



1/28/21

Alaska Department of Environmental Conservation (ADEC)

RE: Alaska Regulation 18 AAC 50.077(c)

Report Revision Hearth & Home Technologies model XXV-TC.

To Whom it May Concern:

This cover letter provides an overview of results generated from ADEC's review of OMNI certification report 0135PS033E.REV001 generated for Hearth & Home Technologies. Stove model XXV-TC was tested in March 2016 to test standard ASTM 2779, and ASTM 2515. In 2020, ADEC reviewed a Non-CBI version of the report and released a list of findings from their report review. The following is a list of responses to the ADEC audit in the order they appeared in the Summary of Review.

1. Testing Information

- a.) *Third-party certifier not reported.* - Appliance is certified by OMNI-Test Laboratories as indicated by the signed certification test report and certificate of conformity.
- b.) *Report certified, not reported* - Appliance is certified by OMNI-Test Laboratories as indicated by the signed certification test report and certificate of conformity.

2. Test Report Elements

- a.) ADEC requires first hour emissions be less than 6 grams per hour, highest first hour emissions result for this series is 7.94 grams per hour. By ADEC regulations this disapproves the appliance. This regulation does not exist in certification to ASTM standards.
- b.) *Pre-burn completed by not reported* – Preburn (conditioning data) is shown on page 109 in the certification report, data was generated by Hearth & Home / Harman representatives.



OMNI-Test Laboratories, Inc.

Product Testing & Certification

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3. Test Run Data

- a.) *Train precision % not reported* - Actual train precision % was not reported, quality checks do show Dual Train Comparison results are Acceptable on Emissions results page for each test run. Precision percentage and gram per kilogram comparison have been added to revised report page 111. Passing criteria is precision within 7.5% or gram per kilogram within 0.5.
- b.) *Negative weights handled appropriately* - On clean burning wood fired devices it is typical to capture near zero measurable catch. A built-in variance in the test standard for filters is 0.2 mg, meaning they are considered at a constant weight when weighed twice and show no more than ± 0.2 mg. Negative values of 0.2 mg should be allowed as part of the built-in variance. In some tests negative filter weights more than 0.2 mg are found, the corresponding weight can be seen on the O-ring or probe assembly final weights indicating transfer of material. There is no indication of total loss. Transfer of filter material to a secondary container using a solvent would only add additional error by 0.2 mg. for any weighing container, and possible errors in calculating residue weight of the solvent used. No changes were made to the report on this issue.
- c.) *Lowest burn rate tested, cannot be determined.* – A setting of temp control 1, feed rate 25%, blower off was used. It was explained by the manufacturer that the pellet stove operating program has a min/max flue component temperature limit. As flue component temperatures approach maximum, the program cuts back on fuel feed to control maximum burn rate. The same control is used at minimum but as the flue component cool the program will increase fuel feed to maintain a programmed minimum temperature. As the program increases burn rate each time the minimum temperature limit is reached the resulting burn rate is higher than maintaining a constant rate at 25% feed rate. Specifics of the operating program are not shown in a non-CBI report.

4. Reporting

- a.) *Test report complete* - Requested information is explained above.
- b.) *30-day notice submitted* - This information is not included in any certification reports, can be provided separately upon request.
- c.) *Testing on proposed dates* - This information is not included in any certification report, can be provided separately upon request.

Findings of this evaluation by ADEC did not produce any deficiencies that caused the Certified emissions and efficiency values for the Hearth & Home Technologies model XXV-TC to change. All requested changes are to simply clarify information already included in the certification report.

If you have any questions, please do not hesitate to contact **OMNI**.

Sincerely,

A handwritten signature in black ink, appearing to read "Bruce Davis".

Bruce Davis
Testing Manager

Non-Confidential Business Information (Non-CBI)

Certification Test Report

**Hearth & Home Technologies - Halifax
Freestanding Pellet Stove
Model: XXV-TC**

Prepared for: Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032

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

Test Period: March 22, 2016

Original Report Date: April 2016

Project Number: 0135PS033E
Report Number: 0135PS033E.REV001


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

*Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032*

AUTHORIZED SIGNATORIES

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

Technician:

A handwritten signature in black ink, appearing to read 'Bruce Davis', is written over a horizontal line.

Bruce Davis, Testing Manager
OMNI-Test Laboratories, Inc.

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Section 1

Sampling Procedures and Test Results

INTRODUCTION

Hearth & Home Technologies - Halifax retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the XXV-TC. The XXV-TC is a freestanding, pellet-fired room heater.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The altitude of the laboratory is 30 feet above sea level. The unit was received in good condition and logged in at the *OMNI*'s testing facility on March 17, 2016. It was assigned and labeled with *OMNI* ID #2165. *OMNI* representative Aaron Kravitz conducted the certification testing and completed all testing by March 22, 2016.

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

SAMPLING PROCEDURE

The XXV-TC was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters using ASTM E2515 and ASTM E2779. The fuel used for certification testing was Lignetics Gold hardwood/softwood blend pellet fuel; this fuel was graded as premium by the Pellet Fuels Institute and was produced at registered mill # 03434. Particulate emissions were measured using dual sampling trains consisting of two sets of filters (front and back). The results of the integrated test run indicate an average particulate emission rate of 1.75 g/hr. The XXV-TC results are within the emission limit of 4.5 g/hr for affected facilities manufactured on or after May 15, 2015, or sold at retail after December 31, 2015.

The model XXV-TC was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10. The heater has a demonstrated an average thermal efficiency of 72.51%. The calculated CO emission rate was 34.6 g/hr.

RUN DISCUSSION

Run 1 was an attempt at an integrated test run consisting of burn settings that result in 60 +5/-0 minutes at maximum, 120 +5/-0 minutes at medium (<50% of maximum), and 180 +5/-0 minutes at minimum. Each burn category in this run was achieved, meeting both time and burn rate requirements. No sampling anomalies occurred, so this integrated test run is acceptable per ASTM E2779 and no further runs are needed.

SUMMARY OF RESULTS

The average particulate emission rate over the complete, integrated test run was measured to be 1.75 g/hr.

The average particulate emission factor for the complete, integrated test run was measured to be 1.59 g/dry kg of fuel.

The average thermal efficiency for the complete, integrated test run was measured to be 72.51%.

The particulate emission rate calculated from the one-hour filter was 7.94 g/hr.

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

SUMMARY TABLES

Table 1.1 – Particulate Emissions

	One-Hour Filter	Integrated Total
Emission Rate (g/hr)	7.94	1.75
Emission Factor (g/dry kg)	3.07	1.59

Table 1.2 – Efficiency and CO

	Burn Rate Segment			Integrated Total
	Maximum	Medium	Minimum	
Time (minutes)	62	121	181	364
Burn Rate (dry kg/hr)	2.59	1.09	0.60	1.10
Heat Output Rate (BTU/hr)	35,283	14,827	7,096	14,758
Efficiency (%, HHV)	73.58%	73.62%	64.28%	72.51%
CO Emission Rate (g/hr)	208.6	0.0	0.0	34.1

Table 1.3 – Test Facility Conditions

	Initial	Middle	Final
Room Temperature (°F)	68	70	70
Barometric Pressure (in Hg)	30.14	30.17	30.20
Air Velocity (ft/min)	< 50	< 50	< 50
Induced Draft (in H₂O)	0	0	0

Table 1.4 – Fuel Measurement Summary

Segment	Time (min)	Burn Rate (dry kg/hr)	Consumed Fuel Weight (lbs)	Fuel Moisture Content (dry basis - %)
Pretest	62	2.55	6.0	3.51
Maximum	62	2.59	6.1	3.51
Medium	121	1.09	5.0	3.51
Minimum	181	0.60	4.1	3.51
Integrated Total	364	1.10	15.2	3.51

Table 1.5 – Dilution Tunnel and Flue Gas Measurements

Segment	Average Flue Draft (in H₂O)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
Integrated Total	-0.030	12.08	134.2	92.9

Table 1.6 – Heater Configuration

Segment	Temperature Control	Feed Rate	Distribution Blower Setting	Combustion Blower Setting (max RPM)	Combustion Blower Setting (min RPM)
Pretest	7.0	90%	100%	2700	2600
Maximum	7.0	90%	100%	2700	2600
Medium	2.5	43%	100%	2700	2200
Minimum	1.0	25%	OFF	2700	2200

Section 2

Photographs Appliance Description Drawings

Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032

Hearth & Home Technologies - Halifax XXV-TC

PHOTOGRAPHS



XXV-TC Front



XXV-TC Back



XXV-TC Left



XXV-TC Right

APPLIANCE DESCRIPTION

Appliance Manufacturer: Hearth & Home Technologies - Halifax

Pellet Stove Model: XXV-TC

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

The XXV-TC's principle elements include a fuel hopper, steel firebox chamber, steel burn pot, and electrical fuel feed, combustion air, and convection air supply systems.

Air is forced by the combustion air blower through holes in the burn pot and combustion products are routed out of the firebox chamber through a 3-inch diameter flue outlet located on the rear of the unit.

Fuel is supplied from the hopper to the burn pot via an auger which moves pellets horizontally towards the front of the appliance. Fuel supply rate is varied by cycling the auger motor as needed.

Ashes fall through the burn pot into a removable ash drawer located at the bottom of the unit. The drawer is accessed through the front firebox door, which also features a 5mm glass viewing window sealed by fiberglass rope gasket

The electrical systems are regulated by a user-operated control board. On this board settings such as feed rate, combustion and distribution fan speeds, and desired temperature and can be adjusted to achieve desired heat output. The unit can also be controlled by an external thermostat system.

*Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032*

Engineering Drawings (K List)

Section 3

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

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

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

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

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

The manufacturing facilities and quality control system for the production of the XXV-TC at Hearth & Home Technologies - Halifax were evaluated to determine if sufficient to maintain conformance with OMNI’s requirements for product certification. OMNI has concluded that the manufacturing facilities, processes, and quality control system are adequate to produce the appliance congruous with the standards and model codes to which it was evaluated.

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Manufacturer's Quality Assurance Plan

The following quality assurance plan has been developed to ensure all that all units within the model line are similar in all material respects that would affect emissions to the sample tested under this report, in accordance with § 60.533 (m) / § 60.5475 (m).

*Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032*

Sample Analysis
Analysis Worksheets
Moisture Content Worksheet
Fuel Certification Label
Tared Filter, Probe, and O-Ring Data

Pellet Heater Lab Data - ASTM E2779 / ASTM E2515

Manufacturer: Harman
 Model: XXV
 Tracking No.: 2165
 Project No.: 0135PS033E.REV001
 Run #: 1
 Date: 3/22/16

Equipment Numbers: 23, 283A, 592



TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	C382	129.6	120.7	8.9
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: 8.9

TRAIN 1 (Remainder of Test)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	C383	124.0	121.4	2.6
B. Rear filter catch	Filter	C384	119.6	120	-0.4
C. Probe catch*	Probe	24	114130.9	114130.8	0.1
D. Filter seals catch*	Seals	R397	3433.5	3432.7	0.8

Sub-Total Total Particulate, mg: 3.1

Train 1 Aggregate Total Particulate, mg: 12.0

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	C385	132.9	121	11.9
B. Rear filter catch	Filter	C38	120.8	120.8	0.0
C. Probe catch*	Probe	28	114758.8	114758.7	0.1
D. Filter seals catch*	Seals	R398	3280.6	3280.4	0.2

Total Particulate, mg: 12.2

AMBIENT

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

Total Particulate, mg: 0.0

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

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

ASTM E2779 Pellet Heater Run SheetsClient: **Harman**Project Number: **0135PS033E.REV001** Run Number: **1**Model: **Absolute**Tracking Number: **2165**Date: **3/22/16**Test Crew: **A. Kravitz**OMNI Equipment ID numbers: **23, 131, 185, 132, 209, 283A, 335, 336, 410, 420, 559, 592****ASTM E2515 Lab Sheet**

Assembled By:

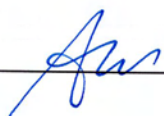
A. Kravitz

Date/Time in Dessicator:

3/22/16 16:15

Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date: 3/24/16	Date: 3/24/16	Date: 3/24/16	Date:	Date:
Time: 1100	Time: 0815	Time: 1400	Time:	Time:
R/H %: 12.6	R/H %: 12.8	R/H %: 7.2	R/H %:	R/H %:
Temp: 68.7	Temp: 67.1	Temp: 71.0	Temp:	Temp:
Audit: 100000.0	Audit: 100000.6	Audit: 100000.6	Audit:	Audit:
Initials: A	Initials: A	Initials: A	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A	Front Filter (60 min)	C382	120.7	129.7	129.6	-		
A	Front Filter (Remainder)	C383	121.4	124.1	124.0	-		
A	Rear Filter	C384	120.0	119.7	119.6	-		
A	Probe	24	114130.8	114131.0	114130.9	-		
A	O-Ring Set	R397	3432.7	3435.2	3433.5	3433.5		
B	Front Filter	C385	121.0	133.0	132.9	-		
B	Rear Filter	C386	120.8	120.9	120.8	-		
B	Probe	28	114758.7	114758.9	114758.8	-		
B	O-Ring Set	R398	3280.4	3281.6	3280.8	3280.6		
BG	Filter	N?A						

Technician Signature: Date: **3/29/16**



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

Report No: USR:W216-0057-01
Issue No: 1

Analytical Test Report

Client:	Hearth & Home Technologies 352 Mountain House Road Halifax, PA 17032	Signed:	
Attention:	Matthew Troutman		Stephen Sundeen Chemistry Laboratory Manager
PO No:	11614416	Date of Issue:	1/26/2016
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample Details			
Sample Log No:	W216-0057-01	Sample Date:	
Sample Designation:	HHT 01/12/2016	Sample Time:	
Sample Recognized As:	Biomass Pellets	Arrival Date:	1/18/2016

Test Results				
	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		3.39
Ash	ASTM D1102	wt. %	0.75	0.72
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3172	wt. %		
Sulfur	ASTM D4239	wt. %	0.009	0.009
SO ₂	Calculated	lb/mmbtu		0.020
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	18.90	17.56
Net Cal. Value at Const. Pressure	ISO 1928	J/g	18901	17557
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20221	19535
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8694	8399
Carbon	ASTM D5373	wt. %	50.32	48.61
Hydrogen*	ASTM D5373	wt. %	6.06	5.86
Nitrogen	ASTM D5373	wt. %	0.25	0.24
Oxygen*	ASTM D3176	wt. %	42.61	41.17

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

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

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

Comments		

TARE SHEET - FILTERS

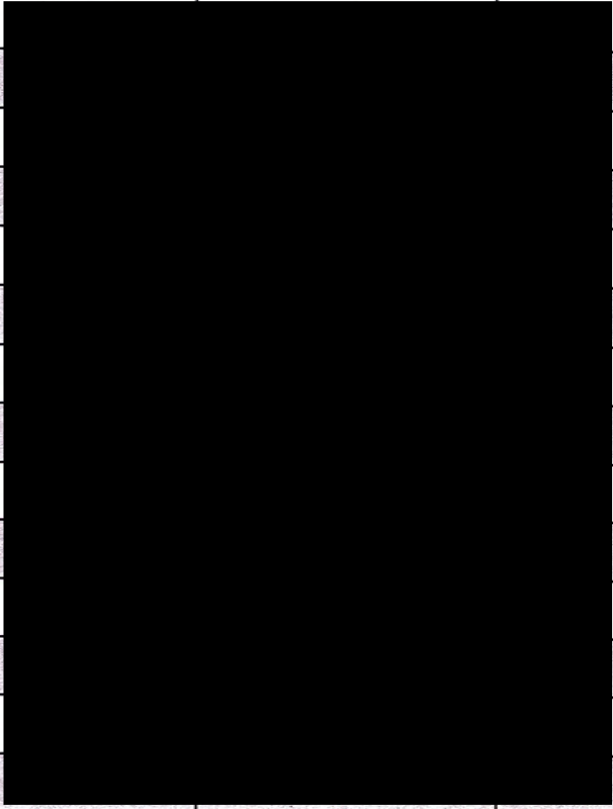
Date Placed in Dessicator: 1/15/16 16:30

Thermohygrometer ID #: 291

Cleaned By: S. Button

Balance ID #: 23

Audit Weight ID #:

Filter ID #	Date: <u>2/8/16</u> Time: <u>1600</u> RH %: <u>14.5</u> T (°F): <u>75.0</u> Audit: <u>560.2</u>	Date: <u>2/12/16</u> Time: <u>1530</u> RH %: <u>11.1</u> T (°F): <u>73.5</u> Audit: <u>500.2</u>	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
C368	120.7	120.5					
C369	120.5	120.5					
C370	121.1	121.0					
C371	121.3	121.3					
C372	120.8	120.8					
C373	120.8	120.9					
C374	120.0	120.1					
C375	121.7	121.6					
C376	120.7	120.8					
C377	120.6	120.7					
C378	121.6	121.6					
C379	120.5	120.6					
C380	120.5	120.5					
C381	121.4	121.3					
C382	120.7	120.7			3/22/16	0135 IPS033E. R1	1
Initials: <u>A</u>		Initials: <u>A</u>	Initials:	Initials:			

Final Technician Signature: 

Date: ²⁰2/12/16

TARE SHEET - FILTERS

Date Placed in Dessicator: 3/4/16

Thermohygrometer ID #: 23 592

Cleaned By: A. Kowitz

Balance ID #: 23

Audit Weight ID #: 131

Filter ID #	Date: <u>3/14/16</u> Time: <u>1506</u> RH %: <u>10.1</u> T (°F): <u>70.7</u> Audit: <u>500.1</u>	Date: <u>3/15/16</u> Time: <u>1230</u> RH %: <u>12.3</u> T (°F): <u>69.4</u> Audit: <u>500.2</u>	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
C383	121.5	121.4			3/22/16	013SPS033E. R1	1
C384	120.0	120.0			↓	↓	↓
C385	121.0	121.0					
C386	120.8	120.8					
C387	120.2	120.2					
C388	120.8	120.7					
C389	121.0	121.1					
C390	121.0	121.0					
C391	121.0	121.0					
C392	119.7	119.6					
C393	120.8	120.8					
C394	120.9	120.8					
C395	120.9	120.9					
C396	120.3	120.4					
C397	120.9	121.0					
Initials: <u>A</u>		Initials: <u>A</u>	Initials:	Initials:			

Final Technician Signature: 

21
Date: 3/15/16

TARE SHEET - PROBES

Date Placed in Dessicator: 2/18/16Thermohygrometer ID #: 592Cleaned By: A. KravitzBalance ID #: 23Audit Weight ID #: 383A

Probe ID #	Date: 3/4/16 Time: 1230 RH %: 15.6 T (°F): 74.1 Audit: 100.0000	Date: 3/8/16 Time: 1000 RH %: 18.2 T (°F): 70.8 Audit: 100000.0	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
0ES 3	114771.4	114771.6					
4	114863.9	114863.9					
6	115355.2	115355.3					
7	114985.0	114985.0					
8	115597.1	115597.3					
9	115693.7	115693.9					
11	114192.4	114192.6					
12	114287.6	114287.5					
24	114130.6	114130.8			3/22/16	0135PS033E.R1	1
28	114758.6	114758.7			1	J	J
37	114469.4	114169.3					
38	114154.5	114154.6					
52	122774.9	122775.0					
54	122837.3	122837.1					
55	123235.1	123235.3					
Initials: <u>A</u>		Initials: <u>Ar</u>	Initials:	Initials:			

Final Technician Signature: ArDate: ²² 3/8/16

O-RING TARES

Date Placed in Desiccator: 10/27/15 11:20 Technician: J. Button Balance ID # 00023

Thermo/Hygro meter ID #: 00291 Audit Weight ID # 00131 (Balance audit mfr. Std.: 500 ± 0.72)

O-Ring Size/ID# 47	Date: <u>3/4/16</u> Time: <u>1245</u> RH%: <u>12.9</u> T (F): <u>74.4</u> Initials: <u>2.0003</u>	Date: <u>3/8/16</u> Time: <u>1015</u> RH%: <u>15.2</u> T (F): <u>71.4</u> Initials: <u>20004</u>	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
R393	3546.8	3456.6						
R394	3508.2	3508.1						
R395	3505.1	3504.9						
R396	3579.7	3579.7						
R397	3432.6	3432.7						
R398	3280.2	3280.4			Harman	4x xxv	0135PS033E.R1	1
R399	3332.9	3332.9			1	1	1	1
R400	3301.5	3301.6						
R401	3373.0	3373.0						
R402	4163.8	4163.8						
R403	3402.0	3402.0						
R404	3370.5	3370.4						
R405	3376.1	3376.1						
R406	4334.4	4334.2						

Final Technician signature: 

Date: 3/8/16

Calibrations

EPA Method 28R, ASTM E2515, ASTM E2779

ID #	Lab Name/Purpose	Log Name	Attachment Type
23	Scale-Analytical Balance	Mettler Analytical Balance	Calibration Certificate
131	500 mg Weight	Ohaus Weight Standard, 500 mg	Calibration Certificate
132	10 lb Weight	Weight Standard, 10 lb.	Calibration Log
185	Platform Scale	Weigh-Tronix Platform Scale	Calibration Certificate
209	Barometer	Barometer – Princo	Equipment Record
283A	Calibration Weights	Troemner Metric Weight Standards	Calibration Certificate
335	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
336	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
410	Microtector	Dwyer Microtector	Equipment Record
420	Combustion Gas Analyzer	CAI Gas Analyzer	Equipment Record
559	Vaneometer	Dwyer Vaneometer	Equipment Record
592	Thermohygrometer	Omega Digital Thermohygrometer	Calibration Log

Certificate of Calibration

Certificate Number: **615462**

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



JJ Calibrations, Inc.

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

OnSite

PO: 160070

Order Date: **03/04/2016**

Authorized By: N/A

Calibrated on: **03/04/2016**

*Recommended Due: **09/04/2016**

Environment: **20 °C 40 % RH**

* As Received: **Out of Tolerance**

* As Returned: **Within Tolerance**

Action Taken: **Calibrated**

Technician: **123**



0723.01
Calibration

Property #: **OMNI-00023**

User: **N/A**

Department: **N/A**

Make: **Mettler**

Model: **AE200**

Serial #: **E17657**

Description: **Scale, 205g**

Procedure: **DCN 500818/500887**

Accuracy: **±0.0004g ±1 LSD**

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

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
723A	Rice Lake	1mg-200g (Class O)	Mass Set	12/01/2016	603626

Parameter

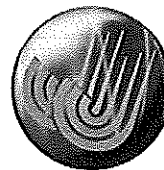
Measurement Data

Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before							Accredited = ✓
Force							
	g	0.00100	0.0005	0.0015	0.0001	0.0011g	5.7E-04 ✓
	g	0.01000	0.0095	0.0105	0.0002	0.0102g	5.7E-04 ✓
	g	0.10000	0.0995	0.1005	0.0002	0.1002g	5.7E-04 ✓
	g	0.50000	0.4995	0.5005	0.0002	0.5002g	5.7E-04 ✓
	g	1.00000	0.9995	1.0005	0.0002	1.0002g	5.7E-04 ✓
	g	40.00000	39.9995	40.0005	0.0010	40.0010g	5.7E-04 ✓
	g	80.00000	79.9995	80.0005	0.0019	80.0019g	5.7E-04 ✓
	g	120.00000	119.9995	120.0005	0.0028	120.0028g	5.7E-04 ✓
	g	160.00000	159.9995	160.0005	0.0039	160.0039g	5.8E-04 ✓
	g	200.00000	199.9995	200.0005	0.0043	200.0043g	5.7E-04 ✓
After							Accredited = ✓
	g	0.00100	0.0005	0.0015	0.0000	0.0010g	5.7E-04 ✓
	g	0.01000	0.0095	0.0105	0.0000	0.0100g	5.7E-04 ✓
	g	0.10000	0.0995	0.1005	0.0000	0.1000g	5.7E-04 ✓
	g	0.50000	0.4995	0.5005	0.0001	0.4999g	5.7E-04 ✓
	g	1.00000	0.9995	1.0005	0.0000	1.0000g	5.7E-04 ✓
	g	40.00000	39.9995	40.0005	0.0002	40.0002g	5.7E-04 ✓
	g	80.00000	79.9995	80.0005	0.0003	80.0003g	5.7E-04 ✓
	g	120.00000	119.9995	120.0005	0.0002	120.0002g	5.7E-04 ✓
	g	160.00000	159.9995	160.0005	0.0004	160.0004g	5.8E-04 ✓
	g	200.00000	199.9995	200.0005	0.0004	200.0004g	5.7E-04 ✓

Certificate of Calibration

Certificate Number: **547339**

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



JJ Calibrations, Inc.

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



PO: OTL-13-035

Order Date: **11/19/2013**

Authorized By: **N/A**

Calibrated on: **12/02/2013**

*Recommended Due: **12/02/2018**

Environment: **20 °C 34 % RH**

As Received: **Within Tolerance**

As Returned: **Within Tolerance**

Action Taken: **Calibrated**

Technician: **34**

Property #: **OMNI-00131**

User: **N/A**

Department: **N/A**

Make: **Ohaus**

Model: **500mg**

Serial #: **27503**

Description: **Mass**

Procedure: **DCN 500901**

Accuracy: **CLASS F ($\pm 0.72\text{mg}$)**

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Refer to attachment for measurement results.

Standards Used

<u>Std ID</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Nomenclature</u>	<u>Due Date</u>	<u>Trace ID</u>
432A	Sartorius	C-44	Microbalance 5.1g	03/11/2014	517747
723A	Rice Lake	1mg-200g (Class O)	Mass Set	09/05/2014	540048

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

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

Reviewer

3 Issued 12/06/2013

Rev # 14

Inspector

Certificate: **547339**

SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 lb

ID Number: 132

Standard Calibration Weight: 10 lb

ID Number: 255

Scale Used: MTW-150K

ID Number: 353

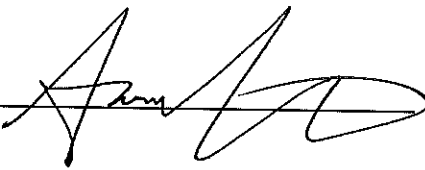
Date: 2/19/13

By: A. Kravitz

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

*Acceptable tolerance is 1%.

This calibration is traceable to NIST using calibrated standard weights.

Technician signature:  Date: 2/19/13



QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
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OMNI-Test Laboratories, Inc.
13327 NE Airport Way
Portland, OR 97230

Report Number: OMNE0321676151027

A2LA ACCREDITED **CERTIFICATE OF CALIBRATION WITH DATA**

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Weigh-Tronix	WI-127	21676	185	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
lbs	0.2	QC033	10/27/15	N/A	10/2016

FUNCTIONAL CHECKS

SHIFT TEST		LINEARITY		REPEATABILITY		ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:	
300	0.4	HB44	HB44	500	0.2	
As-Found:		As-Found:		As-Found:		
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	
As-Left:		As-Left:		As-Left:		Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor <input type="checkbox"/> Temperature: 18.8°C
Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	Pass: <input checked="" type="checkbox"/>	Fail: <input type="checkbox"/>	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.0	1000.0	0.16
700	700.0	700.0	0.16
500	500.0	500.0	0.13
200	200.0	200.0	0.13
100	100.0	100.0	0.11
50	50.0	50.0	0.11

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	10/28/13	10/2015	34XX

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

Report prepared/reviewed by: J. Colacchio

Date: 10/27/15

Technician: J. Colacchio

Signature: [Signature]

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

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

Equipment Record

Name: Fortin Type Mercurial Barometer

Type of Equipment: Barometer

S/N: 0674 **OMNI ID #:** OMNI-00209

Manufacturer: PRINCO Instruments, Inc.

