
182	55.935	0.309	3.16	81.1	1.22	100	81	-0.040	5.95	0.01
183	56.241	0.306	3.16	81.1	1.22	99	81	-0.040	4.81	0.01
184	56.549	0.308	3.16	81.1	1.21	100	81	-0.040	4.68	0.02
185	56.855	0.306	3.17	81.1	1.2	99	81	-0.040	5.36	0.01
186	57.164	0.309	3.16	81.1	1.19	100	81	-0.040	4.73	0.03
187	57.470	0.306	3.17	81.2	1.21	99	81	-0.040	4.55	0.02
188	57.779	0.309	3.17	81.2	1.2	98	81	-0.040	4.21	0.02
189	58.085	0.306	3.16	81.2	1.2	97	81	-0.040	4.66	0.02
190	58.394	0.309	3.16	81.2	1.19	100	81	-0.040	4.83	0.01
191	58.700	0.306	3.16	81.2	1.21	99	81	-0.040	4.52	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
192	59.009	0.309	3.17	81.1	1.2	100	81	-0.040	4.67	0.02
193	59.315	0.306	3.16	81.2	1.2	99	81	-0.040	4.57	0.02
194	59.623	0.308	3.16	81.3	1.19	100	81	-0.040	4.70	0.03
195	59.929	0.306	3.16	81.2	1.2	97	81	-0.030	4.82	0.02
196	60.238	0.309	3.16	81.2	1.22	98	81	-0.040	4.64	0.00
197	60.544	0.306	3.16	81.2	1.19	97	81	-0.030	4.55	0.02
198	60.852	0.308	3.16	81.2	1.19	100	81	-0.040	4.66	0.02
199	61.158	0.306	3.16	81.2	1.21	99	81	-0.030	5.33	0.02
200	61.467	0.309	3.16	81.2	1.19	100	81	-0.030	5.46	0.03
201	61.773	0.306	3.16	81.2	1.21	99	81	-0.030	5.31	0.01
202	62.082	0.309	3.16	81.2	1.22	100	81	-0.030	5.49	0.01
203	62.388	0.306	3.16	81.1	1.22	99	81	-0.030	5.18	0.02
204	62.696	0.308	3.16	81.1	1.19	100	81	-0.030	5.29	0.06
205	63.002	0.306	3.16	81.1	1.22	97	81	-0.030	5.29	0.03
206	63.310	0.308	3.16	81.1	1.2	100	81	-0.030	5.55	0.05
207	63.616	0.306	3.16	81.1	1.2	99	81	-0.030	5.56	0.06
208	63.925	0.309	3.15	81	1.19	100	81	-0.030	5.81	0.01
209	64.230	0.305	3.15	81.1	1.21	96	81	-0.030	6.32	0.03
210	64.539	0.309	3.16	81.1	1.21	100	81	-0.030	6.86	0.06
211	64.844	0.305	3.15	81.1	1.22	99	81	-0.030	6.80	0.02
212	65.152	0.308	3.16	81.1	1.19	97	81	-0.030	6.95	0.04
213	65.458	0.306	3.15	81.2	1.22	97	81	-0.030	6.96	0.04
214	65.766	0.308	3.15	81.2	1.2	100	81	-0.030	7.29	0.09
215	66.072	0.306	3.15	81.3	1.22	99	81	-0.040	7.65	0.04
216	66.379	0.307	3.15	81.3	1.21	100	81	-0.030	7.23	0.13
217	66.686	0.307	3.15	81.4	1.22	100	81	-0.040	7.25	0.04
218	66.992	0.306	3.14	81.3	1.19	99	81	-0.040	7.58	0.12
219	67.300	0.308	3.15	81.4	1.21	100	81	-0.040	7.28	0.07
220	67.605	0.305	3.14	81.4	1.19	99	81	-0.040	5.79	0.06
221	67.912	0.307	3.14	81.5	1.22	100	81	-0.040	6.14	0.15
222	68.217	0.305	3.14	81.4	1.2	99	81	-0.040	5.88	0.06
223	68.525	0.308	3.14	81.4	1.2	100	81	-0.040	5.14	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
224	68.830	0.305	3.14	81.5	1.21	99	81	-0.040	5.18	0.01
225	69.137	0.307	3.14	81.6	1.2	100	81	-0.040	5.19	0.01
226	69.443	0.306	3.14	81.6	1.19	97	81	-0.040	4.69	0.01
227	69.749	0.306	3.14	81.5	1.2	99	81	-0.040	4.55	0.01
228	70.056	0.307	3.14	81.6	1.2	100	81	-0.040	4.16	0.01
229	70.362	0.306	3.14	81.6	1.22	99	81	-0.040	3.77	0.01
230	70.669	0.307	3.14	81.6	1.21	100	81	-0.040	3.92	0.01
231	70.974	0.305	3.14	81.6	1.21	96	81	-0.040	3.83	0.02
232	71.281	0.307	3.14	81.6	1.21	97	81	-0.040	4.37	0.01
233	71.586	0.305	3.13	81.6	1.22	99	81	-0.040	4.70	0.05
234	71.894	0.308	3.13	81.7	1.22	100	81	-0.030	4.50	0.01
235	72.198	0.304	3.13	81.6	1.19	99	81	-0.030	4.64	0.03
236	72.505	0.307	3.14	81.7	1.22	99	81	-0.030	4.54	0.01
237	72.812	0.307	3.14	81.6	1.21	99	81	-0.030	5.01	0.02
238	73.117	0.305	3.14	81.7	1.22	99	81	-0.030	5.27	0.02
239	73.424	0.307	3.14	81.7	1.2	97	81	-0.030	5.06	0.02
240	73.729	0.305	3.13	81.7	1.2	99	81	-0.030	4.98	0.02
241	74.036	0.307	3.13	81.7	1.21	99	81	-0.030	4.98	0.01
242	74.341	0.305	3.13	81.7	1.22	99	81	-0.030	5.10	0.01
243	74.648	0.307	3.13	81.7	1.2	99	81	-0.030	5.11	0.02
244	74.953	0.305	3.14	81.7	1.21	99	81	-0.030	5.34	0.01
245	75.259	0.306	3.13	81.8	1.22	99	81	-0.030	5.69	0.01
246	75.566	0.307	3.13	81.8	1.2	99	81	-0.030	5.86	0.08
247	75.871	0.305	3.13	81.8	1.2	99	81	-0.030	6.71	0.11
248	76.178	0.307	3.13	81.8	1.21	99	81	-0.030	6.61	0.03
249	76.482	0.304	3.13	81.8	1.22	98	81	-0.030	6.44	0.04
250	76.789	0.307	3.12	81.8	1.21	99	81	-0.030	6.59	0.06
251	77.093	0.304	3.13	81.9	1.21	98	81	-0.030	6.82	0.08
252	77.400	0.307	3.12	81.8	1.22	99	81	-0.040	6.91	0.16
253	77.706	0.306	3.13	81.9	1.2	99	81	-0.040	6.97	0.07
254	78.010	0.304	3.12	81.9	1.21	99	81	-0.040	6.84	0.06
255	78.317	0.307	3.12	81.9	1.22	99	82	-0.040	6.73	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
256	78.621	0.304	3.12	81.9	1.21	99	82	-0.040	6.86	0.07
257	78.928	0.307	3.12	81.9	1.23	100	82	-0.040	6.71	0.07
258	79.232	0.304	3.13	81.9	1.23	99	82	-0.040	5.74	0.03
259	79.539	0.307	3.13	82	1.21	99	82	-0.040	5.46	0.01
260	79.845	0.306	3.13	82	1.22	99	82	-0.040	4.78	0.02
261	80.150	0.305	3.13	82	1.2	99	82	-0.040	4.71	0.01
262	80.457	0.307	3.13	82	1.22	102	82	-0.040	5.03	0.02
263	80.762	0.305	3.13	82	1.23	99	82	-0.040	4.65	0.01
264	81.069	0.307	3.13	82.1	1.22	99	82	-0.040	4.78	0.06
265	81.373	0.304	3.13	82	1.22	99	82	-0.040	4.43	0.01
266	81.680	0.307	3.13	82.1	1.22	100	82	-0.040	4.10	0.02
267	81.986	0.306	3.13	82.1	1.21	99	82	-0.040	4.22	0.00
268	82.291	0.305	3.13	82.2	1.21	99	82	-0.040	3.99	0.01
269	82.598	0.307	3.12	82.2	1.23	99	82	-0.040	4.20	0.04
270	82.902	0.304	3.12	82.2	1.21	99	82	-0.040	4.44	0.01
271	83.209	0.307	3.13	82.2	1.22	99	82	-0.030	4.24	0.03
272	83.513	0.304	3.12	82.2	1.22	101	82	-0.030	4.74	0.03
273	83.820	0.307	3.13	82.3	1.23	99	82	-0.030	5.44	0.03
274	84.126	0.306	3.13	82.2	1.21	99	82	-0.030	5.69	0.02
275	84.431	0.305	3.13	82.3	1.22	99	82	-0.040	5.26	0.02
276	84.737	0.306	3.12	82.3	1.22	99	82	-0.030	6.06	0.04
277	85.041	0.304	3.12	82.3	1.22	101	82	-0.030	6.13	0.01
278	85.348	0.307	3.13	82.3	1.23	99	82	-0.040	5.95	0.04
279	85.653	0.305	3.12	82.3	1.22	99	82	-0.030	6.27	0.04
280	85.959	0.306	3.12	82.4	1.21	99	82	-0.030	6.57	0.04
281	86.265	0.306	3.12	82.4	1.22	99	82	-0.040	6.63	0.14
282	86.569	0.304	3.12	82.5	1.23	98	82	-0.040	6.82	0.06
283	86.876	0.307	3.11	82.4	1.22	102	82	-0.040	7.48	0.18
284	87.179	0.303	3.12	82.5	1.21	101	82	-0.040	6.76	0.07
285	87.486	0.307	3.12	82.5	1.21	102	82	-0.040	6.73	0.12
286	87.791	0.305	3.11	82.6	1.21	99	82	-0.040	7.01	0.09
287	88.095	0.304	3.11	82.5	1.21	99	82	-0.040	6.58	0.03

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
288	88.402	0.307	3.12	82.4	1.21	100	82	-0.040	6.24	0.02
289	88.705	0.303	3.12	82.5	1.22	101	82	-0.040	5.78	0.02
290	89.011	0.306	3.11	82.5	1.23	99	82	-0.040	5.45	0.00
291	89.316	0.305	3.11	82.5	1.21	101	82	-0.040	4.82	0.01
292	89.620	0.304	3.11	82.6	1.21	101	82	-0.040	4.59	0.02
293	89.927	0.307	3.11	82.6	1.21	102	82	-0.040	5.02	0.04
294	90.230	0.303	3.11	82.6	1.21	98	83	-0.040	4.70	0.01
295	90.536	0.306	3.11	82.6	1.21	102	82	-0.040	4.69	0.01
296	90.841	0.305	3.11	82.7	1.21	99	83	-0.040	4.27	0.02
297	91.145	0.304	3.11	82.7	1.22	98	83	-0.040	4.55	0.01
298	91.451	0.306	3.11	82.7	1.21	99	83	-0.040	4.78	0.01
299	91.755	0.304	3.11	82.7	1.21	98	83	-0.040	4.54	0.03
300	92.061	0.306	3.11	82.7	1.23	99	83	-0.040	4.70	0.01
301	92.366	0.305	3.11	82.7	1.21	99	83	-0.040	4.99	0.01
302	92.670	0.304	3.11	82.8	1.23	98	83	-0.040	5.12	0.02
303	92.976	0.306	3.11	82.7	1.21	102	83	-0.030	5.43	0.01
304	93.279	0.303	3.11	82.7	1.23	98	83	-0.040	5.00	0.01
305	93.585	0.306	3.11	82.9	1.22	99	83	-0.030	4.61	0.01
306	93.891	0.306	3.11	82.8	1.21	99	83	-0.030	4.61	0.01
307	94.195	0.304	3.11	82.8	1.23	101	83	-0.030	5.14	0.01
308	94.501	0.306	3.11	82.9	1.22	102	83	-0.030	5.29	0.01
309	94.805	0.304	3.11	82.9	1.22	101	83	-0.030	5.28	0.04
310	95.111	0.306	3.11	82.9	1.22	99	83	-0.030	5.60	0.02
311	95.416	0.305	3.11	82.9	1.21	101	83	-0.030	5.71	0.02
312	95.720	0.304	3.11	82.9	1.22	98	83	-0.030	5.66	0.03
313	96.026	0.306	3.11	82.9	1.22	99	83	-0.040	6.10	0.06
314	96.329	0.303	3.11	82.9	1.23	98	83	-0.040	6.63	0.05
315	96.635	0.306	3.11	83	1.21	99	83	-0.030	6.33	0.04
316	96.940	0.305	3.11	83	1.21	101	83	-0.030	6.05	0.02
317	97.243	0.303	3.10	83	1.21	101	83	-0.040	6.04	0.02
318	97.549	0.306	3.10	83	1.21	99	83	-0.040	5.94	0.04
319	97.853	0.304	3.11	83	1.23	98	83	-0.040	6.29	0.04

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
320	98.158	0.305	3.10	83.2	1.22	99	83	-0.040	6.44	0.09
321	98.463	0.305	3.10	83.2	1.23	99	83	-0.040	6.37	0.08
322	98.766	0.303	3.10	83.2	1.22	98	83	-0.040	6.66	0.06
323	99.071	0.305	3.10	83.2	1.21	99	83	-0.040	6.48	0.03
324	99.376	0.305	3.10	83.1	1.23	99	83	-0.040	6.27	0.05
325	99.679	0.303	3.10	83.2	1.21	98	83	-0.040	5.73	0.01
326	99.985	0.306	3.10	83.1	1.23	102	83	-0.040	5.44	0.02
327	100.288	0.303	3.10	83	1.23	98	83	-0.040	5.07	0.01
328	100.593	0.305	3.10	83.1	1.21	99	83	-0.040	5.22	0.06
329	100.898	0.305	3.10	83.1	1.21	99	83	-0.040	4.99	0.01
330	101.201	0.303	3.10	83.1	1.22	98	83	-0.040	4.29	0.01
331	101.506	0.305	3.10	83.1	1.21	99	83	-0.040	4.72	0.01
332	101.811	0.305	3.10	83.2	1.23	99	83	-0.040	4.74	0.01
333	102.114	0.303	3.09	83.3	1.22	98	83	-0.040	4.56	0.04
334	102.419	0.305	3.09	83.3	1.23	101	83	-0.040	4.64	0.02
335	102.723	0.304	3.09	83.2	1.22	101	83	-0.040	4.85	0.01
336	103.026	0.303	3.10	83.3	1.22	98	83	-0.040	4.67	0.02
337	103.332	0.306	3.09	83.2	1.21	102	83	-0.040	5.43	0.01
338	103.634	0.302	3.10	83.3	1.22	98	83	-0.040	5.07	0.03
339	103.939	0.305	3.09	83.2	1.23	101	83	-0.040	4.88	0.01
340	104.244	0.305	3.09	83.2	1.21	101	83	-0.030	4.79	0.03
341	104.546	0.302	3.09	83.3	1.21	100	83	-0.030	5.21	0.04
342	104.851	0.305	3.09	83.3	1.23	99	83	-0.040	5.03	0.02
343	105.156	0.305	3.09	83.3	1.23	99	83	-0.040	5.23	0.06
344	105.458	0.302	3.09	83.4	1.21	98	83	-0.040	5.65	0.03
345	105.764	0.306	3.09	83.4	1.23	102	83	-0.040	6.22	0.04
346	106.067	0.303	3.09	83.4	1.23	98	83	-0.030	6.26	0.06
347	106.371	0.304	3.09	83.4	1.23	101	83	-0.030	6.14	0.02
348	106.676	0.305	3.09	83.5	1.23	101	83	-0.040	6.24	0.08
349	106.978	0.302	3.09	83.6	1.21	100	83	-0.030	6.35	0.11
350	107.283	0.305	3.09	83.6	1.23	101	83	-0.040	5.73	0.02
351	107.587	0.304	3.09	83.6	1.23	101	83	-0.040	6.62	0.10

LAB SAMPLE DATA - ASTM E2515

Client: HHT
 Model: P40i-C
 Run #: 1

Job #: 21-677
 Tracking #: 111
 Technician: SJB
 Date: 6/25/2021

	Sample ID	Tare, mg	Total, mg	Final, mg	Catch, mg
Train A Filters - 1st Hour	G00049	118.6	239.6	240.4	0.8
	G00050	121.0			
Train A Probe - 1st hr	5A	116754.5	116754.5	116754.6	0.1
Train A O-Rings - 1st hr	5A	3535.7	3535.7	3535.8	0.1
Train A Filters - Remainder	G00054	121.1	240.3	242.6	2.3
	G00055	119.2			
Train A Probe - Remainder	5C	115854.3	115854.3	115854.2	0.0*
Train A O-Rings - Remainder	5C	3379.1	3379.1	3378.9	0.0*
Train B Filters	G00051	119.9	239.6	242.9	3.3
	G00052	119.7			
Train B Probe	5B	116873.2	116873.2	116873.3	0.1
Train B O-Rings	5B	3531.7	3531.7	3531.9	0.2
Background Filter	G00056	121.7	121.7	121.7	0.0

*Negative value corrected to zero

Placed in Dessicator on:	6/25 - 16:10
---------------------------------	--------------

Train A Filters - 1st hr	240.3	6/29 9:04	240.4	6/30 9:38		
Train A Probe - 1st hr	116754.5	6/29 9:04	116754.6	6/30 9:38		
Train A O-Rings - 1st hr	3535.7	6/29 9:04	3535.8	6/30 9:38		
Train A Filters - Remainder	242.5	6/29 9:04	242.6	6/30 9:38		
Train A Probe - Remainder	115854.2	6/29 9:04	115854.2	6/30 9:38		
Train A O-Rings - Remainder	3378.8	6/29 9:04	3378.9	6/30 9:39		
Train B Filters	242.9	6/29 9:05	242.9	6/30 9:39		
Train B Probe	116873.2	6/29 9:05	116873.3	6/30 9:39		
Train B O-Rings	3531.8	6/29 9:05	3531.9	6/30 9:39		
Background Filter	121.8	6/29 9:05	121.7	6/30 9:39		

1st hour Sub-Total, mg:	1.0
Remainder Sub-Total, mg:	2.3
Train 1 Aggregate, mg:	3.3
Train 2 Aggregate, mg:	3.6
Ambient Aggregate, mg:	0.0

ASTM E2779 Wood Heater Run Sheets

Client: HHT Job Number: 21-677 Tracking #: 111
 Model: P40i-C Run Number: 1 Test Date: 6/25/2021

Pellet Heater Control Settings

High Burn Rate Settings: Feed Adjust Knob: #6 (Max setting)
 Temperature Knob: #7 (Max Setting)
 Mode Knob: Full Counter Clockwise (Constant Burn/Max Fan)

Medium Burn Rate Settings: Feed Adjust Knob: #2 (27.5s)
 Temperature Knob: #3 (335F Setpoint)
 Mode Knob: Full Counter Clockwise (Constant Burn/Max Fan)

Low Burn Rate Settings: Feed Adjust Knob: #1 (Min setting)
 Temperature Knob: #1 (Min Setting)
 Mode Knob: Full Counter Clockwise (Constant Burn/Max Fan)

Preburn Notes

Preburn Start Time: 8:51

Time	Notes
N/A	N/A

Test Notes

Test Burn Start Time: 9:51

Time	Notes
0 min	Started Sampling High Fire
60 min	Changed out 1 st hr filter train, switch the medium burn setting.
180 min	Turned down to low burn setting.
360 min	End of Test

Test Burn End Time: 15:51

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO₂ (%): 17.14 CO (%): 4.300
 Mid Gas CO₂ (%): 9.90 CO (%): 2.470

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	9:15	9:18	9:17	4:18	4:17	4:20
CO ₂	0.00	10.17	17.14	-0.02	9.89	16.99
CO	0.000	2.498	4.303	-0.025	2.435	4.227

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: 

Date: 6/25/2021



TIMBER PRODUCTS
 We Deliver Confidence. ®

Analytical Report

HEARTH & HOME TECHNOLOGIES
 352 Mountain House Rd
 Halifax, PA 17032

Company Contact: Charlie Maguire

TP ID Number:	DBL210090-1	Sample Weight (lbs):	40.48
Product Recognized As:	Wood Pellets	Sample Received:	3/8/2021
Sample Designation:	Cascade-PCP202012	Report Date:	3/19/2021
Sample Date:	3/4/2021	Purchase Order:	

Parameter	As-Received	Dry Basis	Analytical Method	ISO 17025
Total Moisture (%)	4.83		ASTM E871	Q
Ash (%)	0.14	0.15	ASTM D1102	Q
Volatiles (%)	80.16	84.23	CEN/EN 15148	Q
Fixed Carbon (%)	14.86	15.61	By Difference	
GCV (BTU/lb)	8248	8667	ASTM E711	Q
Carbon (%)	48.25	50.70	CEN/EN 15104	Q
Hydrogen (%)	5.99	6.29	CEN/EN 15104	Q
Nitrogen (%)	0.13	0.14	CEN/EN 15104	Q
Oxygen (%)	40.65	42.71	CEN/EN 15104	Q
Sulfur (%)	< 0.01	0.01	CEN/EN 15289	Q
Chlorine (ppm)	< 57	< 57	ASTM D4208	
Fluorine (mg/kg)	< 5.0	< 5.0	CEN/EN 15289	S

Parameter	Result	Analytical Method	ISO 17025
Bulk Density (lb/ft ³)	45.8	PFI Specifications	Q
Length (%) > 1.5 Inches	0.14	PFI Specifications	Q
Diameter (mean)	0.253	PFI Specifications	Q
Durability Index	99.4	PFI Specifications	Q
Fines (%)	0.07	PFI Specifications	Q

Parameter	As-Received	Dry Basis	Analytical Method	ISO 17025
Mercury (Hg) mg/kg	0.000952	0.001	ASTM D6722	O



Prepared By:

David Robles - Laboratory Manager

Findings are based on the sample submitted. TP Inspection is accredited by ALSC for the PFI/ALSC Densified fuel Standards Program. TP Inspection is accredited by the International Accreditation Service to ISO 17025. Specific test procedures included in TP Inspection's scope of accreditation are identified with a "Q". Test parameters performed by our sister laboratory, Technical Laboratory Rotterdam (TLR) are designated with an "S". TLR is an ISO 17025 accredited laboratory by the Dutch Accreditation Council RvA. Other outsourced parameters are designated with an "O". This report shall not be reproduced except in full without laboratory approval.



TIMBER PRODUCTS
We Deliver Confidence. ®

Analytical Report

HEARTH & HOME TECHNOLOGIES
352 Mountain House Rd
Halifax, PA 17032

Company Contact: Charlie Maguire

TP ID Number:	DBL210090-1	Sample Weight (lbs):	40.48
Product Recognized As:	Wood Pellets	Sample Received:	3/8/2021
Sample Designation:	Cascade-PCP202012	Report Date:	3/19/2021
Sample Date:	3/4/2021	Purchase Order:	

Method Description:

ASTM D4208 is a test method intended for analyzing coal samples. PFI standard specifications for residential/commercial densified fuel list this method for use when testing biomass samples.

Method Code:
ASTM D4208

Method Description:

ASTM E711 is a test method intended for analyzing refuse-derived fuel samples. PFI standard specifications for residential/commercial densified fuel list this method for use when testing biomass samples.

Method Code:
ASTM E711



Prepared By:

David Robles - Laboratory Manager

Findings are based on the sample submitted. TP Inspection is accredited by ALSC for the PFI/ALSC Densified fuel Standards Program. TP Inspection is accredited by the International Accreditation Service to ISO 17025. Specific test procedures included in TP Inspection's scope of accreditation are identified with a "Q". Test parameters performed by our sister laboratory, Technical Laboratory Rotterdam (TLR) are designated with an "S". TLR is an ISO 17025 accredited laboratory by the Dutch Accreditation Council RvA. Other outsourced parameters are designated with an "O". This report shall not be reproduced except in full without laboratory approval.

ASTM E2515 - Glass Filters

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G00037	—	—	—	—	—		
G00038	120.3	120.3	-	-	SB	21-661	#1
G00039	121.0	121.1	-	-	SB	↓	↓
G00040	120.3	120.3	-	-	SB	↓	↓
G00041	119.1	119.1	-	-	SB	21-661	#2
G00042	120.7	120.6	-	-	SB	↑	↓
G00043	120.1	120.0	-	-	SB	↑	↓
G00044	120.8	120.8	-	-	SB	↑	↓
G00045	118.3	118.2	-	-	SB	↑	↓
G00046	121.3	121.2	-	-	SB	↑	↓
G00047	119.7	119.7	-	-	SB	↑	↓
G00048	121.1	121.0	-	-	SB	21-677	
G00049	118.7	118.6	-	-	SB	21-677	↓
G00050	120.9	121.0	-	-	SB	↓	↓
G00051	119.9	119.9	-	-	SB	↓	↓
G00052	119.6	119.7	-	-	SB	↓	↓
G00053	120.5	120.3	-	-	SB		
G00054	121.1	121.1	-	-	SB	21-677	↓

Weight 1 Date/Time:
4/2 - 11:00
Weight 2 Date/Time:
4/5 - 9:45
Weight 3 Date/Time:
Weight 4 Date/Time:

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G00055	119.1	118.2	-	-	A	21-677	↓
G00056	121.9	121.7	-	-	A	↓	↓
G00057	121.0						
G00058	118.7						
G00059	119.9						
G00060	120.0						
G00061	118.3						
G00062	120.7						
G00063	120.5						
G00064	120.0						
G00065	119.2						
G00066	120.6						
G00067	120.4						
G00068	120.2						
G00069	120.1						
G00070	119.6						
G00071	121.3						
G00072	120.2						

Weight 1 Date/Time:
5/7 - 15:00
Weight 2 Date/Time:
6/24 - 16:00
Weight 3 Date/Time:
Weight 4 Date/Time:

ASTM E2515 - Probes

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
1A	115901.4	115626.3	115626.2	-	A	21-680	#1
1B	115901.4	115901.3	-	-	A		
1C	116445.5	116432.1	116431.9	-	A		
2A	116055.7	116055.6	-	-	A	21-680	#2
2B	116173.7	116173.6	-	-	A		
2C	116429.6	116430.1	116429.9	-	A		
3A	115878.2	115878.1	-	-	A	21-680	#3
3B	116121.7	116121.6	-	-	A		
3C	116623.4	116623.9	-	-	A		
4A	116026.3	116026.0	116026.2	-	A	21-680	#4
4B	116185.7	116185.5	-	-	A		
4C	117017.0	116995.2	116995.1	-	A		
5A	116754.5	116754.5	-	-	A	21-677	1
5B	116872.4	116873.2	-	-	A		
5C	115854.1	115854.3	-	-	A		

Weight 1 Date/Time:
6/17/21
17:00

Weight 2 Date/Time:
6/18/21
17:00

Weight 3 Date/Time:
6/21/21
8:00

Weight 4 Date/Time:

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
6A	116383.0	116382.8	-	-	A	21-680	#5
6B	115952.8	115952.6	-	-	A		
6C	115128.2	115128.1	-	-	A		
7A	116557.8	116557.6	-	-	A		
7B							
7C							
8A							
8B							
8C							
9A							
9B							
9C							
10A							
10B							
10C							

Weight 1 Date/Time:
6/25/21
14:00

Weight 2 Date/Time:
6/28/21
10:00

Weight 3 Date/Time:

Weight 4 Date/Time:

ASTM E2515 - O-Rings

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
1A	3567.6	3567.4	-	-	A	21-680	#1
1B	3556.0	3556.0	-	-	A		
1C	4169.1	4169.0	-	-	A		
2A	3553.3	3553.3	-	-	A	21-680	#2
2B	3572.3	3572.3	-	-	A		
2C	3393.7	3393.5	-	-	A		
3A	3580.4	3580.3	-	-	A	21-680	#3
3B	3568.8	3568.9	-	-	A		
3C	3377.9	3378.1	-	-	A		
4A	3624.0	3624.2	-	-	A	21-680	#4
4B	3580.7	3580.9	-	-	A		
4C	3374.7	3374.9	-	-	A		
5A	3535.7	3535.7	-	-	A	21-677	#1
5B	3531.8	3531.7	-	-	A		
5C	3379.2	3379.1	-	-	A		

Weight 1 Date/Time:
6/19/21
17:00

Weight 2 Date/Time:
6/21/21
8:00

Weight 3 Date/Time:

Weight 4 Date/Time:

Sample	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
6A	3615.5	3615.6	-	-	AK	21-680	#5
6B	3397.8	3397.6	-	-	AK		
6C	3403.7	3403.6	-	-	AK		
7A							
7B							
7C							
8A							
8B							
8C							
9A							
9B							
9C							
10A							
10B							
10C							

Weight 1 Date/Time:
6/25/21
14:00

Weight 2 Date/Time:
6/28/21
10:00

Weight 3 Date/Time:

Weight 4 Date/Time:

Equations and Sample Calculations – ASTM E2779 & E2515

Client HHT
 Model: P40i-C
 Tracking #: 111
 Run: 1

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 STP, 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

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:

- FM = 5.08 %
- M_{Swb} = 40.4 lbs
- M_{Ewb} = 24.2 lbs
- 0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(40.4 \times 0.4536) - (24.2 \times 0.4536)] (100/(100 + 5.08))$$

$$M_{Bdb} = \mathbf{6.98 \text{ kg}}$$

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

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

Where,

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

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

Sample Calculation (from medium burn rate segment):

$$FM = 5.08 \%$$

$$M_{SSiwb} = 35.3 \text{ lbs}$$

$$M_{ESiwb} = 30.5 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(35.3 \times 0.4536) - (30.5 \times 0.4536)] (100/(100 + 5))$$

$$M_{BSidb} = \mathbf{2.05 \text{ kg}}$$

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

ASTM E2779 equation (3)

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

Where,

θ = Total length of full integrated test run, min

Sample Calculation:

$$M_{Bdb} = 6.98 \quad \text{kg}$$

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

$$BR = \frac{60 \times 6.98}{360}$$

$$BR = 1.16 \quad \text{kg/hr}$$

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):

$$M_{BSidb} = 2.05 \text{ kg}$$

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

$$BR = \frac{60 \times 2.05}{120}$$

$$BR = 1.02 \text{ kg/hr}$$

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

ASTM E2515 equations (9)

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

Where:

- F_p = Adjustment factor for center of tunnel pitot tube placement, $F_p = \frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)
- V_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec
- V_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec
- k_p = Pitot tube constant, 85.49
- C_p = Pitot tube coefficient: 0.99, unitless
- 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 dilution 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:

$$F_p = \frac{7.98}{9.33} = 0.856$$

$$V_s = 0.856 \times 85.49 \times 0.99 \times 0.141 \times \left(\frac{87.1 + 460}{29.82 + \frac{-0.06}{13.6}} \right)^{1/2} \times 28.78$$

$$V_s = \mathbf{8.15} \text{ ft/s}$$

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

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

Q_{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:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 8.15 \times 0.7854 \times \frac{528}{87.1 + 460} \times \frac{29.82 + \frac{-0.06}{13.6}}{29.92}$$

Q_{sd} = **21715.3** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
 ASTM E2515 equation (6)

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

Where:

- K_1 = 17.64 °R/in. Hg
 V_m = Volume of gas sample measured at the dry gas meter, dcf
 Y = Dry gas meter calibration factor, dimensionless
 P_{bar} = Barometric pressure at the testing site, in. Hg
 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 A:

$$V_{m(std)} = 17.64 \times 111.338 \times 1.003 \times \frac{\left(29.82 + \frac{3.13}{13.6} \right)}{\left(86.3 + 460 \right)}$$

$$V_{m(std)} = \mathbf{108.350} \text{ dscf}$$

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 110.318 \times 0.999 \times \frac{\left(29.82 + \frac{3.16}{13.6} \right)}{\left(80.7 + 460 \right)}$$

$$V_{m(std)} = \mathbf{108.028} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 59.61 \times 1.01 \times \frac{\left(29.82 + \frac{0.00}{13.6} \right)}{\left(76.6 + 460 \right)}$$

$$V_{m(std)} = \mathbf{59.001} \text{ dscf}$$

m_n – Total Particulate Matter Collected, mg

ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

$$m_n = 0.1 + 1.0 + 0.1$$

$$m_n = 1.2 \text{ mg}$$

Using equation for Train A (remainder):

$$m_n = 0.0 + 2.3 + 0.0$$

$$m_n = 2.3 \text{ mg}$$

Train A Aggregate = **3.5 mg**

Using equation for Train B:

$$m_n = 0.1 + 3.3 + 0.2$$

$$m_n = \mathbf{3.6 \text{ mg}}$$

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to standard conditions, g/dscf
 ASTM E2515 equation (13)

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

Where:

- K_2 = Constant, 0.001 g/mg
 m_n = Total mass of particulate matter collected in the sampling train, mg
 $V_{m(std)}$ = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train A:

$$C_s = 0.001 \times \frac{3.5}{108.35}$$

$$C_s = \mathbf{0.00003} \text{ g/dscf}$$

For Train B:

$$C_s = 0.001 \times \frac{3.6}{108.03}$$

$$C_s = \mathbf{0.00003} \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{59.00}$$

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

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 A

$$E_T = (\underline{0.000032} - 0.000000) \times \underline{21715.3} \times \underline{360} /60$$

$$E_T = \underline{4.21} \text{ g}$$

For Train B

$$E_T = (\underline{0.000033} - 0.000000) \times \underline{21715.3} \times \underline{360} /60$$

$$E_T = \underline{4.34} \text{ g}$$

Average

$$E = \underline{4.28} \text{ g}$$

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

- 7.5% of the average = 0.32
- Train A difference = 0.07
- Train B difference = 0.07

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 A):

$$PR = \left(\frac{360 \times 0.319 \times 8.15 \times (86.3 + 460) \times (90.3 + 460)}{1 \times 111.34 \times 7.79 \times (87.1 + 460) \times (75.0 + 460)} \right) \times 100$$

$$PR = \underline{111} \%$$

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:

$$E_T (\text{Dual train average}) = 4.28 \text{ g}$$

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

$$PM_R = 60 \times (4.28 / 360)$$

$$PM_R = \mathbf{0.71} \text{ g/hr}$$

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:

$$E_T \text{ (Dual train average)} = 4.28 \text{ g}$$

$$M_{Bdb} = 6.98 \text{ kg}$$

$$PM_F = 4.28 / 6.98)$$

$$PM_F = \mathbf{0.61} \text{ g/kg}$$



MODEL / MODÈLE: "P40i-C PELLET INSERT"

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

Test Performed by / Test réalisés par **OMNI-Test Laboratories, Inc.**

Report #/Rapport#: 0061PN103E / 0061PN103S

Tested to/Testé a: ASTM E 2779-10, ASTM E 2515-11, ASTM E 1509-12, ULC-S628-93

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

"PREVENT HOUSE FIRES" Install and use only in accordance with the manufacturer's installation and operation instructions. Contact local building or fire officials about restrictions and inspection in your area.

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.

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 4" diameter type "PL" venting system, or 4" stainless steel flex as per manual.

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

FOR USE WITH WOOD PELLET FUEL ONLY.

Input Rating Max: 4.11 lb. fuel/hr.

EPA Certified Emissions: 0.7 g/hr

US Electrical Rating: 115 VAC, 60Hz, Start 4.2 AMPS, Run 2.8 AMPS

DANGER: Risk of electrical shock. Disconnect power supply before servicing.

For further instruction refer to owner's manual.

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

OPERATE ONLY WITH DOORS CLOSED.

DANGER: Risque d'électrocution. Débrancher l'appareil avant toute intervention.

Pour une information plus complète, se reporter à la notice d'utilisation.

Ne remplacer la vitre qu'avec une vitre céramique 5 mm de même qualité disponible auprès de votre revendeur.

Tenir la porte frontale et le couvercle de trémie hermétiquement clos durant le fonctionnement de l'appareil.

Ce poêle à granules a été testé et homologué pour une utilisation dans

Maisons fabriqués conformément aux OAR 814-23-900 travers 814-23-909

"PRÉVENIR LES INCENDIES HOUSE" Installez et utilisez uniquement en conformité avec installation et d'utilisation les instructions du fabricant. Contactez local building ou d'incendie concernant les restrictions et l'inspection dans votre région.

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.

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 structurale 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 système de ventilation de type «PL» 4" de diamètre ou un câble flexible en acier inoxydable de 4" comme indiqué dans le manuel.

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

POUR UTILISATION EN BOIS GRANULES SEULEMENT.

Entrée Max Note: 4.11 lb. carburant / h.

Émissions certifiés EPA: 0,7 g / h

US Electrical Rating: 115 VAC, 60Hz, Start 4,2 AMPS, Run 2,8 AMPS

Serial No.

N° de série:

HF

BARCODE LABEL

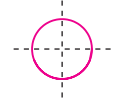
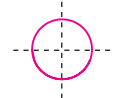
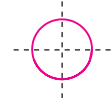
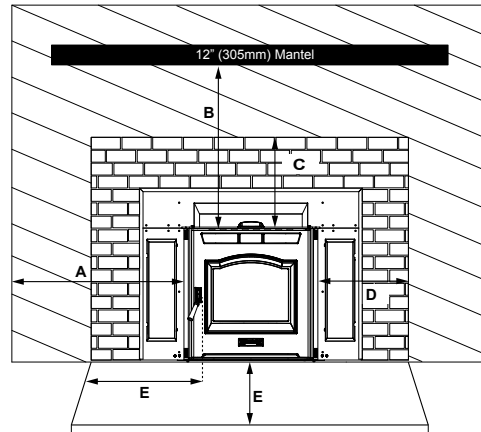
**Minimum Clearances to Combustible Material
Dégagements minimaux aux matériaux combustibles**

Location	Inches	Millimeters
A To Sidewall	12	305
B To 12" Mantel	12	305
*C To 3/4" Trim	0	0
*D To 3/4" Trim	0	0

**Non-combustible floor protector.
Protecteur de sol non combustible.**

Location	Inches	Millimeters
E From Glass	6	152

Note: Floor protection must be used from hearth opening to 6" (152mm) in front of door glass and 6" (152mm) to each side of the stove body OR 8" (203mm) to sides to protect combustibles from hot ashes. A minimum size will be 15-3/8" deep by 25-3/4" wide and be made of a non-combustible material or meet UL approval.



DO NOT OBSTRUCT THE SPACE BENEATH THE HEATER.

MADE IN USA of US and Imported Parts

Fabriqués aux États-Unis-d'Amérique par des pièces d'origine américaine et pièces importées

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER CETTE ÉTIQUETTE

P.N. 8390-040_R1



CAUTION: HOT WHILE IN OPERATION.KEEP CHILDREN AND CLOTHING AWAY.CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS.KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIALS A CONSIDERABLE DISTANCE AWAY FROMTHIS APPLIANCE. KEEP HOPPER LID CLOSED DURING OPERATION.FAILURE TO DO SO MAY RESULT

IN EMISSION OF PRODUCTS OF COMBUSTION FROMTHE HOPPER UNDER CERTAIN CONDITIONS.MAINTAIN HOPPER SEAL IN GOOD CONDITION. DO NOT OVERFILLTHE HOPPER.

DANGER: CHAUD- NE PAS TOUCHER.TENIR LES ENFANTS ET LES VENTEMENTS A !!ECART. RISQUE DE BRULURE.VOIR INSTRUCTIONSSUR LA PLAQUE. LAISSER UNE DISTANCESUFFISANTE ENTRE !!APPAREIL ET LES MEUBLES OU AUTRES OBJET A RISQUE.N'UTILISER CET APPAREIL QUE LORSQUE LE COUVERCLE DE LA TREMIE EST BIEN FERME-IGNORER CETTE CONSIGNE PEUT ENTRAINER DES EMANATIONS DE PRODUITS ISSUS DE LA COMBUSTION ATRAVERS LATREMIE DANS CERTAINES CONDITIONS-VEILLER AU BON ETAT DUJOINT DE LATREMIE- NE PAS EXCEDER LA CAPACITE DE LA TREMIE.

HARMAN®

US ENVIRONMENTAL PROTECTION AGENCY

The P40i is Certified to comply with 2020 particulate emission standards.
La P40i est certifié conforme aux normes d'émission de particules de 2020.

Date of Manufacture / Date de fabrication:

2021 2022 2023 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

LABEL TICKET	
ECO: 90156	LABEL SIZE: 6" H x 17.75" W
PART # / REV: 8390-040	ADHESIVE: 3M 486 Adhesive
ORIGINATOR: Spidlet	MATERIAL: 24 Gauge Aluminum
DATE: 06/10/21	INK: Black Background
(3) Holes = R .156 (6) Corners = R .125	

Installation Manual

Installation and Appliance Setup

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

OWNER: Retain this manual for future reference.

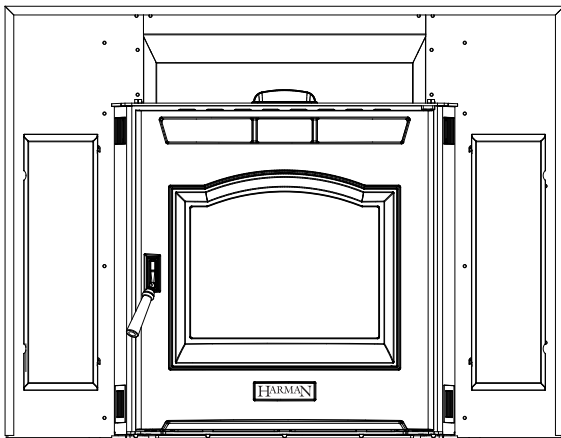
NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):

P40i-C Pellet Insert



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.

CAUTION

Tested and approved for wood pellets only burning of any other type of fuel voids your warranty. When burning higher ash content pellets more frequent cleanings may be required.

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

1 Product Specific and Important Safety Information

A. Appliance Certification	4
B. Glass Specifications	4
C. Mobile Home Approved	4
D. BTU & Efficiency Specifications	4
E. Non-Combustible Materials Specification	5
F. Combustible Materials Specification	5
G. Electrical Codes	5
H. California	5

2 Getting Started

A. Design and Installation Considerations	6
B. Tools and Supplies Needed	7
C. Inspect Appliance and Components	7

3 Clearances

A. Appliance Dimension Diagram	8
B. Clearances to Combustibles & Floor Protection	9
C. Minimum Opening - Masonry & Manufactured Fireplaces	9

4 Termination Location and Vent Information

A. Vent Termination Requirements	10
B. Venting Termination Design	11
C. Venting & Use of Elbows	15
D. Outside Air	15
E. Locating Your Appliance and Chimney	16
F. Draft	16
G. Negative Pressure	17
H. Avoiding Smoke & Odors	17
I. Mobile Home Installation	19
J. Fire Safety	20
K. Inspect Appliance & Components	20

5 Appliance Setup

A. Unpacking Stove	21
B. Installing the Venting	21
C. Routing the Power Cord	22
D. Test Fit Frame & Surround	22
E. Securing the Mounting Frame	22
F. Control Board Installation	22
G. Securing Body into the Mounting Frame	23

6 Reference Materials

A. Safety Reminders	24
B. Wiring Diagram	25

→ = 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

	YES	IF NO, WHY?
Required non-combustible floor protection	<input type="checkbox"/>	_____
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"/>	_____

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:	P40i-C Pellet Insert
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0061PN103E / 0061PN103S
TYPE:	Pellet Fueled Insert/Supplementary For Residential Use
STANDARD(s):	ASTM E 2779-10, ASTM E 2515-11, ASTM E 1509-12, ULC-S628-93
ELECTRICAL RATING:	120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps
GLASS SPECIFICATION:	5mm mirrored ceramic glass

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the ASTM E1509-12, ULC-S628-93 & **(UM) 84-HUD**

The P40i-C Pellet Insert is certified to comply with 2020 EPA particulate emission standards.



B. Glass Specifications

This appliance is equipped with 5mm 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 using a minimum of 8 AWG copper solid or stranded, insulated or bare wire or equivalent and use only listed pellet vent, Class "PL" connector pipe.

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



WARNING

DO NOT INSTALL IN SLEEPING ROOM.



CAUTION

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

D. BTU & Efficiency Specifications

EPA Certification Number:	207-19
EPA Certified Emissions:	0.7 g/hr
*LHV Tested Efficiency:	87.4%
**HHV Tested Efficiency:	81.5%
***EPA BTU Output:	14,450 - 33,126
****BTU Input	17,420 - 42,000
Vent Size:	4 Inch
Hopper Capacity:	64.5 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 8600 BTU's which is the average BTU's from a pound of pellets.

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.

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.

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.

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.

E. 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.

F. 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.

G. 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.

H. 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

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.

Suitable fireplaces for installation:

- Masonry Fireplace
- Existing Factory Built Wood Burning Fireplace
- Harman® Zero Clearance Cabinet - Part #1-00-574323

EXCEPTION: Masonry or steel, including the damper plate, may be removed from the smoke shelf and adjacent damper frame if necessary to accommodate a chimney liner, provided that their removal will not weaken the structure of the fireplace and chimney, and will not reduce protection for combustible materials to less than that required by the National Building Code.

Since pellet exhaust can contain ash, soot or sparks, you must consider the location of:


- Windows
- Air Intakes
- Air Conditioner
- Overhangs, 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.

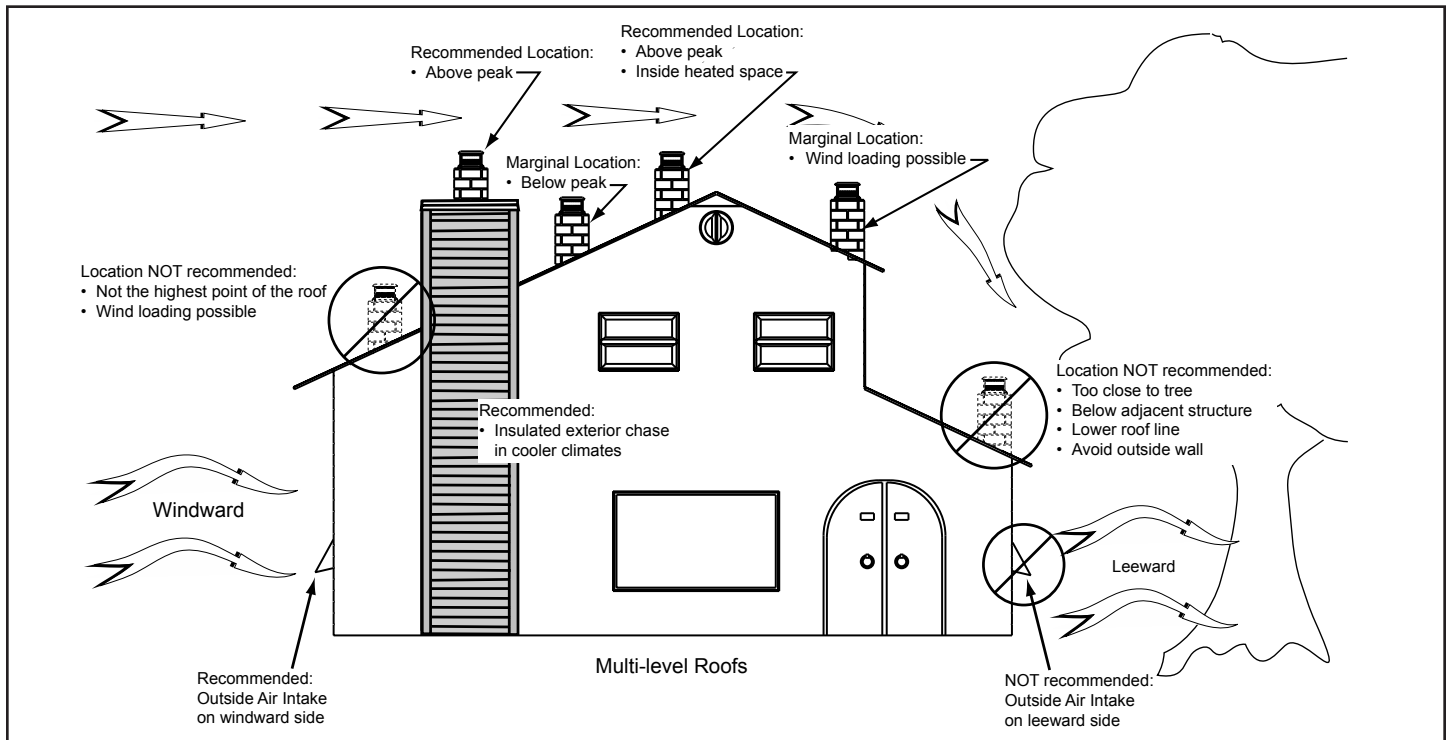


Figure 2.1

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 Screw driver	Electric Drill & Bits
Tape Measure	
Level	<u>May also need:</u>
Non-Combustible Sealant Material	Vent Support Straps
	Venting Paint

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.

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.
- If optional log set is purchased, the log bracket must be installed prior to installing the log set.
- 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.



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 that has been under water.

3 Clearances

A. Appliance Dimension Diagram

Dimensions are actual appliance dimensions. Use for reference only.

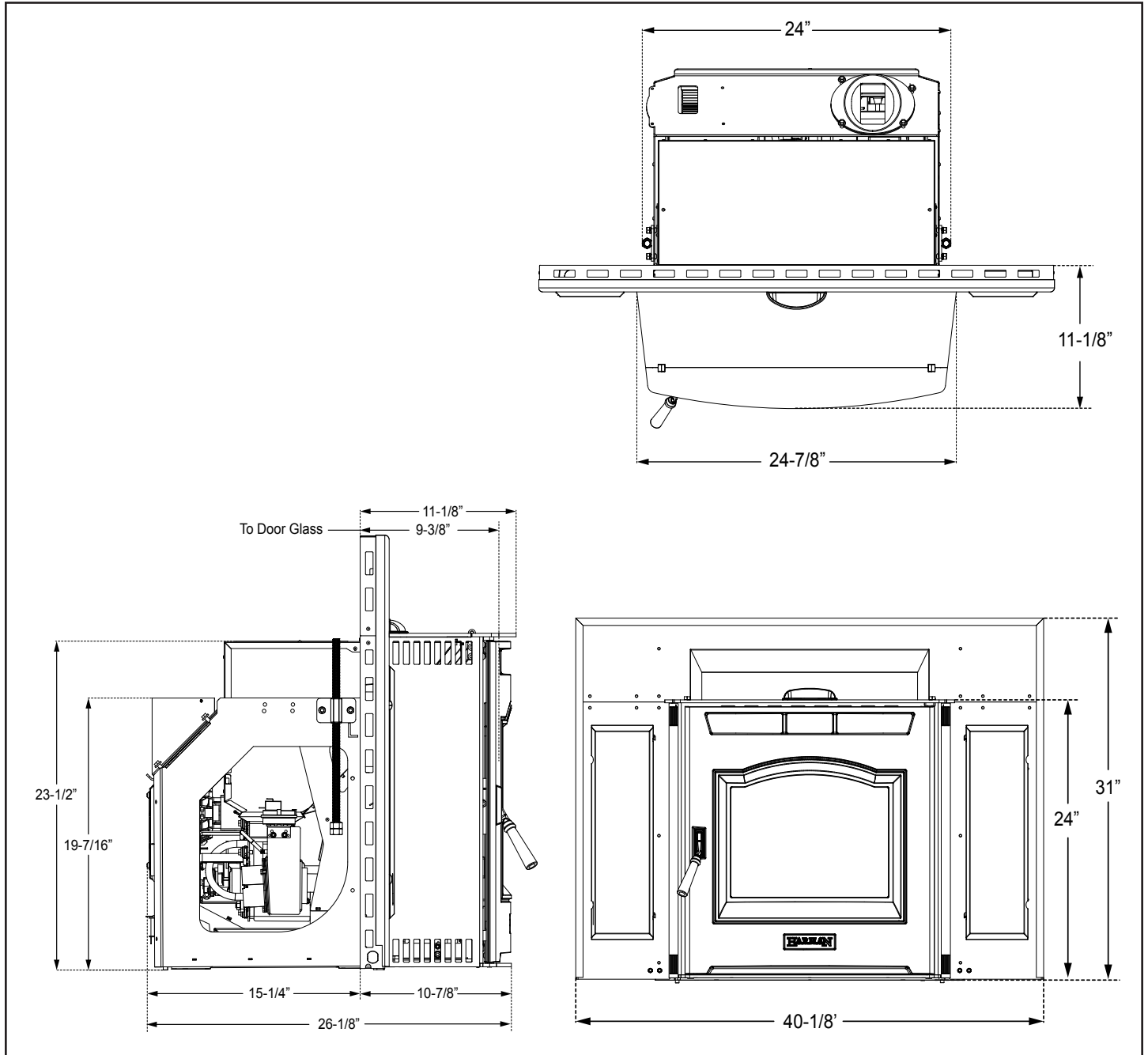




Figure 3.1

B. Clearances to Combustibles & Floor Protection

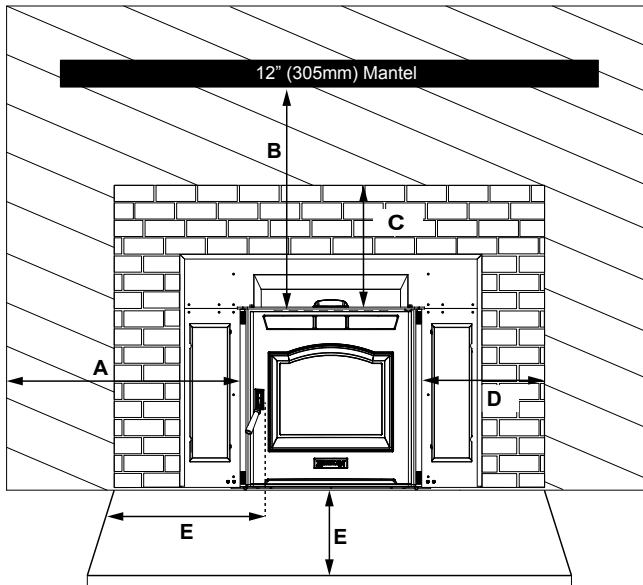
When selecting a location for the appliance it is important to consider the required clearances to walls (see Figure 3.2).