Is Manufacturer's manual available in the equipment file? : Yes, if not why? _____

Date Received: June 2000 **Date Placed in Service:** June 2000

Condition When Received: : New 9 Used 9 Reconditioned

Location: Lab

Location of Calibration Procedures: All PRINCO Fortin mercurial barometers have scales which are set at the time of manufacture to a near zero correction by comparison with a Fortin type mercurial barometer whose scales were calibrated traceable to NIST. If the barometer is not abused an any way , it should never go out of calibration.

Location of Dates/Results of Calibrations: If the barometer is not abused an any way , it should never go out of calibration. The barometer currently hangs on the wall and is never moved.

Location of Maintenance Procedures: Maintenance is performed on an "as needed" basis.

Dates / Results of Maintenance: Regularly scheduled maintenance is not required. Pre-service and post-service maintenance is conducted per QA Manual Section 5.3.5. To date, maintenance has not been required beyond the in-service maintenance prescribed in QA Manual Section 5.3.5.

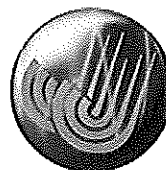
Any Planned Maintenance? : No, if yes what: _____

Equipment History of any damage, malfunction, modification and/or repair (including a statement on the suitability of the equipment for testing): To date, this instrument has not been damaged, has not malfunctioned, has not been modified, and has not been repaired.

Certificate of Calibration

Certificate Number: **543402**

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



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



0723.01
Calibration

PO: OTL-13-031

Order Date: 09/27/2013

Authorized By: N/A

Calibrated on: 10/09/2013

*Recommended Due: 10/09/2018

Environment: 20 °C 41 % RH

As Received: Other - See Remarks

As Returned: Within Tolerance

Action Taken: Calibrated

Technician: 34

Property #: OMNI-00283A

User: N/A

Department: N/A

Make: Troemner Inc

Model: 1mg-100g (Class F)

Serial #: 47883

Description: Mass Set, 21 Pc.

Procedure: DCN 500901

Accuracy: Class F

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Changed set from a Class 4 to a Class F per Jeremy Clark.

Received missing 1g weight.

Refer to attachment for measurement results.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
432A	Sartorius	C-44	Microbalance 5.1g	03/11/2014	517747
479A	Sartorius	MC210S	Scale, 210g	02/22/2014	517755
503A	Rice Lake	1mg-200g (Class O)	Mass Set	12/07/2013	517746
723A	Rice Lake	1mg-200g (Class O)	Mass Set	09/05/2014	540048

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

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

Reviewer

3 Issued 10/11/2013

Rev # 14

Inspector

Thermal Metering System Calibration

Y Factor

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

Average Gas Meter y Factor
1.001

Orifice Meter dH@
N/A

Calibration Date: 01/07/16
 Calibrated by: B. Davis
 Calibration Frequency: Six month
 Next Calibration Due: 7/6/2016
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 29.98 "Hg
 Signature/Date: B. Davis 1/7/16

Previous Calibration Comparison

Date	6/4/2015	Acceptable Deviation (5%)	Deviation
y Factor	1.001	0.05005	0.000
Acceptance	Acceptable		

Current Calibration

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

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	OMNI-00001
	Calib. Date	05-Nov-15
	Calib. Value	0.9983 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	1.30	2.22	0.70
Initial Reference Meter	653.7	659.252	666.017
Final Reference Meter	659.162	665.997	671.748
Initial DGM	0	0	0
Final DGM	5.535	6.827	5.861
Temp. Ref. Meter (°F), Tr	68.0	67.0	67.0
Temperature DGM (°F), Td	78.0	79.0	80.0
Time (min)	34.0	32.0	49.0
Net Volume Ref. Meter, Vr	5.462	6.745	5.731
Net Volume DGM, Vd	5.535	6.827	5.861
Gas Meter y Factor =	1.001	1.003	0.999
Gas Meter y Factor Deviation (from avg.)	0.000	0.002	0.002
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

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

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

** Equations come from EPA Method 5

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

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Flue draft box 00335Maximum Range: 0.25" WCID Number: OMNUS-00335Calibration Instrument: Digital ManometerID Number: OMNUS-00896Date: 1/8/16By: B. Davis**This form is to be used only in conjunction with Standard Procedure C-SPC.**

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0.0 - 0.05	0.035	0.034	0.001	0.4
20-40% Max. Range 0.05 - 0.10	0.072	0.064	0.008	3.2
40-60% Max. Range 0.10 - 0.15	0.150	0.145	0.005	2.0
60-80% Max. Range 0.15 - 0.20	0.200	0.192	0.008	3.2
80-100% Max. Range 0.20 - 0.25	0.235	0.226	0.009	3.6

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.Technician signature: B. Davis Date: 1/8/16Reviewed by: [Signature] Date: 1/11/16

Temperature Calibration EPA Method 28R, ASTM 2515							
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:	
E1		National Instruments Type K data logger				OMNI-00335 - OMNI-00336	
REFERENCE METER EQUIPMENT NUMBER:				Calibration Due Date:			
CALIBRATION PERFORMED BY:			DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:
B. Davis			1-8-16		66		30.16
Input Temperature (F)	Ambient	Meter A					Catalyst
			Meter B	Filter A	Filter B	Tunnel	
0	0	0	0	0	0	-1	0
100	100	100	100	100	100	100	100
300	300	300	300	300	300	300	300
500	500	500	500	500	500	500	500
700	700	700	700	700	700	700	700
1000	1001	1001	1001	1001	1000	1000	1001

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stack
0	0	-1	0	-1	-1	-1
100	100	100	99	100	100	100
300	300	300	300	300	300	300
500	500	500	500	500	500	500
700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000

Technician signature: B. Davis Date: 1/8/16

Reviewed By: [Signature] Date: 1/11/16

Thermal Metering System Calibration

Y Factor

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

Average Gas Meter y Factor
1.001

Orifice Meter dH@
N/A

Calibration Date: 01/07/16
 Calibrated by: B. Davis
 Calibration Frequency: Six month
 Next Calibration Due: 7/6/2016
 Instrument Range: 1.000 cfm
 Standard Temp.: 68 oF
 Standard Press.: 29.92 "Hg
 Barometric Press., Pb: 29.98 "Hg
 Signature/Date: *B. Davis* 1/7/16

Previous Calibration Comparison

Date	6/4/2015	Acceptable Deviation (5%)	Deviation
y Factor	1.003	0.05015	0.002
Acceptance	Acceptable		

Current Calibration

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

Reference Standard *

Standard Calibrator	Model	Standard Test Meter
	S/N	OMNI-00001
	Calib. Date	05-Nov-15
	Calib. Value	0.9983 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H ₂ O), Pr	0.00	0.00	0.00
DGM Pressure ("H ₂ O), Pd	0.51	1.00	1.84
Initial Reference Meter	671.748	679.511	686.563
Final Reference Meter	679.472	686.515	693.337
Initial DGM	0	0	0
Final DGM	7.822	7.133	6.878
Temp. Ref. Meter (°F), Tr	67.0	68.0	68.0
Temperature DGM (°F), Td	77.0	80.0	79.0
Time (min)	66.0	44.0	32.0
Net Volume Ref. Meter, Vr	7.724	7.004	6.774
Net Volume DGM, Vd	7.822	7.133	6.878
Gas Meter y Factor =	1.003	1.000	0.999
Gas Meter y Factor Deviation (from avg.)	0.002	0.001	0.002
Orifice dH@	N/A	N/A	N/A
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

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

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

** Equations come from EPA Method 5

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

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Tunnel Static box 00336Maximum Range: 1" WCID Number: OMNI-00336Calibration Instrument: Digital ManometerID Number: OMNI-00396Date: 1/8/16By: B Davis**This form is to be used only in conjunction with Standard Procedure C-SPC.**

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0.0 - 0.2	0.128	0.133	0.005	0.5
20-40% Max. Range 0.2 - 0.4	0.382	0.387	0.005	0.5
40-60% Max. Range 0.4 - 0.6	0.576	0.574	0.002	0.2
60-80% Max. Range 0.6 - 0.8	0.749	0.747	0.002	0.2
80-100% Max. Range 0.8 - 1.0	0.870	0.864	0.006	0.6

*Acceptable tolerance is 4%.

The uncertainty of measurement is ± 0.4 " WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.Technician signature: [Signature] Date: 1/11/16Reviewed by: [Signature] Date: 1/11/16

Temperature Calibration EPA Method 28R, ASTM 2515								
BOOTH:		TEMPERATURE MONITOR TYPE:				EQUIPMENT NUMBER:		
E1		National Instruments Type K data logger				OMNI-00335 - OMNI-00336		
REFERENCE METER EQUIPMENT NUMBER:				Calibration Due Date:				
CALIBRATION PERFORMED BY:			DATE:		AMBIENT TEMPERATURE:		BAROMETRIC PRESSURE:	
B. Davis			1-8-16		66		30.16	
Input Temperature (F)	Ambient	Meter A					Catalyst	
			Meter B	Filter A	Filter B	Tunnel		
0	0	0	0	0	0	-1	0	
100	100	100	100	100	100	100	100	
300	300	300	300	300	300	300	300	
500	500	500	500	500	500	500	500	
700	700	700	700	700	700	700	700	
1000	1001	1001	1001	1001	1000	1000	1001	

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Stack
0	0	-1	0	-1	-1	-1
100	100	100	99	100	100	100
300	300	300	300	300	300	300
500	500	500	500	500	500	500
700	700	700	700	700	700	700
1000	1000	1000	1000	1000	1000	1000

Technician signature: B. Davis Date: 1/8/16

Reviewed By: [Signature] Date: 1/11/16

Equipment Record

Name: Microtector

Type of Equipment: Hook Gage Liquid Manometer with Micrometer Gage in Inches

Model: 1430

S/N: 115004-00

OMNI ID #: OMNI-00410

Manufacturer: Dwyer Instruments

Vendor/Retailer: Dwyer Instruments

Is Manufacturer's manual available in the equipment file? ☒ Yes, if not why? _____

Date Received: December 2007 **Date Placed in Service:** December 2007

Condition When Received: ☒ New ☐ Used ☐ Reconditioned

Location: shop

Location of Calibration Procedures: Calibrate prior to use using NIST Traceable standard OMNI-00033. "Zeroing" instructions in attached manual.

Location of Dates/Results of Calibrations: N/A

Location of Maintenance Procedures: Maintenance is performed on an "as needed" basis as determined by calibrations.

Dates / Results of Maintenance: Regularly scheduled maintenance is not required. Pre- and post-service maintenance is conducted per QA Manual Section 5.3.5. To date, maintenance has not been required beyond the in-service maintenance prescribed in QA Manual Section 5.3.5.

Any Planned Maintenance? ☒ No, if yes what: _____

Equipment History of any damage, malfunction, modification and/or repair (including a statement on the suitability of the equipment for testing): To date, this instrument has not been damaged, modified or repaired, nor has it malfunctioned.

Equipment Record

Name: Infrared Gas Analyzer

Type of Equipment: gas analyzer **Model:** 300 NDIR

S/N: A8P9073T **OMNI ID #:** OMNI-00420

Manufacturer: California Analytical Instruments

Vendor/Retailer: California Analytical Instruments

Is Manufacturer's manual available in the equipment file? ☒ Yes, if not why? _____

Date Received: 5/2009 **Date Placed in Service:** 6/2009

Condition When Received: ☒ New ☐ Used ☐ Reconditioned

Location: shop

Location of Calibration Procedures: Unit is calibrated prior to use using the procedures and specifications outlined in the instruction manual. Additional information avail in file OMNI-00419

Location of Dates/Results of Calibrations: See attached calibration sheets.

Location of Maintenance Procedures: Maintenance is performed on an "as needed" basis as determined by calibrations.

Dates / Results of Maintenance: Regularly scheduled maintenance is not required. Pre- and post-service maintenance is conducted per QA Manual Section 5.3.5. To date, maintenance has not been required beyond the in-service maintenance prescribed in QA Manual Section 5.3.5.

Any Planned Maintenance? ☒ No, if yes what: _____

Equipment History of any damage, malfunction, modification and/or repair (including a statement on the suitability of the equipment for testing): To date, this instrument has not been damaged, modified or repaired, nor has it malfunctioned.

Equipment Record

Name: Vaneometer Air Velocity Meter

Type of Equipment: Air Velocity Meter

Model: 480

S/N: T36Z

OMNI ID #: OMNI-00559

Manufacturer: Dwyer Instruments

Vendor/Retailer: Dwyer Instruments

Is Manufacturer's manual available in the equipment file? ☒ Yes, if not why? _____

Date Received: 9/5/2014

Date Placed in Service: 9/5/2014

Condition When Received: ☒ New ☐ Used ☐ Reconditioned ☐ Unknown

Location: Cabinet 1

Location of Calibration Procedures: The meter is equipped with a factory pre-calibrated vane. The vane is replaced at least every six months, or in case of damage.

Location of Dates/Results of Calibrations: See attached calibration record.

Location of Maintenance Procedures: Maintenance is performed on a six month basis by replacing the pre-calibrated vane.

Dates / Results of Maintenance: See attachments.

Any Planned Maintenance? ☒ No, if yes what: _____

Equipment History of any damage, malfunction, modification and/or repair (including a statement on the suitability of the equipment for testing): _____

VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

Step 2: Place unit to be calibrated, tracking No. OMNI-00592, inside OMNI desiccate box on the same shelf with the NIST traceable standard.

Step 3: After a period of not less than four hours record the temperature and humidity of both units in the spaces provide below.

Step 4: If the unit to be calibrated matches the NIST standard within $\pm 4\%$, it is acceptable. If not, the unit needs to be sent to a repair company or replaced.

Verification Data:

Date: 1/13/16 Technician: B Davis

Time in desiccate: 10:30 Recording time: 14:30

NIST Standard Temperature: 74.5 °F NIST Standard Humidity: ³⁰21.7 19.2

Test Unit Temperature Reading: 74.4 °F Test Unit Humidity Reading: 16.8

Test unit OMNI- 00592 is X or was not within acceptable limits.

Technician Signature: 

Comments: Hygrometer OMNI-00291 was used to verify new unit.
A difference of 2.4% RH was found, this result is within $\pm 4\%$, with a
full scale of 100% for OMNI-00291, and 95% for OMNI-00592

Example Calculations

Equations and Sample Calculations – ASTM E2779 & E2515

Manufacturer: Harman
 Model: XXV
 Run: 1
 Category: [Integrated]

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

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

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

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

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

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

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

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

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

C_s - Concentration of particulate Particulate concentration, g/dscf

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

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

PM_R – Average particulate Total particulate emissions, grams

PM_F – Average particulate Average fuel load moisture content, %

M_{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:

3.5 %
M_{Swb} = 34.1 lbs
M_{Ewb} = 18.9 lbs
0.4536 = Conversion factor from lbs to kg

$$M_{Bdb} = [(34.1 \times 0.4536) - (18.9 \times 0.4536)] (100/(100 + 3.51))$$

M_{Bdb} = 6.7 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):

$$FM = 3.5 \%$$

$$M_{SSiwb} = 28.0 \text{ lbs}$$

$$M_{ESiwb} = 23.0 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{BSidb} = [(28.0 \times 0.4536) - (23.0 \times 0.4536)] (100/(100 + 4))$$

$$M_{BSidb} = 2.2 \text{ kg}$$

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:

$$M_{Bdb} = 6.66 \quad \text{kg}$$

$$\theta = 364 \quad \text{min}$$

$$BR = \frac{60 \times 6.66}{364}$$

$$BR = 1.10 \quad \text{kg/hr}$$

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):

$$M_{BSidb} = 2.19 \text{ kg}$$

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

$$BR = \frac{60 \times 2.19}{121}$$

$$BR = 1.09 \text{ kg/hr}$$

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:

$$F_p = \frac{12.25}{14.04} = 0.873$$

$$V_s = 0.873 \times 85.49 \times 0.99 \times 0.205 \times \left(\frac{92.9 + 460}{\left(\frac{30.17}{13.6} + \frac{-0.18}{13.6} \right) \times 28.78} \right)^{1/2}$$

$$V_s = 12.08 \text{ ft/s}$$

*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, ft^2
- T_{std} = Standard absolute temperature, 528 °R
- P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg
- T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_{std} = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 12.08 \times 0.196 \times \frac{528}{92.9 + 460} \times \frac{30.2 + \frac{-0.18}{13.6}}{29.92}$$

$$Q_{sd} = \mathbf{8054.3 \text{ dscf/hr}}$$

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

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

Where:

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

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 56.326 \times 1.001 \times \frac{\left(30.17 + \frac{1.20}{13.6} \right)}{\left(79.0 + 460 \right)}$$

$$V_{m(std)} = \mathbf{55.829} \text{ dscf}$$

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 56.163 \times 1.001 \times \frac{\left(30.17 + \frac{0.98}{13.6} \right)}{\left(78.7 + 460 \right)}$$

$$V_{m(std)} = \mathbf{55.670} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 0 \times \frac{\left(30.17 + \frac{0.00}{13.6} \right)}{\left(69.4 + 460 \right)}$$

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

m_n – Total Particulate Matter Collected, mg

ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train 1 (first hour):

$$m_n = 0.0 + 8.9 + 0.0$$

$$m_n = 8.9 \text{ mg}$$

Using equation for Train 1 (remainder):

$$m_n = 0.1 + 2.2 + 0.8$$

$$m_n = 3.1 \text{ mg}$$

Train 1 Aggregate = **12.0 mg**

Using equation for Train 2:

$$m_n = 0.1 + 11.9 + 0.2$$

$$m_n = \mathbf{12.2 \text{ mg}}$$

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

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

Where:

K₂ = 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 1:

$$C_s = 0.001 \times \frac{12.0}{55.83}$$

$$C_s = \mathbf{0.00021} \text{ g/dscf}$$

For Train 2

$$C_s = 0.001 \times \frac{12.2}{55.67}$$

$$C_s = \mathbf{0.00022} \text{ g/dscf}$$

For Ambient Train

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

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

E_T – Total Particulate Emissions, g

ASTM E2515 equation (15)

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

Where:

C _s	=	Concentration of particulate matter in tunnel gas, g/dscf
C _r	=	Concentration particulate matter room air, g/dscf
Q _{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

$$E_T = (\underline{0.000215} - 0.000000) \times \underline{8054.3} \times \underline{364} / 60$$

$$E_T = \underline{10.50} \text{ g}$$

For Train 2

$$E_T = (\underline{0.000219} - 0.000000) \times \underline{8054.3} \times \underline{364} / 60$$

$$E_T = \underline{10.71} \text{ g}$$

Average

$$E = \underline{10.61} \text{ g}$$

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

$$7.5\% \text{ of the average} = \underline{0.80}$$

$$\text{Train 1 difference} = \underline{0.10}$$

$$\text{Train 2 difference} = \underline{0.10}$$

PR - Proportional Rate Variation

ASTM E2515 equation (16)

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

Where:

 θ = Total sampling time, min θ_i = Length of recording interval, min V_{mi} = Volume of gas sample measured by the dry gas meter during the "ith" time interval, dcf V_m = Volume of gas sample as measured by dry gas meter, dcf V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec V_s = Average gas velocity in the dilution tunnel, ft/sec T_{mi} = Absolute average dry gas meter temperature during the "ith" time interval, °R T_m = Absolute average dry gas meter temperature, °R T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, °R T_s = Absolute average gas temperature in the dilution tunnel, °R

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

$$PR = \left(\frac{364 \times 0.145 \times 12.08 \times (108.0 + 460) \times (79.0 + 460)}{1 \times 56.33 \times 12.24 \times (92.9 + 460) \times (68.0 + 460)} \right) \times 100$$

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

PM_R – Average particulate emissions for full integrated test run, g/hr
ASTM E2779 equation (5)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T (\text{Dual train average}) = 10.61 \text{ g}$$

$$\theta = 364 \text{ min}$$

$$PM_R = 60 \times (10.61 / 364)$$

$$PM_R = 1.75 \text{ g/hr}$$

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:

$$E_T (\text{Dual train average}) = 10.61 \text{ g}$$

$$M_{Bdb} = 6.66 \text{ kg}$$

$$PM_F = 10.61 / 6.66)$$

$$PM_F = 1.59 \text{ g/kg}$$

*Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032*

Section 4

Labeling & Owner's Manual

Installation Manual

Installation and Appliance Setup

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

OWNER: Retain this manual for future reference.

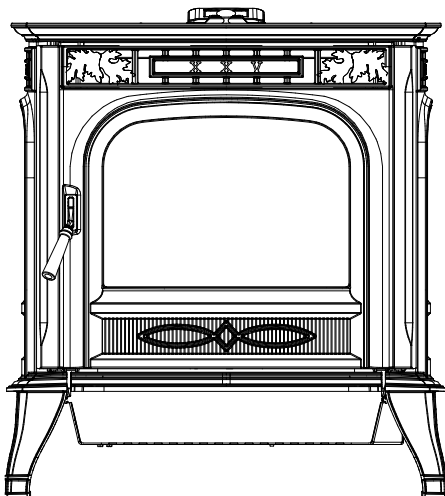
NOTICE: SAVE THESE INSTRUCTIONS

HARMAN®

BUILT TO A STANDARD, NOT A PRICE

Model(s):

XXV-TC Freestanding Pellet Stove



Tested &
Listed By
OMNI-TEST
OMNI-Test Laboratories, Inc.

Portland
Oregon USA

We suggest that our
hearth products be
installed and serviced by
professionals who are
certified in the U.S. by
the National Fireplace
Institute (NFI) as NFI
Specialists.



CAUTION

Tested and approved for wood pellet fuel only. Burning of any other type of fuel voids your warranty.



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.



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

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➔ = 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:** Indicates practices which could cause damage to the stove or to property.

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

	YES	IF NO, WHY?
Required non-combustible floor protection. (Pg. 9)	<input type="checkbox"/>	_____
Verified clearances to combustible. (Pg. 10-14)	<input type="checkbox"/>	_____
Unit is Leveled and secured.	<input type="checkbox"/>	_____

Venting/Chimney Section 4 (Pg. 10-19)

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 (Pg. 4)

120VAC unswitched power provided to the appliance.	<input type="checkbox"/>	_____
--	--------------------------	-------

Appliance Setup Section 5 (Pg. 20-21)

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"/>	_____

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:	XXV-TC Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS014S & 0135PS033E
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 2779-10, ASTM E 2515-11, ASTM E 1509-04, ULC-S627-00
ELECTRICAL RATING	115 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps
GLASS SPECIFICATIONS	5mm mirrored ceramic glass

The XXV-TC is Certified to comply with 2020 particulate emission standards.



Note: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2012, ULC S628-93, (UM) 84-HUD**

B. Glass Specifications

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

C. Mobile Home Approved

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

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

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



WARNING

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

DO NOT INSTALL IN SLEEPING ROOM.

D. BTU & Efficiency Specifications

EPA Certification Number:	
EPA Certified Emissions:	1.75 g/hr
*LHV Tested Efficiency:	77.5%
**HHV Tested Efficiency:	72.5%
***EPA BTU Output:	7,100 - 35,300
****BTU Input	11,000 - 48,000
Vent Size:	3 Inch
Hopper Capacity:	65 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.

E. Electrical Codes

115 VAC, 60 Hz, Start 3.5 AMPS, Run 2.5 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.

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

NOTE: 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 and 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.

NOTE: 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

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

- Windows
- Air Intakes
- Air Conditioner
- Overhang, soffits, porch roofs, adjacent walls
- Landscaping, vegetation

When locating vent and venting termination, vent above roof line when possible.

WARNING



Risk of Fire!

Damaged parts could impair safe operation. Do NOT install damaged, incomplete or substitute components.

myhht
FACTORY
training

Installation and service of this appliance should be performed by qualified personnel. Hearth & Home Technologies recommends HHT Factory Trained or NFI certified professionals.

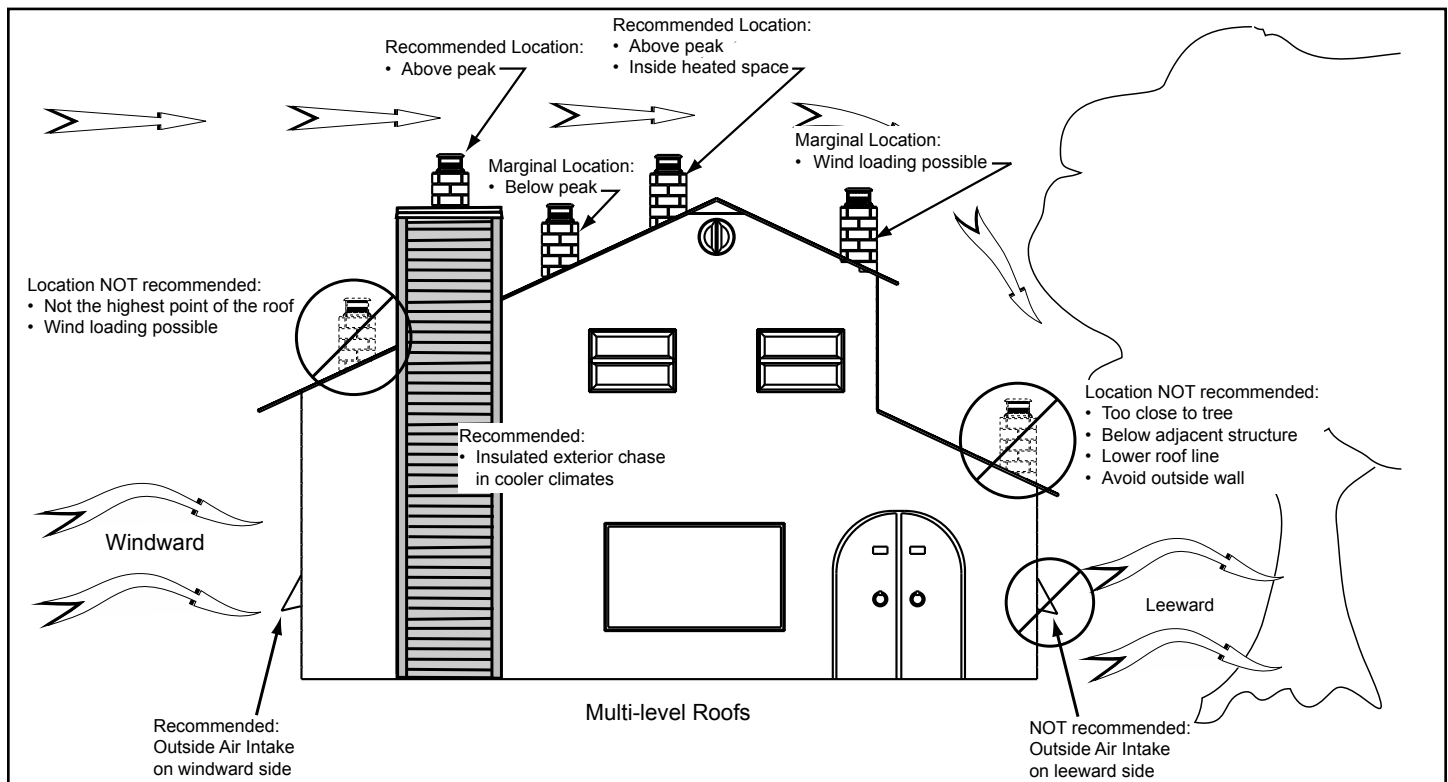


Figure 2.1

B. Tools And Supplies Needed

Tools and building supplies normally required for installation, unless installing into an existing masonry fireplace:

- Reciprocating Saw
 - Hammer
 - Phillips Screwdriver
 - Tape Measure
 - Level
 - Non-Combustible Sealant
 - Gloves
 - Safety Glasses
 - Electric Drill & Bits
- May also need:**
- Vent Support Straps
 - Venting Paint

C. Inspect Appliance and Components

- Carefully remove the appliance and components from the packaging.
- 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.**

DO NOT:

- *Install or operate a 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.

Hearth & Home Technologies disclaims any responsibility for, and the warranty will be voided by the following actions:

- Installation and use of any damaged appliance or vent system component.
- Modification of the appliance or vent system.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.