NOTICE: Illustrations reflect typical installations and are FOR DESIGN PURPOSES ONLY. Illustrations/diagrams are not drawn to scale. Actual installation may vary due to individual design preference.

	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.

Clearances:	A	B	*C	*D	E (From Glass)
From Insert Body:	12" (305 mm)	12" (305 mm)	0"	0"	6" (152 mm)
*3/4" Trim, Zero Clearance to Cast Surround					

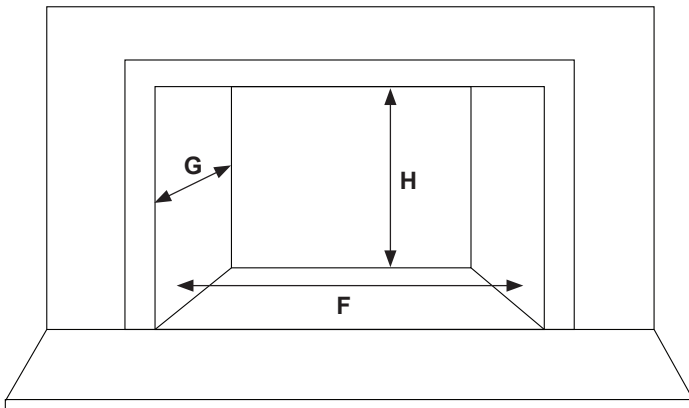
- A** = to sidewall
- B** = to 12" mantel
- C** = to 3/4" trim
- D** = to 3/4" trim
- E** = floor protection



Note: Floor protection must be used from hearth opening to 6" (152mm) in front of door glass and 6" (152mm) to each side of the stove body OR 8" (203mm) to sides to protect combustibles from hot ashes. A minimum size will be 15-3/8" deep by 25-3/4" wide and be made of a non-combustible material or meet UL approval.

Figure 3.2

C. Minimum Opening - Masonry and Manufactured Fireplaces

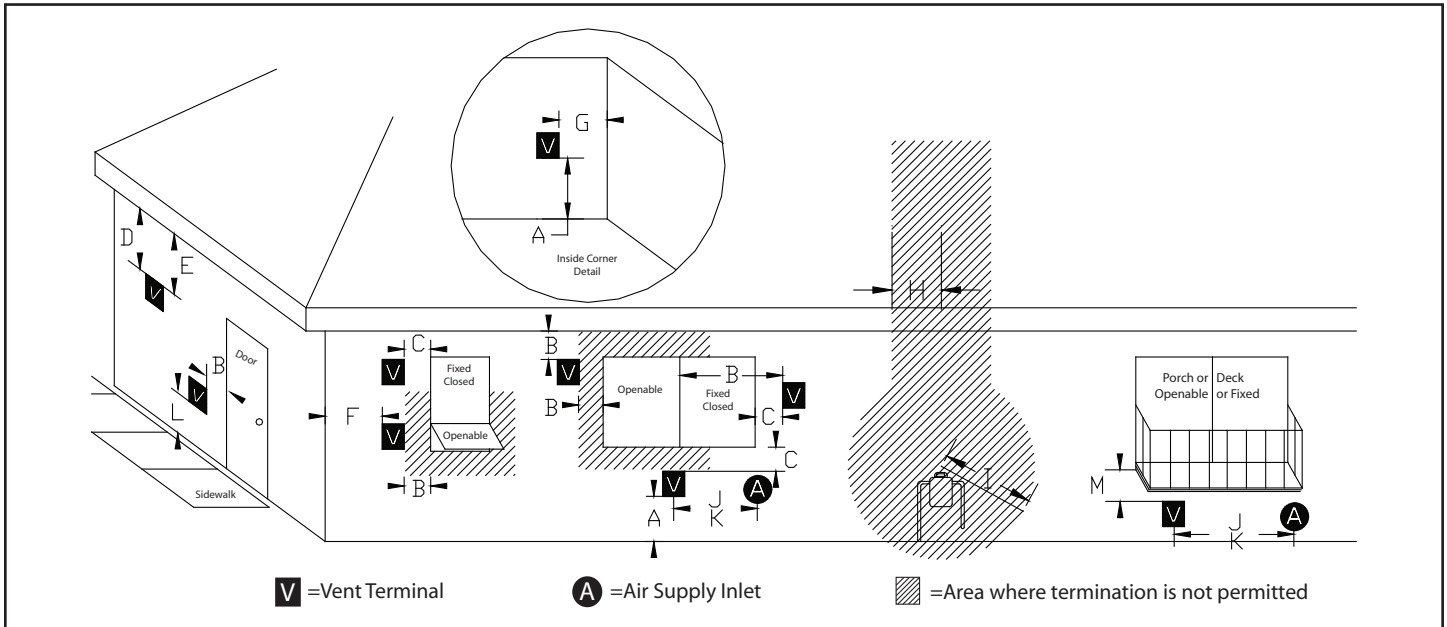


Location	Inches	Millimeters
F Minimum Width	24-7/8	632
G Minimum Depth	15-9/16	395
H Minimum Height #1-90-740235	24	610
H Minimum Height #1-90-740200	20-1/4	514

4 Termination Location and Vent Information

A. Vent Termination Requirements

Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor or ceiling.



WARNING: Venting terminals must not be recessed into a wall or siding.

NOTE: Only PL or L vent pipe wall pass-throughs and fire stops should be used when venting through combustible materials.

NOTE: Always take into consideration the affect 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:

- A. The clearance above grade must be a minimum of 12".
- B. 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, 9" to side and below)**
- C. A 12" clearance to a permanently closed window is recommended to prevent condensation on the window.
- D. The vertical clearance to a ventilated soffit located above the terminal within a horizontal distance of 2 feet (607mm) from the center-line of the terminal must be a minimum of 18".
- E. The clearance to an unventilated soffit must be a minimum of 12".
- F. The clearance to an outside corner is 11" from center of pipe.
- G. The clearance to an inside corner is 12".
- H. A vent must not be installed within 3 feet (914mm) above a gas meter/regulator assembly when measured from the horizontal center-line of the regulator.

- I. The clearance to service regulator vent outlet must be a minimum of 6 feet.
- J. 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".
- K. The clearance to a mechanical air supply inlet must be a minimum of 10 feet. **(with outside air installed, 6 feet)**
- L. The clearance above a paved sidewalk or a paved driveway located on public property must be a minimum of 7 feet.
- M. The clearance under a veranda, porch, deck or balcony must be a minimum of 12". **(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 or a minimum of 7 feet below the outlet.

Certain Canadian and or Local codes or regulations may require different clearances.

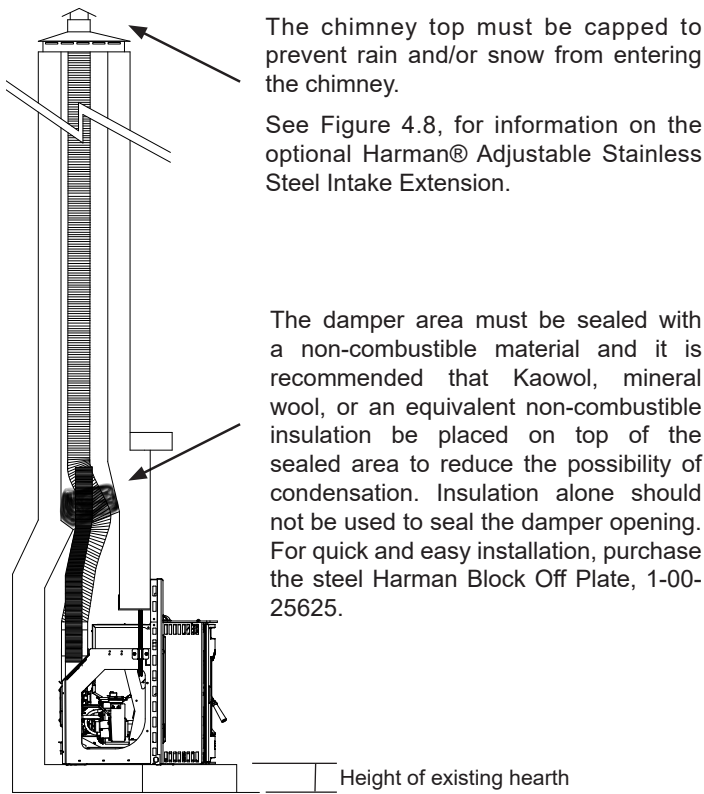
A vent shall not terminate directly above a side-walk or paved driveway which is located between two single family dwellings and serves both dwellings.

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.

NOTE: In Canada, where passage through a wall or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365.

B. Venting Termination Design



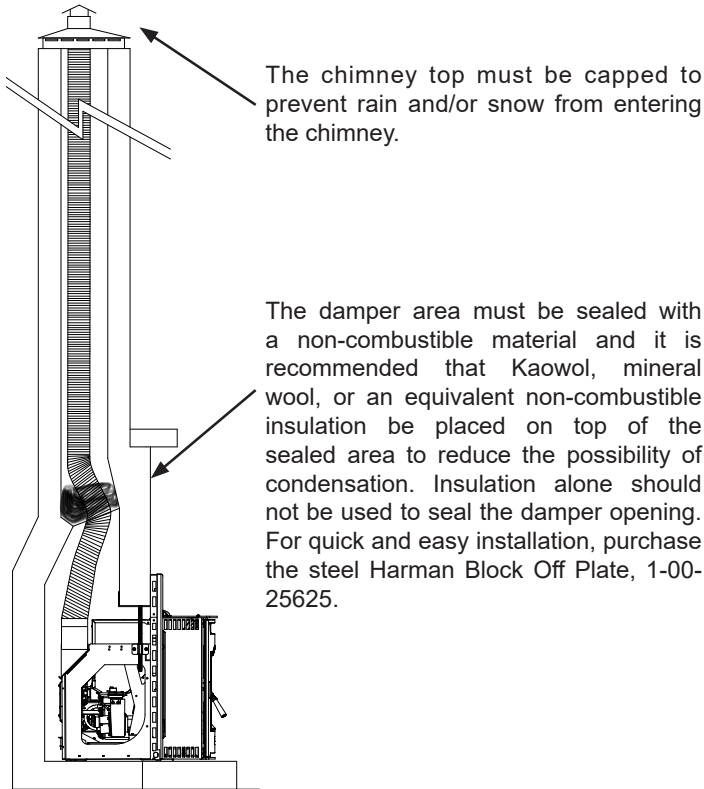
The chimney top must be capped to prevent rain and/or snow from entering the chimney.

See Figure 4.8, for information on the optional Harman® Adjustable Stainless Steel Intake Extension.

The damper area must be sealed with a non-combustible material and it is recommended that Kaowol, mineral wool, or an equivalent non-combustible insulation be placed on top of the sealed area to reduce the possibility of condensation. Insulation alone should not be used to seal the damper opening. For quick and easy installation, purchase the steel Harman Block Off Plate, 1-00-25625.

Height of existing hearth

Figure 4.1



The chimney top must be capped to prevent rain and/or snow from entering the chimney.

The damper area must be sealed with a non-combustible material and it is recommended that Kaowol, mineral wool, or an equivalent non-combustible insulation be placed on top of the sealed area to reduce the possibility of condensation. Insulation alone should not be used to seal the damper opening. For quick and easy installation, purchase the steel Harman Block Off Plate, 1-00-25625.

Figure 4.2

#1 Installing into an existing fireplace chimney

This method provides excellent venting with 100% outside air which is the most efficient operation of this unit. This method also provides natural draft in the event of a power failure.

A 4" stainless steel flex pipe is needed for the flue pipe, and 3" aluminum or Stainless Steel Flex Pipe is used for the intake.



WARNING

CHIMNEY CONNECTOR PIPE MAY NOT PASS THROUGH CONCEALED SPACES INCLUDING AN ATTIC, ROOF SPACE, CLOSET, FLOOR OR CEILING.



WARNING

DO NOT REMOVE BRICKS OR MORTAR FROM THE EXISTING FIREPLACE.

#2 Installing into an existing fireplace chimney

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure.

A cap should be installed on the chimney to keep out rain.

Combustion air is provided from the living area and enters the feed system from around the wing and stove body spaces.



WARNING

DO NOT REMOVE BRICKS OR MORTAR FROM THE EXISTING FIREPLACE.

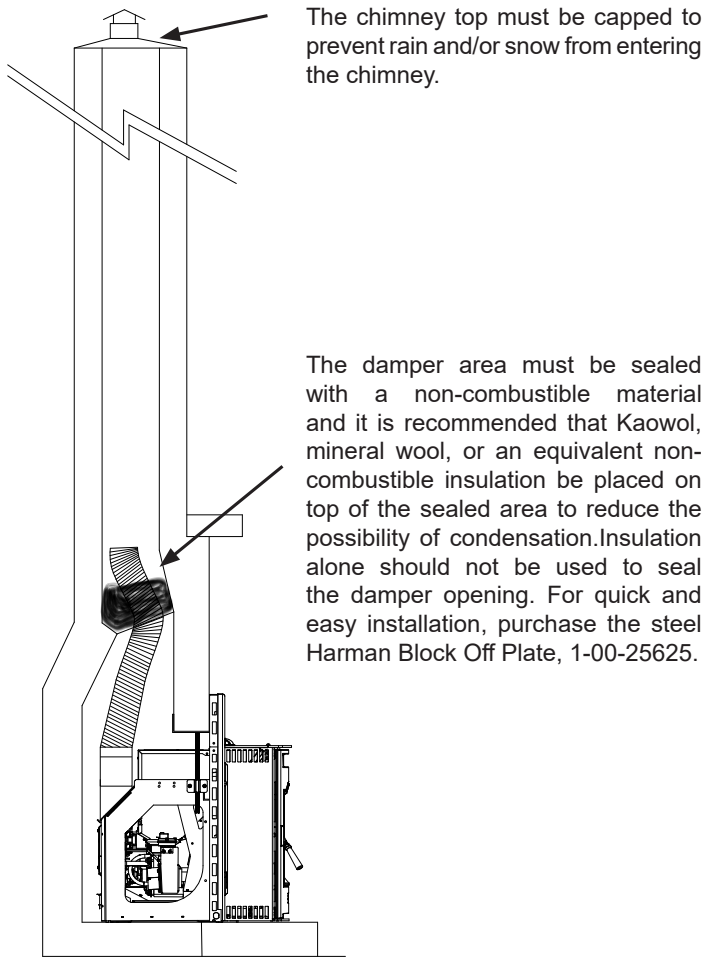


Figure 4.3

#3 Installing into an existing chimney

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 #2.


This is the minimum allowed vent pipe using 4" stainless steel flex pipe.

The vent pipe must extend past the damper sealing area by at least 12".

Note: The insulation material must not be allowed to expand to the point that it covers the end of the flex pipe.

The chimney should be capped with any style cap that will not allow rain or snow to enter.

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. Check your local codes.

 WARNING
CHIMNEY CONNECTOR PIPE MAY NOT PASS THROUGH CONCEALED SPACES INCLUDING AN ATTIC, ROOF SPACE, CLOSET, FLOOR OR CEILING.

 WARNING
DO NOT REMOVE BRICKS OR MORTAR FROM THE EXISTING FIREPLACES.

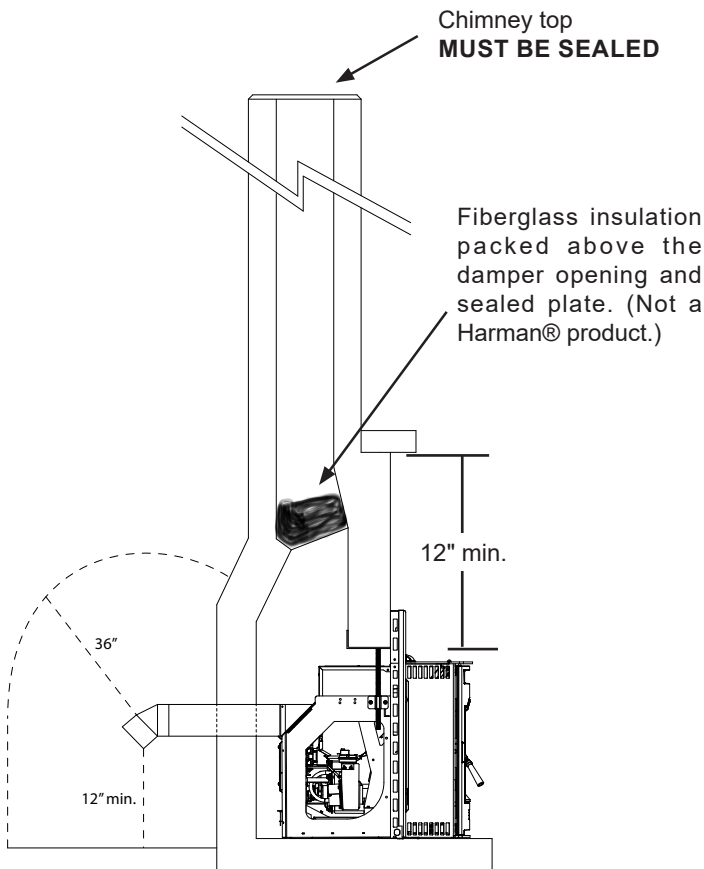
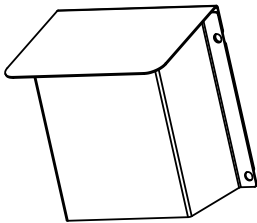



Figure 4.4

#4 Preferred method

This method provides excellent venting for normal operation and in a fireplace with inadequate flue space, or a height of over 30 feet. 4" PL vent pipe should be used with the needed swivel flue stub.

Note: With a 100% outside air kit the outside air can be installed in the same manner as the flue pipe.

<p><i>Stainless Steel Outside Air Inlet Cover Part# 1-10-09542</i></p> 
--

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

IN CANADA: This fireplace insert must be installed with a continuous chimney liner of a minimum 4" diameter extending from the insert to the top of the chimney. The chimney liner must conform to the Class 3 requirements of CAN/ULC-S635, Standard for Lining Systems for Existing Masonry or Factory Built Chimneys and Vents, or CAN/ULC-S640, Standard for Lining Systems for New Masonry Chimneys.

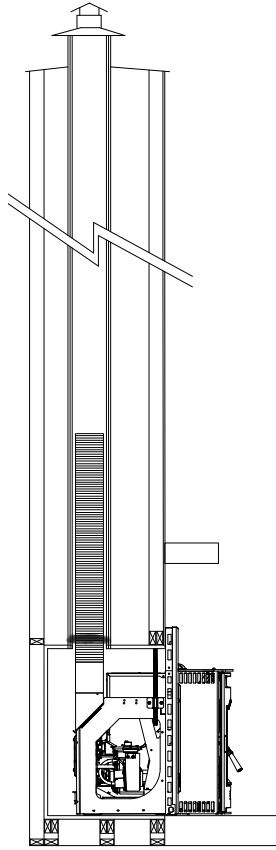


Figure 4.5

Installing the P40i-C Pellet Insert into an existing factory built wood burning fireplace

When installing the P40i-C Pellet Insert into a factory built wood burning fireplace, the Manufactured Fireplace Installation Kit #1-00-574205 must be used. In addition, several things need to be taken into consideration.

The size of the fireplace opening. Will the unit fit into the opening? Many of these units have metal smoke shields inside the top that can be removed to gain height. Often the side and rear refractory can be removed to gain depth and width. In some circumstances, the front lower lip or grill work may also be removed. Be sure and follow the guidelines in the kit instructions. Floor protection guidelines, as listed on Figure 3.2 must also be followed.

The factory built chimney must be listed per UL 127 (US) and meet type HT requirements of UL 103 (US). Factory Built fireplace chimneys tested to UL 127-98 may be, at the fireplace manufacturers option, tested to the same criteria as UL 103HT requirements. If the chimney is not listed as meeting HT requirements, or if the factory built fireplace was tested prior to 1998, a full height listed chimney liner must be installed from the appliance flue collar to the chimney top. Liner must meet high temperature (2100° F) per UL1777 (US). The liner must be securely attached to both the flue collar and the chimney cap. To prevent room air passage to the chimney cavity of the fireplace, seal the damper area around the chimney liner with fiberglass batting. **Note: If the Harman® P40i-C Pellet Insert is installed into a factory built wood burning fireplace, this label (Harman® part #3-90-674204) MUST be attached to the altered fireplace. This label is included in the Manufactured fireplace installation kit.**

● THIS FIREPLACE HAS BEEN ALTERED TO ACCOMMODATE A FIREPLACE INSERT AND SHOULD BE INSPECTED BY A QUALIFIED PERSON PRIOR TO REUSE AS A CONVENTIONAL FIREPLACE ●

Additionally, the firebox floor of the Zero Clearance Wood or Gas Fireplace may be removed down to the outer metal shell of the fireplace if kit 1-00-574305 is used. The kit includes installation instructions and all materials needed to remove the firebox floor and still maintain a safe, compliant installation. Be certain to contact local code enforcement officials before beginning any modifications, as they may not be reversible in many cases.

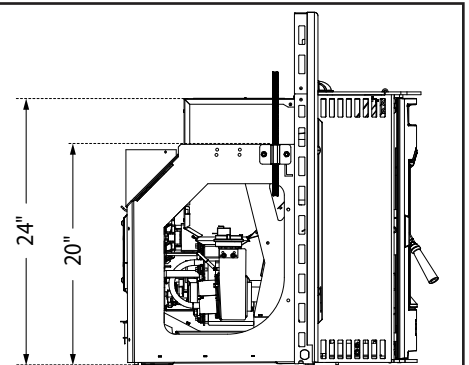
OPTIONAL HOPPER CONFIGURATIONS FOR SMALLER FIREPLACE OPENINGS:

The Harman® P40i-C Pellet Insert can be factory built with shorter hopper configurations.

The standard requires a 24" opening. Part #1-90-740235

Option 1: Requires a 20" opening height. Part #1-90-740200

Keep in mind the hopper capacities will decrease with the optional heights.



Installing the P40i-C Pellet Insert into a Harman Zero Clearance Cabinet

If you don't have a factory built fireplace or masonry fireplace, the P40i-C Pellet Insert can also be installed into the Harman Zero Clearance Cabinet, Part # 1-00-574323. This is the **only permissible** way to install the P40i-C Pellet Insert without a suitable fireplace. After the Harman Zero Clearance Cabinet is installed, type PL vent pipe, wall pass-throughs and terminations are used (**Note:** Flex pipe is not approved these types of installation). Detailed installation instructions are included with the Zero Clearance Cabinet. These same installation instructions can also be found on-line at www.harmanstoves.com.

Figures 4.6 & 4.7 are sample installations using the Harman Zero Clearance Cabinet.

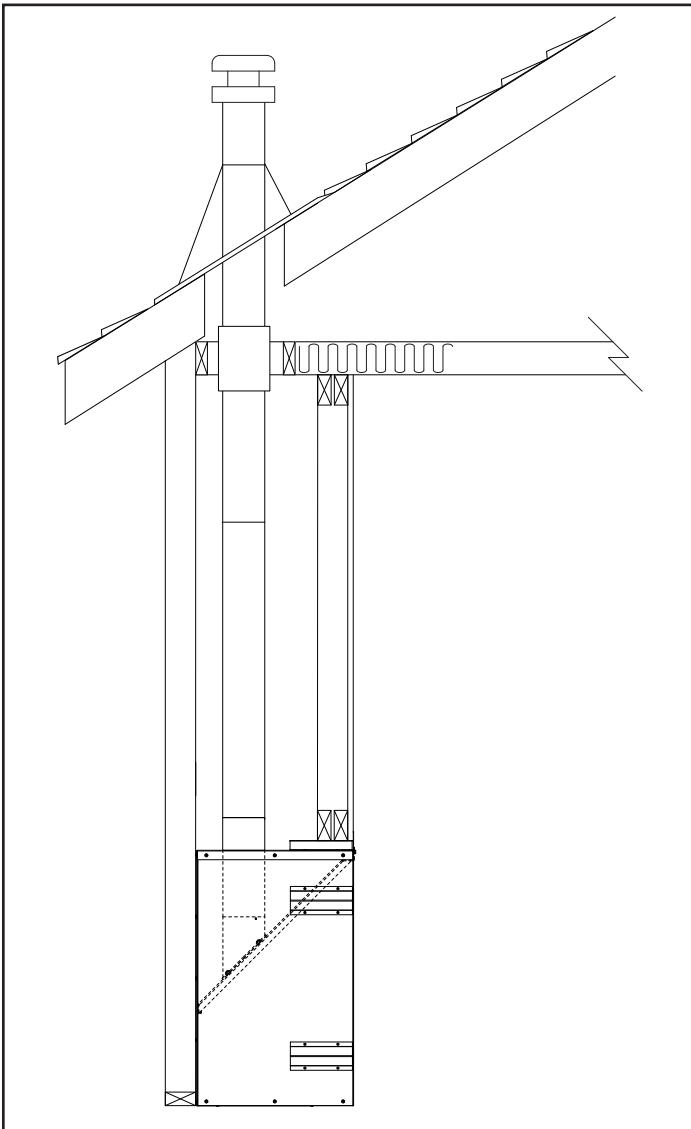


Figure 4.6 - PL Vent Pipe installed through a ceiling.

Requirements for Terminating the Venting through an Exterior Wall.

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 the side or below**)

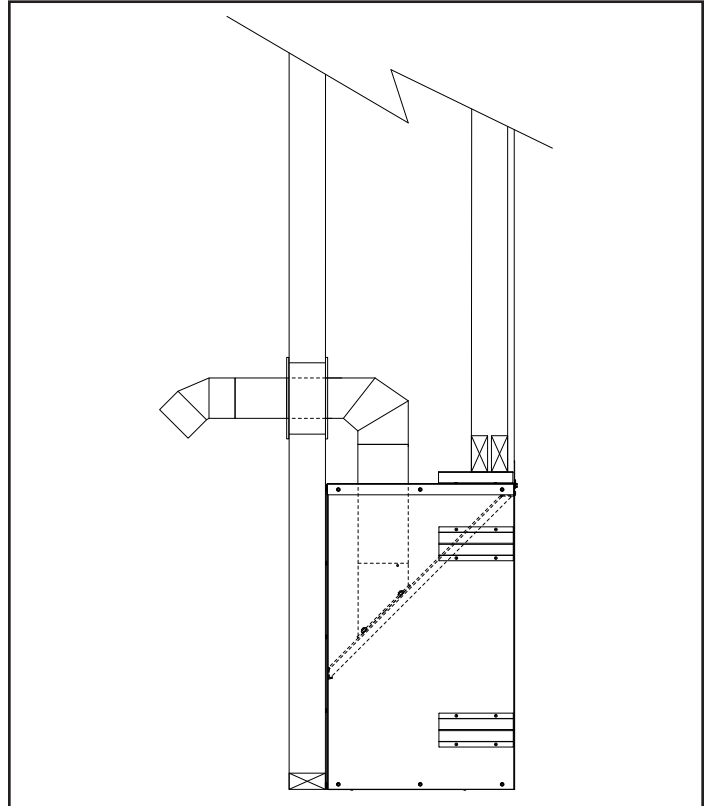


Figure 4.7 - PL Vent Pipe installed through an exterior wall.