Any such action may cause a fire hazard.



WARNING

Risk of Fire, Explosion or Electric Shock! DO NOT use this appliance if any part has been under water. Call a qualified service technician to inspect the appliance and to replace any part of the control system which has been under water.



WARNING



RISK OF FIRE OR EXPLOSION!

DAMAGED PARTS COULD IMPAIR SAFE OPERATION. DO NOT install damaged, incomplete or substitute components. Keep appliance dry.

3 Clearances

A. Appliance Dimension Diagram

Dimensions are actual appliance dimensions. Use for reference only.

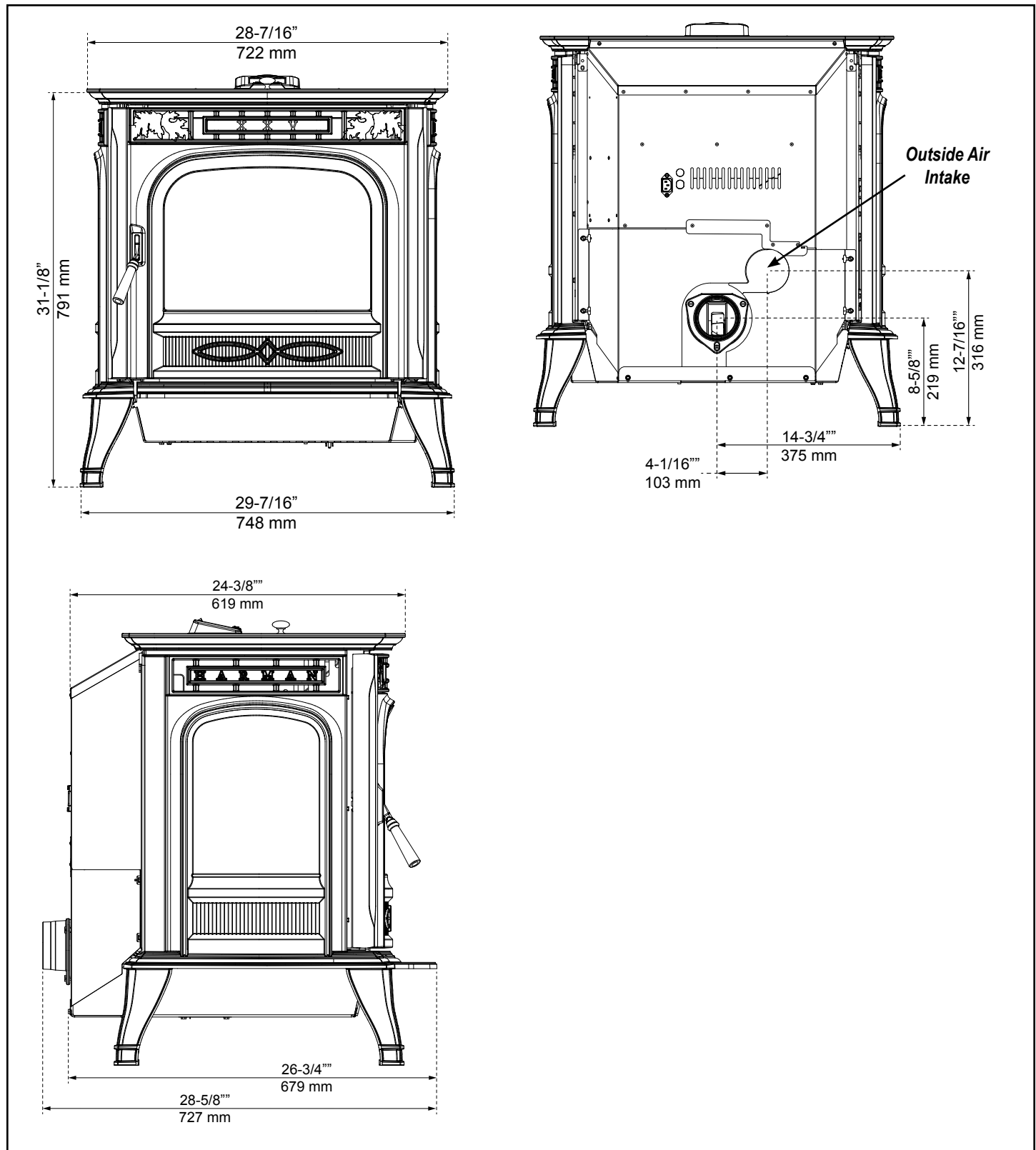


Figure 3.1

B. 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.

C. 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.

D. Clearances to Combustibles

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



WARNING

RISK OF FIRE OR BURNS! Provide adequate clearance around air openings and for service access. Due to high temperatures, the appliance should be located out of traffic and away from furniture and draperies.

Illustrations reflect typical installations and are FOR DESIGN PURPOSES ONLY. Actual installation may vary due to individual design preference.

Place the stove away from combustible walls at least as far as shown in Figure 3.2.

Note that the clearances shown are minimum for safety but do not leave much room for access when cleaning or servicing. Please take this into account when placing the stove.

Alternate floor protector dimension may be used as long as they satisfy the measurement requirements shown below.

When installing the unit into an alcove it is important to consider the required clearances listed below.

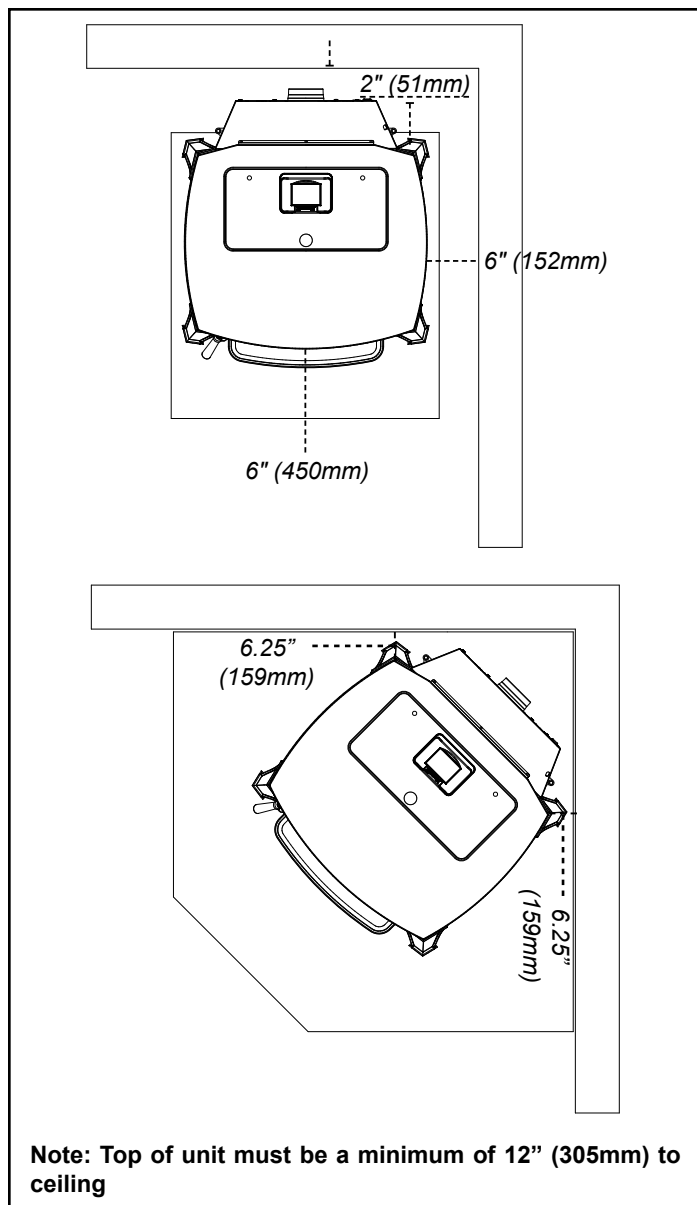
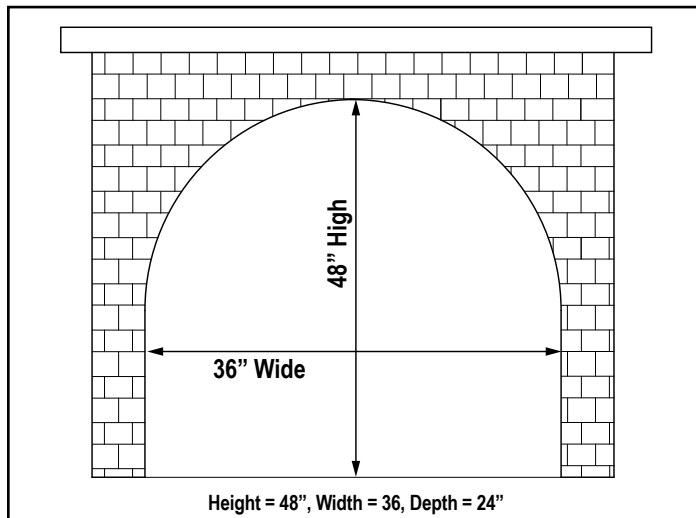


Figure 3.2



CAUTION

THIS APPLIANCE MUST BE VENTED TO THE OUTSIDE.

NOTICE

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

Due to high temperatures, the 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 skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this unit.

E. Floor Protection

Place the stove on a noncombustible floor or floor protector that extends a minimum of 6 inches (152mm) to the front of the load door opening, 6 inches (152mm) to the sides of the door opening, and 1 inches to the rear. Floor protection must also extend 2 inches (51mm) beyond each side of any horizontal flue pipe. The minimum floor protector material is 20 gauge sheet metal. Other floor protector materials are ceramic tile, stone, brick, etc. Figure 3.3

Minimum Size floor protection is 40-1/16" Wide By 30-7/8" Deep (658mm X 784mm).

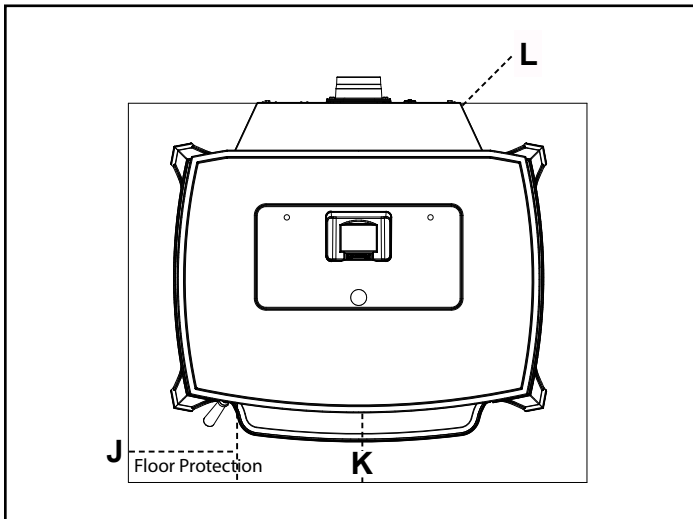
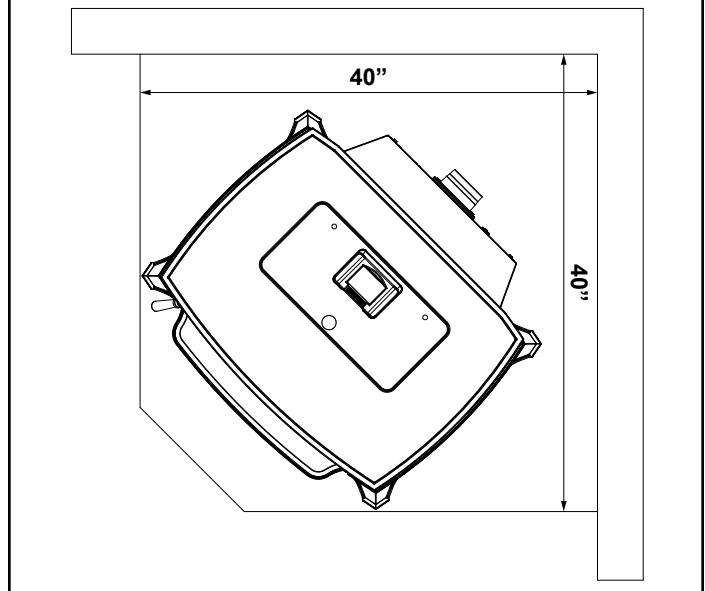


Figure 3.3

Floor Protection Requirements		US	Canada
J	Sides	6"	152mm
K	Front	6"	152mm
L	Rear	1"	25mm

Corner to edge dimension for corner installation floor protection.



Alternate floor protector dimension may be used as long as they satisfy the measurement requirements shown below.

Minimum size floor protection for a corner installation hearth pad is 36" x 36". Note: Floor protector **WILL NOT** touch the wall.

F. Mobile Home Installation

When installing this unit in a mobile home several requirements must be followed (Reference HUD Regulation #24CFR3280):

- The unit must be bolted to the floor. This can be done by using clips (part # 2-00-677110B) and 1/4" lag screws.
- The unit must be connected to outside air. See Section 4-D.
- Floor protection and clearances must be followed as shown above.
- 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.
- Chimney must meet requirements of CAN/ULC-S629, Standard for 650°C Factory Built Chimneys. Follow Manufacturer's guidelines concerning height and clearances to combustibles. Use the same manufacturer's components to provide an effective vapor barrier where the chimney or other component penetrates to the exterior of the mobile home. **DO NOT MIX COMPONENTS FROM DIFFERENT MANUFACTURERS.** The top section of chimney and the chimney cap must be removable to a maximum height of 13-1/2' for transport of the mo

4 Termination Location and Vent Information

A. Vent Termination Minimum Clearances

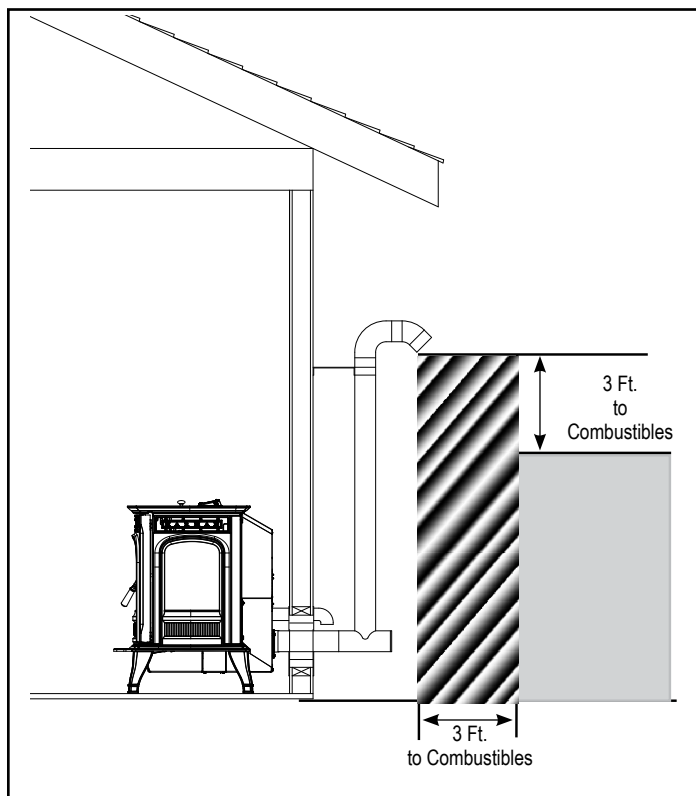


Figure 4.1

#1 Preferred method (Figure 4.1)

This method provides excellent venting for normal operation and allows the stove to be installed closest to the wall. Two inches from the wall is safe; however, four inches allows better access to remove the rear panel. The vertical portion of the vent should be three to five feet high. This vertical section will help provide natural draft in the event of a power failure.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Note: Do not place joints within wall pass-through.

THE CHIMNEY MUST BE OF A TYPE SUITABLE FOR SOLID-FUEL BURNING.



WARNING

THE CHIMNEY AND CONNECTOR MUST BE MAINTAINED IN GOOD CONDITION AND KEPT CLEAN.



CAUTION

DO NOT USE MAKESHIFT COMPROMISES WHEN INSTALLING THIS APPLIANCE. DAMAGE AND/OR INJURY MAY RESULT.

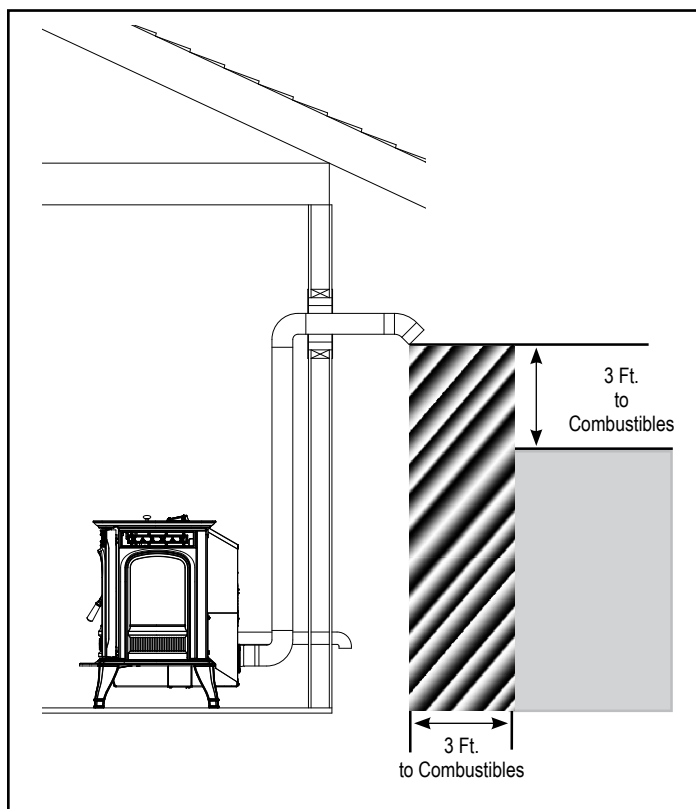


Figure 4.2

#2 Preferred method (Figure 4.2)

This method also provides excellent venting for normal operation but requires the stove to be installed farther from the wall. The vertical portion of the vent should be three to five feet high and at least 1" from a combustible wall. This vertical section will provide natural draft in the event of a power failure.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

If the stove is installed below grade be sure the vent termination is at least 12" above grade (with outside air only). The outlet must also be 12" from the house/building.

Note: Do not place joints within wall pass-through.



CAUTION

Keep combustible materials (such as grass, leaves, etc.) at least 3 feet away from the flue outlet on the outside of the building.

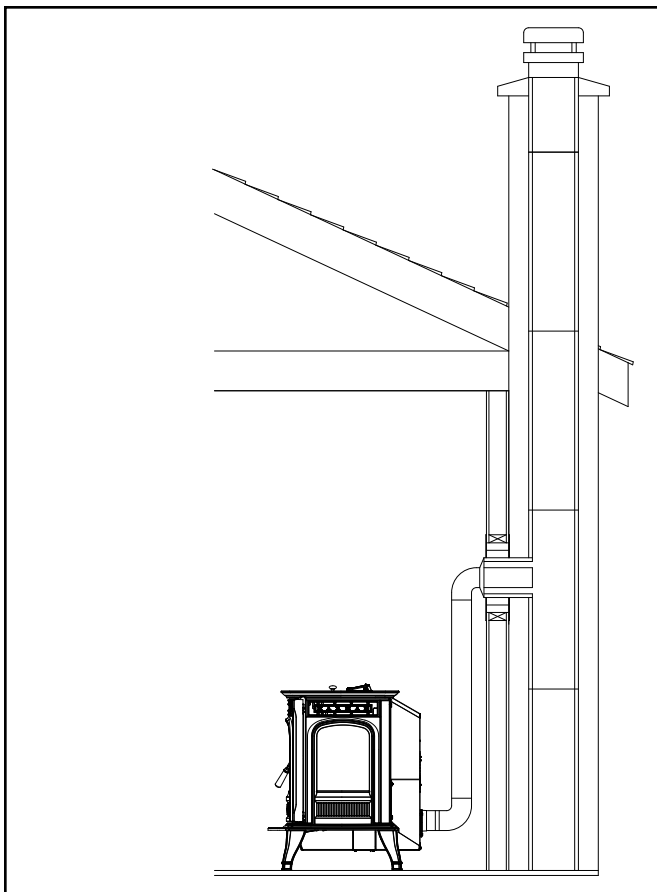


Figure 4.3

#3 Installing into an existing chimney (Figure 4.3)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #6.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. *Refer to Method 5 & 6.* Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Be sure to design the venting so that it can be easily cleaned.

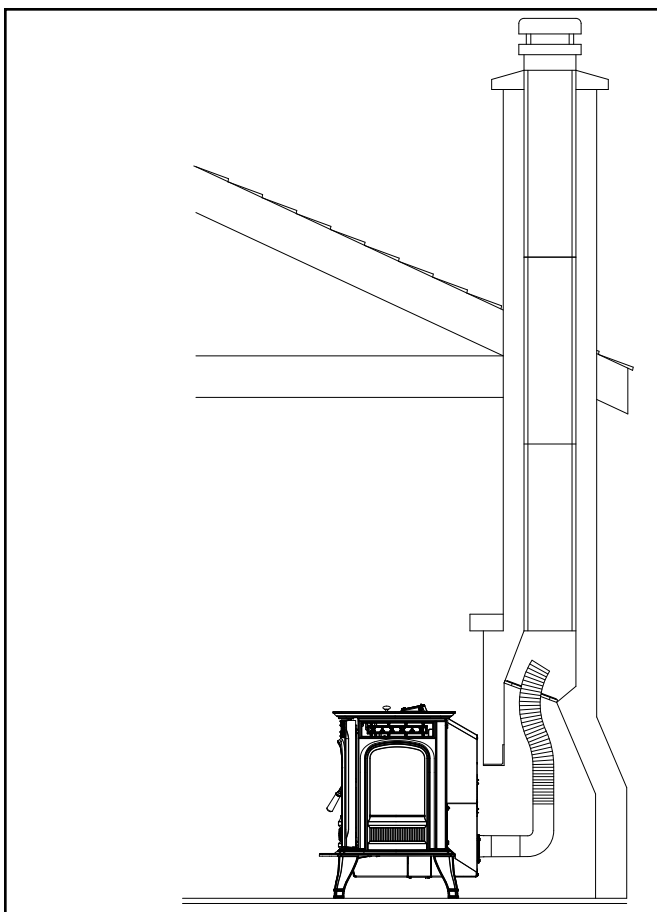


Figure 4.4

#4 Installing into an existing fireplace chimney (Figure 4.4)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #5.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney. In most cases the inside diameter of this liner should be 4". Either flexible or rigid liner may be used for this purpose. *Refer to Method 5 & 6.*

The chimney should be sealed at the damper using a steel plate. Kaowool, mineral wool or an equivalent non-combustible insulation is recommended to be installed on top of the sealing plate to reduce the possibility of condensation. The connector pipe should extend through the smoke chamber to the base or into the first flue tile. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Be sure to design the venting so that it can be easily cleaned.

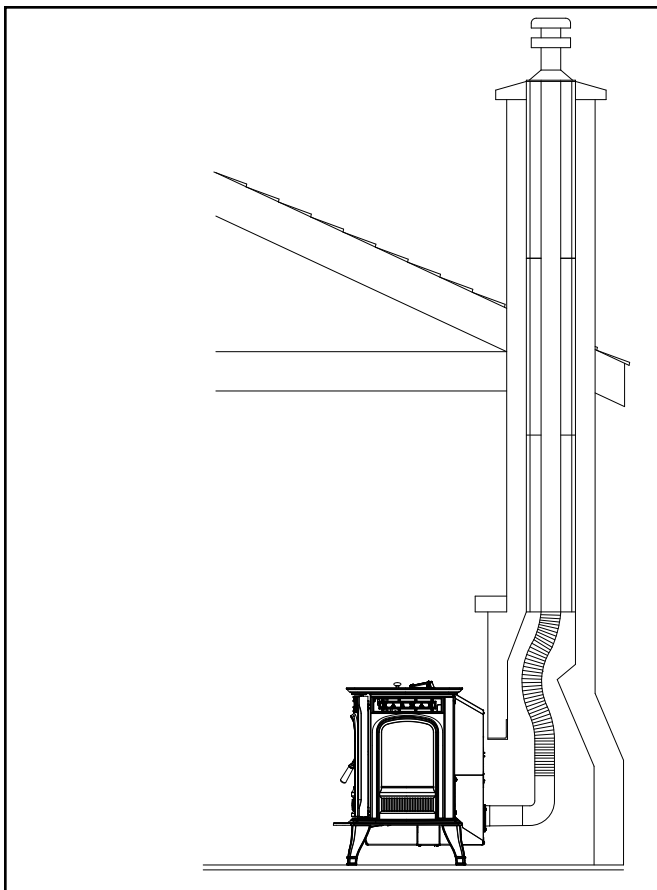


Figure 4.5

#5 Installing into an existing fireplace chimney (Figure 4.5) w/Full Liner

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

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

In this method a cap should also be installed on the chimney to keep out rain. Be sure to use approved pellet vent pipe fittings. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer. Pipe size should be increased to 4" using this method.

In this method a cap should also be installed on the chimney to keep out rain.

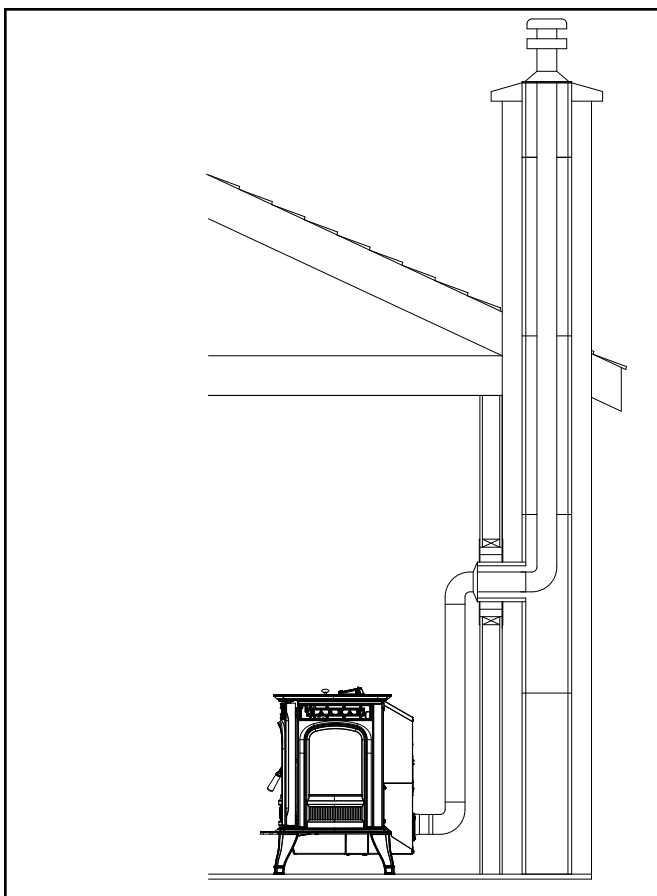


Figure 4.6

#6 Installing into an existing chimney (Figure 4.6) w/Full liner

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

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney. Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer. The pipe or liner inside the chimney should be 4" diameter.

In this method a cap should also be installed on the chimney to keep out rain.

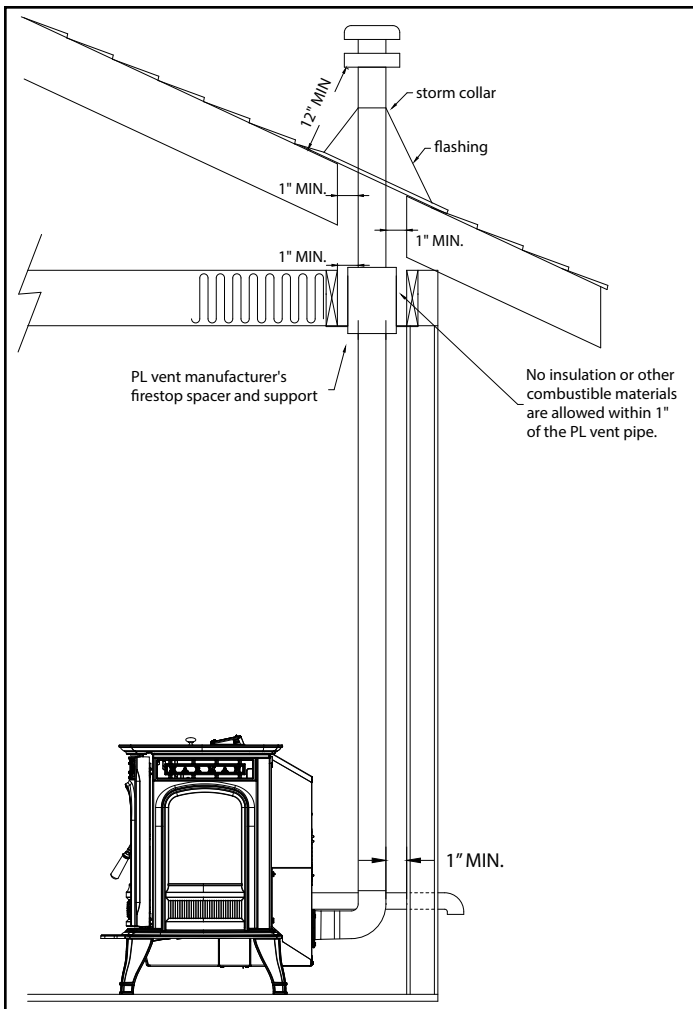


Figure 4.7

#7 Installing through the ceiling (Figure 4.7)

Follow PL vent manufacturers recommendations when using wall and ceiling pass through.

Seal pipe joints with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Note: Do not place joints within wall pass-through.

⚠ CAUTION

DO NOT USE MAKESHIFT COMPROMISES WHEN INSTALLING THIS APPLIANCE. DAMAGE AND/OR INJURY MAY RESULT.

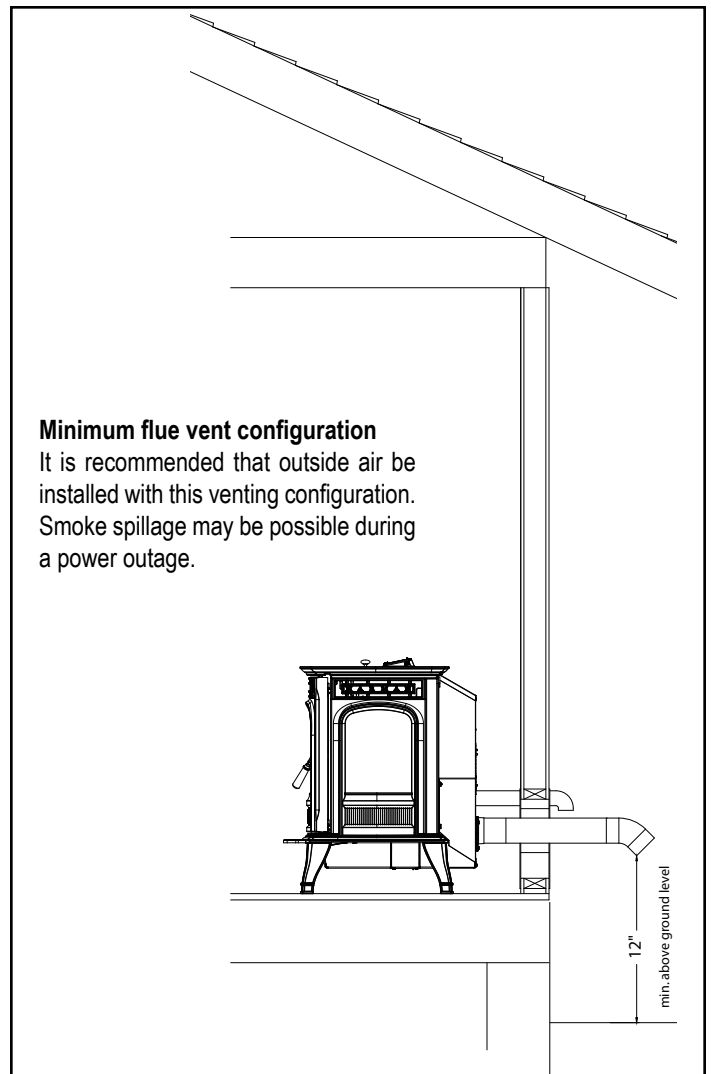


Figure 4.8

Area within dotted circle represents the minimum clearance to combustible materials such as shrubbery, mulch or tall grasses.

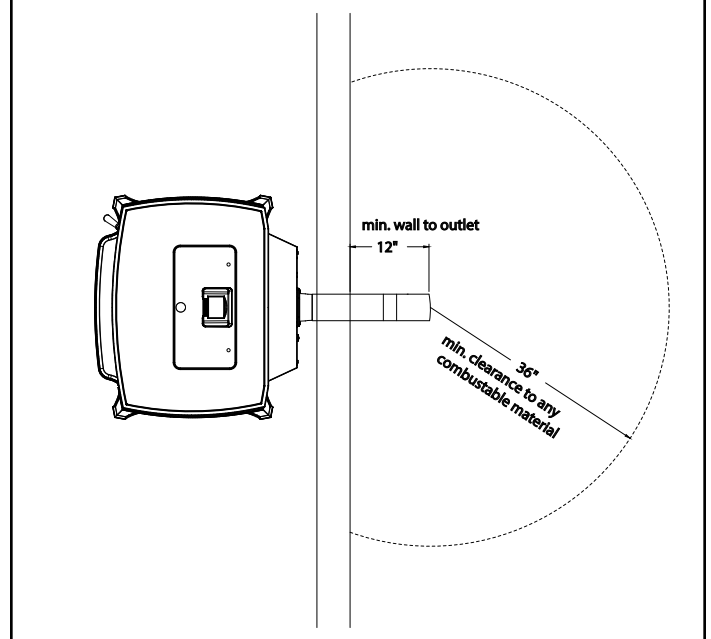


Figure 4.9

#8 Installing into an existing chimney using the Optional Top Vent option. (Figure 4.10)

This method provides excellent venting for normal operation. This method also provides natural draft in the event of a power failure. If the chimney condition is questionable* you may want to install a liner as in method #6.

In some places in the US and Canada it is required that the vent pipe extend all the way to the top of the chimney.

*The chimney should be inspected and cleaned before installing your stove. If you discover that the chimney does not have a clay tile liner or has cracks or flaking of the tile liner you will need to install a stainless steel liner within the chimney.

Be sure to design the venting so that it can be easily cleaned.

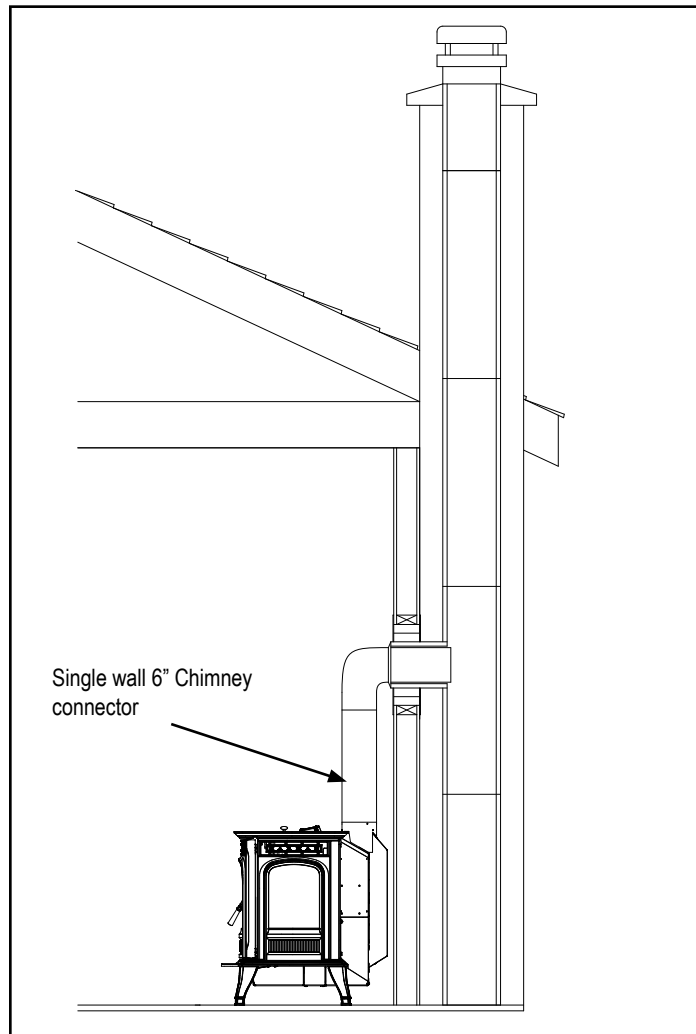
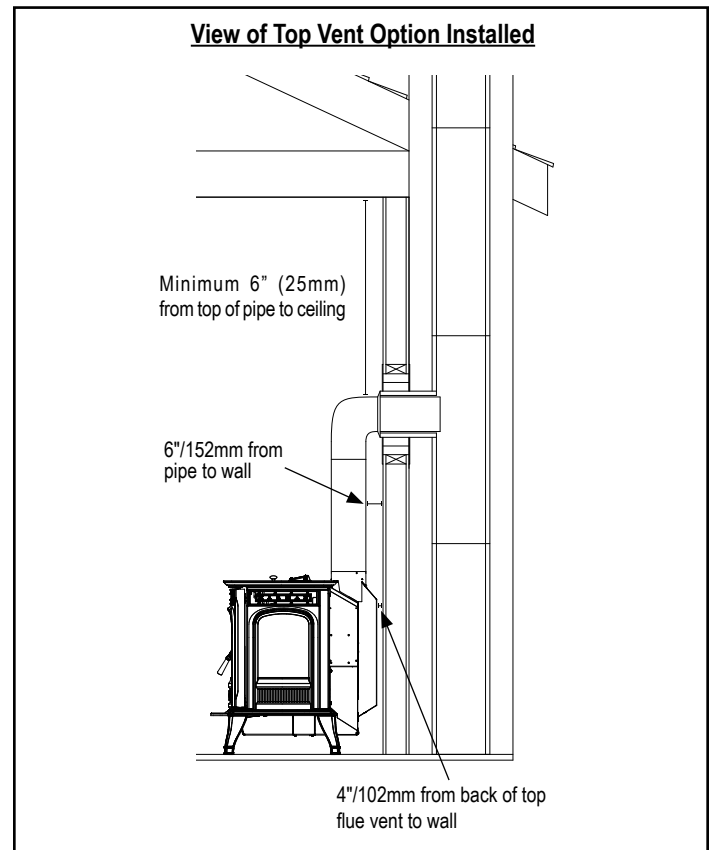


Figure 4.10

Optional Top Vent Pipe Clearances



Chimney Connectors

- Seal single wall joints with silicone to prevent smoke leakage.
- Use three (3) screws at each Joint.

B. Chimney Diagram

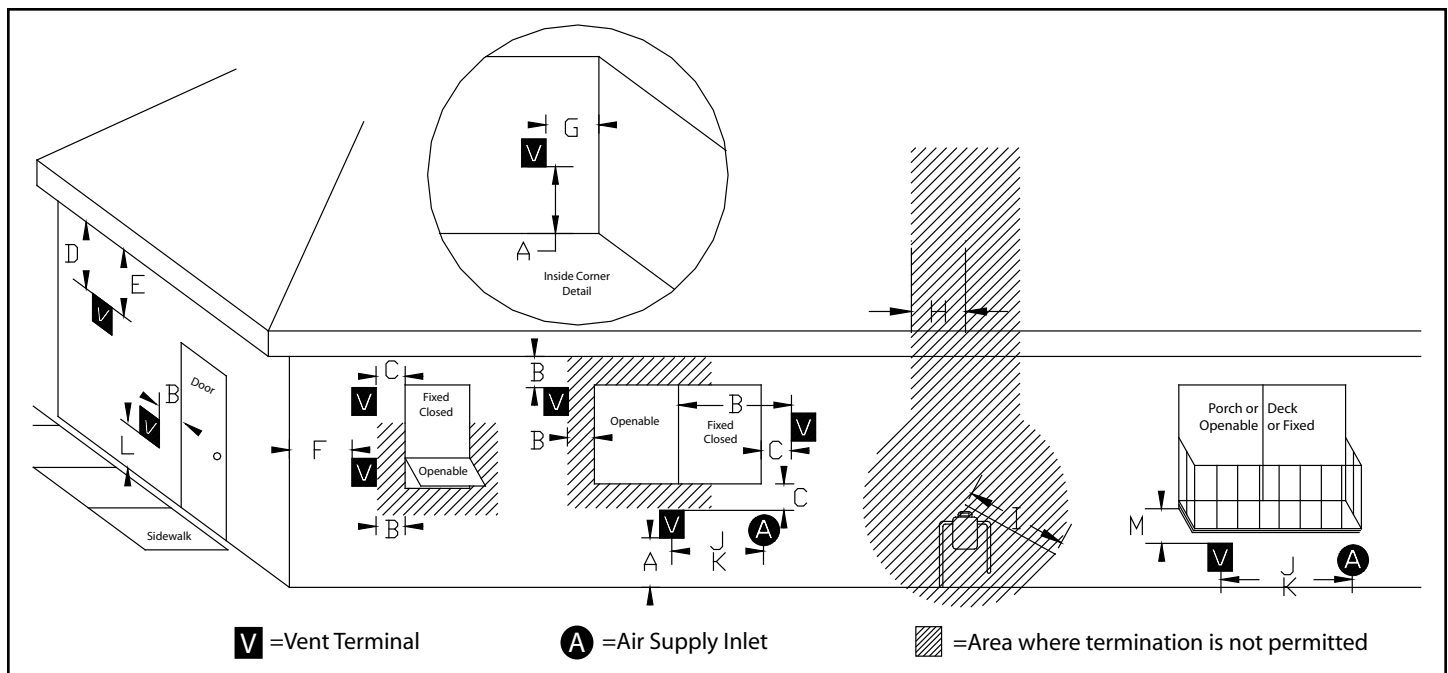


Figure 4.10

Requirements for Terminating the Venting



WARNING

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

Only PL vent pipe wall pass-through and fire stops should be used when venting through combustible materials.

Always take into consideration the effect the prevailing wind direction or other wind currents will cause with flyash and/or smoke when placing the termination.

In addition, the following must be observed:

- 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, 48" below the window/door, 12" above the window/door. **(with outside air installed, 12" 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 (60 cm) 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 (90 cm) 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 inches. **(B. also)**

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.

Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365. (if in Canada)

C. Venting & Use of Elbows

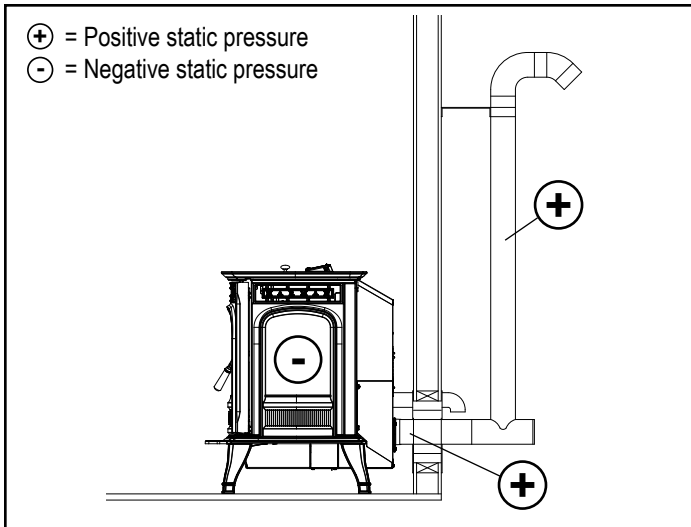


Figure 4.11

Harman pellet stoves depend on a combustion fan to pull air through the unit for combustion. The venting system restricts the ability of the combustion fan to move the required amount of air through the unit. A system with too much resistance will result in incomplete combustion, more frequent required cleaning and poor unit performance. It is always best to choose a location for the appliance that will result in a venting system with the shortest equivalent vent length (EVL).

It is best to have your venting system designed by a Harman authorized dealer before you finalize your purchase of an appliance.

Equivalent Vent Length: *The equivalent vent length for common pellet vent components are:*

- 90° Elbows or Tee: 5 EVL Units
- 45° elbow: 3 EVL Units
- Vertical Pipe or Liner: ½ EVL Unit
- Horizontal Pipe or liner: 1 EVL Unit

The total allowable equivalent vent length is:

- 20 EVL for 3" pellet vent pipe or liner.
- 30 EVL for 4" pellet vent pipe or liner.

Due to the potential for fly ash accumulation in horizontal venting sections, the maximum permissible horizontal venting length is:

- 4 ft. for 3" & 4" pellet vent pipe.

Example: First Floor Installation

A unit is to be installed using 3" Pellet Vent Pipe with 3 feet of horizontal pipe, a Tee, 10 feet of vertical pipe, a 90° elbow and a termination cap.

The equivalent vent length is:

3 ft. of Horizontal Pipe (1 x 3 EVL)	= 3 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
10 ft. of Vertical Pipe (10 x .5 EVL)	= 5 EVL
90° Elbow or Tee (1 x EVL)	= 5 EVL
Termination Cap	= 0 EVL
Equivalent Vent Length	= 18 EVL

In the example system detailed above, the EVL was 18 which is less than the maximum of 20 EVL for 3" pellet vent pipe, thus this is a satisfactory venting configuration.

Example: Connection to Masonry Chimney

A unit is to be installed using 3" Pellet Vent Pipe with 2 feet of horizontal pipe, a Tee, 4 feet of vertical pipe, an elbow, a Tee, 21 feet of vertical liner, and a termination cap.

The equivalent vent length is:

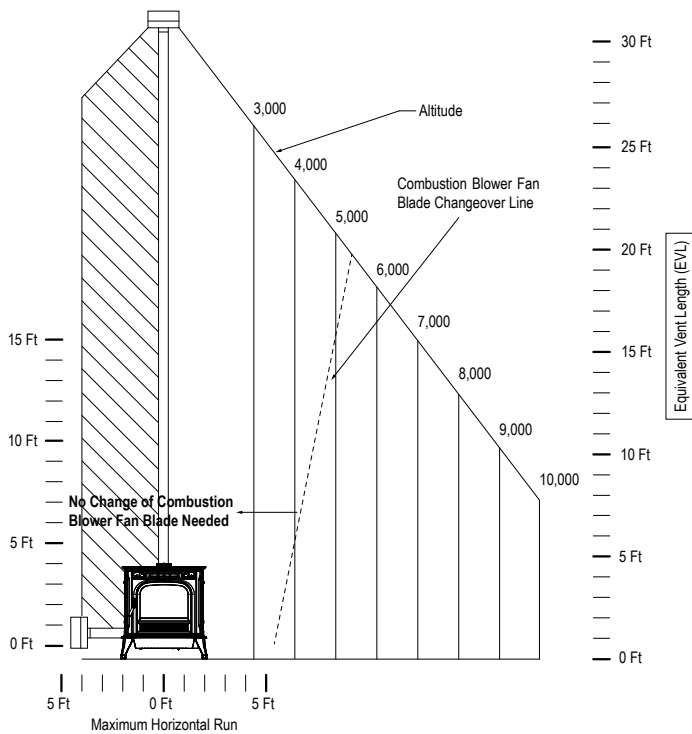
2 ft. of Horizontal Pipe (1 x 2 EVL)	= 2 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
4 ft. of Vertical Pipe (4 x .5 EVL)	= 2 EVL
90° Elbow (1 x 5 EVL)	= 5 EVL
90° Tee (1 x 5 EVL)	= 5 EVL
21 ft. of Vertical Liner (21 x .5 EVL)	= 10.5 EVL
Termination Cap	= 0 EVL
Equivalent Vent Length	= 29.5 EVL

In the example system detailed above, the EVL was 29.5 which exceeds the maximum of 20 ft. for 3" pellet vent pipe, thus 3" vent pipe should not be used in this installation. However, since 4" pipe can support an EVL up to 30, the use of 4" pipe would create a satisfactory installation.

C. Venting & Use of Elbows *continued*

Note: When the amount of vertical pellet vent pipe in the system exceeds 15 feet, 4" pellet vent pipe should be used.

Note: Equivalent Venting Length decreases as altitude increases.



Example:

A unit with an EVL of 13, is to be installed at an altitude of 3,000 feet above sea level.

From the chart to the left, at 3,000 feet of altitude, the maximum permissible equivalent venting length is 26 feet.

However, if the same unit (EVL 13) was to be installed an altitude of 9,000 feet above sea level, the installation would no longer be acceptable and the equivalent vent length of the pipe would have to be reduced for proper unit operation.

- Long runs of flex or PL vent pipe installed directly vertical from the flue stub may require more frequent cleaning due to fly ash falling off inside and collecting directly above the combustion blower outlet.
- 4" stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood-burning fireplaces with Class A metal chimneys.
- All pellet vent pipe must be secured together either by means provided by the pipe manufacturer or by 3 screws at each joint.
- Use only the specified venting components. Use of any other components will void the product warranty and may pose a hazard.
- Do Not Install a Flue Damper In The Exhaust Venting System of This Appliance.
- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
- Simpson DuraVent PelletVent Pro Harman® Adapter Part #3PVP-ADHB and PelletVent Pro Harman® Adapter Increaser Part #3PVPX4ADHB are highly recommended to be installed on the starter collar to insure a proper pipe connection to the unit.
- **INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.**
- Use silicone to create an effective vapor barrier at the location where the chimney or outside air ducting passes through to the exterior of the structure.

D. Outside Air

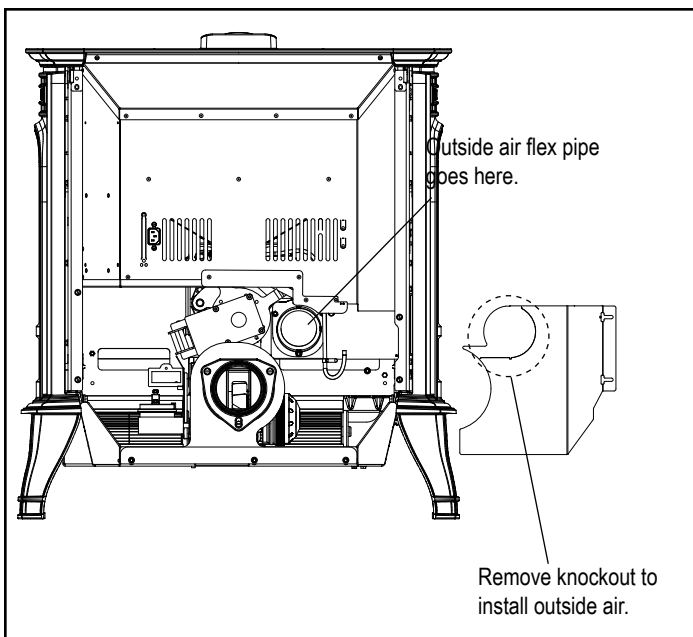


Figure 4.12

Termination Cap Part# 1-10-09542

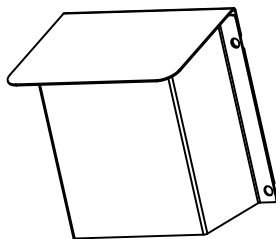


Figure 4.13

Direct Vent Wall Pass-through Kit Part #1-00-677177

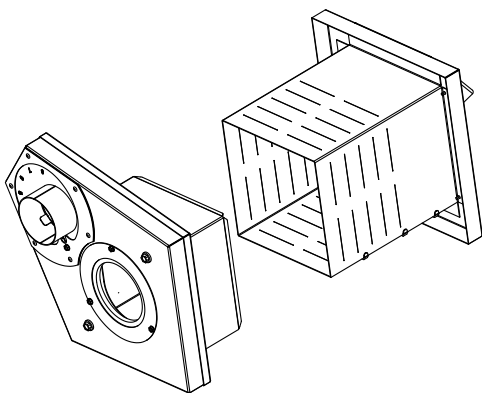


Figure 4.14

Outside Air:

Hearth & Home Technologies recommend attaching outside air in all installations, especially lower level and main floor locations.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands, may lead to back-drafting of those and other appliances.

When the appliance is side-wall vented: The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

When the appliance is roof vented: The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

The outside air connection will supply the demands of the pellet appliance, but consideration must be given to the total house demand. House demand may consume some air needed for the stove, especially during a power failure. It may be necessary to add additional ventilation to the space in which the pellet appliance is located. Consult with your local HVAC professional to determine the ventilation demands for your house.

To install outside air use 3" non-combustible flex pipe. There is a break-away hole on the rear panel of the XXV-TC stove which must be removed before connecting the flex pipe, Figure 4.12. The pipe should be run outside and terminate to the side or below the vent pipe outlet so the flue outlet is more than 12" from the inlet cover. The Termination Cap should be used to keep birds, rodents, etc. out of the pipe, Figure 4.13.

You may choose to use the optional Direct Vent Wall Pass-through Kit which incorporates the venting pass-through and outside air inlet into one component, Figure 4.14.

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 in your appliance use a manahelic or a digital pressure gauge capable of reading 0 - 1 inches of water column (W.C.).

The appliance should be running on high for at least 15 minutes for the test.

With the stove running on high you should have a negative pressure equal to or greater than the number given in the chart below. If you have a lower reading than you find on the chart, your appliance does not have adequate draft to burn the fuel properly.

Minimum Vacuum Requirements:
.20

Prior to installing the flue pipe, connect a draft meter. (The draft meter must have a minimum range of 0 - .5") Record the first reading. Connect flue pipe to stove and be sure all doors and windows in the home are closed. Record the second draft reading _____. If the second reading is more than .05" lower than the first reading, check for possible restrictions or the need for outside air. For more information on the draft test procedure, refer to "Appliance Set-Up" Section C.

G. Negative Pressure



WARNING

Risk of Asphyxiation! Negative pressure can cause spillage of combustion fumes and soot.

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

- Exhaust fans (kitchen, bath, etc.).
- Range hoods.
- Combustion air requirements for furnaces, water heaters and other combustion appliances.
- Clothes dryers.
- Location of return-air vents to furnace or air conditioning.
- Imbalances of the HVAC air handling system.
- Upper level air leaks such as:
 - Recessed lighting
 - Attic hatch
 - Duct leaks

To minimize the effects of negative air pressure:

- Install the outside air kit with the intake facing prevailing winds during the heating season.
- Ensure adequate outdoor air for all combustion appliances and exhaust equipment.
- Ensure furnace and air conditioning return vents are not located in the immediate vicinity of the appliance.
- Avoid installing the appliance near doors, walkways or small isolated spaces.
- Recessed lighting should be a "sealed can" design.
- Attic hatches weather stripped or sealed.
- Attic mounted duct work and air handler joints and seams taped or sealed.

NOTICE

Hearth & Home Technologies assumes no responsibility for the improper performance of the chimney system caused by:

- Inadequate draft due to environmental conditions
- Downdrafts
- Tight sealing construction of the structure
- Mechanical exhausting devices

H. Avoiding Smoke and Odors

Negative Pressure, Shut-down, and Power Failure:

To reduce the probability of back-drafting or burn-back in the pellet burning appliance during power failure or shut-down conditions, the stove must be able to draft naturally without exhaust blower operation. Negative pressure in the house will resist this natural draft if not accounted for in the pellet appliance installation.

Heat rises in the house and leaks out at upper levels. This air must be replaced with cold air from outdoors, which flows into lower levels of the house. Vents and chimneys into basements and lower levels of the house can become the conduit for air supply, and reverse under these conditions.