C. Venting & Use of Elbows

A combustion blower is used to extract the combustion gases from the firebox. This causes a negative pressure in the firebox and a positive pressure in the venting system as shown in Figure 4.8. The longer the vent pipe and more elbows used in the system, the greater the flow resistance.

The recommended maximum flue lengths for the P40i-C Pellet Insert are as follows:

4" Flex Pipe:

Maximum 30 Ft. Vertical

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.

Any use of horizontal venting will require more frequent cleaning. It is the responsibility of the installer to make sure the entire flue configuration is accessible for cleaning.

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.

Note: The unit ships with a 4" starter collar for using with flex pipe. If the unit will be installed with Type PL pellet pipe, 1-00-574100 Stub kit will need to be used.

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.

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

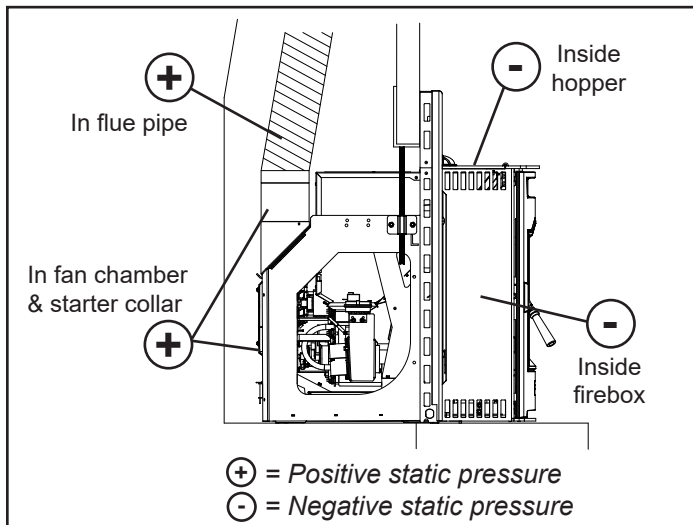


Figure 4.8

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.

CAUTION

Use only Harman® approved battery back-up devices. Other products may not operate properly, can create unsafe conditions or damage your appliance.

D. Outside Air

The outside air kit consists of a Intake Stub, Stub Gasket, Outside Air intake Weldment and hardware, Figure 4.9.

An adjustable chimney intake extension, part #1-00-674104 is available to be used on masonry chimneys only, Figure 4.10.

Additional information and diagrams can be found under the "Venting Termination Design" section of the manual.

To install outside air, use kit part #1-00-774696. Follow the installation instructions provided with the kit.

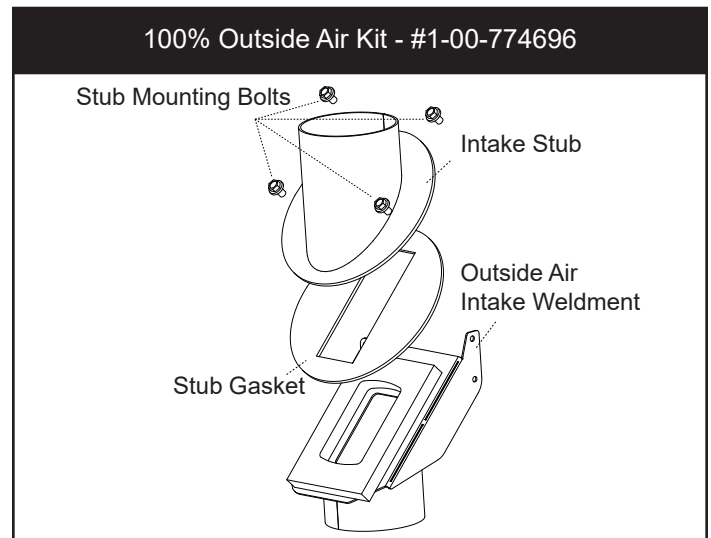


Figure 4.9

Adjustable Chimney Intake Extension Part # 1-00-674104

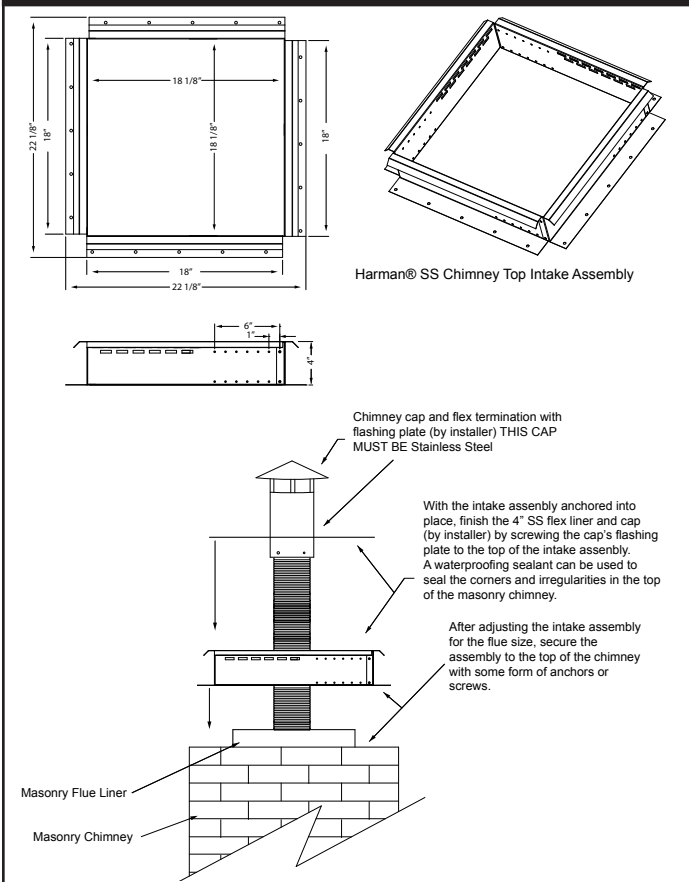


Figure 4.10

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 byproducts are exiting the home through the chimney.

Considerations for successful draft include:

- Negative pressure in the firebox
- Location of appliance and chimney

To measure the draft or negative pressure on your appliance use a magnehelic or a digital pressure gauge capable of reading 0 - 1" 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:	.20 - .25
------------------------------	-----------

Prior to installing the flue pipe, connect a draft meter, Figure 4.11. (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.

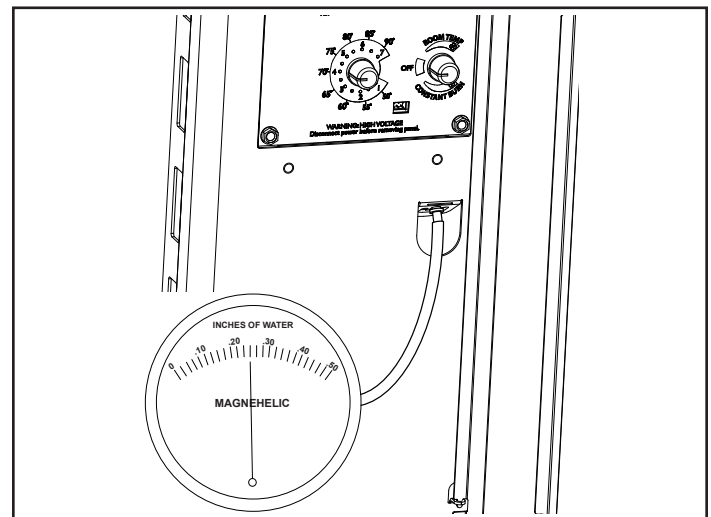


Figure 4.11

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*
- *Down drafts*
- *Tight sealing construction of the structure*
- *Mechanical exhausting devices*

H. Avoiding Smoke and Odors

Avoiding Smoke, 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:

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.

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" 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.



If a rear exit flue configuration is used, with or without outside air, make sure the flue pipe termination clearances are followed as per NFPA 211.

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. Follow venting manufacturer's recommendations for sealing pipe joints.

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 PL 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". The sections of pipe lock together to form an air tight seal in most cases; however, in some cases a perfect seal is not achieved. For this reason and the fact that the P40i-C Pellet Insert operates with a positive vent pressure, we specify that the joints also be sealed with silicone.

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.

Venting Termination Requirements

1. Termination must exhaust above air inlet elevation. It is recommended that at least 60" (1524mm) of vertical pipe be installed when appliance is vented directly through a wall. This will create a natural draft, which will help prevent the possibility of smoke or odor venting into the home during a power outage. It will also keep exhaust from causing a nuisance or hazard by exposing people or shrubs to high temperatures. The safest and preferred venting method is to extend the vent vertically through the roof.
2. Distance from doors and operable windows, gravity or ventilation air inlets into building:
 - a. Not less than 48" (1219mm) below;
 - b. Not less than 48" (1219mm) horizontally from;
 - c. Not less than 12" (305mm) above.
3. Distance from permanently closed windows:
 - a. Not less than 12" (305mm) below, horizontally from or above.
4. Distance between bottom of termination and grade should be 12" (305mm) minimum. This is conditional upon plants in the area, and nature of grade surface. The grade surface must be a non-combustible material (i.e., rock, dirt). The grade surface must not be lawn. Distance between bottom of termination and public walkway should be 84" (2134mm) minimum.
5. Distance to combustible materials must be 24" (610mm) minimum. This includes adjacent buildings, fences, protruding parts of the structure, roof overhang, plants and shrubs, etc.
6. Termination Cap Location (Home Electrical Service)
 - Side-to-side clearance is to be the same as minimum clearance to vinyl inside corners.
 - Clearance of a termination cap below electrical service shall be the same as minimum clearance to vinyl soffits.
 - Clearance of a termination cap above electrical service will be 12" (305mm) minimum.
 - Location of the vent termination must not obstruct or interfere with access to the electrical service.

For Canada Only: This Fireplace Insert must be installed with a continuous chimney liner of 4" diameter extending from the fireplace insert to the top of the chimney. The chimney liner must conform to the Class 3 requirements of CAN/ULC-S635, Standard for Lining Systems for Existing Masonry or Factory-Built Chimneys and Vents, or CAN/ULC-S640, Standard for Lining Systems for New Masonry Chimneys.

I. Mobile Home Installation

You must use a Harman® Outside Air Kit for installation in a mobile home.

1. An outside air inlet must be provided for the combustion air and must remain clear of leaves, debris, ice and/or snow. It must be unrestricted while the appliance is in use to prevent room air starvation which causes smoke spillage. Smoke spillage can also set off smoke alarms.
2. The combustion air duct system must be made of metal. It must permit zero clearance to combustible construction and prevent material from dropping into the inlet or into the area beneath the dwelling and contain a rodent screen.
3. The appliance must be secured to the mobile home structure by bolting it to the floor (using lag bolts). Use the same holes that secured the appliance to the shipping pallet.
4. The appliance must be grounded with #8 solid copper grounding wire or equivalent, terminated at each end with an NEC approved grounding device.
5. Refer to “Clearances to Combustibles and Floor Protection” section of this manual for listings to combustibles.
6. Use silicone to create an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure.
7. Follow the chimney manufacturer’s instructions when installing the vent system for use in a mobile home.
8. Installation shall be in accordance with the Manufacturers Home & Safety Standard (HUD) CFR 3280, Part 24.

WARNING

**Asphyxiation Risk:
NEVER INSTALL INTO A SLEEPING ROOM
Consumes oxygen in the room**

WARNING

Installation must comply with Manufactured Home and Safety Standard (HUD), CFR 3280, Part 24

CAUTION

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

Do NOT cut through:

- Floor joist, wall, studs ceiling trusses.
- Any supporting material that would affect the structural integrity.

CAUTION

Never draw outside combustion air from:

- Wall, floor or ceiling cavity.
- Enclosed space such as an attic or garage.

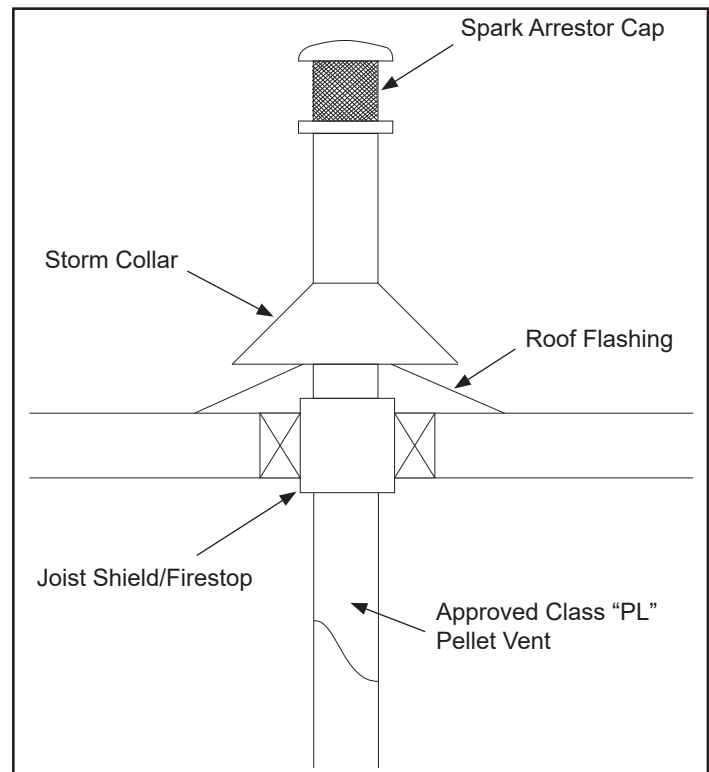


Figure 4.12

J. Fire Safety

To provide reasonable fire safety, the following should be given serious consideration:

- Install at least one smoke 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.

K. 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.

5 Appliance Set-Up

A. Unpacking Stove

Once the box is removed, the unit will need to be removed from the skid.

Firmly grab the stove and pull it away from the frame. Set unit to the side, Figure 5.1. **Note: This may take 2 people to achieve.**

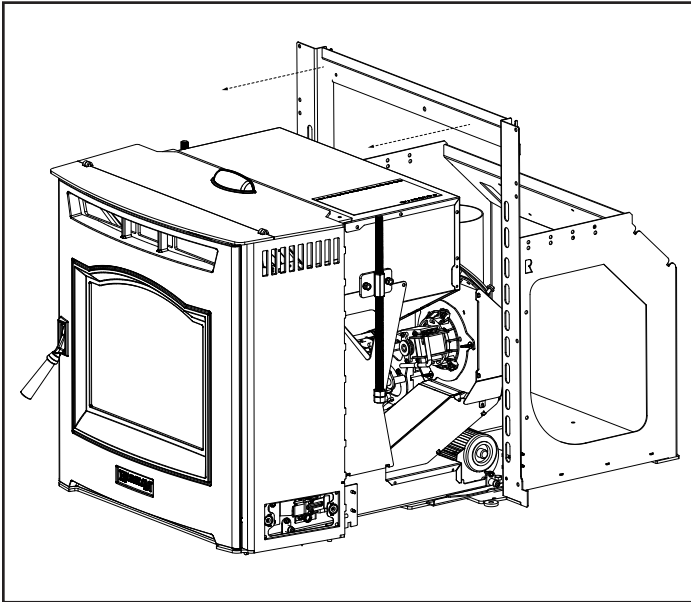


Figure 5.1 - Pull unit away from the mounting frame.

Now that the unit is removed you can remove the mounting frame from the skid. To do this simply remove (4) 5/16" Hex head lag bolts. Figure 5.2.

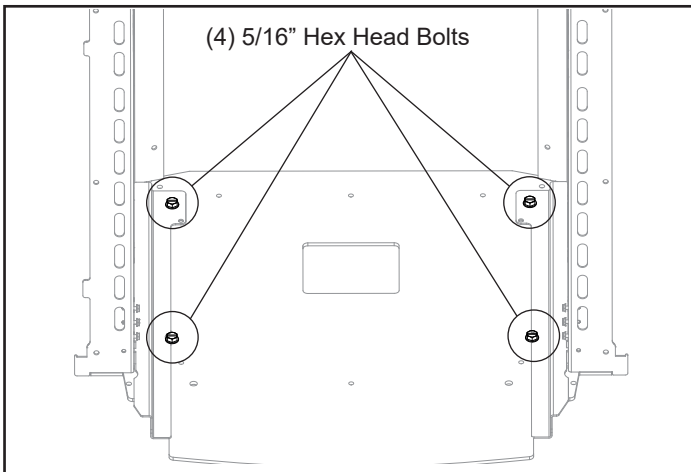


Figure 5.2 - Remove (4) 5/16" Hex Head Bolts

Install the coupler nut weldments to the frame in the hole location that suits your needs with the (4) 1/4-20 x 5/8 flange screws and nuts and 1/2" jack bolts., Figure 5.3.

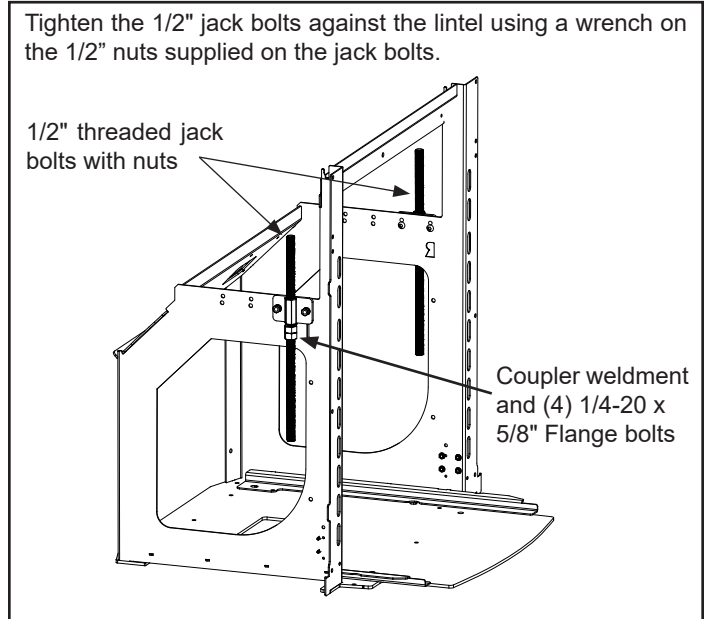


Figure 5.3 - Install jack bolts

B. Installing the Surround

Install the surround panels to mounting frame. **Note:** Installation instructions for the surround are located inside the box with the surround panels.

Loosen the four mounting bolts and adjust the angle of the collar as needed, Figure 5.4. (2) of the bolts may need to be removed in order to position the collar properly. **Note:** When installed in a rear vent configuration, the maximum BTU may be reduced due to elevated ESP temperatures associated with the horizontal exhaust stream.

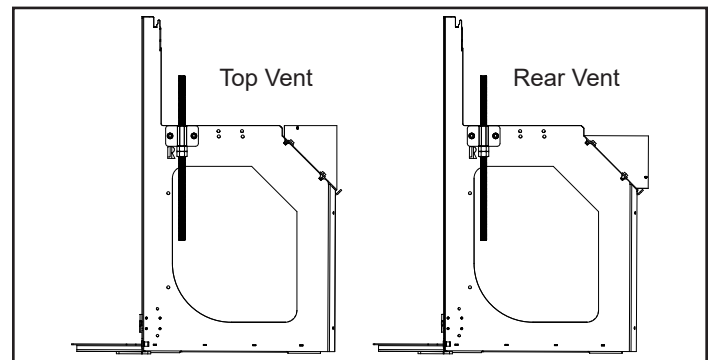


Figure 5.4

C. Routing the Power Cord

Choose a properly grounded electrical outlet, be sure the polarity is correct, and that the supplied voltage is within the range of 117 to 123 Volts. Surge protection is also recommended to protect the control board software in the event of a surge or spike.

Once the outlet location is decided, you'll need to install and route the power cord.

At the bottom of each side panel is a knockout for the cord retainer. Remove the appropriate knockout and feed the loose wire end of the power cord into the hole. If your cord needs to exit from the right side, route the cord up the side and over the top of the mounting frame and back down the left side. Use the two hooks on the top corners of the mounting frame to secure the cord. Attach the ground terminal over the stud just below and to the left of the control opening, Figure 5.5. Then put the ring terminal of the power cord on the stud and secure with the 10-24 nut with star washer attached. Route any loose cord wire back through the clamp hole.

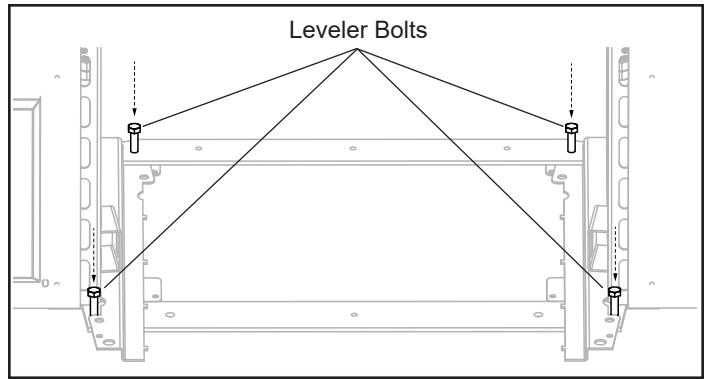
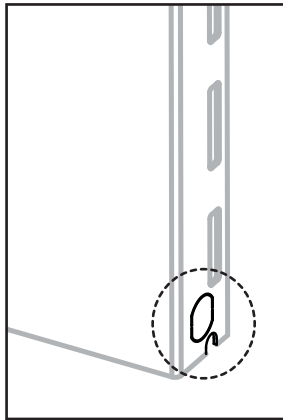


Figure 5.5

F. Control Board Installation

Prior to installing the control board you must place unit into the mounting frame far enough to allow for wiring to be installed on the control board.

The control board is packaged in a bag. Use care when handling, hold the control board only by the frame.

Connecting Wiring Harness, ESP Sensor & Room Sensor.

Follow these steps;

- Place the unit into the frame far enough so that the hopper is under the upper surround edge. **Note:** This will keep the unit from falling out.
- From the left side, feed the wiring bundle through the control opening.
- Install barbed fitting with cap by bending tab inward roughly 30 degrees and snap barbed fitting into slot, Figure 5.6.
- Push the silicone draft tube onto rear side of fitting, Figure 5.6.
- Push the ground wire onto the ground terminal, Figure 5.6
- The black wire from the power cord gets attached to the short brown wire from the control harness.
- The white wire from the power cord will attach to the short white wire on the control harness.
- Plug 11 pin connector to control board.
- Connect the ESP sensor, Figure 5.6.
- Using (2) cable ties supplied, cable tie the wiring harness to the bottom of the control cover, Figure 5.6.
- Plug in the remote sensor wire, Figure 5.6.

 **WARNING**

ROUTE POWER CORD AWAY FROM THE APPLIANCE. DO NOT RUN THE CORD UNDER OR IN FRONT OF THE APPLIANCE.

D. Test Fit Frame & Surround

Test fit into the fireplace opening using the leveling bolts to align the surround to the fireplace face, Figure 5.5.

Note: During test fit, make sure the venting configuration that was chosen will work before securing the mounting frame.

E. Securing the Mounting Frame

The mounting frame is the anchor for the appliance. If the frame is not secured properly, shifting will occur when sliding the insert in or out.

The stove is supplied with (4) 5/16 Hex Head bolts located in the hardware pack for levelers. These bolts should be threaded down through the holes to raise the frame corners as needed to make the frame level as needed, Figure 5.5.

Note: The use of tapcons may be needed if the jack bolts can not be used.

Connecting Room Sensor

Connect the room sensor to the control board, Figure 5.6. Using a minimum size 18 gauge wire, you may splice in an additional length, to extend the room sensor. The following are typical locations for the room sensor;

- On an interior wall next to or in place of a typical wall thermostat.
- On the leg of a coffee table or end table in your favorite sitting location.

Note: When installing the room sensor externally, limit the distance from the stove to 25 feet or less.

Once the location has been decided, run the wiring to the control panel. You'll need to remove the two terminals from the end of the sensor cable and replace them with the two smaller terminals from the hardware bag. Plug the terminals into the control board. These connections are not polarity specific.

Note: If the room sensor is located too close to the appliance, or in a direct path of the distribution air, You may need to elevate the temperature setting to maintain a comfortable temperature level throughout the heated space.

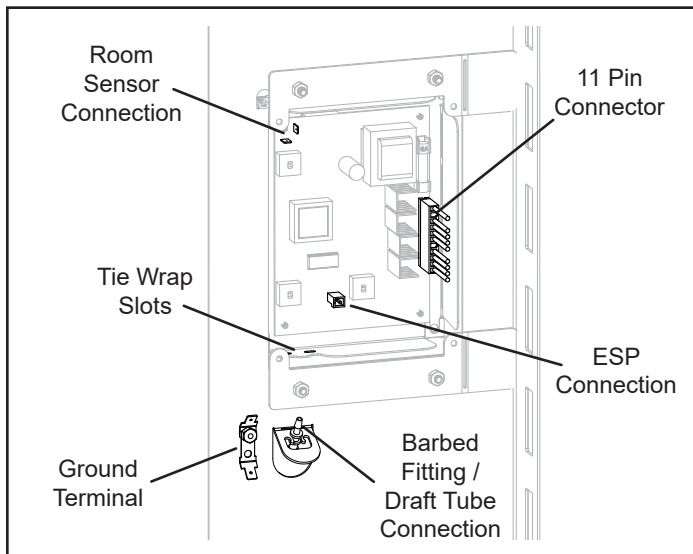


Figure 5.6 - Connect wiring and Draft Hose.

Using (4) black sheet metal screws located in the hardware pack, install control board assembly, Figure 5.7.

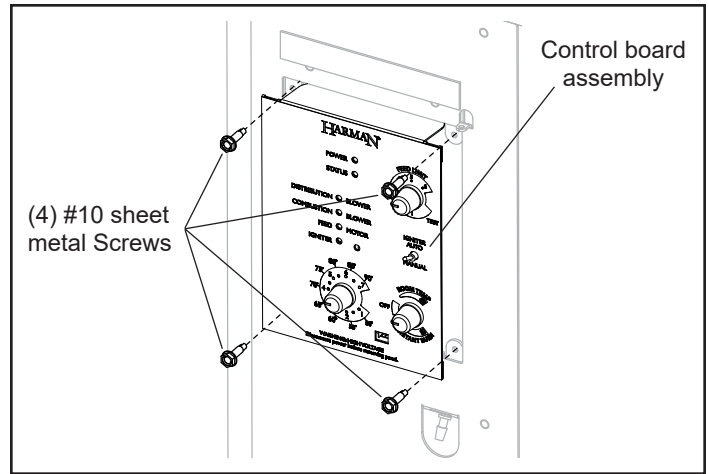


Figure 5.7 - Install control board assembly.

G. Securing Body into the Mounting Frame

The rollers on either side of the insert body will ride on the rails of the mounting frame. Once the body is all the way in, hook and close the spring latches located on each side of the unit to secure the stove body to frame, Figures 5.8 and 5.9.

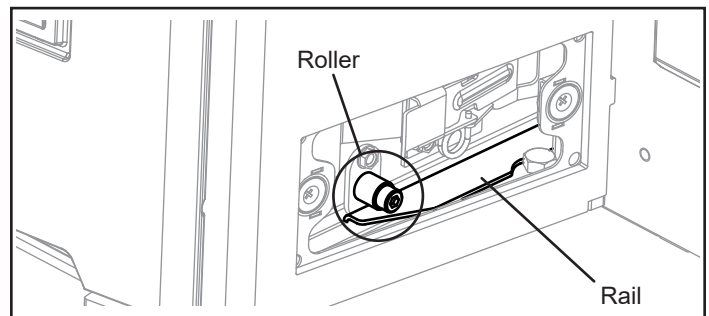


Figure 5.8

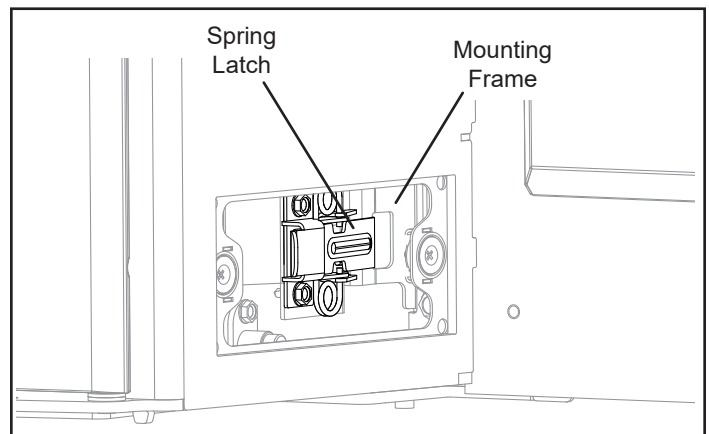


Figure 5.9

6 Reference Material

A. Safety Reminders

When installing the Harman® P40i-C Pellet Insert, respect basic safety standards. Read these instructions carefully before you attempt to install or operate the P40i-C Pellet Insert. 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 will be required. It is imperative that control compartments, burners, and circulating air passageways of this stove be kept clean.

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.

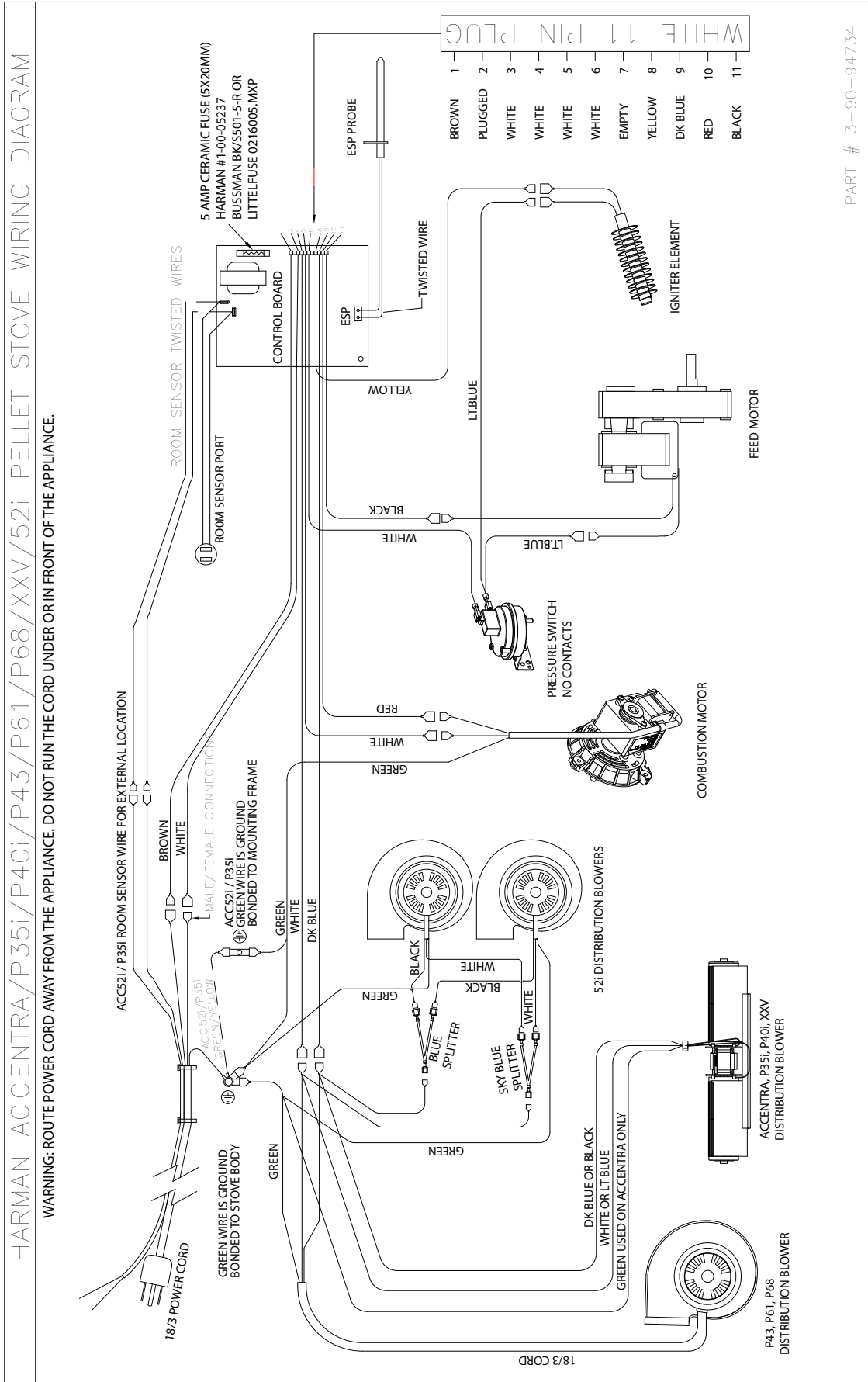
WARNING

USE OF IMPROPER FUELS, FIRE STARTERS 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

CAUTION

DO NOT USE MAKESHIFT COMPONENTS OR OTHER COMPROMISES WHEN INSTALLING THIS APPLIANCE.

B. Wiring Diagram



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

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.

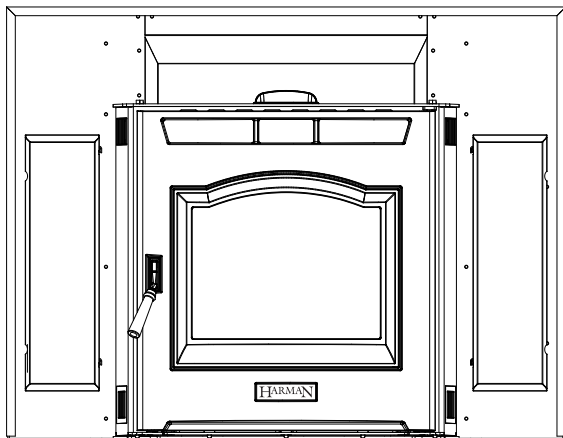
NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):

P40i-C Pellet Insert



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.



CAUTION

Tested and approved for wood pellets only burning of any other type of fuel voids your warranty. When burning higher ash content pellets more frequent cleanings may be required.



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.

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

Table of Contents

Sample of Serial Number / Safety Label	3
Warranty Policy	4

1 Product Specifications and Important Safety Information

A. Appliance Certification	6
B. Mobile Home Approval	6
C. BTU & Efficiency Specifications	6
D. Appliance Safety	7
E. California	7
F. Clear Space	7
G. Helpful Hints	8
H. Fuel Specifications	8
I. Frequently Asked Questions	10

2 Operating Instructions

A. Fire Safety	11
B. Fuel and Fuel Storage	11
C. General Operating Information	12
D. Before Your First Fire	14
E. Starting a Fire in “Automatic” Mode	14
F. Maintaining a Fire	14
G. Shut-Down Procedure	14

3 Maintenance and Service

A. Proper Shutdown Procedure	15
B. Quick Reference Maintenance Chart	16
C. Unit Maintenance	17
• Daily/Weekly Maintenance	17
• Monthly Maintenance	17
• Yearly Maintenance	18

4 Reference Materials

A. Service Parts	20
B. Loss of Power	25
C. Manual Ignition	25
D. Troubleshooting	26
E. Contact Information	28

➔ = Contains updated information

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.

A. Sample of Serial Number / Safety Label

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.

Congratulations, The Harman® P40i-C pellet insert 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® P40i-C Pellet Insert 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 on the underside of the hopper lid.

Model Name

MODEL / MODÈLE: "P40i-C PELLET INSERT"

SUITABLE FOR MOBILE HOME INSTALLATION
This pellet burning appliance has been tested and listed for use in Manufactured Homes in accordance with CARF 814-23-950 through 814-23-959.

Test Performed by: Test réalisée par OMNI-Test Laboratories, Inc.
Report #/Rapport#: 0061PN103E / 0061PN103S
Tested to/Tests à: ASTM E 2779-10, AG TM E 25 10-11, ASTM E 1509-12, UL-C 9628 (S)
This pellet burning appliance has been tested and listed for use in Manufactured Homes in accordance with CARF 814-23-950 through 814-23-959.

"PREVENT HOUSE FIRES" Install and use only in accordance with the manufacturer's installation and operation instructions. Contact local building or fire officials about restrictions and inspection in your area.

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.

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 4" diameter type "PK" venting system, or 4" stainless steel flex as per manual.
Do not connect this unit to a chimney that serves another appliance.

FOR USE WITH WOOD PELLET FUEL ONLY.
EPA Certified Emission: 0.7 g/hr
UL Electrical Rating: 115 VAC, 60Hz, Start 4.2 AMPS, Run 2.8 AMPS
DANGER: Risk of electrical shock. Disconnect power supply before servicing.
For further instruction refer to owner's manual.

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

OPERATE ONLY WITH DOORS CLOSED.
DANGER: Risque d'électrocution. Débrancher l'appareil avant toute intervention.
Pour une information plus complète, se reporter à la notice d'utilisation.

Ne remplacer la vitre qu'avec une vitre céramique 5 mm de même qualité disponible auprès de votre revendeur.
Tenir la porte fermée et le couvercle de bûche hermétiquement clos durant le fonctionnement de l'appareil.

Serial Number

Serial No. / N° de série: **HF**

BARCODE LABEL

Minimum Clearances to Combustible Material
Dégradements minimaux aux matériaux combustibles

Location	Inches	Millimeters
A To Sidewall	12	305
B To 12" Mantel	12	305
C To 3/4" Trim	0	0
D To 3/4" Trim	0	0

Non-combustible floor protector.
Protecteur de sol non combustible.

Location	Inches	Millimeters
E From Glass	6	152

Note: Floor protection must be used from hearth opening to 6" (152mm) in front of door glass and 6" (152mm) to each side of the stove body OR 6" (203mm) to sides to protect combustibles from hot ashes. A minimum size will be 15-3/8" deep by 25-3/4" wide and be made of a non-combustible material or meet UL approval.

CAUTION: HOT WHILE IN OPERATION. KEEP CHILDREN AND CLOTHING AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIALS A CONSIDERABLE DISTANCE AWAY FROM THIS APPLIANCE. KEEP HOPPER LID CLOSED DURING OPERATION. FAILURE TO DO SO MAY RESULT IN EMISSION OF PRODUCTS OF COMBUSTION FROM THE HOPPER UNDER CERTAIN CONDITIONS. MAINTAIN HOPPER SEAL IN GOOD CONDITION. DO NOT OVERFILL THE HOPPER.

DANGER: CHAUD- NE PAS TOUCHER. TENIR LES ENFANTS ET LES VÊTEMENTS À L'ÉCART. RISQUE DE BRÛLURE. VOIR INSTRUCTIONS SUR LA PLAQUE. LAISSER UNE DISTANCE SUFFISANTE ENTRE L'APPAREIL ET LES MEUBLES OU AUTRES OBJETS À RISQUE. N'UTILISER CET APPAREIL QUE LORSQUE LE COUVERCLE DE LA TREMIE EST BIEN FERMÉ. IGNORER CETTE CONSIGNE PEUT ENTRAÎNER DES ÉMANATIONS DE PRODUITS ISSUS DE LA COMBUSTION À TRAVERS LA TREMIE DANS CERTAINES CONDITIONS. VEILLER AU BON ÉTAT DU JOINT DE LA TREMIE- NE PAS EXCÉDER LA CAPACITÉ DE LA TREMIE.

HARMAN®

US ENVIRONMENTAL PROTECTION AGENCY
The P40i is Certified to comply with 2020 particulate emission standards.
La P40i est certifiée conforme aux normes d'émission de particules de 2020.

Date of Manufacture / Date de fabrication:
2021 2022 2023 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Manufactured by / Fabriqué par: Harman and Home Technologies 352 Mountain House Road, Haffax PA 17033

PN: E390-040_R1

DO NOT OBSTRUCT THE SPACE BENEATH THE HEATER.
MADE IN USA OF US AND Imported Parts
Fabriqué aux États-Unis-d'Amérique par des pièces d'origine américaine et pièces importées

DO NOT REMOVE THIS LABEL. NE PAS ENLEVER CETTE ÉTIQUETTE

B. Limited Lifetime Warranty

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, and 10 years from the beginning date of warranty coverage for wood and pellet appliances. 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	1 year	X					Vent Free Burners, Vent Free Logs	
			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	
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.**

1 Product Specific and Important Safety Information

A. Appliance Certification

MODEL:	P40i-C Pellet Insert
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0061PN103E / 0061PN103S
TYPE:	Pellet Fueled Insert/Supplementary For Residential Use
STANDARD(s):	ASTM E 2779-10, ASTM E 2515-11, ASTM E 1509-12, ULC-S628-93
ELECTRICAL RATING:	120 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps
GLASS SPECIFICATION:	5mm mirrored ceramic glass

The P40i-C Pellet Insert is certified to comply with 2020 EPA particulate emission standards.



NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the ASTM E 1509-12, ULC-S628-93 & (UM) 84-HUD

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.



CAUTION

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

DO NOT INSTALL IN SLEEPING ROOM.



WARNING

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

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.

C. BTU & Efficiency Specifications

EPA Certification Number:	207-19
EPA Certified Emissions:	0.7 g/hr
*LHV Tested Efficiency:	87.4%
**HHV Tested Efficiency:	81.5%
***EPA BTU Output:	14,450 - 33,126
****BTU Input	17,420 - 42,000
Vent Size:	4 Inch
Hopper Capacity:	64.5 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 8600 BTU's which is the average BTU's from a pound of pellets.

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.

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.

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.

D. Appliance Safety

WARNING

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.
- 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.

Due to high temperatures, this stove should be placed away from traffic, furniture and draperies.

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns to the 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.

Connect the power cord into 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.

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. 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.

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.

WARNING

MOBILE/MANUFACTURED HOME GUIDELINES: DO NOT ALLOW INSTALLATION IN A SLEEPING ROOM.

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

G. Helpful Hints

When operating your Harman® P40i-C Pellet Insert, follow basic safety standards. Read these instructions carefully before you attempt to operate the P40i-C Pellet Insert. Failure to do so may result in damage to property or personal injury and may void the product warranty.

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 when scraping the bumpot.

Disposal of Ashes: Ashes should be placed in a steel 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. Other waste shall not be placed in this container.

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

When burning wood pellets on low, the potential exists for creosote to form. The venting system should be inspected periodically throughout the heating season to determine if creosote buildup has occurred. If a significant layer of creosote has accumulated (1/8" 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.

With any hearth appliance, installation of smoke detectors is recommended on every level of the home.

Possible causes of smoke detector activation:

Paint curing process - Open a window near the appliance for the first few hours of burning.

Exhaust being drawn back inside the dwelling - Outside air connection to the appliance is necessary.

Vent leakage - All interior seams and joints should be sealed with silicone where applicable. Follow vent manufacturers instructions for proper sealing.



CAUTION

This appliance must be vented to the outside

H. Fuel Specifications

The P40i-C Pellet Insert is approved for burning any grade of pelletized bio-mass fuel.

It should be noted, however, that higher ash content will require more frequent cleaning.

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.

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 and other biomass

Lower Ash Content Material

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

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.

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.

H. Fuel Specifications (Cont.)

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.

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.*



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.



CAUTION

Odors and vapors released during initial operation.

- Curing of high temperature paint.
- Open windows for air circulation.

Odors may be irritating to sensitive individuals.



CAUTION

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



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.



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.

I. Frequently Asked Questions

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.

Contact your dealer for additional information regarding operation and troubleshooting. Visit www.harmanstoves.com to find a dealer.

ISSUES	SOLUTIONS
Metallic noise.	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.
White ash buildup on glass.	This is normal. Clean the glass using any non-abrasive glass cleaner.
Glass has buildup of black soot	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.
Glass has turned dirty.	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.
Fire has tall flames with black tails and is lazy.	The feed rate needs to be reduced or the burnpot needs cleaning. Heat exchanger or exhaust blower needs cleaning.
Smoky start-up or puffs of smoke from the airwash.	Burnpot may be dirty, Clean the burnpot.
Large flame at start-up.	This is normal. Flame will settle down once the fire is established.
Missed Ignition	<p>Ensure pellets in burnpot</p> <p>Ensure holes in burnpot are clear of obstructions above the igniter. See Burnpot Maintenance.</p> <p>Check to see if the ignitor is getting hot, if not replace ignitor. *See addendum for manual ignition instructions for emergency heating needs.</p>

2 Operating Instructions

A. Fire Safety

You can never be too cautious when it comes to fire safety. Please give serious consideration to the following:

- Install at least one smoke detector and CO detector on each level of the home.
- Locate detectors away from the appliance and close to the sleeping quarters.
- Follow the manufacturer's guidelines on placement and installation as well as maintaining regularly.
- Place a Class A fire extinguisher nearby to contend with small fires.
- In the event of a fuel hopper fire:
 - Evacuate the house immediately.
 - Notify the Fire Department.

B. Fuel and Fuel Storage

Pellet fuel quality can fluctuate. This appliance is designed to burn a wide variety of pellet fuel, giving you the freedom to choose the most economical fuel in your area.

Hearth & Home Technologies strongly recommends that you choose a fuel that is recognized by the Pellet Fuels Institute (PFI).

Pellet fuels are made from sawdust, or other wood fibers. The source material determines the ash and heat content. Higher ash content fuel, or Standard Grade, may contain bark, leaves, stems, or other by-products. Higher ash may not mean more or less heat value, but it will require more maintenance and cleaning. Low ash content fuel, or Premium Grade, is made from only the cleanest sawdust. Cleaning and maintenance are greatly reduced while typically higher heat value is experienced.

APPROVED FUELS

- **Wood Pellets** - Any grade of wood or biomass pelletized fuel. Pellets should be either 1/4" or 5/16" (6 - 8mm) in diameter, and no more than 1-1/2" (38mm) in length.



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.

STORAGE

Fuel should be stored in a dry area, preferably indoors, and well away from the appliance clearance area.



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.



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".

C. General Operating Information

The P40i-C's ESP control will maintain an output level to fit your temperature demands. There are two modes of operation; "Constant Burn" mode, where the control will maintain a specified constant temperature, regardless of the surrounding environment temperature conditions, Or "Room Temp" mode, where the control will adjust the rate of burn to meet a specified room temperature setting. You also have the choice of Automatic or Disabled ignition. Regardless of the mode selected, operation is controlled by both, exhaust temperature- being reported by the ESP (Exhaust Sensing Probe), and the microprocessor control board.

ESP (Exhaust Sensing Probe)

The ESP is located in the exhaust stream, Figure 2.1. The probe is monitored by the control board and used to determine the need for changes in the burn rate to meet the temperature demand.

Control Board

The control board will adjust itself based on reported temperatures and demand temperature. The control board will also flash a code sequence on the status light if an error is detected.

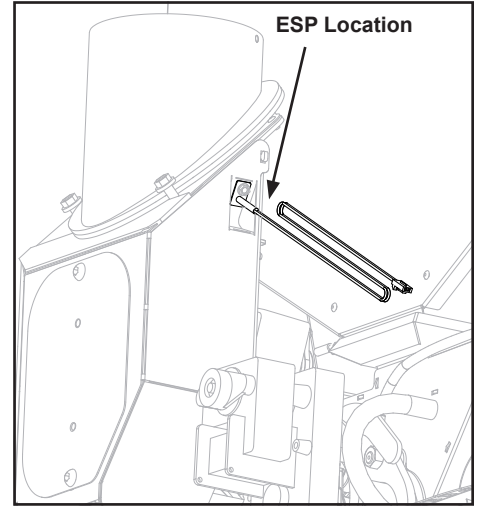
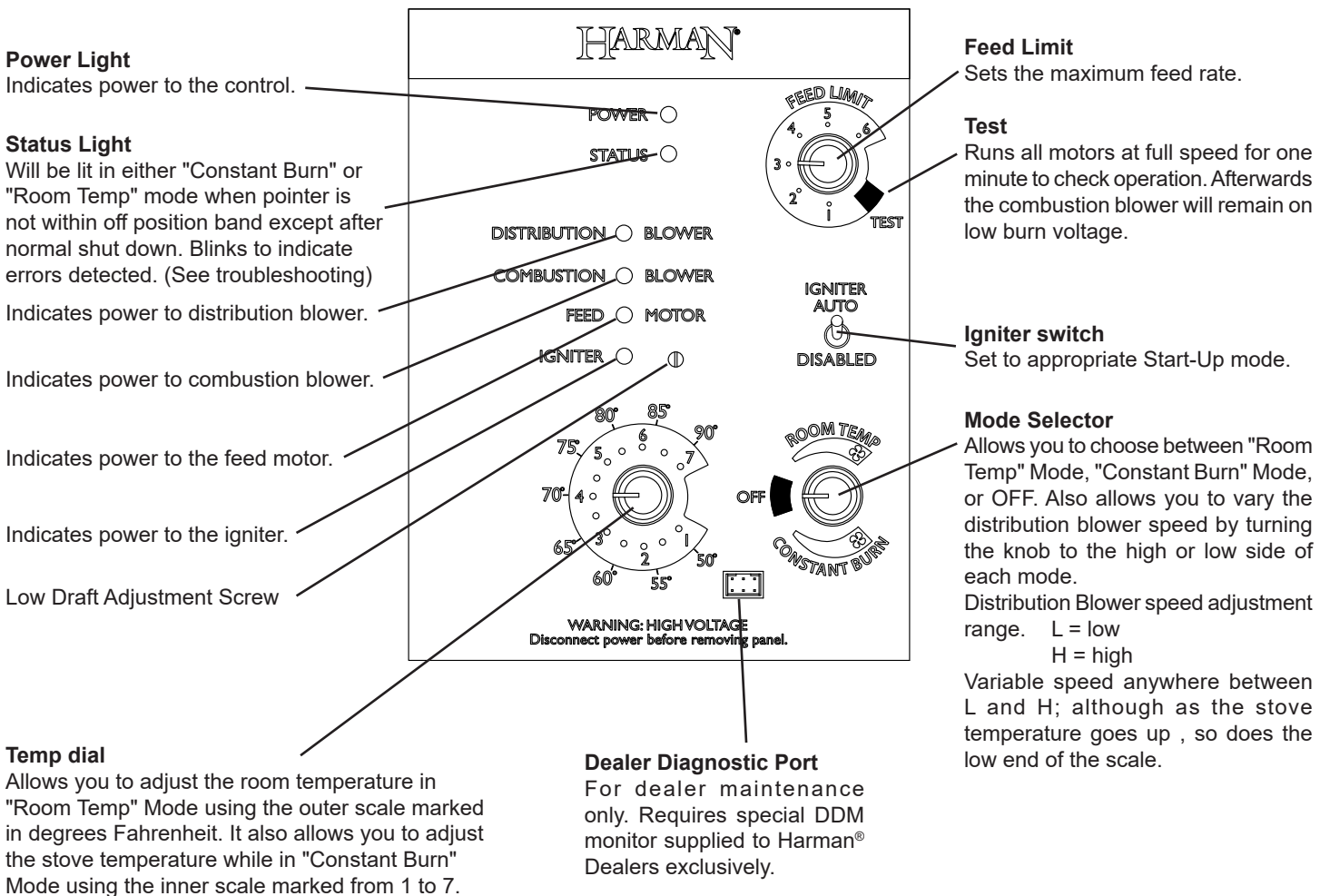


Figure 2.1



Feed Limit Adjustment

The feed limit controls the maximum amount of time the unit feeds fuel into the burn pot.

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.

Note: Since the control board is feeding as needed, only adjust the feed rate while maximum demand is occurring. (Constant Burn Mode, with a temp dial setting of #7 will create maximum demand.)

Mode Selection

Room-Temp mode is the ideal mode of operation if you wish to maintain a comfortable temperature in the room. The control will adjust the feed rate to maintain the desired temperature setting in the room. For best results, be sure the room sensor is located away from drafty areas and not positioned on the floor or near an exterior wall.

Constant Burn mode is a manual method of operation. The stove will run at a constant heat output, regardless of surrounding air temperature.

Temperature Dial

The temperature dial is a dual purpose dial. In Room-Temp mode, you select the room temperature you want the stove to maintain at the room sensor probe. This is marked in Fahrenheit scale from 50 to 90 degrees. In Constant Burn mode, you select a temperature setting based on the #1 - 7 with 1 being a minimum burn and 7 being a maximum burn rate.

Blower Speed Adjustment

The mode selector is also marked with a L to H scale in each mode. This is a variable speed control for the distribution blower. **L** is the low setting, and **H** is the high setting. It is important to note that the blower will not come on until the ESP reaches a specific temperature, to ensure that cold air is not being blown out into the room. Also, the speed of the blower, when set on lower speeds, will automatically increase as the temperature of the stove increases.

Igniter Auto Mode Switch

The toggle switch for the igniter is a two position switch. Select from either Igniter Auto or Disabled.

Igniter Auto - Will automatically start the fire in either Constant Burn or Room Temp mode.

Constant Burn: The ignition mode will start the fire one time only. Since Constant Burn maintains a constant output, the fire will never go out to need re-ignited.

Room Temp: The ignition mode will start the first fire. Then, if the room temperature is satisfied, the fire will go out. Once the room cools, the ignition mode will start another fire, and so on. This mode provides fully automatic temperature control.

Disabled - The fire must be started manually using starting gel or other manufactured fire starter.

Disabled - With the igniter switch in the MANUAL position, the igniter is disabled.

Constant Burn: The fire would need to be started manually, and will maintain a constant output based on the temperature setting.

Room Temp: The fire would need to be started manually. The control will adjust output to maintain a constant room temperature, however it will not allow the fire to go out. If the room temperature is satisfied, the control will adjust to the minimum burn rate and hold there until the room temperature decreases.

D. Before Your First Fire

- Be sure the appliance is installed properly and that all safety requirements have been met. Pay particular attention to the clearances to combustibles, floor protection and the venting instructions.
- Test your smoke detector(s) and CO detector(s) to the specifications of the manufacturer.
- Double check that the ash pan and internal firebox are empty.
- Be sure to read this entire manual.



WARNING

TESTED AND APPROVED FOR USE WITH WOOD PELLETS ONLY. USE OF ANY OTHER TYPE OF FUEL WILL VOID THE APPLIANCE WARRANTY.



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".

The optimal method of operation is in Room Temp mode, with the Ignition switch set to Automatic.