Outside Air

An outside air kit is recommended in all installations. The Outside Air Kit must be ordered separately.

Per national building codes, consideration must be given to combustion air supply to all combustion appliances. Failure to supply adequate combustion air for all appliance demands may lead to back drafting of those and other appliances.

When the appliance is roof vented (strongly recommended):

The air intake is best located on the exterior wall oriented towards the prevailing wind direction during the heating season.

When the appliance is side-wall vented:

The air intake is best located on the same exterior wall as the exhaust vent outlet and located lower on the wall than the exhaust vent outlet.

The outside air supply kit can supply most of the demands of the pellet appliance, but consideration must be given to the total house demand.

House demand may consume the air needed for the appliance. It may be necessary to add additional ventilation to the space in which the pellet appliance is located.

Consult with your local HVAC professional to determine the ventilation demands for your house.

Vent Pipe

Be sure to use approved pellet vent pipe wall and ceiling pass-through fittings to go through combustible walls and ceilings. Be sure to use a starting collar to attach the venting system to the stove. The starting collar must be secured to the flue stub with at least three screws, and sealed with high temp silicone caulking.

4" stainless steel flex vent piping is only allowed for use in masonry fireplaces and chimneys or factory built wood-burning fireplaces with class A metal chimneys.

Pellet vent pipe is constructed of two layers with air space between the layers. This air space acts as an insulator and reduces the outside surface temperature to allow a clearance to combustibles of only 1 inch. The sections of pipe lock together to form an air tight seal in most cases; however, in some cases a perfect seal is not achieved. For this reason and the fact that the XXV-TC operates with a positive vent pressure, we specify that the joints also be sealed with silicone or aluminum tape in addition to the sealing system used by the manufacturer.

Where passing through an exterior wall or roof, use silicone to maintain an effective vapor barrier at the location where the chimney or component penetrates to the exterior of the structure.

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.
- Installing outside air.

To prevent soot damage to exterior walls of the house and to prevent re-entry of soot or ash into the house:

- Maintain specified clearances to windows, doors, and air inlets, including air conditioners.
- Vents should not be placed below ventilated soffits. Run the vent above the roof.
- Avoid venting into alcove locations.
- Vents should not terminate under overhangs, decks or onto covered porches.
- Maintain minimum clearance of 12 inches from the vent termination to the exterior wall. If you see deposits developing on the wall, you may need to extend this distance to accommodate your installation conditions.

Hearth & Home Technologies assumes no responsibility for, nor does the warranty extend to, smoke damage caused by reverse drafting of pellet appliances under shut-down or power failure conditions.

I. Fire Safety

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

- Install at least one smoke detector and CO detector on each floor of your home. The National Fire Protection Association (NFPA), recommends one smoke alarm on every floor, in every sleeping area, and in every bedroom.
- 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.

J. Inspect Appliance & Components

- Remove appliance and components from packaging and inspect for damage.
- Report to your dealer any parts damaged in shipment.
- **Read all the instructions before starting the installation. Follow these instructions carefully during the installation to ensure maximum safety and benefit.**



WARNING



Inspect appliance and components for damage. Damaged parts may impair safe operation.

- Do NOT install damaged components.
- Do NOT install incomplete components.
- Do NOT install substitute components.

Report damaged parts to dealer.

5 Appliance Set-Up

A. Unpacking

The XXV-TC is bolted (5/16" x 2" Lag Screws) to the skid to prevent movement during shipping.

To free the stove from the skid you must remove the Lag Screws from each shipping bracket using a 1/2" socket or wrench. Figure 5.1.

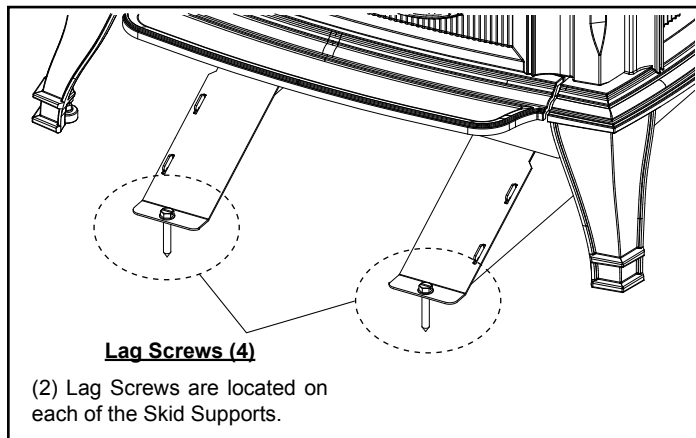


Figure 5.1

B. Firebox Draft and Combustion Fan RPM

These units are pre-tested at the factory with exactly 120 VAC, 60 Hz. They are checked and adjusted for firebox tightness, gasket leakage, motor operation and igniter operation. The Allure50 is then factory set at a mid-point adjustment and in most cases will not need any adjustments.

Check and record the firebox draft before installing venting and after venting is installed (**before starting fire**).

There is a draft meter port located in the back of the unit at the pressure switch where draft can be measured. Install the manahelic meter (*capable of at least .5" of water column*) Figure 5.2.

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

Go to the "Home Screen", the power icon should be gray. Press menu, on the first menu page press "test" icon.

The test page has 4 component test modes. The second icon is for the combustion fan test.

One press of the icon turns the combustion fan to full line voltage. (**Note: During this test, the combustion fan will not achieve its top RPM of 3200 due to the density of the ambient air.**) All RPM displays could vary +/- 50 from that of the set RPM's. Allow several minutes for the fan motor to warm up.

Press the icon a second time, the combustion fan will go to "Maximum" (as set in the **Authorized Dealer Only** area under the combustion fan icon)

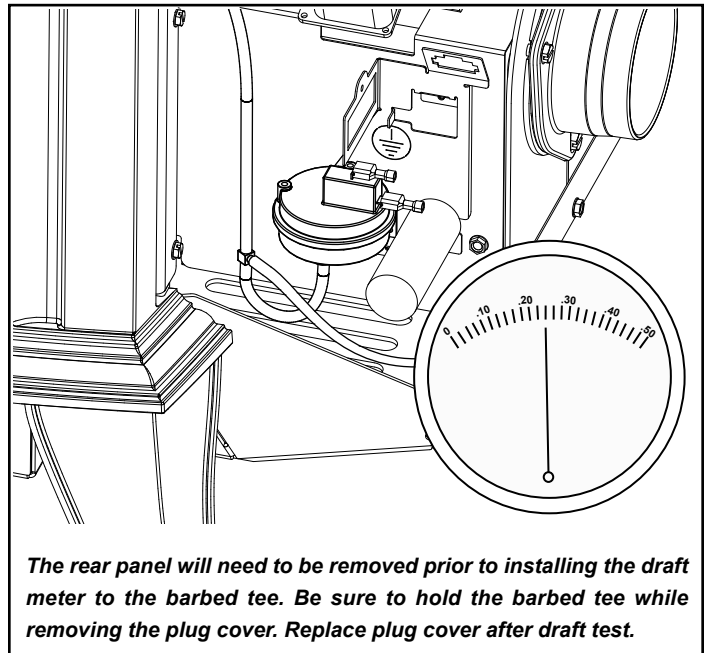


Figure 5.2

The "Maximum" is factory set at 3100 RPM. Allow the RPM to stabilize and record the firebox draft Maximum.

Before Install: _____ IWC

After Install: _____ IWC

(Firebox Draft and Combustion Fan RPM Cont.)

Press the icon a third time, the combustion fan will go to "Minimum" (as set in the **Authorized Dealer Only** area under the combustion fan icon) allow the RPM to stabilize and record the firebox draft minimum.

Before Install: _____ IWC

After Install: _____ IWC

Cold Stove Draft:

2400 RPM Low -.20 and -.25

3100 RPM High -.45 and -.50

Leaving the test page will end any tests in progress and goes back to whatever mode of operation it was set to on the home page.

If the unit is not adjusted properly, it does not cause a safety concern. If the unit is adjusted too high, only efficiency is lost. If the unit is adjusted too low, the low draft pressure switch will not allow the feed motor or the igniter to operate.

6 Reference Material

A. Safety Reminders

When installing and operating your Harman® XXV-TC, respect basic safety standards. Read these instructions carefully before you attempt to install or operate the XXV-TC. 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.

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

Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burn to skin and/or clothing.

Young children should be carefully supervised when they are in the same room as the stove.

Clothing and other flammable materials should not be placed on or near this stove.

Installation and repair of this stove should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning may be required. It is imperative that control compartments, burners, and circulating air passageways of this stove be kept clean.



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.



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

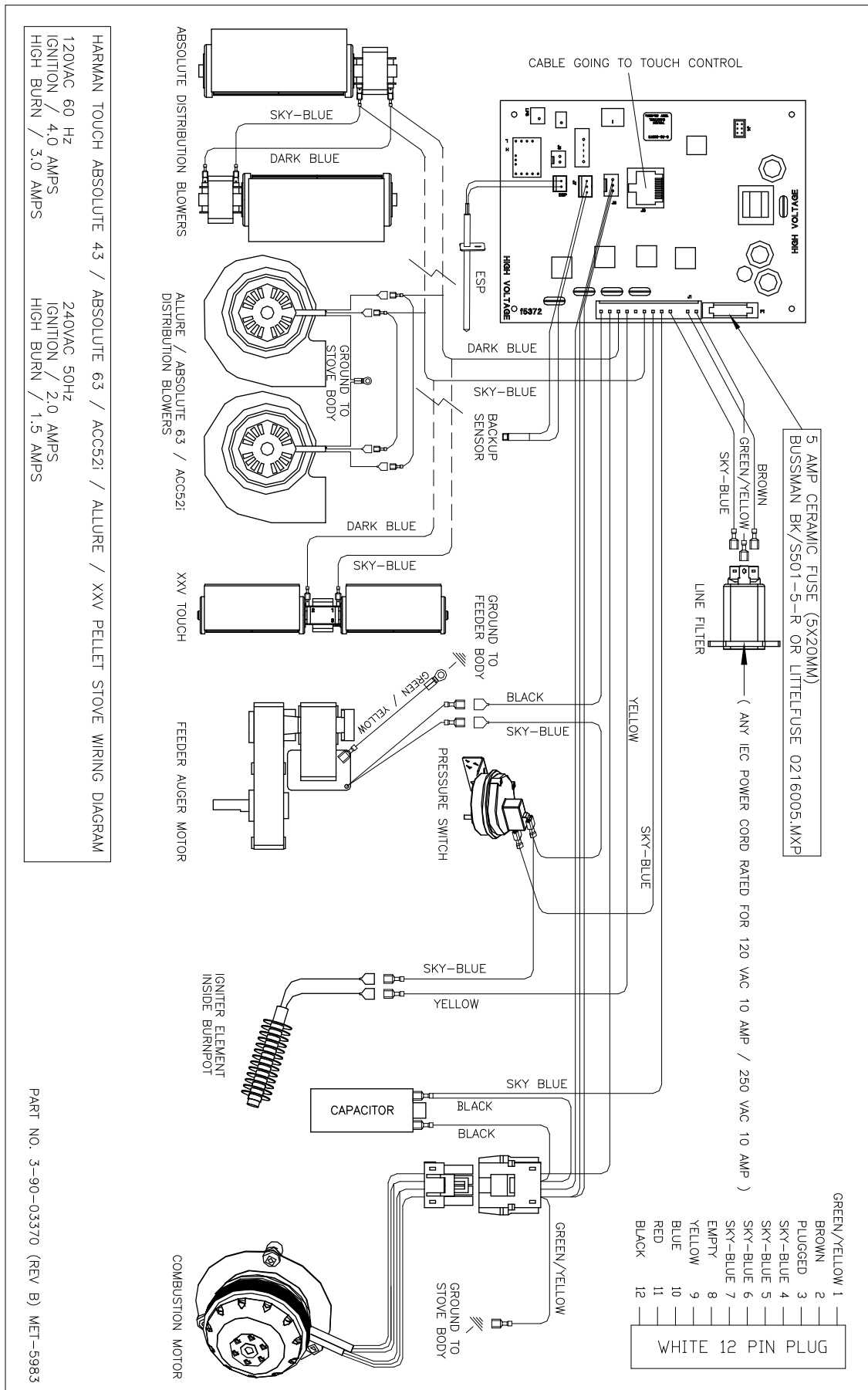
THIS APPLIANCE MUST BE VENTED TO THE OUTSIDE.



CAUTION

THE STOVE IS HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

B. Wiring Diagram



Harman®, a brand of Hearth & Home Technologies Inc.
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.

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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®

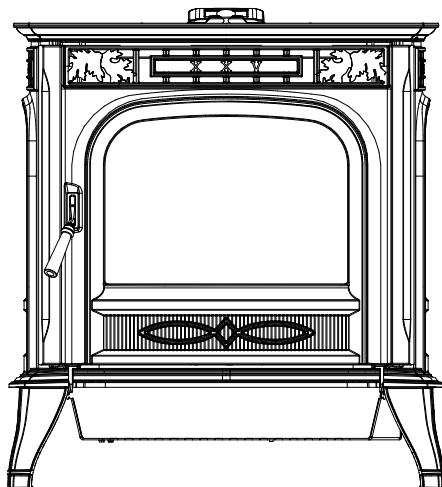
BUILT TO A STANDARD, NOT A PRICE

Model(s):

XXV-TC Freestanding Pellet Stove



XXV-TC
Use & Care Video



Tested & Listed By **O-T-L** Portland Oregon USA
OMNI-Test Laboratories, Inc.



CAUTION

Tested and approved for wood pellet fuel only. Burning of any other type of fuel voids your warranty.



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.



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

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

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

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

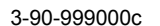


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▲ Safety Alert Key:

- **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.

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➔ = Contains updated information

1 Product Specific and Important Safety Information

A. Appliance Certification / Specifications

MODEL:	XXV-TC Pellet Stove
LABORATORY:	OMNI Test Laboratories, Inc
REPORT NO.	0135PS014S & 0135PS033E
TYPE:	Pellet Fueled/Supplementary For Residential Use
STANDARD(s):	ASTM E 2779-10, ASTM E 2515-11, ASTM E 1509-04, ULC-S627-00
ELECTRICAL RATING	115 VAC, 60 Hz, Start 4.2 Amps, Run 2.8 Amps
GLASS SPECIFICATIONS	5mm mirrored ceramic glass

The XXV-TC is Certified to comply with 2020 particulate emission standards.



NOTE: This installation must conform with local codes. In the absence of local codes you must comply with the **ASTM E1509-2004, ULC S628-93, ULC/ORD-C-1482-M1990, (UM) 84-HUD**

B. Mobile Home Approval

This appliance is approved for mobile and manufactured 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" or "L" connector pipe.

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



WARNING

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

DO NOT INSTALL IN SLEEPING ROOM.

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.

C. BTU & Efficiency Specifications

EPA Certification Number:	
EPA Certified Emissions:	1.75 g/hr
*LHV Tested Efficiency:	77.5%
**HHV Tested Efficiency:	72.5%
***EPA BTU Output:	7,100 - 35,300
****BTU Input	11,000 - 48,000
Vent Size:	3 Inch
Hopper Capacity:	65 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.

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.

D. Appliance Safety (Cont.)

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. It is imperative that control compartments and circulating air passageways of this stove be kept clean.

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. 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.

CAUTION

THE STOVE IS HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS.

F. Helpful Hints

When operating your Harman® XXV-TC Pellet Stove, follow basic safety standards. Read these instructions carefully before you attempt to operate the XXV-TC Pellet Stove. 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 burnpot.

Disposal of Ash: 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.

G. Fuel Specifications

The XXV-TC Pellet Stove is approved for burning any grade of pelletized bio-mass fuel.

It should be noted, that higher ash content fuel 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.



CAUTION

This appliance must be vented to the outside

G. 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

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

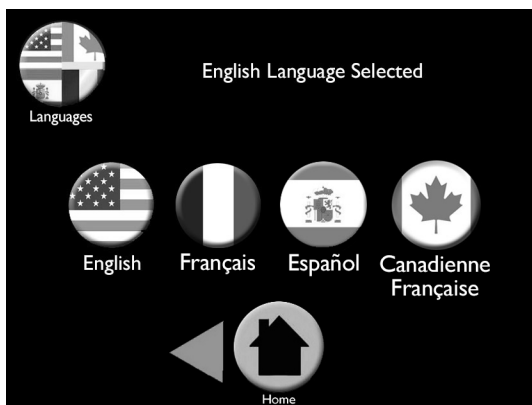
NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR 'FRESHEN UP' A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER, WHILE IN USE.



WARNING

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

H. Quick Start Guide



Initial start-up Only

1. Select Language.



2. Fill hopper with pellets.



3. Adjust arrows to set room desired temperature.



4. Touch the On/Off Power Icon.
Refer to Touch Manual for all other operations.

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 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.	Ensure there are pellets in burnpot. Ensure holes in burnpot are clear of obstructions above the igniter. See Burnpot Maintenance. Check to see if the ignitor is getting hot, if not replace ignitor. *See manual ignition instructions for emergency heating needs.

J. Cleaning Prompts, Messages and Errors


Your EASY Touch Control communicates with you by showing messages on the top center of the EASY Touch Control home screen. If you have more than one message, the messages will show consecutively until you acknowledge the message by performing the task. These communications include:


PROMPTS	Scrape Burn Pot and Reset Here 	When prompted, scrape burnpot. Press check-mark to reset.
	Empty Ash Pan and Press Here 	When prompted, inspect and empty ash pan as needed. Press check-mark to reset.
	Total Clean and Reset 	When prompted, inspect and perform total clean. Press check-mark to reset.
MESSAGES	Touch Here If Hopper Was Filled 	Press check-mark if you filled the hopper. If you did not fill hopper, The message will disappear in 30 seconds.
	Wireless Sensor Low Battery Warning	Replace the 2 “AA” batteries in the Wireless Remote Sensor.
	Using Backup Sensor	If Wireless Remote Sensor batteries die, the Back Up Sensor will continue to heat your home.
ERRORS	Warning: Door Open	Check and close the front and ash doors for the stove to continue to heat.
	Warning: Hopper Lid Open	Close the hopper lid for the stove to continue to heat.
	Error: Check Fuel and Reset 	Fill the hopper with pellets. Press check-mark to reset. If you did not fill the hopper, the message will stop after 30 seconds. This error only appears if “Show Fuel Gauges” is turned on.
	Wireless Signal Lost Replace Batteries in Wireless Sensor	Batteries in Wireless Remote Sensor have expired. Replace the 2 “AA” batteries.
	Return Air Sensor Failure	Return Air Sensor has failed. Call your Harman Dealer.
	Ignition Failure Correct and Reset 	Unit has failed to ignite. Scrape the burnpot. Call your Harman Dealer if problem persists.
	Connection Failure Control <====> Display	Touch Control has lost communication to the stove. Call your Harman Dealer.
	Exhaust Sensing Probe Failure	Exhaust Sensing Probe (ESP) as failed. Clean the ESP. If issue persists, call your Harman Dealer.
	Combustion Error Correct and Reset 	Clean your stove. Call your Harman Dealer if problem persists.

2 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

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

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.***

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

B. Quick Reference Maintenance Chart

Cleaning or Inspection	Frequency		Daily	Weekly	Monthly	Yearly
Ash Pan	Every 5 bags of fuel depending on the fuel type or ash build-up	OR		X		
Ash Removal from Firebox	Every 5 bags or more frequently depending on the fuel type or ash build-up	OR		X		
Heat Exchanger	Every 1 ton of fuel	OR			X	
Fan, Combustion (Exhaust)	More frequently depending on the fuel type	OR				X
Fan, Distribution	Every 25 bags or more frequently depending on the fuel type	OR			X	
Door Gasket Inspection	Prior to heating season	OR				X
Exhaust Path	More frequently depending on ash build-up	OR				X
Firebox - Prepare for Non-Burn Season	At end of heating season	OR				X
Burnpot - Burning pellets - hardwood	Every 3 bags	OR	X			
Burnpot - Burning pellets - softwood	Every 5 bags	OR	X			
Glass	When clear view of burnpot becomes obscure	OR		X		
Hopper / Hopper Lid Gasket	Every 50 bags of fuel or when changing fuel types	OR			X	
Venting System	More frequently depending on the fuel type	OR				X

C. Burnpot Maintenance

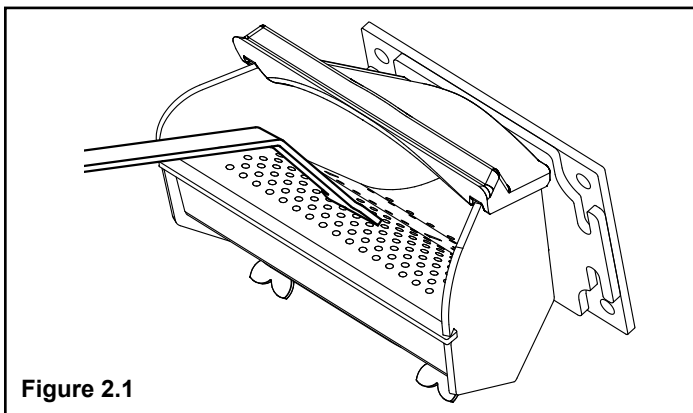


Figure 2.1

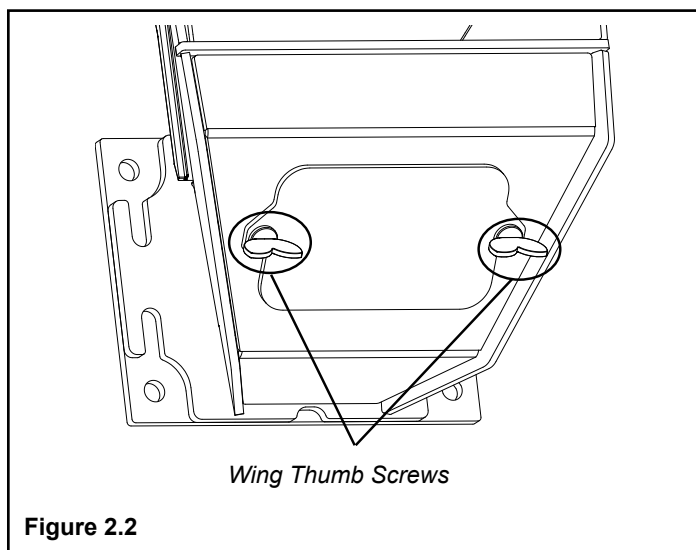


Figure 2.2

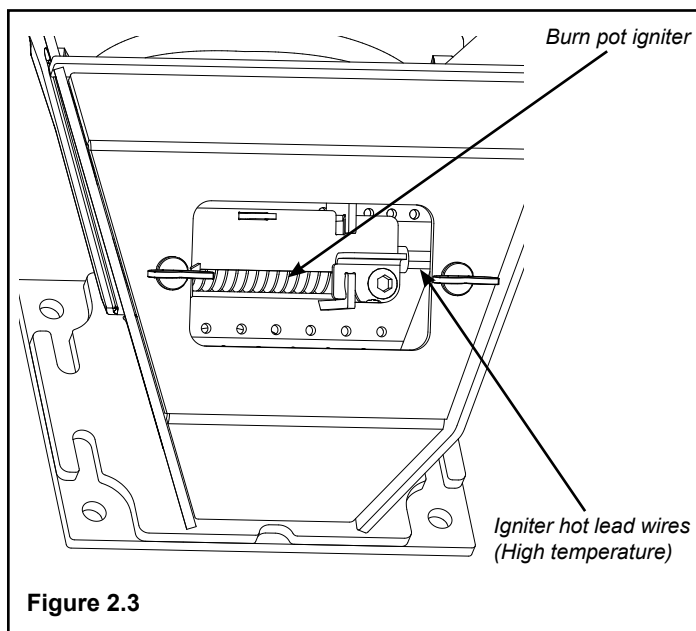


Figure 2.3

Viewed from below through the ash pan opening.

Whenever adding fuel, take the opportunity to clean the burn pot. **(Weekly at minimum)**

- Scrape the top grate and sides of the burn pot down to auger tube Figure 2.1. It is not necessary to completely remove all material from the burn pot. The excess will be pushed out during the next use.
- With the fire out and burn pot cold, use the supplied allen wrench to remove any build-up that may have accumulated in the holes of the burn pot grate. Simply push the allen wrench down through each hole ensuring it is clear of any build-up paying attention not to damage the igniter element in the process.

Monthly, or after each ton of fuel burned:

- Loosen the (2) wing thumb screws on the lower front angle of the burn pot. Figure 2.2
- Lift off the clean-out cover to open the bottom clean-out chamber. Figure 2.3

DANGER

Disconnect the power to the unit before removing cover.

- Clean ash buildup from inside the chamber while cover is off. Use the scraper tool and tap on the top front edge of the burn pot. This will help knock loose ash and other debris down through the burnpot. Prior to reinstalling the clean-out cover, ensure the igniter and bracket is clear of any ash build-up. Build-up can be removed using a vacuum.

Figure 2.3

The igniter is made to be removable for service by insulated male/female wire connectors. These connections between the hot leads (the wires inside the burn pot) and the cold leads (the wires from the control board) are always pulled to the inside rear of the feeder body. **(Not coiled inside the burn pot.)**

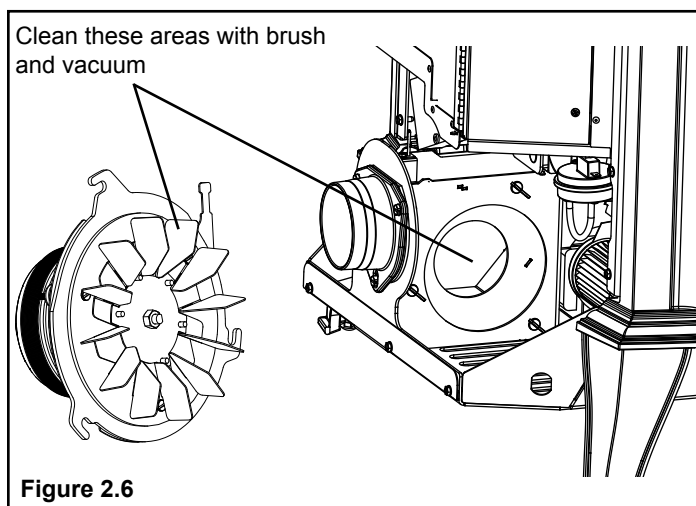
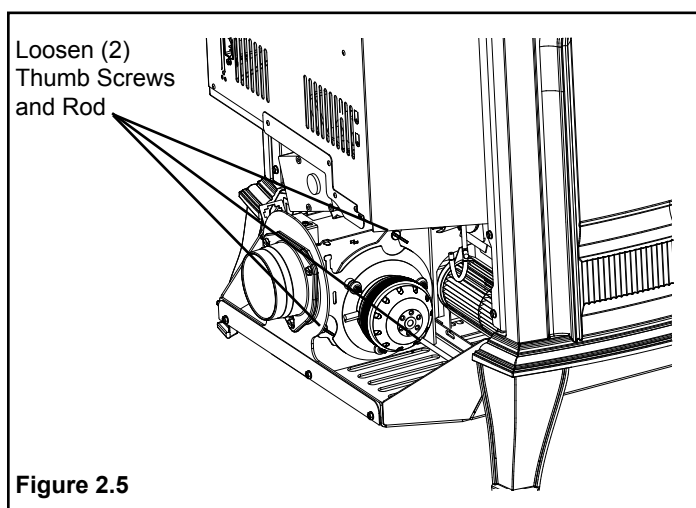
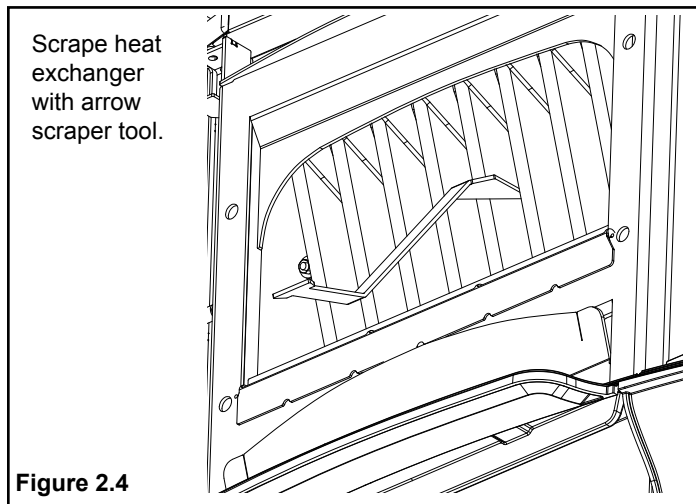
It is very important that these connections are to the inside rear of the feeder body. Also, the extra wire of the igniter wire service loop must be pulled out through the rear of the feeder and tied up so that it will not be damaged by any moving parts.