E. Starting a Fire - "AUTOMATIC"

1. With the mode selector in the "Off" position, and the Feed Limit **NOT** on "Test", plug the power cord into a properly grounded receptacle.
2. Fill the hopper with DRY fuel.
3. Turn the Feed Limit dial to "Test". This will run the feed motor for one minute. If you begin to see fuel entering the burn pot, you can stop the test cycle. Return to #4 or #5 to start out.
4. Position the Igniter switch to Igniter Auto.
5. Turn the mode selector dial to the desired mode. This will start the combustion blower, feeder, and igniter operating. **If Room Temp is selected, be sure to turn the temperature dial above the current room temperature.**
6. After the initial feed cycle is typically when you'll begin to see sparks, smoke, or flames.

Keep Hopper Lid, Ash Pan, and Fire viewing doors closed while in operation. Maintain all door seals and gaskets in good condition. Replace gaskets when necessary using parts obtained through your Harman® dealer.

F. Maintaining the Fire

Once the Distribution Blower begins operation, your fire is well established. Now, you can make any desired adjustments to the temperature dial. Remember, in Constant Burn, the temperature dial uses the inner portion of the scale (#1 thru #7). In Room Temp, select the desired temperature in Fahrenheit from 50° to 90°.

The flames should appear brisk and bright. If you see deep orange and lazy flames, it is usually an indication that the burn pot needs to be cleaned. *Refer to the Maintenance Section of this manual.*



WARNING

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

- Do **NOT** store flammable materials in the vicinity of this appliance.
- **DO NOT BURN COLORED PAPER, CARDBOARD, SOLVENTS, TRASH, GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**
- **DO NOT USE CHEMICALS OR FLUIDS TO START A FIRE.**

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

Shut-Down

During operation in Room Temp / Igniter Auto mode, the appliance will shut down naturally when demand is met or exceeded. In other modes of operation, the unit will shut-down only if or when it runs out of fuel.

To kill or stop a fire, turn the mode selector dial to "OFF". The shut down cycle will slow or stop the feeder to gradually cool the fire and ensure that all of the exhaust gases are safely expelled before stopping the combustion blower. This not only ensures removal of all smoke and gases, it also keeps the fire from attempting to travel into the fuel storage hopper. For this reason; Hearth & Home Technologies recommends installing a battery back-up in areas where frequent power outages are experienced.



NEVER ATTEMPT TO EXTINGUISH A FIRE BY PULLING THE PLUG OR OTHERWISE DISCONNECTING THE ELECTRICITY SUPPLY.

The best way to extinguish a fire, especially at the end of the heating season, is to simply allow it to run out of fuel.

3 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.

A. Proper Shutdown Procedure

 CAUTION	
	Shock and Smoke Hazard
	<ul style="list-style-type: none">• Turn unit to the off position, let appliance completely cool and combustion fan must be off. Now you can unplug appliance before servicing.
	<ul style="list-style-type: none">• Smoke spillage into room can occur if appliance is not cool before unplugging.
	<ul style="list-style-type: none">• 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.

NOTICE

The type of fuel you are burning will dictate how often you have to clean your burnpot. Clean more frequently if you encounter heavy build-up of ash at the recommended interval or you see soot coming from the vent. **Not properly cleaning your appliance on a regular basis will void your warranty.**

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.

B. 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.

C. Unit Maintenance

Daily/Weekly Maintenance: It is recommend that the burn pot be scraped whenever adding fuel; taking the opportunity to clean the burn pot will insure proper daily operation.

Scraping the Burn Pot-

- Using flame resistant gloves, vigorously scrape the top holed surface and sides of the burn pot down to auger tube, be sure to concentrate in the neck of the burnpot. Figure 2.1.
- Scrape loosened material over edge of burnpot grate into the ashpan.
- If needed, empty the ash pan while adding fuel and after scraping the burn pot.

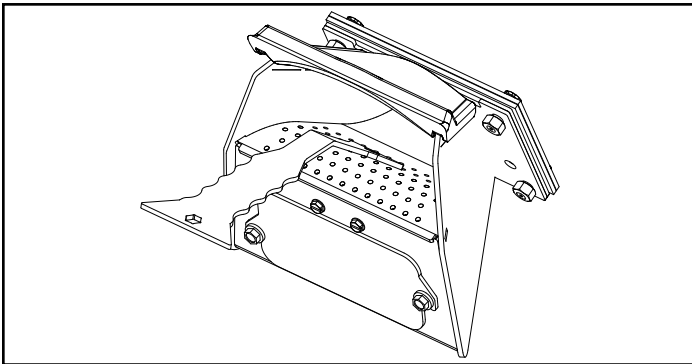


Figure 2.1

Monthly Maintenance: It is recommend that the unit be shut down and unplugged from any power source for a monthly cleaning. Monthly cleanings will insure proper operation of your unit throughout the heating season.

- Cleaning Glass - Once unit is cold, use a non-abrasive glass cleaner on glass and wipe clean.
- Scrape and Vacuum Heat Exchanger.

Cleaning the Heat Exchanger-

Clean the heat exchanger with scraper as shown in Figure 2.2. Brush or scrape the inside of the stove to remove fly ash. Remove the ash pan and dispose of ashes in an approved manner, according to local codes.

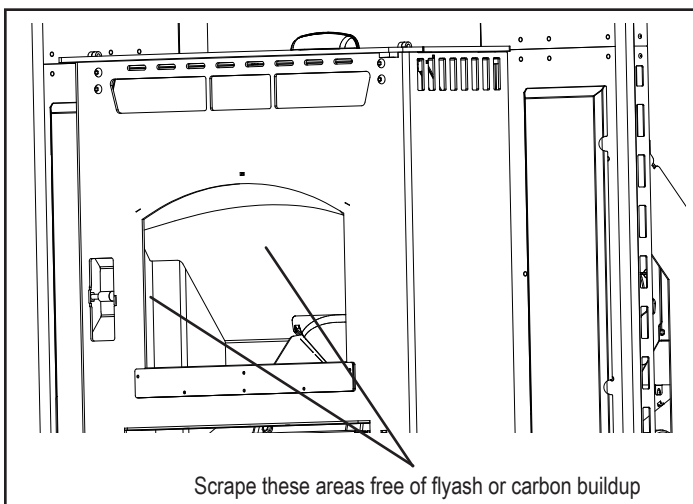


Figure 2.2

Cleaning the Burn Pot-

- Vigorously scrape the top holed surface and sides of the burn pot down to auger tube, as suggested in the Daily/Weekly Maintenance Section.
- 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. Figure 2.3.

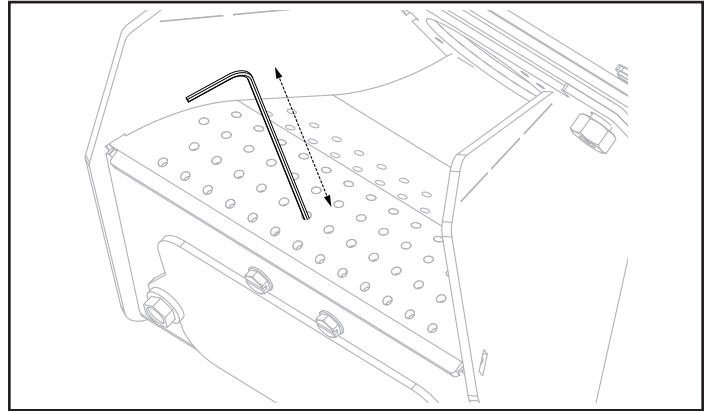


Figure 2.3



DANGER

Disconnect the power to the unit before removing cover.

- Loosen (2) 1/4-20 Flange Bolts and pull up on cover and remove to gain access to igniter element and cradle. Figure 2.4. **Note:** a wrench is built into the burnpot scraper for this purpose.
- Using the brush supplied, brush the igniter element free of any ash or debris. Figure 2.4.

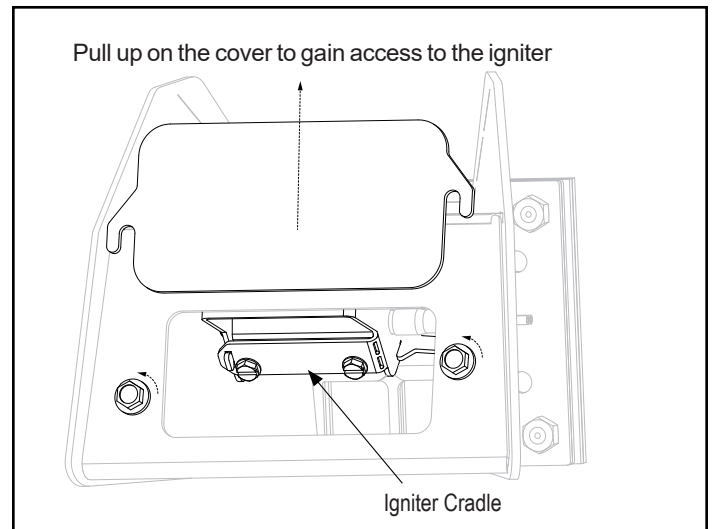


Figure 2.4 - Viewed from below through the ash pan opening.

Cleaning Igniter Bracket-

Check cleanliness of the igniter bracket and inner burnpot. If the igniter has ash buildup it must be removed to insure proper ignition. Use the provided brush to remove ash buildup from in and around the igniter. Once ash is loose vacuum around igniter and at the base of burn pot.



WARNING

Use caution when cleaning burn pot clean-out chamber. Do not damage the high temperature igniter wires.

Yearly Maintenance: Cleaning Heat Exchanger & Exhaust

- **Completed By:** Dealer / Service Tech (Recommended)

It is recommended that you use a vacuum that is designed for ash, as ashes may block conventional vacuum filters.

NOTICE: For optimal performance of your pellet burning appliance, you must perform regular cleaning and maintenance as directed in this manual. Not doing so will result in:

- Poor performance
- Smoke spillage into the room
- Overheating of components

Failure to perform regular cleaning on your pellet burning appliance will void the warranty.

- a. Make sure the fire is out and cool. Disconnect power cord prior to servicing.
- b. Scrape the majority of ashes into the ash pan. Begin with the back and roof above the burn pot.
- c. Scrape the ashes from both sides, into the ash pan.
- d. Remove the ash pan. Dispose of the ashes in a metal container with a tight fitting lid.
- e. Brush or vacuum the remaining ash from the firebox.
- f. Guide the vacuum hose upward into the exhaust passage in the right rear corner of the firebox, Figure 2.5.

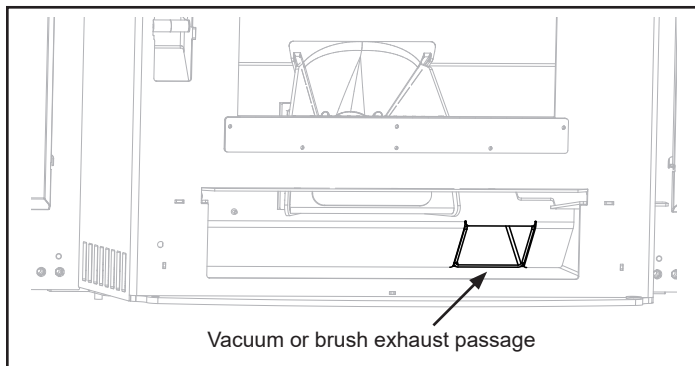


Figure 2.5

- g. You can now return the ashpan.
- h. Release the right and left side spring latches and slide the insert body out onto the hearth or onto the service rail kit, if purchased, Figure 2.6.

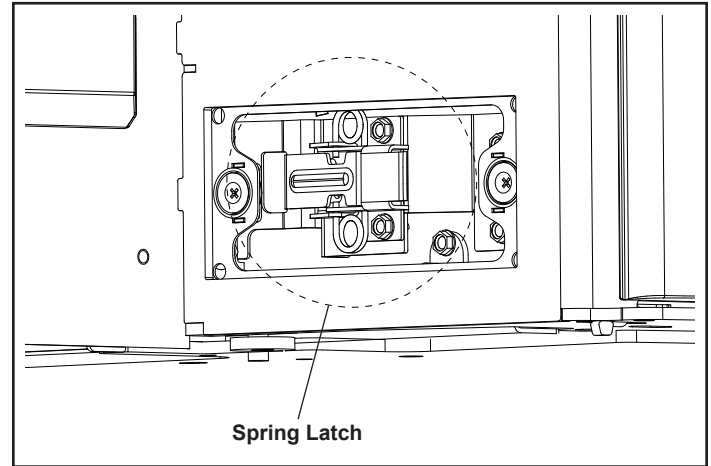


Figure 2.6

- i. Remove the exhaust chamber access cover on the right rear of the insert, Figure 2.7

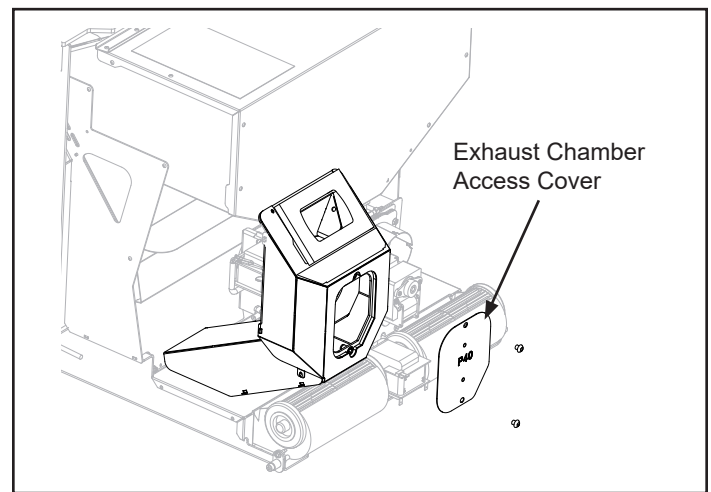


Figure 2.7

- j. With this cover removed, you can vacuum the paddle fan and the inside of the chamber. Be careful not to bend the blades on the paddle fan.
- k. Before re-installing the access cover, make sure the insulation between the two layers is in tact, Figure 2.8.
- l. Using the appropriate brush size, run the brush into the flue ensuring that it is free from any buildup. May take several passes with the brush for a proper cleaning.

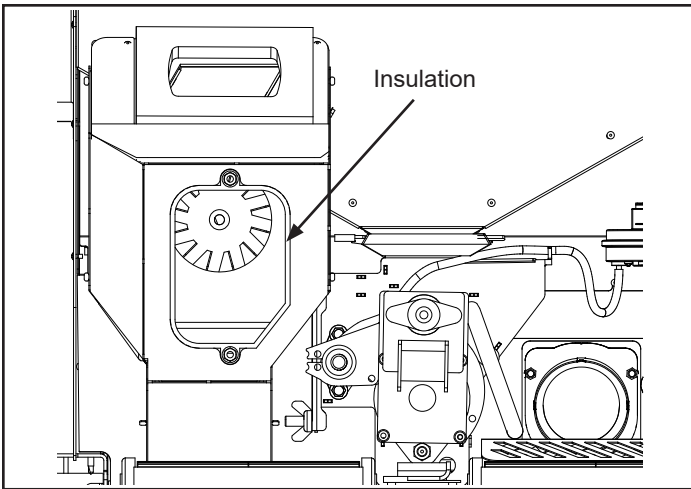


Figure 2.8

Inspect / Clean Hopper

- **Frequency:** Whenever run to empty
- **By:** User

Whenever the hopper is empty, inspect and remove any large amounts of sawdust or fines. Although this finer material will mostly feed through with the fuel, large quantities of sawdust may restrict feeder flow.

m. Slide unit back into the mounting frame to within an 1/8" of the surround face. Insert the allen wrench driver through the holes in the front of the unit and push bolt inward until you see it align with the tightening nut located on the mounting frame. While pushing inward tighten bolt, Figure 2.9.

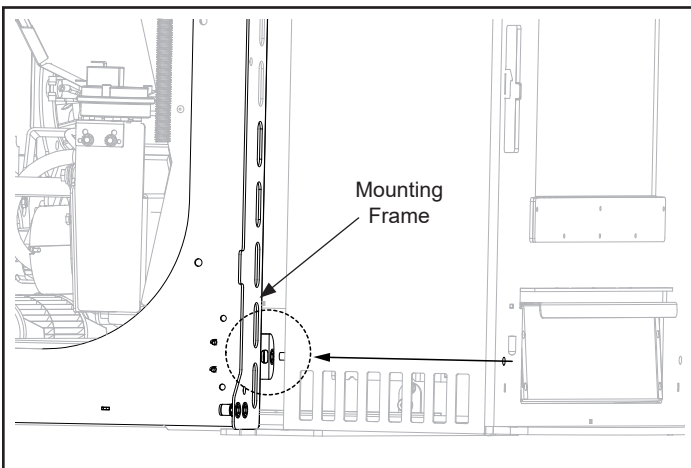


Figure 2.9 - Align bolt with tightening nut.

Cleaning the Door Glass

- **Frequency:** As needed / Weekly
- **By:** User

Whenever the view of the fire is obstructed, or weekly, clean the glass using a soft cloth dampened with standard household glass cleaner.

Never spray glass cleaner directly onto hot glass. Apply the cleaner to the cloth then wipe the glass.

Inspect the glass and sealing gasket. Replace gasket as needed. Do not operate the stove with a broken glass. Replacement glass, which is mirrored ceramic glass, should be obtained through your Harman® dealer.

To replace a broken glass; first be sure to carefully remove the broken glass and any remaining shards or pieces. With the door laying on a flat surface, lay the gasketed glass panel onto the door and be sure it is properly fitted into the channel. Lay the glass retainer clips in place near each corner, and secure them using the 1/4-20 button head screws. Be sure to tighten each screw equally so you don't create a pressure point on the glass.

NEVER OPERATE THIS APPLIANCE WITH THE GLASS DOOR REMOVED, CRACKED, BROKEN, OR SCRATCHED.

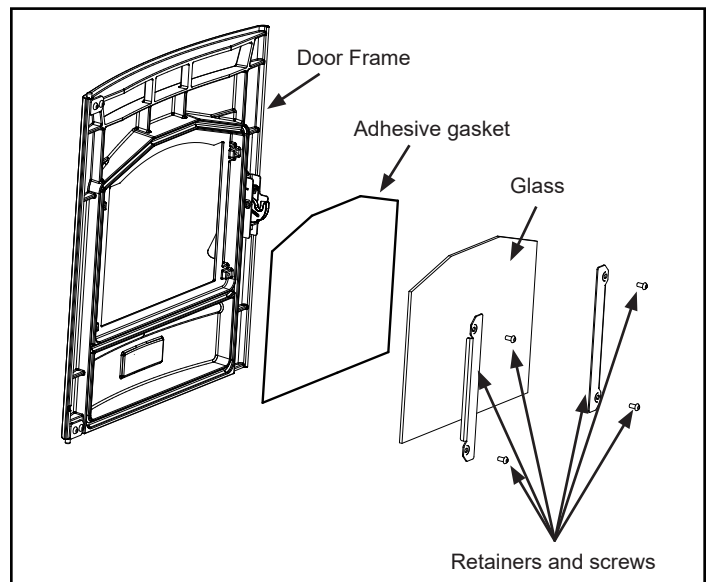


Figure 2.10

CAUTION

Handle glass with care.

When cleaning door glass;

- Avoid striking, scratching, or slamming glass.
- Do NOT Clean Glass When Hot.
- Do NOT use abrasive cleaners.
- Inspect gasket, replace if necessary.

3 Reference Material

A. Service Parts

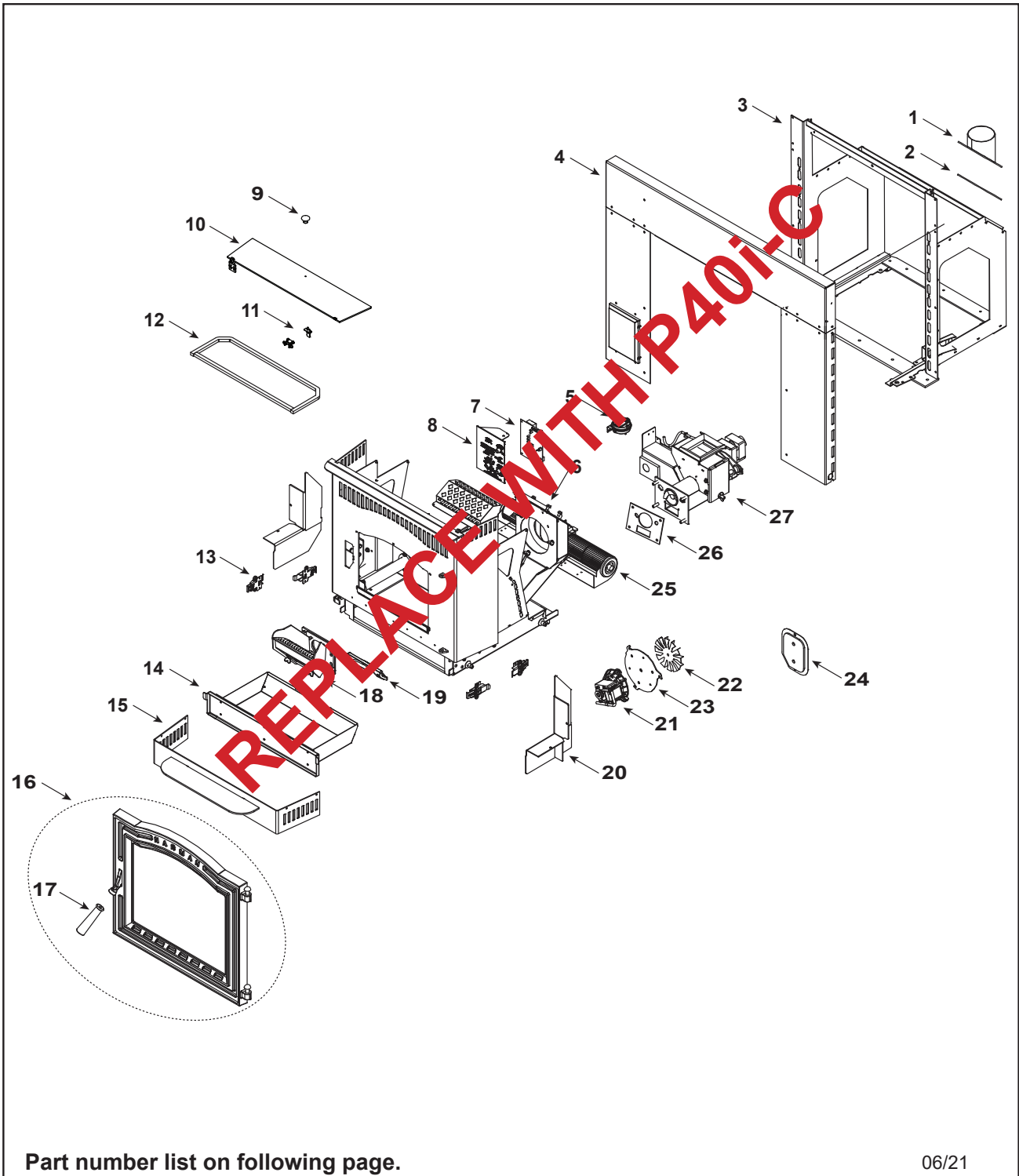


Service Parts

Pellet Insert
1-70-784195-1 (Black, 19.5 inch)
1-70-784235-1 (Black, 23.5 inch)

P35i-C Pellet Insert

Beginning Manufacturing Date: Jan 2020
Ending Manufacturing Date: Active



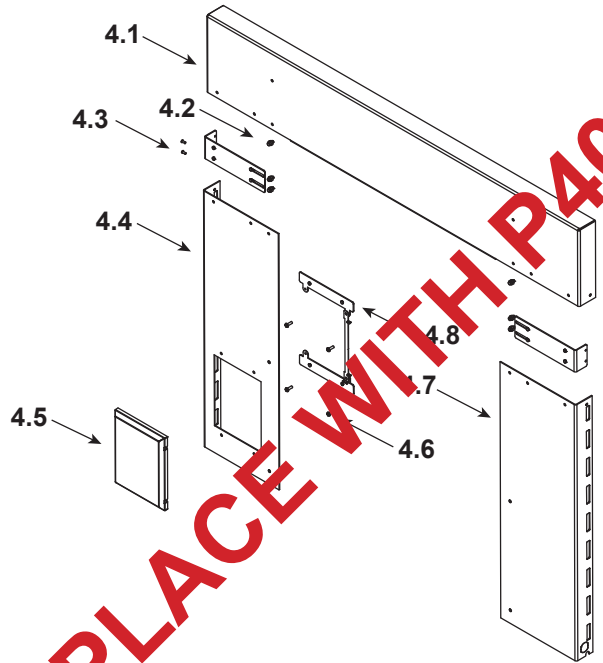
IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers.** Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked
at Depot

ITEM	Description	COMMENTS	PART NUMBER	
1	Pipe Stub/4 in Flex w/gasket		1-00-674040	
	3" Stub Kit		1-00-674039	
2	Gasket Set, Burnpot/Pipe Stub	Set of 5	1-00-07384	Y
3	Mounting Frame Assembly		1-10-774235A	
	Screw - HCS 5/16-18 X 1	Pkg of 12	27887/12	Y

#4 Surround Assembly



4	Wing Assembly	Oversize-Black	1-00-774250-1	
		Standard Black	1-00-774221-1	
		Custom	1-00-774221-SPL	
4.1	Surround Top	Standard	1-10-774222	
		Oversize	1-10-774250	
4.2	Machine Screw Nut10-24, Pkg of 100	Pkg of 100	3-30-8002-100	Y
4.3	Pop Rivet 1/8 X 1/8 Black	Pkg of 50	3-30-9004-50	
4.4	Surround Left	Standard	1-10-774220	
		Oversize	1-10-774248	
4.5	Control Door w/Hinge		1-00-774310	
4.6	Screw, PHM 8 X 1/2 Black	Pkg of 100	3-30-5000-100	Y
4.7	Surround Right	Standard	1-10-774221	
		Oversize	1-10-774249	
4.8	Control Board Mount	1 Set	1-00-774251	
	Wing Splices	Set of 2	2-00-774178-2	

Additional service parts on following page.

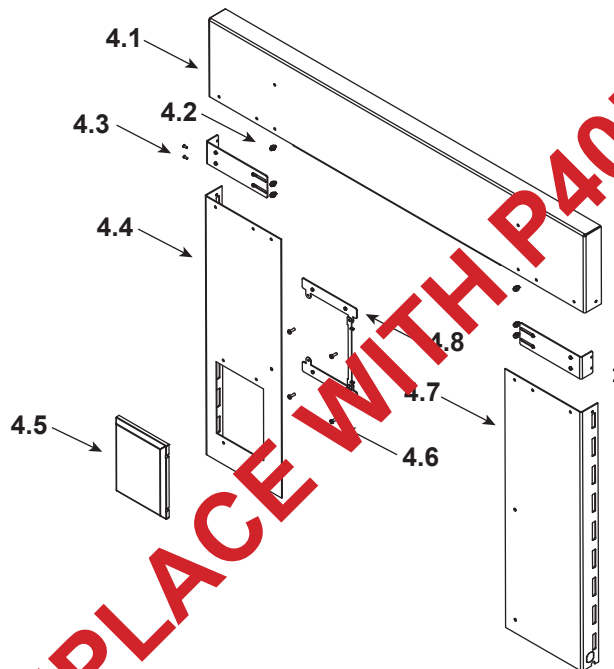
IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers.** Provide model number and serial number when requesting service parts from your dealer or distributor.



Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
1	Pipe Stub/4 in Flex w/gasket		1-00-674040	
	3" Stub Kit		1-00-674039	
2	Gasket Set, Burnpot/Pipe Stub	Set of 5	1-00-07384	Y
3	Mounting Frame Assembly		1-10-774235A	
	Screw - HCS 5/16-18 X 1	Pkg of 12	27887/12	Y

#4 Surround Assembly



4	Wing Assembly	Upsize-Black	1-00-774250-1	
		Standard Black	1-00-774221-1	
		Custom	1-00-774221-SPL	
4.1	Surround Top	Standard	1-10-774222	
		Upsize	1-10-774250	
4.2	Machine Screw Nut10-24, Pkg of 100	Pkg of 100	3-30-8002-100	Y
4.3	Pop Rivet 1/8 X 1/8 Black	Pkg of 50	3-30-9004-50	
4.4	Surround Left	Standard	1-10-774220	
		Upsize	1-10-774248	
4.5	Control Door w/Hinge		1-00-774310	
4.6	Screw, PHM 8 X 1/2 Black	Pkg of 100	3-30-5000-100	Y
4.7	Surround Right	Standard	1-10-774221	
		Upsize	1-10-774249	
4.8	Control Board Mount	1 Set	1-00-774251	
	Wing Splices	Set of 2	2-00-774178-2	

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.

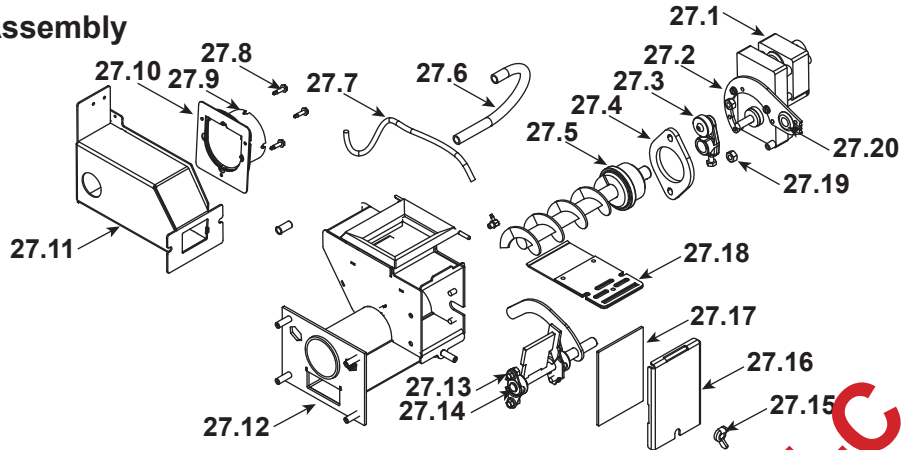


Stocked at Depot

ITEM	Description	COMMENTS	PART NUMBER	
21	Combustion Blower		3-21-08639	Y
	Combustion Blower Mounting Screws (Pkg of 100)	Commonly required for Combustion Blower replacement	1-00-53483208	
22	Motor Blade, 4-3/4" Single Paddle		3-21-00661	Y
23	Combustion Blower Mount		1-10-677006	
24	Combustion Cleanout		1-0-774167A	Y
25	Distribution Blower		1-00-29145	Y
26	Gasket, Burnpot/Pipe Stub	Pkg of 5 sets	1-00-07384	Y
27	UL Feeder Assembly		See following page	
	14 Ft Power cord		3-20-674200	Y
	306W/120V Igniter 15 Fin		3-20-677200	Y
		Pkg of 10	1-00-677200	Y
	Ash Lip Trim	Brushed Stainless	3-43-08400-7	
		Bright Nickel	3-43-08400-8	
	Burnpot Scrapers	Pkg of 10	2-00-773850-10	
	Component Pack		SRV8784-000	
	Diagnostic Display Module		3-20-05401	Y
	DDM Replacement Cable		1-00-05402	
	Disconnect, 3/16" Female	Pkg of 25	1-00-08529	Y
	Disconnect, Female	Pkg of 25	1-00-00959	Y
	Disconnect, Male	Pkg of 25	1-00-00957	Y
	Door Hinge		2-00-06707L	
	Leaf Door Trim	Brushed Stainless	3-43-06717-7	
		Bright Nickel	3-43-06717-8	
	Modern Door Trim	Brushed Stainless	3-43-06797-7	
	Draft Meter Assembly		1-00-00637	Y
	Draft Meter Bolt & Tube		1-00-04004	
	ESP-RED/RED		3-20-00844	Y
	Labels, Caution & Danger	10 Sets	1-00-200408541	
	Lintel, All Thread	Qty 2 req	3-31-00949	
	Pipe Insulation		3-44-774282	Y
	Pop Rivets, 1/8" Black	Pkg of 100	3-30-1104-100	Y
	Roller Hardware	4 Sets	1-00-05232	Y
	Room Sensor		3-20-00906	Y
	Touch up Paint, Black		3-42-19905	
	Wiring Harness		3-20-08727	Y

Additional service parts on following page.

#27 Feeder Assembly



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	
27	UL Feeder Assembly		1-10-774000A	Y
27.1	Pellet Feeder CW Motor-4 RPM		3-20-60906	Y
27.2	Feeder Motor Bracket w/ Grommet		1-00-247406	Y
27.3	Bearing 3/8 ID X 1-1/8 OD		3-31-3014	Y
	Cast Cam Block		3-00-677154	Y
27.4	Pellet Feeder Bearing RETNR w/Bolts		1-00-04035	Y
27.5	Pellet Feeder Auger		3-50-00565	Y
27.6	Feeder Air Crossover Kit		1-00-67900	Y
	9MM X 13MM Tubing Kit	5 Ft	1-00-511427	Y
27.7	1/8 Silicone Tubing	5 Ft	1-00-5113574	Y
27.8	Screws-HWH TEKS 10 X 1/4	Pkg of 100	3-30-5004-100	Y
27.9	Pellet Air Intake w/Gasket		1-10-06810A	
27.10	Gasket, Feeder Air Intake	Pkg of 6	3-44-72224-6	Y
27.11	Snout Weldment w/Gasket		1-10-774143A	
27.12	Pellet Feeder Weldment		1-10-724132	Y
27.13	Flange 1/4-20 X 3/8	Pkg of 50	3-30-2000-50	Y
27.14	Pillow Block-1/2 in	Pkg of 4	3-31-3614087-4	Y
27.15	Wing Nut, 5/16-18	Pkg of 25	3-30-8012-25	Y
27.16	Short Feed CVR & Gasket		1-00-677122	Y
27.17	Pusher Arm Assembly		1-10-774354W	Y
27.18	Slide Plate		1-10-677121A	Y
27.19	Nut, FHN 5/16-18 Z 5	Pkg of 100	3-30-8005-100	Y
27.20	Grommet-1/2 in ID-Thick	Pkg of 12	3-31-2761-12	
	Silicone Cap	Pgk of 10	3-99-123/10	
	Gasket Hopper Throat		3-44-677185	Y
	Gasket, Snout	Pkg of 10	3-44-677160-10	Y
	Hopper Switch Feeder Fitting	Pkg of 2	1-00-142818	Y

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

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.

C. Manual Ignition

Harman® pellet stoves and inserts should and always 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. 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.

D. 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 proper diagnosis and repair. This guide is intended for qualified service technician use only.

Error Message	Possible Cause	Corrective Action
2-Blinks; Open feed control	Pressure switch, Hopper switch	Check doors / Check connections / Replace pressure switch or Hopper Switch
3-Blinks; Poor ESP Signal	Broken, Wire or connection	Check connection / Replace Probe
	Exhaust temperature has gone out of range multiple times.	Clean exhaust - possible soot or creosote accumulation near ESP.
4-Blinks; Poor room sensor signal	Broken Sensor, wire or connection	Check connections / Replace sensor
5-Blinks; Failed ignition	No fuel in hopper	Add fuel
	Door, hopper lid, or ash pan open	Close all doors and check seals
	Poor draft / weak combustion blower	Perform draft test, clean exhaust, replace blower if necessary.
	Fuel feed restriction	Check operation in "Test" mode. Clear obstruction
	Blocked airflow / Ignition failure	Open burn pot cleanout to access igniter - clean Check igniter, replace if necessary
6-Blinks; Poor combustion	No fuel in hopper	Add fuel
	Door, hopper lid, or ash pan open	Close all doors and check seals
	Poor draft / weak combustion blower	Perform draft test, clean exhaust, replace blower if necessary
	Fuel feed restriction	Check operation in "Test" mode, Clear obstruction
Symptom	Possible Cause	Corrective Action
Low volume or no fuel feed	No fuel in hopper	Add fuel
	Door, hopper lid, or ash pan open	Close all doors and check seals
	Poor draft / weak combustion blower	Perform draft test, clean exhaust, replace blower if necessary
	Fuel feed restriction	Check operation in "Test" mode, Clear obstruction
	Failed feed motor	Replace motor if necessary
No Distribution Blower	Fire isn't hot enough for blower operation	Increase temperature setting
	Disabled / Constant Burn	When operating in Disabled / Constant Burn Mod, the blower will not run below a #3 setting on the temperature dial. Increase temperature setting
	Failed motor or connection- "Test" mode	Check connections / Replace blower
Low heat output, or room temperature doesn't match thermometer or other readings	Feed Limit too low	Set Feed Limit at #4 or higher
	Room sensor location different than thermometer location	Room sensor reports the room air temperature to the control board. Move sensor location or adjust set pint accordingly.
	Excessive ash buildup on heat exchanger or in the exhaust	Clean exhaust, firebox and heat exchanger thoroughly

E. Contact Information

HARMAN[®]
a brand of
Hearth & Home Technologies
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.

- NOTES -

NOTICE



- Important operating and maintenance instructions included.

DO NOT DISCARD THIS MANUAL

- Read, understand and follow these instructions for safe installation and operation.

- Leave this manual with party responsible for use and operation.



Printed in U.S.A.

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, OH 43240
1-800-523-5123



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

ISO 17025 Registered
ANSI/NCSL Z540-1 Accredited

Accuracy Calibration Certificate

Customer

Company: PFS-TECO
Address: 11785 SE Hwy 212; Ste 305
City: Clackamas **Contact:** John Steinert
Zip / Postal: 97015-9050
State / Province: Oregon

Weighing Device

Manufacturer: Mettler Toledo **Instrument Type:** Weighing Instrument
Model: PFD774-US11 **Asset Number:** 1
Serial No.: C112381341 **Terminal Model:** IND570
Building: N/A **Terminal Serial No.:** C101887027
Floor: N/A **Terminal Asset No.:** N/A
Room: N/A

Range	Max. Capacity	Readability (d)
1	1000 lb	0.02 lb

Procedure

Calibration Guideline: ASTM E898 - 20
METTLER TOLEDO Work Instruction: 30260953

This calibration certificate including procedures and uncertainty estimation also complies with EURAMET cg-18 v 4.0.

This calibration certificate contains measurements for As Found and As Left calibrations.

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

	Temperature		Humidity	
As Found	Start: 20.0 °C	End: 20.0 °C	Start: 44.0 %	End: 44.0 %
As Left	Start: 20.0 °C	End: 20.0 °C	Start: 44.0 %	End: 28.0 %

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

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

As Found Calibration Date: 16-Apr-2021
As Left Calibration Date: 16-Apr-2021
Issue Date: 16-Apr-2021
Requested Next Calibration Date: 30-Apr-2022

Authorized A2LA Signatory: 
Gary Sargent

Measurement Results

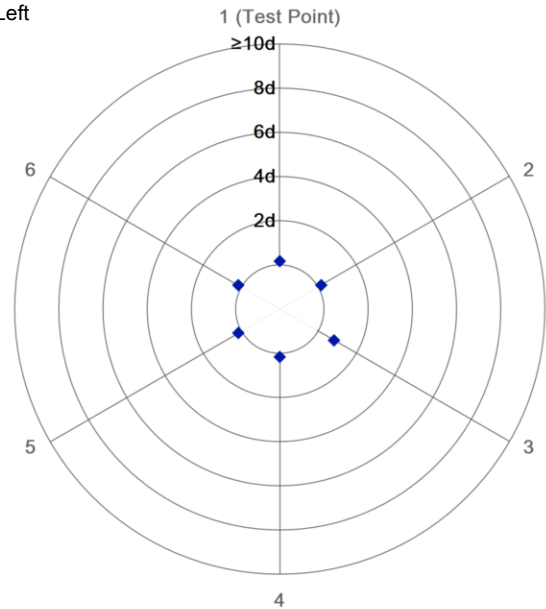
Repeatability

Test Load: 500 lb

	As Found	As Left
1	N/A	500.00 lb
2	N/A	500.00 lb
3	N/A	500.02 lb
4	N/A	500.00 lb
5	N/A	500.00 lb
6	N/A	500.00 lb

Standard Deviation	N/A	0.008 lb
--------------------	-----	----------

○ As Found
◆ As Left



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

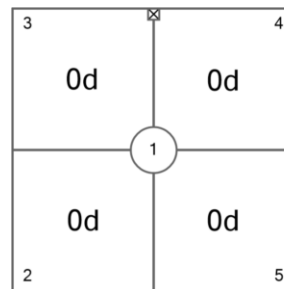
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

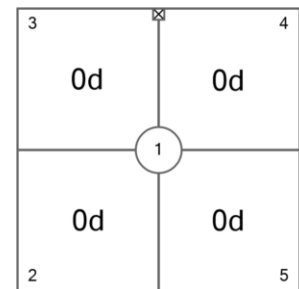
Test Load: 325 lb

Position	As Found	As Left
1	325.00 lb	325.00 lb
2	325.00 lb	325.00 lb
3	325.00 lb	325.00 lb
4	325.00 lb	325.00 lb
5	325.00 lb	325.00 lb

Maximum Deviation	0.00 lb	0.00 lb
-------------------	---------	---------



As Found



As Left

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

Error of Indication

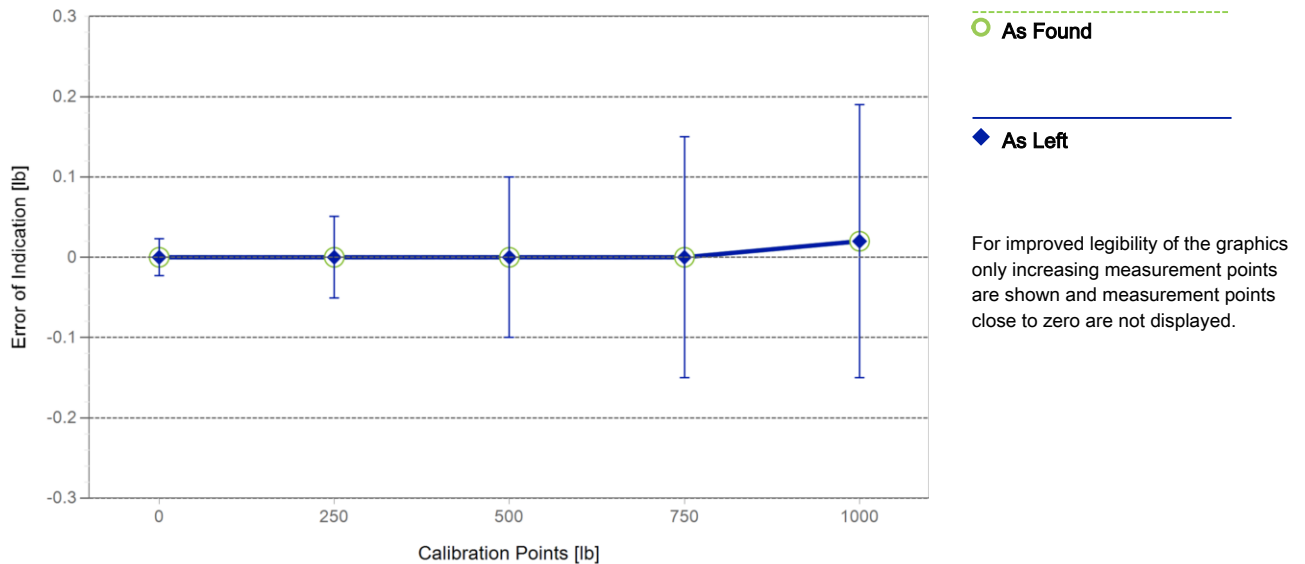
As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 lb	0.00 lb	0.00 lb	N/A	N/A
2 ¹	250 lb	250.00 lb	0.00 lb	N/A	N/A
3 ¹	500 lb	500.00 lb	0.00 lb	N/A	N/A
4 ¹	750 lb	750.00 lb	0.00 lb	N/A	N/A
5	1000 lb	1000.02 lb	0.02 lb	N/A	N/A
6 ¹	750 lb	750.00 lb	0.00 lb	N/A	N/A
7 ¹	500 lb	500.00 lb	0.00 lb	N/A	N/A
8 ¹	250 lb	250.00 lb	0.00 lb	N/A	N/A
9	0 lb	0.00 lb	0.00 lb	N/A	N/A

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 lb	0.00 lb	0.00 lb	0.023 lb	2.28
2 ¹	250 lb	250.00 lb	0.00 lb	0.051 lb	2
3 ¹	500 lb	500.00 lb	0.00 lb	0.10 lb	2
4 ¹	750 lb	750.00 lb	0.00 lb	0.15 lb	2
5	1000 lb	1000.02 lb	0.02 lb	0.17 lb	2.05
6 ¹	750 lb	750.00 lb	0.00 lb	0.15 lb	2
7 ¹	500 lb	500.00 lb	0.00 lb	0.10 lb	2
8 ¹	250 lb	250.00 lb	0.00 lb	0.051 lb	2
9	0 lb	0.00 lb	0.00 lb	0.023 lb	2.28

¹The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k - which can be larger than 2 according to ASTM E898 and EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: NIST NIST-F

Weight Set No.:	<u>182 50's & 25's</u>	Date of Issue:	<u>25-Jun-2019</u>
Certificate Number:	<u>OR-19-186-F</u>	Calibration Due Date:	<u>30-Jun-2021</u>

Remarks

Equipment condition: Good

Calibration after installation

The recording of false fictitious or fraudulent statements or entries on this document may be punishable as a felony under federal Statute

End of Accredited Section

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

Measurement Uncertainty of the Weighing Instrument in Use

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

Temperature coefficient for the evaluation of the measurement uncertainty in use: 10.0 · 10⁻⁶ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 10 K

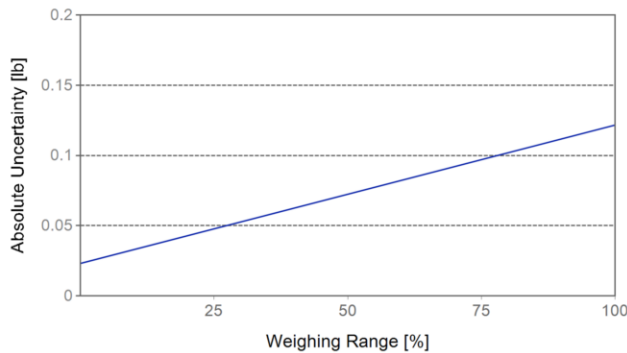
Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.02 lb	1000 lb	N/A	$U_1 = 0.023 \text{ lb} + 0.0000986 \text{ lb/lb} \cdot R$

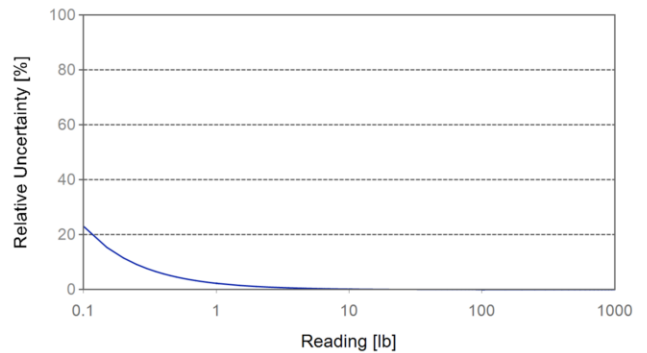
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
1.00 lb	N/A	N/A	0.023 lb	2.3%
10.00 lb	N/A	N/A	0.024 lb	0.24%
100.00 lb	N/A	N/A	0.033 lb	0.033%
500.00 lb	N/A	N/A	0.072 lb	0.014%
1000.00 lb	N/A	N/A	0.12 lb	0.012%



As Found



As Left

Handbook 44 Tolerance Assessment(Acceptance)

Assessment done without considering measurement uncertainty.

The measurements from the attached calibration certificate were assessed against the Tolerances defined by NIST Handbook 44.

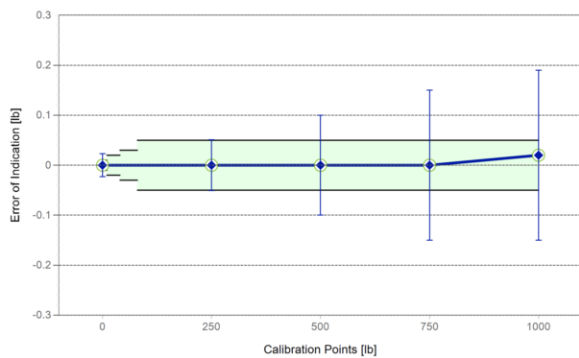
The range of measurements for both Eccentricity and Repeatability (if performed) tests is assessed against Maintenance Tolerances.

Overall **As Found** **As Left**

✔ ✔ ✔ = Passed
✘ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	1000 lb	0.02 lb	0.02 lb	III



Tolerances according to NIST Handbook 44

Test Load		Tolerance
From	To	
0.00 lb	0.00 lb	0.005 lb
0.02 lb	10.00 lb	0.01 lb
10.02 lb	40.00 lb	0.02 lb
40.02 lb	80.00 lb	0.03 lb
80.02 lb	1000.00 lb	0.05 lb

○ As Found
 ◆ As Left
 — Tolerance

Eccentricity and Repeatability

Test	Test Load	Tolerance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
Eccentricity (Max. Error)	325 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
Eccentricity (Range)	325 lb	0.1 lb	0.00 lb	✔	0.00 lb	✔
Repeatability (Max. Error)	500 lb	0.05 lb	N/A	N/A	0.02 lb	✔
Repeatability (Range)	500 lb	0.10 lb	N/A	N/A	0.02 lb	✔

Max. Error: Maximum of the absolute values of the individual errors.

Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolerance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 lb	0.01 lb	0.00 lb	✔	0.00 lb	✔
2	250 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
3	500 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
4	750 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
5	1000 lb	0.05 lb	0.02 lb	✔	0.02 lb	✔
6	750 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
7	500 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
8	250 lb	0.05 lb	0.00 lb	✔	0.00 lb	✔
9	0 lb	0.01 lb	0.00 lb	✔	0.00 lb	✔

Dry Gas Meter Calibration

Meter Manufacturer: Apex
 Model: XC-50-DIR
 Lab ID #: 129
 Serial #: 1906005
 Calibration Date: 3/15/2021
 Calibration Expiration: 9/15/2021
 Barometric Pressure: 30.07 in. Hg



Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/24/2021
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	8/17/2020
γ Factor:	0.999
Allowable Deviation ($\pm 5\%$):	0.04995
Actual Deviation:	0.00
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	141.383	272.209	183.411
Standard DGM Temperature ($^{\circ}$ F)	66.0	66.0	67.0
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	0.000	0.000
DGM Final Volume (ft ³)	5.147	9.868	6.720
DGM Temperature ($^{\circ}$ F)	86.0	87.0	88.0
DGM Pressure (in H ₂ O)	1.00	2.00	0.5
Time (min)	34.0	42.0	77.0
Net Volume for Standard DGM (ft ³)	4.993	9.613	6.477
Net Volume for DGM (ft ³)	5.147	9.868	6.720

Dry Gas Meter γ Factor	1.002	1.006	0.999
γ Factor Deviation From Average	1.002	1.006	0.999

Average Gas Meter γ Factor

1.003

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is $\pm 0.5\%$.

Pressure Gauge Calibration Work Sheet

Gauge Manufacturer: Apex
 Maximum Range (inH₂O): 3
 Instrument ID #: 129 (dH)
 Calibration Date: 3/16/2021
 Calibration Expiration: 3/16/2022
 Barometric Pressure: 30.10 in. Hg



Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	477AV-1
Instrument ID#:	174
Calibration Expiration Date:	10/8/2021

Calibration Point (inH ₂ O)	Reference Gauge Reading (inH ₂ O)	Pressure Gauge Reading (inH ₂ O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 0.6	0.45	0.51	0.06	2.0%
0.6 - 1.2	1.01	1.06	0.05	1.7%
1.2 - 1.8	1.59	1.63	0.04	1.3%
1.8 - 2.4	2.06	2.12	0.06	2.0%
2.4 - 3.0	2.78	2.84	0.06	2.0%

Acceptable tolerance is 4%

Technican Signature: _____

Date: 3/16/2021

Uncertainty is 0.4 inH₂O, based on mininum uncertainty ration of 4:1 between standard reference meter and unit under test.
 PFS-TECO

Emissions Sampling System Thermocouple Calibration Check

Calibration based on NIST Monograph 175 per ASTM E2515-11
All thermocouples are type "K"

Date: 3/12/2021

Sampling System ID Numbers: 129/130

Performed By: S. Button

Calibration Instrument ID Number: 165

Reference Temperature (F)	Acceptable Error (F)	Thermocouple Location						
		FB Left	FB Right	FB Back	FB Top	FB Bottom	Catalyst Exit	Flue
0	± 4.0	-0.9	-0.9	-0.9	-1.2	-1.3	-0.8	-0.5
200	± 4.0	199.0	199.0	199.0	198.8	198.7	199.1	199.4
400	± 4.0	399.0	398.9	399.0	398.8	398.6	399.1	399.3
600	± 4.5	599.0	598.9	599.0	598.8	598.7	599.2	599.4
800	± 6.0	799.0	798.9	799.0	798.7	798.7	799.1	799.4

Reference Temperature (F)	Acceptable Error (F)	Thermocouple Location					
		Ambient	Filter A	Filter B	Meter A	Meter B	Dilution Tunnel
0	± 4.0	-1.3	-0.7	0.0	-1.0	-1.2	-0.3
200	± 4.0	198.6	199.3	200.4	199.0	198.8	199.6
400	± 4.0	398.6	399.2	400.2	399.0	398.7	399.6
600	± 4.5	598.7	599.3	600.1	599.0	598.8	599.6
800	± 6.0	798.6	799.2	799.9	798.9	798.7	799.5

Technician Signature: 

Date: 3/12/2021

Dry Gas Meter Calibration

Meter Manufacturer: Apex
 Model: XC-50-DIR
 Lab ID #: 130
 Serial #: 1906006
 Calibration Date: 3/15/2021
 Calibration Expiration: 9/15/2021
 Barometric Pressure: 30.06 in. Hg



Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/24/2021
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	8/17/2021
γ Factor:	1.004
Allowable Deviation ($\pm 5\%$):	0.0502
Actual Deviation:	0.005
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	222.273	145.988	169.207
Standard DGM Temperature ($^{\circ}$ F)	67.0	66.0	67.0
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	0.000	0.000
DGM Final Volume (ft ³)	8.161	5.347	6.249
DGM Temperature ($^{\circ}$ F)	90.0	90.0	91.0
DGM Pressure (in H ₂ O)	1.10	2.20	0.6
Time (min)	51.0	22.0	60.0
Net Volume for Standard DGM (ft ³)	7.849	5.156	5.975
Net Volume for DGM (ft ³)	8.161	5.347	6.249

Dry Gas Meter γ Factor	0.999	1.001	0.996
γ Factor Deviation From Average	0.999	1.001	0.996

Average Gas Meter γ Factor

0.999

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is $\pm 0.5\%$.

Pressure Gauge Calibration Work Sheet

Gauge Manufacturer: Apex
 Maximum Range (inH₂O): 3
 Instrument ID #: 130 (dH)
 Calibration Date: 3/16/2021
 Calibration Expiration: 3/16/2022
 Barometric Pressure: 30.10 in. Hg



Reference Standard Gauge	
Manufacturer:	Dwyer
Model:	477AV-1
Instrument ID#:	174
Calibration Expiration Date:	10/8/2021

Calibration Point (inH ₂ O)	Reference Gauge Reading (inH ₂ O)	Pressure Gauge Reading (inH ₂ O)	Difference (Reference - UUT)	% Error of Full Range
0.0 - 0.6	0.55	0.58	0.03	1.0%
0.6 - 1.2	1.12	1.15	0.03	1.0%
1.2 - 1.8	1.77	1.81	0.04	1.3%
1.8 - 2.4	2.13	2.16	0.03	1.0%
2.4 - 3.0	2.88	2.94	0.064	2.1%

Acceptable tolerance is 4%

Technican Signature: _____

Date: 3/16/2021

Dry Gas Meter Calibration

Meter Manufacturer: Apex
 Model: Apex-AK-600
 Lab ID #: 55
 Serial #: 810016
 Calibration Date: 3/31/2021
 Calibration Expiration: 9/30/2021
 Barometric Pressure: 30.31 in. Hg



Reference Standard DGM	
Manufacturer:	apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	6/14/2019
γ Factor:	0.992
Allowable Deviation ($\pm 5\%$):	0.0496
Actual Deviation:	0.02
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	151.130	140.010	142.787
Standard DGM Temperature ($^{\circ}$ F)	64.7	64.7	65.4
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	0.000	0.000
DGM Final Volume (ft ³)	5.162	4.905	5.019
DGM Temperature ($^{\circ}$ F)	63.0	67.0	68.0
DGM Pressure (in H ₂ O)	2.20	2.20	2.2
Time (min)	27.0	25.0	25.0
Net Volume for Standard DGM (ft ³)	5.337	4.944	5.042
Net Volume for DGM (ft ³)	5.162	4.905	5.019

Dry Gas Meter γ Factor	1.023	1.005	1.002
γ Factor Deviation From Average	1.023	1.005	1.002

Average Gas Meter γ Factor

1.010

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is $\pm 0.5\%$.

Certificate of Calibration

Certificate Number: **743897**



JJ Calibrations, Inc.

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

PFS TECO

11785 SE Hwy 212
Suite 305
Clackamas, OR 97015

PO: **1033**

Order Date: **03/08/2021**

Authorized By: **N/A**



Calibrated on: **03/18/2021**

*Recommended Due: **03/18/2022**

Environment: **22 °C 37 % RH**

* As Received: **Within Tolerance**

* As Returned: **Within Tolerance**

Action Taken: **Calibrated w/Parts**

Technician: **146**

Property #: **064**

User: **N/A**

Department: **N/A**

Make: **Control Company**

Model: **4198**

Serial #: **80531676**

Description: **Digital Temp. / Barometer**

Procedure: **404323**

Accuracy: **±1°C ±0.2362Hg(±8mb)**

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.

Replaced batteries.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
644A	Thunder Scientific	1200	Two Pressure Humidity Generator	11/17/2021	734190
847A	Fluke	RPM4	Reference Pressure Monitor	12/30/2021	738139

Parameter

Measurement Data

Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After Temperature								Accredited = \bar{U}
		°C	20.00	19.0	21.0	0.1	20.1 °C	8.1E-02 \bar{U}
		°C	30.00	29.0	31.0	0.2	30.2 °C	8.1E-02 \bar{U}
		°C	40.00	39.0	41.0	0.7	39.3 °C	8.1E-02 \bar{U}
Barometer		mbar	1013.0	1005	1021	8	1005 mbar	6.2E-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/NCCL 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 03/25/2021

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



Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

<u>Material</u>	<u>Assumed Density</u>	<u>Range</u>	<u>Tolerance Class</u>
Stainless Steel	7.95 g/cm ³	200mg & 100mg	ASTM Class 1

Method and Traceability

The procedure used for this calibration is NIST IR 6969 SOP 4 Double Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:

100g to 1mg Working Standards Were Calibrated: 03/03/17 Due: 03/31/18 Standards ID: 723318
Mass Comparators Used: MET-05 Tested by: D. Thompson

Conventional Mass: “The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). “Conventional Value of the Result of Weighing in Air” (Previously known as “Apparent Mass vs. 8.0g/cm³”).

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor k=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

page 1 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson

This document shall not be reproduced, except in full, without the written approval of Quality Control Services Mass Laboratory.

Member: National Conference of Standards Laboratories and Weights & Measures



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



Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.967	753.44	49.44

Conventional Mass Value

Nominal Value	As Found grams	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
200mg SN 1000101395	0.2000061	0.0061	0.0026	0.01
100mg SN 1000126267	0.1000046	0.0046	0.0028	0.01

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were new from the manufacturer and were within ASTM Class 1 tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

page 2 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson



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



Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 01/15/16
Purchase Order: 1001
Traceable Number: 20152489

Test Item: 20lb and 10lb Individual Grip Handle Weights
Serial No.: Listed in Table

Manufacturer: Unknown

<u>Material</u>	<u>Assumed Density</u>	<u>Range</u>	<u>Tolerance Class</u>
Cast Iron	7.2 g/cm ³	20lb to 10lb	NIST HB 105-1 (F)

Method and Traceability

The procedure used for this calibration is NIST IR 6969 SOP 7 Single Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:

Avoirdupois Working Standards were calibrated: 06/18/2014 Due: 06/18/2016 Standards ID: 34AA
Mass Comparators Used: MET-09, 20 Tested by: D. Thompson

Conventional Mass: “The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). “Conventional Value of the Result of Weighing in Air” (Previously known as “Apparent Mass vs. 8.0g/cm³).

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor K=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

page 1 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 01/15/16


Signature David S. Thompson

This document shall not be reproduced, except in full, without the written approval of Quality Control Services Mass Laboratory.

Member: National Conference of Standards Laboratories and Weights & Measures



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



Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 01/15/16
Purchase Order: 1001
Traceable Number: 20152489

Test Item: 20lb and 10lb Individual Grip Handle Weights
Serial No.: Listed in Table

Manufacturer: Unknown

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.448	760.64	44.58

Conventional Mass Value

Nominal Value	As Found pounds	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
20lb #098	19.9995450	-206.4	6.4	910
10lb #097	10.0006510	295.3	5.1	450
10lb #051	10.0003421	155.2	5.1	450

*Correction is the difference between the conventional mass value of a weight and its nominal value.


Comments: These weights were received in good condition and were within NIST Handbook 105-1 Class F tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

page 2 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 01/15/16


Signature David S. Thompson



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



Report of Calibration

Firm: PFS Teco
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 08/27/18
Submitted By: John Steinert
Traceable Number: 20181772

Test Item: 5 lb Individual Grip Handle Weight
Serial No.: 10744

Manufacturer: Rice Lake

<u>Material</u>	<u>Assumed Density</u>	<u>Range</u>	<u>Tolerance Class</u>
Cast Iron	7.2 g/cm ³	5 lb	ASTM Class 7

Method and Traceability

The procedure used for this calibration is NIST IR 6969 SOP 7 Single Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:

20 kg to 200 g Working Standards Were Calibrated: 03/22/18 Due: 03/31/19 Standards ID: 75388
100 g to 1 mg Working Standards Were Calibrated: 04/04/18 Due: 04/30/19 Standards ID: 723318
Mass Comparators Used: MET-08 **Tested by:** D. Thompson

Conventional Mass: “The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). “Conventional Value of the Result of Weighing in Air” (Previously known as “Apparent Mass vs. 8.0 g/cm³).

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor k=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

page 1 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 08/28/18

Signature David S. Thompson

This document shall not be reproduced, except in full, without the written approval of Quality Control Services Mass Laboratory.

Member: National Conference of Standards Laboratories and Weights & Measures



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



Report of Calibration

Firm: PFS Teco
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 08/27/18
Submitted By: John Steinert
Traceable Number: 20181772

Test Item: 5 lb Individual Grip Handle Weight
Serial No.: 10744

Manufacturer: Rice Lake

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.838	762.06	52.23

Conventional Mass Value

Nominal Value	As Found pounds	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
5 lb	5.0006085	276.0	2.0	760

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: This weight was new from the manufacturer and was within ASTM Class 7 tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

page 2 of 2

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 08/28/18

Signature David S. Thompson

This document shall not be reproduced, except in full, without the written approval of Quality Control Services Mass Laboratory.



CERTIFICATE OF CALIBRATION

CUSTOMER:	PFS-TECO : CLACKAMAS, OR	CALIBRATION DATE:	04/30/2020
PO NUMBER:	1016	CALIBRATION DUE:	04/30/2021
INST. MANUFACTURER:	DWYER	PROCEDURE:	T.O.33K6-4-1769-1
INST. DESCRIPTION:	VELOMETER	CALIBRATION FLUID:	AIR @ 14.7 PSIA 70°F
MODEL NUMBER:	471	RECEIVED CONDITION:	WITHIN MFG. SPECS.
SERIAL NUMBER:	CP288559 (ID# 095)	LEFT CONDITION:	WITHIN MFG. SPECS.
RATED UNCERTAINTY:	SEE NOTES BELOW.	AMBIENT CONDITIONS:	763mm HGA 46% RH 69°F
UNCERTAINTY GIVEN:	± 0.43% RD ; k=2	CERTIFICATE FILE #:	490265.2020

NOTES: ± 3% FS (0-500 / 0-1500) *** ± 4% F.S. (0-5000) ***± 5% F.S. (0-15000) *** ± 2 °F
NOTES CONT. : Q.MANUAL IM 1.5 REV 2017.1 DATED 7-18-2017

UUT INDICATED FT/MIN	DM.STD. ACTUAL FT/MIN	UUT INDICATED DEG. F	DM.STD. ACTUAL DEG. F
55	56	0 TO 200°F	0 TO 200°F
128	130	43.9	43.2
219	223	71.4	70.7
499	509	99.0	98.4
542	546		
1019	1029		
1490	1510		
511	516		
3268	3308		
4995	5077		
6028	6137		
14519	14815		

STANDARDS USED:

A263A: KURZ / DMC WIND TUNNEL LFE 0 – 14000 FPM ± .122% RD. TRACE# 1453296155,1329407628	DUE	06/08/2020
A24: HART SCIENTIFIC TEMP. STANDARD ±.024 F TRACE# 1520423238	DUE	03/04/2021

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 11133 Winners Circle • Los Alamitos, CA 90720
 Phone (714) 827-1215 • Fax (714) 827-0823

This Calibration Certificate shall not be reproduced except, in full, without approval by DICK MUNNS COMPANY. The data shown applies only to the instrument being calibrated and under the stated conditions of calibration.

Date: 04/30/2020 Approved By: Calibration Technician: D C



Model 1430 Microtector® Electronic Point Gage

Installation and Operating Instructions



Model 1430 Microtector® Portable Electronic Point Gage combines modern, solid-state integrated circuit electronics with a time-proven point gage manometer to provide fast, accurate pressure measurements.

SPECIFICATIONS AND FEATURES

- Accurate and repeatable to $\pm .00025$ inches water column
- Pressure range: 0 - 2" w.c., positive, negative, or differential pressures
- Non-toxic and inexpensive gage fluid consists of distilled water mixed with a small amount of fluorescein green color concentrate
- Convenient, portable, lightweight and self-contained, the unit requires no external power connections and is operated by a 1.5 volt penlight cell
- A.C. detector current eliminates point plating, fouling and erosion
- Micrometers are manufactured in accordance with ASME B89.1.13-2001, and are traceable to a standard at the National Institute of Standards and Technology

- Three-point mounting, dual leveling adjustment, and circular level vial assure rapid setup
- Durablock® precision-machined acrylic gage body
- Sensitive 0 - 50 microamp D.C. meter acts as a detector and also indicates battery and probe condition
- Heavy 2" thick steel base plate provides steady mounting
- Top-quality glass epoxy circuit board and solid-state, integrated circuit electronics
- Electronic enclosure of tough, molded styrene acrylonitrile provides maximum protection to components yet allows easy access to battery compartment
- Rugged sheet steel cover and carrying case protects the entire unit when not in use
- Accessories included are (2) 3-foot lengths Tygon® tubing, (2) 1/8" pipe thread adapters and 3/4 oz. bottle of fluorescein green color concentrate with wetting agent

Maximum pressure: 100 psig with optional pipe thread connections.

Tygon® is a registered trademark of Saint-Gobain Corporation

DWYER INSTRUMENTS, INC.

P.O. BOX 373

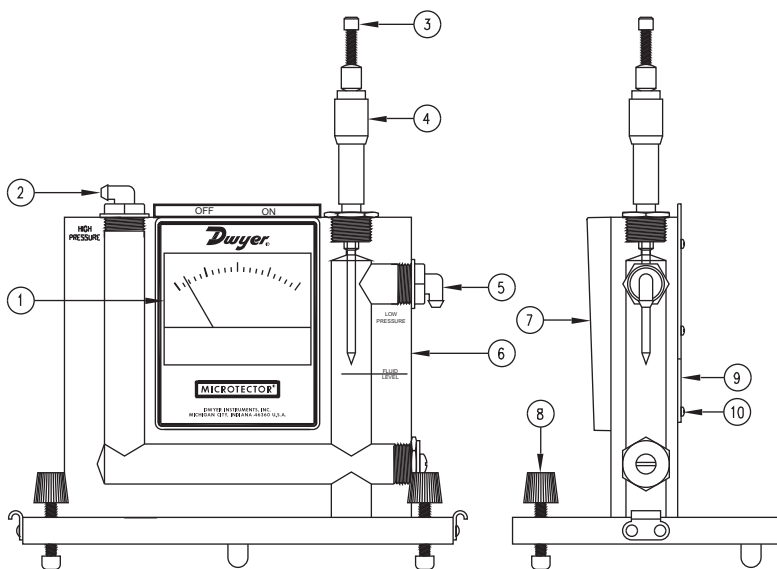
MICHIGAN CITY, INDIANA 46361, U.S.A.

Phone: 219/879-8000

Fax: 219/872-9057

www.dwyer-inst.com

e-mail: info@dwyer-inst.com



Microtector® Gage

Precision Pressure Measurement

The Microtector® Gage combines the time-proven principles of the Hook Gage type manometer and modern solid-state integrated circuit electronics. It provides an inexpensive means of achieving accuracy and repeatability within $\pm .00025$ inches water column throughout its 0 to 2 inches w.c. range. It is truly a new standard in precision measuring devices.

Principles of Operation

A pressure to be measured is applied to the manometer fluid which is displaced in each leg of the manometer by an amount equal to $1/2$ the applied pressure. A micrometer mounted point is then lowered until it contacts the manometer gage fluid. The instant of contact is detected by completion of a low-power A.C. circuit. Current for this circuit is supplied by a 1.5 volt penlight cell feeding two semiconductor amplifiers which act as a free-running multivibrator operating at a frequency of approximately two kilohertz. Completion of the A.C. circuit activates a bridge rectifier which provides the signal for indication on a sensitive (0 to 50 microamps) D.C. microammeter.

On indication of contact, the operator stops lowering the point and reads the micrometer which indicates one half the applied pressure. By interpolating eight divisions (each being $.000125$ w.c.) between $.001$ micrometer graduations, a total accuracy of $.00025$ can easily be achieved. The micrometer complies with Federal Specification GGG-C-105A and is traceable to a master at the NIST.

Locating and Opening

Stand the Microtector® Gage and case on a firm flat level surface. Remove cover by releasing the latches and lifting it straight up. If it is necessary to move the gage without case, handle only the base plate or clear acrylic block. **(CAUTION: Do not handle gage by grasping meter-electronic package housing Item 7 on drawing.)**

Fluid Level

Level the gage by adjusting the two front leveling screws (Item 8 on drawing) until the bubble in the spirit level is centered in the small circle. After leveling the gage, open both rapid shut-off valve tube connectors (Items 2 and 5). Back off the micrometer (Item 4), if necessary, to make sure that the point is not immersed in the gage fluid. The fluid level in the gage should now coincide with the mark on the right hand bore (Item 6) plus or minus approximately 1/32 inch. If the level of fluid is too high, fluid can be removed with an eye dropper pipette or carefully poured out of the right connection (Item 5).

If the level is too low, remove the top left rapid shut-off valve tube connector (Item 2) and add distilled water pre-mixed with the proper amount of green concentrate. (See maintenance instructions for proportions. After correcting the fluid level, re-install the rapid shut-off connectors and, with these in the open position, re-level the Microtector® Gage. The gage is now ready to be zeroed.

Zeroing

Turn the Micrometer barrel (Item 4) until its lower end just coincides with the zero mark on the scale and the zero on the barrel scale coincides with the vertical line on the internal scale. Note that the internal scale is graduated every .025" from 0 to 1.00 inch and the barrel scale is graduated in one thousandths from 0 to .025". Turn the meter circuit switch at the top of gage to the "on" position. While holding the barrel at the zero position (and with gage level), raise or lower the point by turning the knurled knob (Item 3) until the point is above, but near, the fluid.

Check to be sure that the meter registers zero. Watch the meter, hold the barrel, and lower the point slowly by turning the top knurled knob. As the knob is turned, the point will contact the fluid and the meter pointer will move from zero to some upscales position.

After making contact, turn the point out of the fluid by turning the micrometer barrel counter-clockwise to a reading of .010 or more. Again, watch the meter and, this time, lower the point by turning the micrometer barrel. The point position where the meter pointer begins to move up scale is the zero position. This position should correspond to the zero reading on the micrometer. Adjust the point in relation to the micrometer barrel by turning the top knob while holding the barrel steady. Repeat lowering the point, watching the meter for contact, and adjusting the point until the zero position and zero reading exactly coincide. The gage is now zeroed and should not be moved.

An alternative method of zeroing and reading can be used wherein, instead of zeroing the gage completely, a zero correction reading is taken and recorded, then subtracted from the final reading. Comparable results can be obtained with either method.

Positive Pressure Measurement

With the fluid at its proper level, a pressure of 2.0" water column maximum can be measured. Positive pressure should be applied to the top left connection (Item 2) with the micrometer zeroed as described above. This will permit a simple direct reading to be taken.

After an unknown pressure has been applied at the top left connection, the fluid level will drop in the left bore and rise over the point in the right bore. Note that the indicating meter point has moved upscales because the point is immersed in the fluid. Turn the micrometer counter-clockwise until the point leaves the fluid as indicated by the meter pointer dropping to zero on its scale. Then slowly turn the micrometer down until its point just touches the fluid surface, causing movement of the meter pointer. Withdraw the point and repeat several times, noting each time the micrometer reading where the meter pointer begins. The average of these readings multiplied by two is the pressure applied to the gage. (Avg. reading x 2 = pressure applied in inches w.c. The degree of uncertainty for the operator is indicated by the difference in these readings.

When the readings are complete, the pressure should be removed and the zero setting of Microtector® Gage rechecked. Any change in the zero position will indicate inaccurate readings. Should this happen, the zero-set and pressure measurement procedure should be repeated.

Negative Pressure or Vacuum Measurement

Zero the gage. Connect the source of vacuum or negative pressure to the right-side gage connection (Item 5) and proceed as described under Positive Pressure Measurement section. Remember that the pressure measured in this way is negative.

Differential Pressure Measurement

Differential pressures may be measured by connecting the higher (more positive) pressure to the left connection (Item 2) and the lower pressure to the right connection (Item 5).

Storage

Turn meter circuit switch to "off" position and withdraw the point well clear of fluid (by turning micrometer clockwise) when gage is not in use. This will conserve the batteries and minimize build-up of oxides, etc., on the point. Keep the unit covered and in an area free of strong solvent fumes.

Maintenance

When the meter reading becomes reduced or the pointer movement gets sluggish (with the circuit on and the point in fluid), the following should be done:

(1) Remove the point (by unscrewing) and clean the tip lightly using fine crocus cloth. Wipe off all grit and dirt with a clean rag; reassemble and recheck meter operation.

(2) If the meter operation continues to be sluggish, replace the size AA, 1.5 volt battery. (Replace the battery at least once a year to avoid deterioration of battery and damage to gage. Leakproof alkaline battery is recommended.)

To replace the battery, remove center screw (Item 10) located in the back of the electronic enclosure. Cover (Item 9) will come off, exposing the battery. Pull the old battery out and push a new battery into the battery holder with the positive (center) terminal to the right (to the end marked with + on the holder).

If the fluid becomes contaminated and requires replacement: empty old fluid from gage; flush out with clear water and replace with distilled water and A-126 fluorescein green color concentrate mixed with 3/4 oz. concentrate to each quart of water.

CAUTION:

1. Do not substitute other gage fluids, as proper gage operation depends on use of the specified gage fluid to provide proper surface tension, wetting ability and electrolyte capability with unity specific gravity.

If the gage bore is very dirty, a mild soap solution may be used to aid in cleaning prior to flushing with clear water.

2. Do not clean with liquid soaps, special solvent, de-greasers, aromatic hydrocarbons, etc. Such cleaners and solvents may contain chlorine, fluorine, acetone and related compounds that will permanently damage the gage and prevent proper operation.



IS 17025
ACCREDITED LABORATORY

55 N. 4th Street
Beaumont, TX 77701

Certificate of Analysis – EPA Protocol Gas

Customer:
Inter-Mountain Labs
555 Absaraka St.
Sheridan, WY 82801

PO Number: 196148
Reference#: CGS-10-20029 (2 of 2)
Date Filled:
Customer Part #:

Cylinder Number	Size	Concentration Basis	Standard type	Certificate ID
91005049	ALS	Mole	EPA Protocol	02-03112002

Certified Concentration

Carbon Monoxide=	2.47%	+/- 0.018%
Carbon Dioxide=	9.9%	+/- 0.1%
Oxygen=	10.37%	+/- 0.06%
Nitrogen =	Balance Gas	

Analytical Information

Component	Analyzer Make/Model/SN	Analytical Principle	Last Calibration Date
Carbon Monoxide	MKS/2031DJG2EKVS13T/017146467	FT-IR	3/13/2020
Carbon Dioxide	Thermo 410i/1162980025	NDIR	3/4/2020
Oxygen	Thermo 410i/1162980025	MPA	2/11/2020

First Assay Date 3/13/2020

Reference Standard(s)

Component	GMS #	Cylinder #	NIST Reference	Concentration	Uncertainty	Exp Date
Carbon Monoxide	CC219495.20151013g	CC219495	2642a	2.488%	+/- 0.015%	1/11/2024
Carbon Dioxide	EB007908.20190327	EB007908	C1579010.02	9.5%	+/- 0.02%	6/18/2027
Oxygen	EB0080793.20180118	EB0080793	071001	11.97%	+/- 0.06%	7/21/2026
Oxygen	EB0087693.20180504	EB0087693	071001	12%	+/- 0.12%	7/21/2026
Carbon Dioxide	EB0097897.20171018	EB0097897	C1309410.01	24.9%	+/- 0.10%	2/6/2026
Nitrogen	Balance Gas					

This calibration standard has been certified per the 2012 EPA Traceability Protocol, Document EPA 600/R-12/531, using the procedure G1.

Do Not Use This Standard Below 100 psig (0.7 Megapascals).

Valve Outlet Connection CGA: 660
 Mix Pressure (psig) @ 70F: 2000
 Certification Date: 3/13/2020
 Shelf Life: 8 years
 Expiration Date: 3/11/2028

Certified By: *Jennifer Healy* Reviewed By: *Kelly Ray*

Produced By:
 Red Ball Technical Gas Service Phone 800-551-8150
 555 Craig Kennedy Way Shreveport, LA 71107
 Red Ball Technical Gas Service PGVP Vendor ID: G12020



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

LXPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062

Certificate Issuance Date: 02/25/2019
Praxair Order Number: 70870813
Part Number: NI CD17C08E-AS

Fill Date: 02/20/2019
Lot Number: 70086905101
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 1200 psig 99 ft3

Certified Concentration

Expiration Date:	02/25/2027	NIST Traceable
Cylinder Number:	SA18857	Expanded Uncertainty
17.14 %	Carbon dioxide	± 0.3 %
4.30 %	Carbon monoxide	± 0.6 %
17.01 %	Oxygen	± 0.2 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 02/25/2019 Term: 96 Months Expiration Date: 02/25/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. 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: 17.14 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 01/28/2019

Reference Standard: Type / Cylinder #: GMIS / CC187238
Concentration / Uncertainty: 20.10 % ±0.24%
Expiration Date: 06/07/2026
Traceable to: SRM # / Sample # / Cylinder #: RGM#CC193512 / N/A / RGM#CC193512
SRM Concentration / Uncertainty: 26.99% / ±0.05%
SRM Expiration Date: 05/15/2023

First Analysis Data:		Date: 02/25/2019	
Z: 0	R: 20.1	C: 17.14	Conc: 17.14
R: 20.11	Z: 0	C: 17.16	Conc: 17.16
Z: 0	C: 17.14	R: 20.1	Conc: 17.14
UOM: %	Mean Test Assay:		17.14 %

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

2. Component: Carbon monoxide
Requested Concentration: 4.25 %
Certified Concentration: 4.30 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 01/28/2019

Reference Standard: Type / Cylinder #: GMIS / CC242633
Concentration / Uncertainty: 5.00 % ±0.543%
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

First Analysis Data:		Date: 02/25/2019	
Z: 0	R: 5	C: 4.3	Conc: 4.3
R: 5	Z: 0	C: 4.31	Conc: 4.31
Z: 0	C: 4.29	R: 4.99	Conc: 4.29
UOM: %	Mean Test Assay:		4.3 %

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

3. Component: Oxygen
Requested Concentration: 17 %
Certified Concentration: 17.01 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 02/04/2019

Reference Standard: Type / Cylinder #: GMIS / CC505868
Concentration / Uncertainty: 20.87 % ±0.108%
Expiration Date: 12/14/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

First Analysis Data:		Date: 02/25/2019	
Z: 0	R: 20.88	C: 17.02	Conc: 17
R: 20.9	Z: 0	C: 17.02	Conc: 17
Z: 0	C: 17.04	R: 20.9	Conc: 17.02
UOM: %	Mean Test Assay:		17.01 %

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

Analyzed By Jose Vasquez (AR)
Jose Vasquez

Certified By Nelson Ma
Nelson Ma