WARNING

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

Note: The hot lead/cold lead connection must always be pulled to the rear of the feeder body before operation.

D. Combustion Blower Chamber



Monthly Cleaning- continued:

Clean the heat exchanger with scraper as shown in Figure 2.4. 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.

The exhaust passage may need cleaned as well. Keep in mind the ESP Sensor is located just inside the exhaust passage Figure 2.7. Be sure not to damage the ESP Sensor while cleaning this area.

- Remove the combustion blower by loosening the 2 Thumb Screws and Rod (Figure 2.5), twisting the combustion blower mount plate counterclockwise to unlock, and pulling the blower out.
- Clean the combustion blower housing and fan blade with a brush and a vacuum cleaner Figure 2.6.

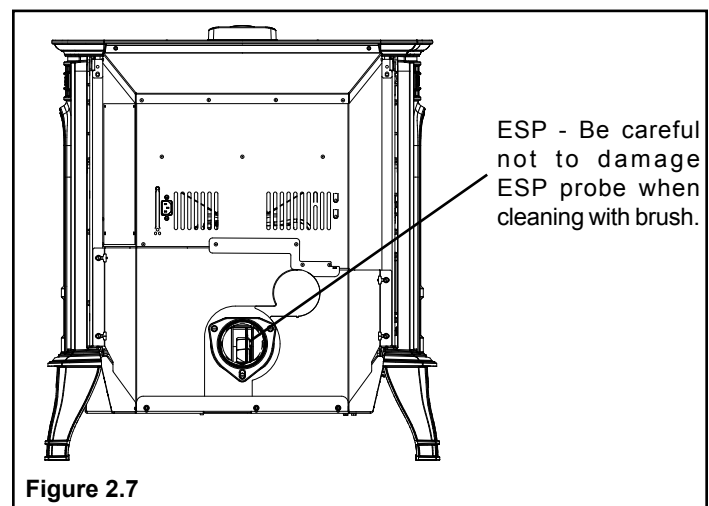
Note: Do not use a household vacuum to clean the stove. We recommend that you use a shop vacuum that is equipped with a fine dust filter called a HEPA filter or a vacuum specially made for fly ash and soot. USING A VACUUM WHICH IS NOT EQUIPPED WITH A FINE DUST FILTER WILL BLOW FLY ASH AND SOOT OUT INTO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

Use a brush to clean the flue, being careful not to damage the ESP probe Figure 2.7.

Reinstall the combustion blower by turning plate clockwise to lock into place and tightening the 3 wing nuts. Be sure the fan plate is flush with the exhaust housing on the stove body and the motor armature points up toward the hopper.

Slide ash pan into the stove and latch the door.



E. Glass Maintenance

The glass used in your stove is manufactured to exact standards to withstand the high heat of the fire, but like all glass, it must be treated with common sense and care. Never abuse the glass by slamming the door shut or striking the glass with a heavy object. If the glass is broken or damaged, do not operate the stove until it has been replaced.

Glass - Cleaning

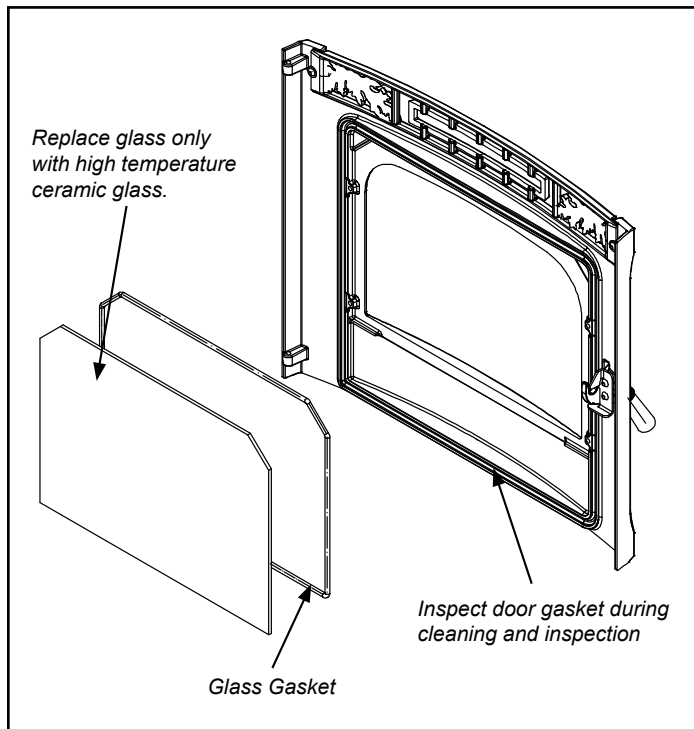
Sometimes it will be necessary to clean accumulated ash from the glass surface; allowing this ash to remain on the glass for long periods can result in “etching” due to the acidity of the ash. Never clean the glass while it is hot, and **do not** use abrasive substances. Wash the surface with cool water, and rinse thoroughly. You may wish to use a non-abrasive cleaner specifically designed for use on stove glass. In any case, dry thoroughly before relighting your stove.

Glass - Replacement

If the stove’s glass is cracked or broken, you must replace it before operating your stove. Remove pieces carefully. Replace glass only with Harman® replacement glass; **do not use substitutes.**

Carefully remove damaged glass, gasket material, and hold down clips (set aside).

Install the self adhesive 1/4” gasket material around the front face of the glass. Set the glass panel and gasket gently onto the door. Install the hold down clips and tighten with bolts.



3 Reference Material

A. Service Parts

**Service Parts
List**

Service Parts List

Service Parts List

Service Parts List

Service Parts List

B. Limited Lifetime Warranty

Hearth & Home Technologies LIMITED LIFETIME WARRANTY

Hearth & Home Technologies, on behalf of its hearth brands ("HHT"), extends the following warranty for HHT gas, wood, pellet, coal and electric hearth appliances that are purchased from an HHT authorized dealer.

WARRANTY COVERAGE:

HHT warrants to the original owner of the HHT appliance at the site of installation, and to any transferee taking ownership of the appliance at the site of installation within two years following the date of original purchase, that the HHT appliance will be free from defects in materials and workmanship at the time of manufacture. After installation, if covered components manufactured by HHT are found to be defective in materials or workmanship during the applicable warranty period, HHT will, at its option, repair or replace the covered components. HHT, at its own discretion, may fully discharge all of its obligations under such warranties by replacing the product itself or refunding the verified purchase price of the product itself. The maximum amount recoverable under this warranty is limited to the purchase price of the product. This warranty is subject to conditions, exclusions and limitations as described below.

WARRANTY PERIOD:

Warranty coverage begins on the date of original purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the product by an independent, authorized HHT dealer/ distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from HHT, regardless of the installation or occupancy date. The warranty period for parts and labor for covered components is produced in the following table.

The term "Limited 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, pellet, and coal appliances. These time periods reflect the minimum expected useful lives of the designated components under normal operating conditions.

Warranty Period		HHT Manufactured Appliances and Venting							Components Covered
Parts	Labor	Gas	Wood	Pellet	EPA Wood	Coal	Electric	Venting	
1 Year		X	X	X	X	X	X	X	All parts and material except as covered by Conditions, Exclusions, and Limitations listed
2 years				X	X	X			Igniters, electronic components, and glass
		X	X	X	X	X			Factory-installed blowers
			X						Molded refractory panels
3 years				X					Firepots and burnpots
5 years	1 year			X	X				Castings and baffles
7 years	3 years		X	X	X				Manifold tubes, HHT chimney and termination
10 years	1 year	X							Burners, logs and refractory
Limited Lifetime	3 years	X	X	X	X	X			Firebox and heat exchanger
90 Days		X	X	X	X	X	X	X	All replacement parts beyond warranty period

See conditions, exclusions, and limitations on next page.

B. Limited Lifetime Warranty (*continued*)

WARRANTY CONDITIONS:

- This warranty only covers HHT appliances that are purchased through an HHT authorized dealer or distributor. A list of HHT authorized dealers is available on the HHT branded websites.
- This warranty is only valid while the HHT appliance 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 appliance resides.
- Contact your installing dealer for warranty service. If the installing dealer 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 product.
- Check with your dealer 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 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. These parts include: paint, wood, pellet and coal 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 appliance in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the appliance; (2) failure to install the appliance 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 operating instructions; (7) installation or use of components not supplied with the appliance 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 appliance.
- Non-HHT venting components, hearth components or other accessories used in conjunction with the appliance.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas appliance is installed.
- HHT's obligation under this warranty does not extend to the appliance's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper appliance for the application. Consideration must be given to appliance location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The appliance has been over-fired or 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, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The appliance is subjected to prolonged periods of dampness or condensation.
- There is any damage to the appliance or other components due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF LIABILITY:

- The owner's exclusive remedy and HHT's sole obligation under this warranty, under any other warranty, express or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified above. In no event will HHT be liable for any incidental or consequential damages caused by defects in the appliance. Some states do not allow exclusions or limitation of incidental or consequential damages, so these limitations may not apply to you. This warranty gives you specific rights; you may also have other rights, which vary from state to state. EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE.

C. Loss of Power

Minimizing Smoke During Loss of Power Using Battery Back-up

Harman® strongly recommends installing battery back-up to minimize entry of smoke into the room in the event of power loss.

Your pellet/biomass burning appliance relies on a combustion blower to remove exhaust. A power failure will cause the combustion blower to stop. This may lead to exhaust seeping into the room. Vertical rise in the venting may provide natural draft. It is, however, no guarantee against leakage.

There are two Harman® approved battery back-up options for your appliance:

Uninterruptible Power Supply (UPS) battery back-ups are available online or at computer and office equipment stores. Your Harman® appliance may be plugged directly into a Harman® approved UPS:

- The APC (American Power Conversion) model #BE750G and the TrippLite model INTERNET750U are 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.**

- The Surefire 512 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.

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 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.



WARNING

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



CAUTION

Always keep appliance doors and hopper lid closed and latched during operation and during power failures to minimize risk of smoke or burn-back.

D. Emergency Manual Ignition

Harman® pellet stoves and inserts should be lit using the automatic ignition system. This is the safest and most reliable way for igniting the unit. In the event the automatic igniter is not functioning, the steps below may be followed to manually light the stove or insert in the “Constant Burn” mode. Manual lighting is for emergency purposes only, and the igniter should be repaired or replaced as soon as practical.



WARNING

Only use firestarter commercially marketed for pellet stoves and inserts, including wax coated wood chips, pellet starter gel and pellet igniter blocks. Use of any other type of firestarter is prohibited.

To avoid serious injury or death read and follow manufacturer’s warning and instructions for use of firestarter. Use of firestarter is only permitted when performing a cold start.

Never attempt to manually light a stove or insert that has been operated recently and is not at room temperature. If automatic ignition was attempted, be sure to give the stove or insert at least 30 minutes or longer to cool to room temperature.

Be sure that the stove or insert is in the “Igniter - Disabled” mode of operation.

Once all the precautions have been taken, follow these steps:

1. On the touch control, select the Burn Mode icon then select “Constant Burn”.
2. Arrow back and select the Igniter icon then select “Manual” for the ignition method. Select the Home Icon to go back to the Main Menu.
3. Fill burn pot with pellets, only half way. (Do Not Over Fill).
4. Add firestarter to pellets following manufacturer’s instructions.
5. Light pellet firestarter with a match, and close the door, touch the On/Off icon on the home screen. Operation will begin when the fire reaches the proper temperature.

E. Troubleshooting

ISSUES	SOLUTIONS
Stove does not feed	<ul style="list-style-type: none"> No fuel in hopper. Firebox draft may be too low for sensing switch in feeder circuit to operate. Check for closed doors, loose or missing gasket on doors or hopper lid. Restriction in the hopper or feeder. Remove all fuel and examine. Clear the obstruction. Feed motor has failed.
Partially burned pellets	<ul style="list-style-type: none"> Feed rate too high. Poor air to fuel mixture. (Check burn pot clean-out cover and air intake). Burn pot may need to be cleaned. Combination of all the above.
Smoke smell	Seal the vent pipe joints and connection to stove with silicone. The exhaust vent is the only part of the system that is under positive pressure.
Fire has gone out	<ul style="list-style-type: none"> No fuel in hopper. Draft is too low, blocked flue. Something is restricting fuel flow. Hopper lid not closed properly. Feed motor or combustion fan has failed.
Smoke is visible coming out of vent	<ul style="list-style-type: none"> Air-fuel ratio is too rich. <ul style="list-style-type: none"> - Feed rate too high. - Draft too low caused by a gasket leak.
Low heat output	<ul style="list-style-type: none"> Feed rate too low. Draft too low because of gasket leak. Poor quality or damp pellets. Combination of 1 and 2.
Stove does not ignite but igniter is operating correctly	<ul style="list-style-type: none"> Burnpot has excess ash located around igniter and bracket. Burpot grate holes are blocked or partially block.

F. 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



DO NOT DISCARD THIS MANUAL

- Important operating and maintenance instructions included.
- Read, understand and follow these instructions for safe installation and operation.
- Leave this manual with party responsible for use and operation.



Printed in U.S.A.

Section 5

Test Data by Run

(Note – Hearth & Home Technologies – Halifax is referred to by its previous name, Harman, throughout the test run documentation.)

Pellet Heater Conditioning Data - ASTM E2779 / ASTM E2515

Manufacturer: Harman
 Model: XXV
 Tracking No.: 2165
 Project No.: 0135PS033E.REV001
 Test Date: March 1-3, 2016
 Technician: Matt Troutman, Harman
 Operation Category: January 2, 1900

Elapsed Time (hr)	Flue Gas Temp (degrees F)
0	288.6
1	288.7
2	288.3
3	289.5
4	290.9
5	289.5
6	289.3
7	288.8
8	288.2
9	287.0
10	286.7
11	287.5
12	287.2
13	286.4
14	287.1
15	287.9
16	288.1
17	287.2
18	287.0
19	287.3
20	285.7
21	284.5
22	283.2
23	283.7
24	284.1
25	285.1

Elapsed Time (hr)	Flue Gas Temp (degrees F)
26	285.2
27	285.8
28	284.6
29	284.9
30	285.5
31	286.7
32	286.8
33	286.1
34	286.9
35	286.6
36	286.1
37	286.8
38	287.3
39	287.6
40	288.6
41	289.1
42	289.3
43	289.4
44	287.9
45	288.5
46	287.8
47	287.1
48	287.0
49	288.0
50	286.5



*Model: XXV-TC
Hearth & Home Technologies - Halifax
352 Mountain House Road
Halifax, PA 17032*

Run 1

Pellet Heater Test Results - ASTM E2779 / ASTM E2515

Manufacturer: Harman
 Model: XXV
 Project No.: 0135PS033E.REV001
 Tracking No.: 2165
 Run: 1
 Test Date: 03/22/16

Burn Rate (Composite)	1.10 kg/hr dry
Average Tunnel Temperature	93 degrees F
Average Gas Velocity in Dilution Tunnel - vs	12.08 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8054.3 dscf/hour
Average Delta p	0.042 inches H2O
Average Delta H	1.20 inches H2O
Total Time of Test	364 minutes

Burn Rate (High)	2.59 kg/hr dry
Burn Rate (Med)	1.09 kg/hr dry 42.0% of High
Burn Rate (Low)	0.60 kg/hr dry 23.0% of High

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	1 st HR FILTER (TRAIN 1)
Total Sample Volume - Vm	0.000 cubic feet	56.326 cubic feet	56.163 cubic feet	9.008 cubic feet
Average Gas Meter Temperature	69 degrees F	79 degrees F	79 degrees F	73 degrees F
Total Sample Volume (Standard Conditions) - Vmstd	0.000 dscf	55.829 dscf	55.670 dscf	9.032 dscf
Total Particulates - m _t	0 mg	12 mg	12.2 mg	8.9 mg
Particulate Concentration (dry-standard) - C _t /C _s	0.000000 grams/dscf	0.00021 grams/dscf	0.00022 grams/dscf	0.00099 grams/dscf
Total Particulate Emissions - E _T	0.00 grams	10.50 grams	10.71 grams	7.94 grams
Particulate Emission Rate	0.00 grams/hour	1.73 grams/hour	1.77 grams/hour	7.94 grams/hour
Emissions Factor		1.58 g/kg	1.61 g/kg	3.07 g/kg
Difference from Average Total Particulate Emissions		0.10 grams	0.10 grams	
Dual Train Comparison Results Are Acceptable				

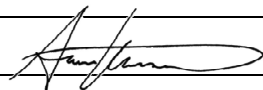
FINAL AVERAGE RESULTS

Integrated Test Run	
Total Particulate Emissions - E _T	10.61 grams
Particulate Emission Rate	1.75 grams/hour
Emissions Factor	1.59 grams/kg
Total PM Precision (%)	1.45
Train A - Train B G/KG ≤ 0.5	0.03
First Hour Emissions	7.94 grams
Total Particulate Emissions - E _T	7.94 grams/hour
Particulate Emission Rate	3.07 grams/kg
Emissions Factor	
7.5% of Average Total Particulate Emissions	

OMNI-Test Laboratories, Inc.

Manufacturer: Harman
Model: XXV
Date: 03/22/16
Run: 1
Control #: 2165
Test Duration: 364
Output Category: Integrated

Technicians: A. Kravitz



Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	72.5%	77.5%
Combustion Efficiency	98.9%	98.9%
Heat Transfer Efficiency	73%	78.4%

Output Rate (kJ/h)	15,557	14,758	(Btu/h)
Burn Rate (kg/h)	1.10	2.42	(lb/h)
Input (kJ/h)	21,454	20,352	(Btu/h)

Test Load Weight (dry kg)	6.66	14.68	dry lb
MC wet (%)	3.39		
MC dry (%)	3.51		
Particulate (g)	0		
CO (g)	207		
Test Duration (h)	6.07		

Emissions	Particulate	CO
g/MJ Output	0.00	2.19
g/kg Dry Fuel	0.00	31.09
g/h	0.00	34.15
lb/MM Btu Output	0.00	5.10

Air/Fuel Ratio (A/F)	22.21
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VERSION:

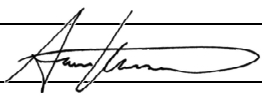
2.3

3/23/2010

OMNI-Test Laboratories, Inc.

Manufacturer: Harman
Model: XXV
Date: 03/22/16
Run: 1
Control #: 2165
Test Duration: 62
Output Category: Max

Technicians: A. Kravitz



Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	73.6%	78.7%
Combustion Efficiency	94.5%	94.5%
Heat Transfer Efficiency	78%	83.3%

Output Rate (kJ/h)	37,195	35,283	(Btu/h)
Burn Rate (kg/h)	2.59	5.70	(lb/h)
Input (kJ/h)	50,549	47,951	(Btu/h)

Test Load Weight (dry kg)	2.67	5.89	dry lb
MC wet (%)	3.39		
MC dry (%)	3.51		
Particulate (g)	0		
CO (g)	216		
Test Duration (h)	1.03		

Emissions	Particulate	CO
g/MJ Output	0.00	5.61
g/kg Dry Fuel	0.00	80.62
g/h	0.00	208.62
lb/MM Btu Output	0.00	13.04

Air/Fuel Ratio (A/F)	11.08
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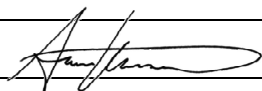
2.3

3/23/2010

OMNI-Test Laboratories, Inc.

Manufacturer: Harman
Model: XXV
Date: 03/22/16
Run: 1
Control #: 2165
Test Duration: 121
Output Category: Med

Technicians: A. Kravitz



Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	73.6%	78.7%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74%	79.1%

Output Rate (kJ/h)	15,631	14,827	(Btu/h)
Burn Rate (kg/h)	1.09	2.40	(lb/h)
Input (kJ/h)	21,230	20,139	(Btu/h)

Test Load Weight (dry kg)	2.19	4.83	dry lb
MC wet (%)	3.39		
MC dry (%)	3.51		
Particulate (g)	0		
CO (g)	0		
Test Duration (h)	2.02		

Emissions	Particulate	CO
g/MJ Output	0.00	0.00
g/kg Dry Fuel	0.00	0.00
g/h	0.00	0.00
lb/MM Btu Output	0.00	0.00

Air/Fuel Ratio (A/F)	22.16
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VERSION:

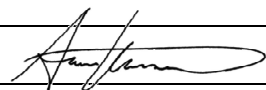
2.3

3/23/2010

OMNI-Test Laboratories, Inc.

Manufacturer: Harman
Model: XXV
Date: 03/22/16
Run: 1
Control #: 2165
Test Duration: 181
Output Category: Min

Technicians: A. Kravitz



Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	64.3%	68.7%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	65%	69.1%

Output Rate (kJ/h)	7,481	7,096	(Btu/h)
Burn Rate (kg/h)	0.60	1.31	(lb/h)
Input (kJ/h)	11,638	11,040	(Btu/h)

Test Load Weight (dry kg)	1.80	3.96	dry lb
MC wet (%)	3.39		
MC dry (%)	3.51		
Particulate (g)	0		
CO (g)	0		
Test Duration (h)	3.02		

Emissions	Particulate	CO
g/MJ Output	0.00	0.00
g/kg Dry Fuel	0.00	0.00
g/h	0.00	0.00
lb/MM Btu Output	0.00	0.00

Air/Fuel Ratio (A/F)	33.87
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VERSION:

2.3

3/23/2010

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (″H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (″H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
0	0.000	0.000			0.98	68	2.12	0.87	68	1.2	108	0.042			34.1		428	66	67	68	-0.045	8.4	0.1
1	0.145	0.156	0.15	0.16	1.29	68	2.29	1.09	68	1.2	108	0.042	97	105	34.1	0	428	68	69	68	-0.046	8.2	0
2	0.304	0.317	0.16	0.16	1.29	68	2.3	1.09	68	1.2	108	0.042	106	108	34.0	-0.1	426	69	69	68	-0.046	8.7	0.1
3	0.461	0.477	0.16	0.16	1.28	68	2.31	1.08	68	1.2	108	0.042	105	107	33.9	-0.1	426	69	70	68	-0.046	9.2	0.3
4	0.619	0.638	0.16	0.16	1.28	68	2.3	1.08	68	1.2	108	0.042	106	108	33.8	-0.1	425	70	70	68	-0.046	9	0.3
5	0.777	0.798	0.16	0.16	1.27	69	2.31	1.08	68	1.2	108	0.042	105	107	33.7	-0.1	423	70	71	68	-0.046	9	0.3
6	0.933	0.957	0.16	0.16	1.26	69	2.33	1.07	69	1.2	107	0.042	104	106	33.6	-0.1	423	70	71	68	-0.046	9	0.3
7	1.091	1.116	0.16	0.16	1.26	69	2.35	1.07	69	1.2	108	0.042	105	106	33.5	-0.1	425	71	71	68	-0.046	9.6	0.4
8	1.246	1.275	0.16	0.16	1.24	69	2.36	1.06	69	1.3	108	0.042	103	106	33.4	-0.1	427	71	71	68	-0.047	9.7	0.6
9	1.402	1.433	0.16	0.16	1.23	69	2.39	1.05	69	1.3	108	0.042	104	106	33.3	-0.1	428	71	72	68	-0.047	9.8	0.8
10	1.556	1.591	0.15	0.16	1.22	69	2.41	1.03	69	1.3	108	0.042	103	106	33.2	-0.1	428	72	72	68	-0.046	9.4	0.6
11	1.710	1.746	0.15	0.16	1.21	69	2.42	1.03	69	1.3	107	0.042	103	104	33.1	-0.1	427	72	72	68	-0.047	9.1	0.3
12	1.863	1.903	0.15	0.16	1.19	69	2.45	1.01	69	1.3	108	0.042	102	105	33.0	-0.1	427	72	72	69	-0.046	9.5	0.6
13	2.017	2.058	0.15	0.16	1.19	70	2.47	1.01	70	1.4	108	0.042	103	103	32.9	-0.1	427	72	72	68	-0.046	9.6	0.5
14	2.168	2.213	0.15	0.16	1.19	70	2.47	1.00	70	1.4	107	0.042	100	103	32.8	-0.1	428	72	72	69	-0.047	9	0.3
15	2.321	2.367	0.15	0.15	1.17	70	2.51	0.99	70	1.4	108	0.042	102	103	32.7	-0.1	429	73	72	69	-0.047	9.8	0.9
16	2.471	2.521	0.15	0.15	1.17	70	2.51	0.98	70	1.4	108	0.042	100	103	32.6	-0.1	430	73	73	69	-0.047	9.1	0.3
17	2.622	2.674	0.15	0.15	1.16	70	2.51	0.98	71	1.4	108	0.042	101	102	32.5	-0.1	427	73	73	69	-0.046	8.4	0.3
18	2.774	2.827	0.15	0.15	1.16	71	2.53	0.98	71	1.4	108	0.042	101	102	32.4	-0.1	425	73	73	69	-0.046	8.8	0.3
19	2.923	2.980	0.15	0.15	1.15	71	2.54	0.97	71	1.5	108	0.042	99	102	32.3	-0.1	426	73	73	69	-0.046	9.2	0.4
20	3.073	3.132	0.15	0.15	1.14	71	2.57	0.96	71	1.5	108	0.042	100	101	32.2	-0.1	428	74	73	69	-0.048	9.8	0.9
21	3.223	3.283	0.15	0.15	1.13	71	2.6	0.94	71	1.5	108	0.042	100	101	32.1	-0.1	429	74	73	69	-0.047	9.7	1.1
22	3.371	3.433	0.15	0.15	1.13	72	2.61	0.94	72	1.5	108	0.042	98	100	32.0	-0.1	428	74	73	69	-0.047	9	0.6
23	3.519	3.583	0.15	0.15	1.12	72	2.62	0.93	72	1.5	108	0.042	98	100	31.8	-0.2	428	74	73	69	-0.047	9.4	0.7
24	3.667	3.732	0.15	0.15	1.11	72	2.64	0.93	72	1.5	108	0.042	98	99	31.7	-0.1	428	74	73	69	-0.047	9.3	0.5
25	3.814	3.881	0.15	0.15	1.10	72	2.65	0.92	72	1.6	109	0.042	98	99	31.7	0	429	74	73	69	-0.047	9.6	0.5
26	3.961	4.030	0.15	0.15	1.10	72	2.68	0.90	72	1.6	109	0.042	98	99	31.6	-0.1	431	74	74	69	-0.047	9.8	0.9
27	4.107	4.178	0.15	0.15	1.09	72	2.69	0.91	73	1.6	110	0.042	97	98	31.4	-0.2	433	74	74	69	-0.047	9.6	0.3
28	4.252	4.325	0.15	0.15	1.09	73	2.69	0.90	73	1.6	109	0.042	96	98	31.4	0	428	74	74	69	-0.046	8.5	0.2
29	4.399	4.472	0.15	0.15	1.09	73	2.69	0.90	73	1.6	109	0.042	97	98	31.3	-0.1	425	74	74	69	-0.046	8.5	0.3
30	4.545	4.619	0.15	0.15	1.08	73	2.71	0.90	73	1.6	109	0.042	97	98	31.2	-0.1	424	74	74	69	-0.046	9	0.5
31	4.690	4.766	0.15	0.15	1.07	73	2.72	0.89	73	1.6	109	0.042	96	98	31.1	-0.1	422	74	74	69	-0.046	8.7	0.4
32	4.836	4.912	0.15	0.15	1.06	73	2.74	0.88	74	1.6	108	0.042	97	97	31.0	-0.1	422	74	74	69	-0.046	9	0.7
33	4.980	5.058	0.14	0.15	1.06	74	2.75	0.88	74	1.7	108	0.042	95	97	30.9	-0.1	422	74	74	69	-0.046	9.1	0.4
34	5.125	5.204	0.15	0.15	1.06	74	2.77	0.87	74	1.7	109	0.042	96	97	30.8	-0.1	424	75	74	69	-0.046	9.5	0.7

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (Hg)	Orifice dH 2 (H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (H₂O)	CO₂ (%)	CO (%)
35	5.268	5.349	0.14	0.15	1.05	74	2.79	0.86	74	1.7	109	0.042	95	96	30.7	-0.1	424	75	74	69	-0.046	9.6	0.9
36	5.412	5.493	0.14	0.14	1.04	74	2.8	0.85	74	1.7	109	0.042	95	96	30.6	-0.1	424	75	74	69	-0.046	9	0.7
37	5.554	5.636	0.14	0.14	1.03	74	2.83	0.84	74	1.8	109	0.042	94	95	30.4	-0.2	425	75	74	69	-0.046	9.3	1.1
38	5.696	5.779	0.14	0.14	1.02	74	2.84	0.84	75	1.8	108	0.042	94	95	30.4	0	423	75	74	69	-0.046	8.6	0.3
39	5.838	5.921	0.14	0.14	1.01	75	2.86	0.84	75	1.8	108	0.042	94	94	30.3	-0.1	422	75	74	69	-0.046	9.1	0.8
40	5.983	6.065	0.15	0.14	1.36	75	3.47	1.05	75	2.1	108	0.042	96	95	30.2	-0.1	421	75	74	69	-0.045	9.3	0.8
41	6.142	6.223	0.16	0.16	1.19	75	3.24	1.04	75	2.2	108	0.042	105	105	30.1	-0.1	420	75	74	69	-0.045	9.1	0.9
42	6.294	6.380	0.15	0.16	1.18	75	3.28	1.02	75	2.2	108	0.042	100	104	30.0	-0.1	417	75	74	69	-0.046	8.9	1
43	6.446	6.536	0.15	0.16	1.16	75	3.29	1.01	75	2.2	108	0.042	100	103	29.9	-0.1	416	75	74	69	-0.046	8.7	0.8
44	6.598	6.692	0.15	0.16	1.15	75	3.33	1.00	75	2.3	108	0.042	100	103	29.8	-0.1	415	75	74	69	-0.046	8.7	0.9
45	6.748	6.847	0.15	0.16	1.15	76	3.34	0.99	76	2.3	107	0.042	99	102	29.7	-0.1	414	75	74	69	-0.045	8.6	0.9
46	6.898	7.001	0.15	0.15	1.13	76	3.38	0.98	76	2.3	108	0.042	99	102	29.6	-0.1	415	75	75	69	-0.046	9	0.8
47	7.051	7.155	0.15	0.15	1.19	76	3.53	0.97	76	2.3	107	0.042	101	102	29.5	-0.1	415	75	75	69	-0.046	8.6	0.9
48	7.205	7.307	0.15	0.15	1.18	76	3.56	0.97	76	2.4	107	0.042	101	100	29.4	-0.1	414	75	75	69	-0.045	8.9	0.8
49	7.358	7.460	0.15	0.15	1.17	76	3.59	0.95	76	2.4	107	0.042	101	101	29.3	-0.1	415	75	75	69	-0.047	8.9	1.2
50	7.509	7.612	0.15	0.15	1.17	76	3.62	0.95	76	2.4	108	0.042	99	100	29.2	-0.1	417	75	75	69	-0.045	9.1	1.2
51	7.661	7.762	0.15	0.15	1.16	76	3.64	0.94	76	2.5	107	0.042	100	99	29.0	-0.2	415	75	75	69	-0.045	8.7	0.9
52	7.812	7.913	0.15	0.15	1.15	76	3.67	0.93	77	2.5	107	0.042	99	99	29.0	0	414	75	75	70	-0.045	8.7	1
53	7.963	8.063	0.15	0.15	1.14	77	3.68	0.93	77	2.5	108	0.042	99	99	28.8	-0.2	414	75	75	69	-0.045	8.9	1.1
54	8.114	8.212	0.15	0.15	1.13	77	3.71	0.92	77	2.5	107	0.042	99	98	28.7	-0.1	413	75	75	69	-0.045	8.7	0.9
55	8.263	8.361	0.15	0.15	1.13	77	3.72	0.91	77	2.5	107	0.042	98	98	28.7	0	413	75	75	69	-0.045	8.7	1.2
56	8.412	8.509	0.15	0.15	1.12	77	3.76	0.91	77	2.6	108	0.042	98	98	28.5	-0.2	413	75	75	69	-0.045	8.8	1.3
57	8.562	8.657	0.15	0.15	1.11	77	3.77	0.90	77	2.6	108	0.042	99	98	28.4	-0.1	413	75	75	69	-0.046	8.6	1
58	8.710	8.805	0.15	0.15	1.11	77	3.8	0.89	77	2.6	107	0.042	97	97	28.4	0	413	75	75	70	-0.045	8.7	1.1
59	8.857	8.957	0.15	0.15	1.10	77	3.81	1.03	77	2.9	108	0.042	97	100	28.3	-0.1	411	75	75	70	-0.045	8.3	0.8
60	9.008	9.114	0.15	0.16	1.11	77	2.11	1.01	77	2.9	108	0.042	99	103	28.2	-0.1	409	75	75	70	-0.044	8.1	0.8
61	9.157	9.270	0.15	0.16	1.10	77	2.12	1.01	77	3	108	0.042	98	103	28.1	-0.1	408	76	75	70	-0.044	8.4	0.9
62	9.307	9.426	0.15	0.16	1.54	77	2.63	1.01	77	3	107	0.042	99	103	28.0	-0.1	403	76	75	70	-0.044	7.3	0.1
63	9.465	9.582	0.16	0.16	1.23	77	2.29	1.01	78	3	107	0.042	104	103	28.0	0	399	77	75	70	-0.044	5.8	0
64	9.621	9.739	0.16	0.16	1.24	78	2.28	1.00	78	3	106	0.042	102	103	27.9	-0.1	393	77	75	69	-0.042	4.9	0
65	9.779	9.894	0.16	0.15	1.24	78	2.29	1.01	78	3	105	0.042	103	102	27.9	0	384	76	75	69	-0.041	4	0
66	9.936	10.051	0.16	0.16	1.24	78	2.29	1.00	78	3	105	0.042	103	103	27.8	-0.1	371	76	75	70	-0.039	3.1	0
67	10.093	10.207	0.16	0.16	1.24	78	2.28	1.01	78	3	103	0.042	103	102	27.8	0	358	76	75	70	-0.038	2.7	0
68	10.252	10.363	0.16	0.16	1.24	78	2.29	1.01	78	3	102	0.042	104	102	27.8	0	348	76	74	70	-0.037	2.7	0
69	10.408	10.519	0.16	0.16	1.24	78	2.29	1.01	78	3	101	0.042	102	102	27.7	-0.1	342	76	74	70	-0.037	3.4	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
								ft/sec	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
70	10.565	10.676	0.16	0.16	1.24	78	2.28	1.01	78	3	100	0.042	102	103	27.7	0	334	76	74	70	-0.035	2.7	0
71	10.724	10.832	0.16	0.16	1.24	78	2.29	1.01	78	3	98	0.042	103	102	27.7	0	323	76	74	70	-0.034	2	0
72	10.881	10.988	0.16	0.16	1.24	78	2.28	1.01	78	3	97	0.042	102	102	27.7	0	313	75	74	70	-0.033	1.8	0
73	11.038	11.144	0.16	0.16	1.25	78	2.29	1.01	78	3	96	0.042	102	102	27.6	-0.1	305	75	74	70	-0.032	1.9	0
74	11.196	11.301	0.16	0.16	1.24	78	2.29	1.01	78	3	95	0.042	102	102	27.7	0.1	300	75	74	70	-0.031	2.2	0
75	11.353	11.457	0.16	0.16	1.24	78	2.29	1.01	78	3	94	0.042	102	101	27.7	0	294	75	74	70	-0.030	2.3	0
76	11.511	11.614	0.16	0.16	1.24	78	2.29	1.01	78	3	94	0.042	102	102	27.6	-0.1	289	75	74	70	-0.029	2.4	0
77	11.668	11.770	0.16	0.16	1.24	79	2.29	1.01	79	3	93	0.042	101	101	27.6	0	282	75	74	70	-0.029	2.1	0
78	11.826	11.927	0.16	0.16	1.24	79	2.28	1.01	79	3	92	0.042	102	102	27.5	-0.1	279	75	74	70	-0.029	2.5	0
79	11.984	12.082	0.16	0.16	1.24	79	2.28	1.01	79	3	92	0.042	102	100	27.5	0	274	74	73	69	-0.029	2.2	0
80	12.141	12.239	0.16	0.16	1.24	79	2.28	1.01	79	3	91	0.042	101	102	27.5	0	272	74	73	68	-0.028	2.5	0
81	12.298	12.395	0.16	0.16	1.24	79	2.28	1.01	79	3	91	0.042	101	101	27.5	0	268	74	73	69	-0.027	2.4	0
82	12.457	12.552	0.16	0.16	1.24	79	2.29	1.01	79	3	91	0.042	103	102	27.5	0	265	74	73	69	-0.027	2.3	0
83	12.614	12.708	0.16	0.16	1.24	79	2.29	1.01	79	3	90	0.042	101	101	27.5	0	264	74	73	69	-0.027	2.8	0
84	12.772	12.865	0.16	0.16	1.24	79	2.28	1.01	79	3	90	0.042	102	101	27.4	-0.1	264	74	73	69	-0.027	3.2	0
85	12.930	13.021	0.16	0.16	1.24	79	2.29	1.01	79	3	90	0.042	102	101	27.4	0	264	73	73	69	-0.028	3.4	0
86	13.087	13.177	0.16	0.16	1.24	79	2.29	1.01	79	3	90	0.042	101	101	27.4	0	266	73	73	69	-0.028	3.9	0
87	13.245	13.334	0.16	0.16	1.25	79	2.29	1.01	79	3	90	0.042	102	101	27.3	-0.1	269	73	73	69	-0.028	4	0
88	13.403	13.490	0.16	0.16	1.24	79	2.3	1.01	79	3	91	0.042	102	101	27.2	-0.1	272	73	73	69	-0.029	4.6	0
89	13.560	13.647	0.16	0.16	1.24	79	2.29	1.01	79	3	91	0.042	101	102	27.2	0	275	73	73	69	-0.029	4.5	0
90	13.718	13.803	0.16	0.16	1.24	79	2.29	1.01	79	3	91	0.042	102	101	27.2	0	278	73	73	69	-0.029	4.9	0
91	13.875	13.960	0.16	0.16	1.24	79	2.3	1.00	79	3	91	0.042	101	102	27.1	-0.1	280	73	73	69	-0.030	4.5	0
92	14.032	14.116	0.16	0.16	1.23	79	2.3	1.01	79	3	92	0.042	101	101	27.1	0	282	73	73	69	-0.030	5.5	0
93	14.190	14.272	0.16	0.16	1.24	79	2.3	1.01	79	3	92	0.042	102	101	27.0	-0.1	284	73	73	69	-0.029	4.9	0
94	14.347	14.428	0.16	0.16	1.24	79	2.31	1.01	79	3	92	0.042	101	101	27.0	0	284	73	73	69	-0.029	4.9	0
95	14.504	14.585	0.16	0.16	1.24	79	2.3	1.01	79	3	92	0.042	101	102	26.9	-0.1	285	73	72	69	-0.030	4.4	0
96	14.663	14.740	0.16	0.15	1.24	79	2.3	1.01	79	3	92	0.042	103	100	26.9	0	285	73	72	69	-0.030	4.6	0
97	14.819	14.897	0.16	0.16	1.24	79	2.3	1.01	79	3	92	0.042	101	102	26.8	-0.1	285	73	72	69	-0.030	4.3	0
98	14.978	15.053	0.16	0.16	1.23	79	2.3	1.01	79	3	92	0.042	103	101	26.8	0	285	73	72	69	-0.030	4.2	0
99	15.135	15.210	0.16	0.16	1.24	79	2.29	1.01	79	3	92	0.042	101	102	26.8	0	283	73	72	69	-0.029	3.5	0
100	15.292	15.365	0.16	0.15	1.24	79	2.3	1.01	79	3	92	0.042	101	100	26.7	-0.1	280	73	72	69	-0.029	3.1	0
101	15.450	15.522	0.16	0.16	1.24	79	2.3	1.01	79	3	92	0.042	102	102	26.7	0	276	73	72	69	-0.029	2.8	0
102	15.607	15.678	0.16	0.16	1.24	79	2.3	1.01	79	3	92	0.042	101	101	26.7	0	273	73	72	69	-0.028	2.9	0
103	15.764	15.835	0.16	0.16	1.24	79	2.3	1.00	79	3	92	0.042	101	102	26.7	0	272	73	72	69	-0.028	3.2	0
104	15.922	15.991	0.16	0.16	1.23	79	2.3	1.01	79	3	91	0.042	102	101	26.6	-0.1	271	73	72	69	-0.028	3.6	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}		12.25		ft/sec		V _{scent}		14.04	
						ft/sec		F _p	
								0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (″H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (″H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
105	16.079	16.147	0.16	0.16	1.24	79	2.3	1.01	79	3	91	0.042	101	101	26.6	0	271	73	72	69	-0.029	3.6	0
106	16.237	16.303	0.16	0.16	1.24	79	2.31	1.01	79	3	91	0.042	102	101	26.5	-0.1	273	73	72	69	-0.029	4.4	0
107	16.395	16.460	0.16	0.16	1.23	79	2.31	1.00	79	3	91	0.042	102	102	26.5	0	274	73	72	69	-0.029	4.9	0
108	16.551	16.615	0.16	0.15	1.24	79	2.3	1.00	79	3	91	0.042	101	100	26.4	-0.1	275	73	72	69	-0.029	4.6	0
109	16.710	16.772	0.16	0.16	1.24	79	2.31	1.01	79	3	91	0.042	103	102	26.4	0	276	73	72	69	-0.029	4.3	0
110	16.866	16.928	0.16	0.16	1.24	79	2.3	1.00	79	3	92	0.042	101	101	26.3	-0.1	277	73	72	69	-0.029	4.5	0
111	17.023	17.084	0.16	0.16	1.24	80	2.31	1.01	79	3	92	0.042	101	101	26.3	0	278	73	72	69	-0.029	4.7	0
112	17.181	17.240	0.16	0.16	1.24	80	2.32	1.00	79	3	92	0.042	102	101	26.2	-0.1	278	73	72	69	-0.029	4.8	0
113	17.338	17.396	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	101	101	26.2	0	278	73	72	69	-0.029	4.6	0
114	17.495	17.552	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	101	101	26.1	-0.1	280	73	72	69	-0.029	4.9	0
115	17.653	17.708	0.16	0.16	1.23	80	2.31	1.00	79	3	92	0.042	102	101	26.1	0	281	73	72	69	-0.029	4.5	0
116	17.809	17.863	0.16	0.16	1.23	80	2.31	1.00	79	3	92	0.042	101	100	26.1	0	282	73	72	69	-0.030	5	0
117	17.967	18.020	0.16	0.16	1.23	80	2.33	1.00	79	3	92	0.042	102	102	26.0	-0.1	284	73	72	69	-0.030	5.3	0
118	18.123	18.175	0.16	0.16	1.22	80	2.33	1.00	79	3	92	0.042	101	100	25.9	-0.1	286	73	72	69	-0.030	5.5	0
119	18.279	18.331	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	101	101	25.9	0	287	73	72	69	-0.030	4.6	0
120	18.437	18.486	0.16	0.16	1.23	80	2.33	1.00	79	3	93	0.042	102	100	25.9	0	287	73	72	69	-0.030	4.6	0
121	18.593	18.643	0.16	0.16	1.23	80	2.33	1.00	79	3	93	0.042	101	102	25.8	-0.1	287	73	72	69	-0.030	4.1	0
122	18.751	18.798	0.16	0.15	1.23	80	2.32	1.00	79	3	92	0.042	102	100	25.8	0	285	73	72	69	-0.031	3.8	0
123	18.907	18.954	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	101	101	25.7	-0.1	283	73	72	69	-0.030	3.4	0
124	19.063	19.109	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	101	100	25.7	0	281	73	72	69	-0.030	3.6	0
125	19.221	19.266	0.16	0.16	1.23	80	2.32	1.00	79	3	92	0.042	102	102	25.6	-0.1	279	73	72	69	-0.029	3.5	0
126	19.377	19.421	0.16	0.16	1.23	80	2.33	1.00	79	3	92	0.042	101	100	25.6	0	277	73	72	69	-0.029	3.6	0
127	19.535	19.577	0.16	0.16	1.23	80	2.33	1.00	79	3	92	0.042	102	101	25.6	0	275	73	72	69	-0.029	3.7	0
128	19.691	19.732	0.16	0.15	1.23	80	2.33	1.00	79	3	92	0.042	101	100	25.6	0	274	73	72	69	-0.029	4.1	0
129	19.847	19.889	0.16	0.16	1.23	80	2.33	1.00	79	3	91	0.042	100	102	25.6	0	274	73	72	69	-0.028	4.1	0
130	20.005	20.044	0.16	0.16	1.23	80	2.33	1.00	79	3	92	0.042	102	100	25.5	-0.1	275	73	72	69	-0.029	4.4	0
131	20.161	20.200	0.16	0.16	1.22	80	2.34	1.00	79	3	92	0.042	101	101	25.4	-0.1	276	73	72	69	-0.029	4.7	0
132	20.318	20.355	0.16	0.16	1.23	80	2.34	1.00	79	3	92	0.042	101	100	25.4	0	277	73	72	69	-0.029	4.9	0
133	20.475	20.511	0.16	0.16	1.22	80	2.33	1.00	80	3	91	0.042	101	101	25.3	-0.1	279	73	72	69	-0.029	4.8	0
134	20.631	20.666	0.16	0.16	1.22	80	2.34	1.00	80	3	92	0.042	101	100	25.3	0	279	73	72	69	-0.029	4.4	0
135	20.788	20.822	0.16	0.16	1.22	80	2.34	0.99	79	3	92	0.042	101	101	25.3	0	279	73	72	69	-0.030	4.8	0
136	20.944	20.977	0.16	0.16	1.22	80	2.34	1.00	80	3	92	0.042	101	100	25.2	-0.1	279	73	72	69	-0.030	4.6	0
137	21.101	21.133	0.16	0.16	1.23	80	2.33	1.00	79	3	92	0.042	101	101	25.1	-0.1	281	73	72	69	-0.030	5.1	0
138	21.257	21.287	0.16	0.15	1.22	80	2.34	1.00	79	3	92	0.042	101	100	25.1	0	283	73	72	69	-0.031	4.9	0
139	21.413	21.443	0.16	0.16	1.22	80	2.34	1.00	80	3	92	0.042	101	101	25.0	-0.1	284	73	72	69	-0.031	4.7	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E.REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scent}	14.04	
								ft/sec	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (″H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (″H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
140	21.571	21.598	0.16	0.15	1.22	80	2.34	1.00	80	3	93	0.042	102	100	25.0	0	284	73	72	69	-0.030	5.3	0
141	21.726	21.754	0.15	0.16	1.22	80	2.34	0.99	80	3	92	0.042	100	101	25.0	0	284	73	72	69	-0.031	4.4	0
142	21.884	21.909	0.16	0.15	1.22	80	2.35	1.00	80	3	92	0.042	102	100	24.9	-0.1	284	73	72	69	-0.031	4.4	0
143	22.040	22.065	0.16	0.16	1.22	80	2.34	0.99	80	3	92	0.042	101	101	24.8	-0.1	282	73	72	69	-0.030	3.8	0
144	22.195	22.220	0.16	0.15	1.22	80	2.35	1.00	80	3	92	0.042	100	100	24.8	0	280	73	72	69	-0.030	4	0
145	22.353	22.375	0.16	0.16	1.22	80	2.34	0.99	80	3	92	0.042	102	100	24.8	0	280	73	72	69	-0.029	4.4	0
146	22.508	22.530	0.15	0.16	1.22	80	2.35	1.00	80	3	92	0.042	100	100	24.8	0	280	73	72	69	-0.030	4.7	0
147	22.666	22.686	0.16	0.16	1.22	80	2.35	0.99	80	3	92	0.042	102	101	24.7	-0.1	280	73	72	69	-0.030	4.7	0
148	22.822	22.841	0.16	0.16	1.21	80	2.35	0.99	80	3	92	0.042	101	100	24.6	-0.1	280	73	72	69	-0.030	4.5	0
149	22.978	22.996	0.16	0.15	1.22	80	2.35	0.99	80	3	92	0.042	101	100	24.6	0	280	73	72	69	-0.030	4.5	0
150	23.134	23.152	0.16	0.16	1.21	80	2.35	0.99	80	3	92	0.042	101	101	24.5	-0.1	282	73	72	69	-0.030	5.2	0
151	23.290	23.307	0.16	0.15	1.22	80	2.36	0.99	80	3	92	0.042	101	100	24.5	0	283	73	72	69	-0.030	5.1	0
152	23.447	23.462	0.16	0.16	1.22	80	2.36	0.99	80	3	92	0.042	101	100	24.5	0	285	73	72	69	-0.031	4.8	0
153	23.602	23.617	0.16	0.16	1.22	80	2.36	0.99	80	3	92	0.042	100	100	24.4	-0.1	284	73	72	69	-0.030	4.7	0
154	23.759	23.773	0.16	0.16	1.21	80	2.36	0.99	80	3	92	0.042	101	101	24.3	-0.1	284	73	72	69	-0.030	4.8	0
155	23.915	23.927	0.16	0.15	1.21	80	2.36	0.99	80	3	92	0.042	101	99	24.3	0	285	73	72	69	-0.031	5.2	0
156	24.070	24.082	0.16	0.16	1.22	80	2.36	0.99	80	3	92	0.042	100	100	24.2	-0.1	285	73	72	69	-0.031	4.5	0
157	24.227	24.237	0.16	0.15	1.21	80	2.36	0.99	80	3	92	0.042	101	100	24.2	0	284	73	72	69	-0.030	4	0
158	24.382	24.392	0.16	0.16	1.22	80	2.36	0.99	80	3	92	0.042	100	100	24.2	0	281	73	72	69	-0.029	3.6	0
159	24.539	24.547	0.16	0.16	1.21	80	2.37	0.99	80	3	92	0.042	101	100	24.1	-0.1	280	73	72	69	-0.030	4.2	0
160	24.694	24.702	0.15	0.16	1.22	80	2.36	0.98	80	3.1	92	0.042	100	100	24.1	0	280	73	72	69	-0.030	3.8	0
161	24.851	24.857	0.16	0.15	1.21	80	2.37	0.99	80	3	92	0.042	101	100	24.1	0	278	73	72	69	-0.029	3.7	0
162	25.007	25.012	0.16	0.16	1.21	80	2.36	0.99	80	3	92	0.042	101	100	24.0	-0.1	277	73	72	69	-0.029	3.7	0
163	25.162	25.167	0.15	0.16	1.22	80	2.36	0.99	80	3.1	92	0.042	100	100	24.0	0	276	73	72	69	-0.029	4.4	0
164	25.319	25.322	0.16	0.15	1.21	80	2.36	0.99	80	3.1	92	0.042	101	100	23.9	-0.1	276	73	72	69	-0.029	4.4	0
165	25.474	25.477	0.16	0.16	1.21	80	2.36	0.99	80	3	92	0.042	100	100	23.9	0	277	73	72	69	-0.029	4.8	0
166	25.631	25.632	0.16	0.16	1.21	80	2.37	0.99	80	3.1	91	0.042	101	100	23.9	0	277	73	72	70	-0.030	4.4	0
167	25.786	25.787	0.16	0.15	1.21	80	2.36	0.98	80	3.1	92	0.042	100	100	23.8	-0.1	278	73	72	69	-0.030	5	0
168	25.943	25.941	0.16	0.15	1.21	80	2.37	0.99	80	3.1	92	0.042	101	99	23.7	-0.1	278	73	72	69	-0.029	4.7	0
169	26.098	26.097	0.15	0.16	1.21	80	2.37	0.99	80	3.1	92	0.042	100	101	23.7	0	278	73	72	69	-0.029	4.7	0
170	26.253	26.251	0.16	0.15	1.21	80	2.37	0.99	80	3.1	92	0.042	100	99	23.6	-0.1	279	73	72	70	-0.030	4.9	0
171	26.410	26.406	0.16	0.15	1.21	80	2.37	0.99	80	3.1	92	0.042	101	100	23.6	0	281	73	72	70	-0.030	5	0
172	26.565	26.561	0.16	0.16	1.21	80	2.37	0.99	80	3.1	92	0.042	100	100	23.5	-0.1	283	73	72	70	-0.031	5	0
173	26.721	26.716	0.16	0.16	1.21	80	2.37	0.98	80	3.1	92	0.042	101	100	23.5	0	283	73	72	70	-0.030	4.7	0
174	26.876	26.870	0.16	0.15	1.21	80	2.37	0.99	80	3.1	92	0.042	100	99	23.4	-0.1	282	73	72	70	-0.030	4.9	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (Hg)	Orifice dH 2 (H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (H₂O)	CO₂ (%)	CO (%)
175	27.033	27.025	0.16	0.15	1.21	80	2.38	0.98	80	3.1	92	0.042	101	100	23.4	0	282	73	72	70	-0.030	4.8	0
176	27.188	27.180	0.15	0.16	1.21	80	2.37	0.99	80	3.1	92	0.042	100	100	23.3	-0.1	282	73	72	70	-0.030	4.6	0
177	27.344	27.334	0.16	0.15	1.21	80	2.38	0.98	80	3.1	92	0.042	101	99	23.3	0	282	73	72	70	-0.030	4.9	0
178	27.499	27.490	0.15	0.16	1.21	80	2.38	0.98	80	3.1	92	0.042	100	101	23.3	0	283	73	72	69	-0.030	5	0
179	27.655	27.643	0.16	0.15	1.21	80	2.38	0.99	80	3.1	92	0.042	101	99	23.2	-0.1	282	73	72	70	-0.030	4.8	0
180	27.811	27.799	0.16	0.16	1.20	80	2.37	0.99	80	3.1	92	0.042	101	101	23.2	0	282	73	72	70	-0.030	4.7	0
181	27.966	27.953	0.16	0.15	1.21	80	2.38	0.99	80	3.1	93	0.042	100	100	23.1	-0.1	283	73	72	70	-0.030	4.9	0
182	28.122	28.108	0.16	0.16	1.21	80	2.38	0.98	80	3.1	93	0.042	101	100	23.1	0	284	73	72	70	-0.031	5.2	0
183	28.277	28.262	0.16	0.15	1.21	80	2.38	0.98	80	3.1	92	0.042	100	99	23.0	-0.1	285	73	72	70	-0.031	5	0
184	28.434	28.417	0.16	0.16	1.21	80	2.39	0.98	80	3.1	93	0.042	101	100	22.9	-0.1	285	73	72	70	-0.030	4.6	0
185	28.588	28.571	0.15	0.15	1.20	80	2.38	0.99	80	3.1	93	0.042	99	100	22.9	0	284	73	72	69	-0.030	4	0
186	28.744	28.726	0.16	0.15	1.21	80	2.38	0.99	80	3.1	92	0.042	101	100	22.9	0	283	73	72	69	-0.030	3.6	0
187	28.900	28.881	0.16	0.16	1.20	80	2.38	0.98	80	3.1	92	0.042	101	100	22.8	-0.1	283	73	72	69	-0.030	3.1	0
188	29.055	29.035	0.16	0.15	1.21	80	2.38	0.98	80	3.1	92	0.042	100	99	22.8	0	281	73	72	69	-0.030	3.2	0
189	29.211	29.191	0.16	0.16	1.21	80	2.38	0.98	80	3.1	92	0.042	101	101	22.8	0	279	73	72	70	-0.029	2.8	0
190	29.366	29.344	0.16	0.15	1.21	80	2.38	0.99	80	3.1	92	0.042	100	99	22.7	-0.1	276	73	72	70	-0.029	2.4	0
191	29.523	29.500	0.16	0.16	1.20	80	2.38	0.98	80	3.1	91	0.042	101	101	22.7	0	274	73	72	70	-0.029	2.3	0
192	29.677	29.654	0.15	0.15	1.21	80	2.38	0.99	80	3.1	91	0.042	99	99	22.7	0	272	73	72	70	-0.029	2.5	0
193	29.834	29.809	0.16	0.16	1.21	80	2.38	0.98	80	3.1	91	0.042	101	100	22.7	0	270	73	72	70	-0.029	2.1	0
194	29.989	29.963	0.16	0.15	1.21	80	2.39	0.99	80	3.1	91	0.042	100	99	22.7	0	268	73	72	70	-0.028	2.3	0
195	30.145	30.118	0.16	0.15	1.21	80	2.39	0.98	80	3.1	90	0.042	100	100	22.6	-0.1	266	73	72	70	-0.028	2.2	0
196	30.300	30.273	0.16	0.16	1.20	80	2.39	0.99	80	3.1	90	0.042	100	100	22.6	0	264	73	72	70	-0.028	2.1	0
197	30.455	30.427	0.15	0.15	1.21	80	2.39	0.98	80	3.1	90	0.042	100	99	22.6	0	264	73	72	69	-0.028	2.4	0
198	30.612	30.583	0.16	0.16	1.20	80	2.38	0.98	80	3.1	90	0.042	101	101	22.6	0	261	73	72	69	-0.027	1.9	0
199	30.767	30.736	0.16	0.15	1.20	80	2.38	0.98	80	3.1	89	0.042	100	99	22.5	-0.1	258	73	72	69	-0.027	2	0
200	30.923	30.892	0.16	0.16	1.21	80	2.38	0.98	80	3.1	89	0.042	100	101	22.6	0.1	256	73	72	69	-0.026	1.9	0
201	31.078	31.046	0.16	0.15	1.21	80	2.38	0.98	80	3.1	89	0.042	100	99	22.5	-0.1	254	73	72	69	-0.026	1.8	0
202	31.234	31.201	0.16	0.16	1.21	81	2.39	0.98	80	3.1	89	0.042	100	100	22.5	0	253	73	72	69	-0.026	1.9	0
203	31.389	31.355	0.15	0.15	1.20	81	2.38	0.99	80	3.1	89	0.042	99	99	22.5	0	252	73	72	69	-0.026	2	0
204	31.545	31.510	0.16	0.16	1.21	80	2.38	0.98	80	3.1	88	0.042	100	100	22.5	0	250	73	72	69	-0.026	1.9	0
205	31.700	31.665	0.15	0.15	1.20	80	2.39	0.98	80	3.1	88	0.042	100	100	22.4	-0.1	248	72	72	69	-0.025	1.8	0
206	31.856	31.819	0.16	0.15	1.21	80	2.38	0.98	80	3.1	88	0.042	100	99	22.5	0.1	248	72	72	69	-0.025	2.1	0
207	32.012	31.974	0.16	0.16	1.20	80	2.39	0.99	80	3.1	88	0.042	100	100	22.4	-0.1	247	73	72	69	-0.025	1.9	0
208	32.167	32.128	0.16	0.15	1.21	81	2.39	0.98	80	3.1	88	0.042	99	99	22.4	0	248	73	72	69	-0.026	2.2	0
209	32.323	32.284	0.16	0.16	1.20	81	2.39	0.98	80	3.1	88	0.042	100	100	22.4	0	248	72	72	69	-0.026	2.1	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scent}	14.04	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (Hg)	Orifice dH 2 (H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (H₂O)	CO₂ (%)	CO (%)
210	32.478	32.438	0.16	0.15	1.21	81	2.39	0.98	80	3.1	88	0.042	99	99	22.4	0	248	72	72	69	-0.026	2	0
211	32.634	32.593	0.16	0.16	1.21	81	2.39	0.98	80	3.1	88	0.042	100	100	22.3	-0.1	248	72	72	69	-0.025	2.3	0
212	32.789	32.747	0.16	0.15	1.20	80	2.39	0.98	80	3.1	88	0.042	100	99	22.3	0	248	72	72	69	-0.026	2.3	0
213	32.945	32.902	0.16	0.16	1.21	81	2.39	0.98	80	3.1	88	0.042	100	100	22.3	0	251	72	72	69	-0.027	2.8	0
214	33.100	33.056	0.16	0.15	1.20	81	2.39	0.98	80	3.1	88	0.042	99	99	22.2	-0.1	250	72	72	69	-0.026	2.2	0
215	33.255	33.210	0.16	0.15	1.21	81	2.38	0.98	80	3.1	88	0.042	99	99	22.2	0	250	72	72	69	-0.026	2.5	0
216	33.411	33.366	0.16	0.16	1.20	81	2.39	0.98	80	3.1	88	0.042	100	100	22.2	0	251	72	72	69	-0.026	2.6	0
217	33.566	33.520	0.16	0.15	1.21	81	2.39	0.98	80	3.1	88	0.042	99	99	22.2	0	249	72	72	69	-0.026	2.1	0
218	33.722	33.675	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	100	100	22.1	-0.1	248	72	72	69	-0.025	2.1	0
219	33.877	33.829	0.16	0.15	1.21	81	2.39	0.99	80	3.1	88	0.042	99	99	22.1	0	246	72	72	69	-0.025	2	0
220	34.033	33.984	0.16	0.16	1.21	81	2.39	0.98	80	3.1	88	0.042	100	100	22.1	0	246	72	72	69	-0.025	2.3	0
221	34.188	34.138	0.16	0.15	1.21	81	2.39	0.99	80	3.1	88	0.042	99	99	22.1	0	244	72	72	69	-0.025	1.8	0
222	34.344	34.293	0.16	0.16	1.20	81	2.39	0.98	80	3.1	87	0.042	100	100	22.1	0	243	72	72	69	-0.024	1.7	0
223	34.499	34.447	0.16	0.15	1.20	81	2.39	0.98	80	3.1	88	0.042	99	99	22.0	-0.1	243	72	72	69	-0.024	1.8	0
224	34.655	34.602	0.16	0.15	1.20	81	2.39	0.98	80	3.1	87	0.042	100	100	22.0	0	243	72	72	69	-0.024	2	0
225	34.810	34.757	0.16	0.16	1.20	81	2.39	0.98	80	3.1	88	0.042	99	100	22.0	0	243	72	72	69	-0.024	2.3	0
226	34.965	34.910	0.16	0.15	1.20	81	2.39	0.98	80	3.1	87	0.042	99	98	22.0	0	243	72	72	70	-0.025	2.3	0
227	35.121	35.066	0.16	0.16	1.20	81	2.39	0.98	80	3.1	87	0.042	100	100	22.0	0	242	72	72	70	-0.024	2.1	0
228	35.276	35.219	0.16	0.15	1.20	81	2.4	0.98	80	3.1	87	0.042	99	98	22.0	0	243	72	72	70	-0.025	2.4	0
229	35.432	35.374	0.16	0.16	1.20	81	2.4	0.98	80	3.1	87	0.042	100	100	22.0	0	243	72	72	69	-0.025	2	0
230	35.586	35.528	0.15	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	99	99	22.0	0	242	72	72	69	-0.024	1.9	0
231	35.742	35.683	0.16	0.16	1.20	81	2.4	0.98	80	3.1	88	0.042	100	100	21.9	-0.1	244	72	72	69	-0.025	2.5	0
232	35.897	35.838	0.16	0.16	1.20	81	2.4	0.98	80	3.1	88	0.042	99	100	21.8	-0.1	245	72	72	70	-0.024	2.4	0
233	36.053	35.992	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	100	99	21.9	0.1	244	72	72	70	-0.024	2.3	0
234	36.208	36.147	0.16	0.16	1.20	81	2.39	0.98	80	3.1	87	0.042	99	100	21.8	-0.1	242	72	72	69	-0.025	2	0
235	36.363	36.301	0.16	0.15	1.20	81	2.4	0.98	80	3.1	87	0.042	99	99	21.8	0	242	72	72	70	-0.024	2	0
236	36.518	36.456	0.16	0.16	1.20	81	2.4	0.98	80	3.1	87	0.042	99	100	21.8	0	243	72	72	69	-0.025	2.3	0
237	36.674	36.610	0.16	0.15	1.20	81	2.41	0.98	80	3.1	87	0.042	100	99	21.7	-0.1	243	72	72	69	-0.025	2.3	0
238	36.829	36.765	0.16	0.16	1.20	81	2.4	0.98	80	3.1	88	0.042	99	100	21.8	0.1	243	72	72	69	-0.025	1.9	0
239	36.984	36.919	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	99	99	21.7	-0.1	242	72	72	69	-0.025	1.9	0
240	37.140	37.073	0.16	0.15	1.19	81	2.4	0.98	80	3.1	88	0.042	100	99	21.7	0	243	72	72	69	-0.025	2.2	0
241	37.295	37.228	0.16	0.16	1.21	81	2.4	0.98	80	3.1	87	0.042	99	100	21.7	0	242	72	72	69	-0.024	2.2	0
242	37.451	37.382	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	100	99	21.6	-0.1	243	72	72	69	-0.025	2.3	0
243	37.605	37.537	0.15	0.16	1.20	81	2.4	0.98	80	3.1	88	0.042	99	100	21.7	0.1	245	72	72	70	-0.025	2.5	0
244	37.761	37.690	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	100	98	21.6	-0.1	245	72	72	69	-0.025	2.3	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515



Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (″H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (″Hg)	Orifice dH 2 (″H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (″Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (″H₂O)	CO₂ (%)	CO (%)
245	37.916	37.846	0.15	0.16	1.20	81	2.4	0.98	80	3.1	88	0.042	99	100	21.6	0	244	72	72	69	-0.025	2	0
246	38.072	38.000	0.16	0.15	1.19	81	2.4	0.98	80	3.1	88	0.042	100	99	21.6	0	242	72	72	70	-0.024	1.7	0
247	38.227	38.154	0.15	0.15	1.20	81	2.41	0.97	80	3.1	88	0.042	99	99	21.5	-0.1	242	72	72	69	-0.024	1.9	0
248	38.382	38.308	0.16	0.15	1.20	81	2.41	0.98	81	3.1	88	0.042	99	99	21.5	0	242	72	72	70	-0.024	2.2	0
249	38.537	38.463	0.16	0.16	1.20	81	2.41	0.98	81	3.1	88	0.042	99	100	21.5	0	242	72	72	70	-0.024	2.2	0
250	38.692	38.618	0.16	0.16	1.20	81	2.41	0.98	81	3.1	87	0.042	99	99	21.5	0	241	72	72	69	-0.025	2.2	0
251	38.848	38.771	0.16	0.15	1.20	81	2.41	0.98	80	3.1	88	0.042	100	98	21.5	0	243	72	72	69	-0.025	2.6	0
252	39.002	38.926	0.15	0.16	1.20	81	2.4	0.98	81	3.1	88	0.042	99	100	21.4	-0.1	244	72	72	69	-0.025	2.4	0
253	39.158	39.080	0.16	0.15	1.20	81	2.4	0.98	80	3.1	88	0.042	100	99	21.4	0	244	72	72	69	-0.026	2.3	0
254	39.312	39.235	0.15	0.16	1.20	81	2.4	0.97	81	3.1	88	0.042	99	100	21.4	0	244	72	72	70	-0.025	2	0
255	39.468	39.388	0.16	0.15	1.20	81	2.4	0.98	81	3.1	87	0.042	100	98	21.4	0	243	72	72	69	-0.025	1.9	0
256	39.622	39.543	0.15	0.16	1.20	81	2.41	0.98	81	3.1	88	0.042	99	100	21.3	-0.1	243	72	72	70	-0.025	2.3	0
257	39.779	39.697	0.16	0.15	1.19	81	2.41	0.98	81	3.1	88	0.042	101	99	21.4	0.1	245	72	72	70	-0.025	2.6	0
258	39.933	39.851	0.15	0.15	1.20	81	2.41	0.98	81	3.1	88	0.042	99	99	21.3	-0.1	244	72	72	70	-0.025	2	0
259	40.089	40.006	0.16	0.16	1.19	81	2.41	0.98	81	3.1	88	0.042	100	100	21.3	0	243	72	72	69	-0.025	1.9	0
260	40.243	40.159	0.15	0.15	1.20	81	2.41	0.98	81	3.1	88	0.042	99	98	21.2	-0.1	244	72	72	69	-0.025	2	0
261	40.398	40.314	0.16	0.16	1.20	81	2.4	0.97	81	3.1	88	0.042	99	100	21.2	0	243	72	72	69	-0.025	1.9	0
262	40.553	40.468	0.15	0.15	1.20	81	2.41	0.98	81	3.1	88	0.042	99	99	21.2	0	242	72	72	70	-0.024	2.1	0
263	40.708	40.622	0.16	0.15	1.20	81	2.41	0.98	81	3.1	87	0.042	99	99	21.2	0	242	72	72	69	-0.024	2.3	0
264	40.863	40.777	0.16	0.16	1.20	81	2.41	0.98	81	3.1	88	0.042	99	100	21.2	0	242	72	72	69	-0.024	2.5	0
265	41.018	40.931	0.16	0.15	1.20	81	2.41	0.98	81	3.1	87	0.042	99	99	21.1	-0.1	242	72	72	70	-0.024	2.3	0
266	41.173	41.085	0.16	0.15	1.19	81	2.41	0.98	81	3.1	87	0.042	99	99	21.2	0.1	240	72	72	69	-0.024	2	0
267	41.328	41.239	0.16	0.15	1.20	81	2.41	0.98	81	3.1	87	0.042	99	99	21.1	-0.1	240	72	72	70	-0.024	2.4	0
268	41.483	41.394	0.15	0.16	1.19	81	2.41	0.98	81	3.1	87	0.042	99	99	21.1	0	241	72	72	70	-0.024	2.6	0
269	41.638	41.547	0.16	0.15	1.20	81	2.41	0.98	81	3.1	87	0.042	99	98	21.1	0	241	72	72	70	-0.025	2.3	0
270	41.793	41.701	0.16	0.15	1.19	81	2.41	0.98	81	3.1	87	0.042	99	99	21.0	-0.1	241	72	72	70	-0.024	2.4	0
271	41.948	41.856	0.16	0.16	1.20	81	2.42	0.98	81	3.1	88	0.042	99	100	21.0	0	241	72	72	69	-0.024	2.5	0
272	42.103	42.010	0.16	0.15	1.20	81	2.41	0.98	81	3.1	87	0.042	99	99	21.0	0	240	72	72	69	-0.024	2.1	0
273	42.258	42.165	0.16	0.16	1.20	81	2.41	0.98	81	3.1	88	0.042	99	100	21.0	0	242	72	72	70	-0.025	2.5	0
274	42.413	42.318	0.15	0.15	1.19	81	2.42	0.98	81	3.1	88	0.042	99	98	20.9	-0.1	242	72	72	69	-0.025	2.5	0
275	42.568	42.473	0.16	0.16	1.19	81	2.42	0.98	81	3.1	88	0.042	99	100	20.9	0	242	72	72	70	-0.025	2	0
276	42.723	42.626	0.16	0.15	1.20	81	2.42	0.98	81	3.1	88	0.042	99	98	20.9	0	243	72	72	70	-0.024	2.3	0
277	42.878	42.780	0.16	0.15	1.19	81	2.41	0.97	81	3.1	88	0.042	99	99	20.9	0	243	72	72	69	-0.024	2.5	0
278	43.033	42.935	0.16	0.16	1.20	81	2.41	0.98	81	3.1	88	0.042	99	100	20.8	-0.1	242	72	72	70	-0.025	2.1	0
279	43.187	43.089	0.15	0.15	1.19	81	2.42	0.98	81	3.1	88	0.042	99	99	20.8	0	241	72	72	69	-0.025	1.7	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E-REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet


Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}		12.25		ft/sec		V _{scnt}		14.04	
								ft/sec	
						F _p		0.873	

°H₂O

°F

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 ("Hg)	Orifice dH 2 ("H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft ("H₂O)	CO₂ (%)	CO (%)
280	43.342	43.243	0.16	0.15	1.20	81	2.41	0.98	81	3.1	88	0.042	99	99	20.8	0	241	72	72	69	-0.024	2.1	0
281	43.497	43.397	0.16	0.15	1.19	81	2.42	0.98	81	3.1	88	0.042	99	99	20.8	0	241	72	72	69	-0.024	2.6	0
282	43.652	43.551	0.16	0.15	1.19	81	2.42	0.98	81	3.1	87	0.042	99	99	20.8	0	241	72	72	70	-0.024	2.4	0
283	43.807	43.705	0.16	0.15	1.19	81	2.41	0.98	81	3.1	87	0.042	99	99	20.7	-0.1	241	72	72	70	-0.024	2.5	0
284	43.961	43.859	0.15	0.15	1.19	81	2.41	0.97	81	3.1	87	0.042	99	99	20.7	0	242	72	72	70	-0.024	2.3	0
285	44.117	44.013	0.16	0.15	1.19	81	2.42	0.98	81	3.1	87	0.042	100	99	20.7	0	241	72	72	70	-0.024	2.2	0
286	44.271	44.167	0.15	0.15	1.19	81	2.42	0.98	81	3.1	87	0.042	99	99	20.6	-0.1	242	72	72	70	-0.025	2.3	0
287	44.427	44.322	0.16	0.16	1.20	81	2.42	0.98	81	3.1	87	0.042	100	99	20.6	0	241	72	72	70	-0.025	2.1	0
288	44.581	44.475	0.15	0.15	1.19	81	2.42	0.98	81	3.1	87	0.042	99	98	20.6	0	241	72	72	70	-0.024	2.2	0
289	44.736	44.630	0.15	0.16	1.19	81	2.42	0.97	81	3.1	87	0.042	99	99	20.6	0	240	72	72	70	-0.024	2.2	0
290	44.890	44.783	0.15	0.15	1.20	81	2.43	0.98	81	3.1	87	0.042	99	98	20.6	0	240	72	72	70	-0.024	2.4	0
291	45.046	44.937	0.16	0.15	1.20	81	2.43	0.98	81	3.1	87	0.042	100	99	20.5	-0.1	241	72	72	70	-0.024	2.4	0
292	45.200	45.092	0.15	0.16	1.20	81	2.42	0.98	81	3.1	87	0.042	99	99	20.5	0	241	72	72	70	-0.024	2.5	0
293	45.356	45.245	0.16	0.15	1.20	81	2.43	0.98	81	3.1	87	0.042	100	98	20.5	0	241	72	72	70	-0.024	2.5	0
294	45.510	45.400	0.15	0.16	1.19	81	2.43	0.98	81	3.1	87	0.042	99	99	20.5	0	243	72	72	70	-0.025	2.6	0
295	45.666	45.553	0.16	0.15	1.20	81	2.42	0.98	81	3.1	87	0.042	100	98	20.4	-0.1	243	72	72	70	-0.025	2.4	0
296	45.820	45.708	0.15	0.16	1.20	81	2.43	0.97	81	3.1	87	0.042	99	99	20.4	0	243	72	72	70	-0.025	2.5	0
297	45.975	45.861	0.16	0.15	1.19	81	2.43	0.98	81	3.1	87	0.042	99	98	20.4	0	243	72	72	70	-0.025	2.4	0
298	46.129	46.015	0.15	0.15	1.19	81	2.43	0.98	81	3.1	87	0.042	99	99	20.4	0	244	72	72	70	-0.025	2.5	0
299	46.284	46.170	0.16	0.16	1.20	81	2.43	0.97	81	3.1	87	0.042	99	99	20.4	0	245	72	72	70	-0.025	2.4	0
300	46.439	46.323	0.16	0.15	1.19	81	2.42	0.98	81	3.1	87	0.042	99	98	20.3	-0.1	245	72	72	70	-0.025	2.3	0
301	46.593	46.478	0.15	0.16	1.19	81	2.42	0.97	81	3.1	87	0.042	99	99	20.3	0	244	72	72	70	-0.025	2.1	0
302	46.748	46.631	0.15	0.15	1.19	81	2.42	0.97	81	3.1	87	0.042	99	98	20.3	0	243	72	72	70	-0.024	1.9	0
303	46.903	46.785	0.16	0.15	1.19	81	2.43	0.97	81	3.1	87	0.042	99	99	20.2	-0.1	244	72	72	70	-0.025	2.2	0
304	47.057	46.939	0.15	0.15	1.19	81	2.43	0.98	81	3.1	87	0.042	99	99	20.3	0.1	243	72	72	70	-0.025	2.2	0
305	47.212	47.093	0.16	0.15	1.19	81	2.42	0.97	81	3.1	88	0.042	99	99	20.2	-0.1	243	72	72	70	-0.025	2.1	0
306	47.367	47.248	0.15	0.15	1.18	81	2.43	0.98	81	3.1	88	0.042	99	100	20.2	0	243	72	72	70	-0.025	2	0
307	47.521	47.401	0.15	0.15	1.19	81	2.43	0.98	81	3.1	87	0.042	99	98	20.2	0	242	72	72	70	-0.024	2	0
308	47.677	47.555	0.16	0.15	1.19	81	2.42	0.97	81	3.1	88	0.042	100	99	20.1	-0.1	243	72	72	70	-0.026	2.3	0
309	47.831	47.709	0.15	0.15	1.19	81	2.42	0.98	81	3.1	88	0.042	99	99	20.2	0.1	244	72	72	70	-0.025	2.3	0
310	47.986	47.863	0.15	0.15	1.19	81	2.42	0.97	81	3.1	87	0.042	99	99	20.1	-0.1	243	72	72	69	-0.025	1.9	0
311	48.140	48.017	0.15	0.15	1.19	81	2.42	0.98	80	3.1	87	0.042	99	99	20.1	0	242	72	72	69	-0.024	2	0
312	48.296	48.170	0.16	0.15	1.19	81	2.43	0.98	80	3.1	87	0.042	100	98	20.1	0	242	72	72	70	-0.024	2	0
313	48.450	48.325	0.15	0.16	1.19	81	2.43	0.97	80	3.1	87	0.042	99	100	20.1	0	242	72	72	70	-0.024	2	0
314	48.605	48.478	0.15	0.15	1.19	81	2.43	0.98	81	3.1	87	0.042	99	98	20.0	-0.1	241	72	72	70	-0.024	1.9	0

Pellet Heater Test Data - ASTM E2779 / ASTM E2515

Run: 1

Manufacturer: Harman High Burn End Time: 62
 Model: XXV Medium Burn End Time: 183
 Tracking No.: 2165 Total Sampling Time: 364 min
 Project No.: 0135PS033E.REV001 Recording Interval: 1 min
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26 Background Sample Volume: 0 cubic feet

Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)

Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg

OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: 335/336
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Dilution Tunnel H2O: 2.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Tunnel Area: 0.19635 ft²
 Pitot Tube Cp: 0.99


Avg. Tunnel Velocity: 12.08 ft/sec.
 Initial Tunnel Flow: 130.0 scfm
 Average Tunnel Flow: 134.2 scfm
 Post-Test Leak Check (1): 0.04 cfm @ -8 in. Hg
 Post-Test Leak Check (2): 0 cfm @ -14 in. Hg
 Fuel Moisture: 3.5 Dry Basis %

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042
Temp:	108	108	108	108	108	108	108	108	108
V _{strav}	12.25			ft/sec			V _{scnt}	14.04	
								ft/sec	
							F _p	0.873	

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)				Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft³)	Gas Meter 2 (ft³)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 (H₂O)	Meter Temp 1 (°F)	Meter Vacuum 1 (Hg)	Orifice dH 2 (H₂O)	Meter Temp 2 (°F)	Meter Vacuum 2 (Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Stack	Filter 1	Filter 2	Ambient	Draft (H₂O)	CO₂ (%)	CO (%)
315	48.759	48.633	0.15	0.16	1.19	81	2.43	0.97	81	3.1	87	0.042	99	99	20.0	0	240	72	72	70	-0.024	2	0
316	48.914	48.786	0.16	0.15	1.19	81	2.43	0.98	80	3.1	87	0.042	99	98	20.0	0	241	72	72	69	-0.024	2.3	0
317	49.068	48.940	0.15	0.15	1.19	81	2.42	0.97	81	3.1	87	0.042	99	99	19.9	-0.1	240	72	72	70	-0.024	2.2	0
318	49.224	49.095	0.16	0.16	1.19	81	2.42	0.97	81	3.1	87	0.042	100	99	19.9	0	240	72	72	70	-0.024	2.3	0
319	49.377	49.248	0.15	0.15	1.19	81	2.42	0.98	80	3.1	87	0.042	98	98	19.9	0	240	72	72	70	-0.025	2.4	0
320	49.533	49.402	0.16	0.15	1.18	81	2.42	0.97	80	3.1	87	0.042	100	99	19.9	0	240	72	72	70	-0.024	2.5	0
321	49.687	49.555	0.15	0.15	1.19	81	2.43	0.98	80	3.1	87	0.042	99	98	19.9	0	240	72	72	70	-0.024	2.5	0
322	49.842	49.709	0.16	0.15	1.19	81	2.43	0.97	80	3.1	88	0.042	99	99	19.9	0	240	72	72	70	-0.024	2.3	0
323	49.996	49.864	0.15	0.15	1.19	81	2.43	0.97	80	3.1	88	0.042	99	100	19.8	-0.1	241	72	72	70	-0.024	2.6	0
324	50.152	50.017	0.16	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	100	98	19.8	0	241	72	72	70	-0.024	2.3	0
325	50.306	50.171	0.15	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	99	19.8	0	241	72	72	70	-0.025	2.4	0
326	50.461	50.325	0.16	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	99	19.7	-0.1	242	72	72	70	-0.025	2.4	0
327	50.615	50.478	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	98	19.8	0.1	244	72	72	70	-0.025	2.7	0
328	50.770	50.632	0.16	0.15	1.19	81	2.43	0.98	80	3.1	87	0.042	99	99	19.7	-0.1	243	72	72	70	-0.025	2.5	0
329	50.924	50.786	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	99	19.7	0	243	72	72	70	-0.025	2.2	0
330	51.079	50.940	0.16	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	99	19.6	-0.1	243	72	72	70	-0.025	2.3	0
331	51.233	51.093	0.15	0.15	1.19	81	2.43	0.97	80	3.1	88	0.042	99	98	19.6	0	243	72	72	70	-0.025	2.2	0
332	51.388	51.248	0.16	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	100	19.6	0	242	72	72	70	-0.025	2.2	0
333	51.542	51.401	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	98	19.6	0	242	72	72	70	-0.025	2	0
334	51.697	51.555	0.16	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	99	19.5	-0.1	242	72	72	70	-0.025	2.3	0
335	51.851	51.709	0.15	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	99	19.5	0	244	72	72	70	-0.025	2.4	0
336	52.005	51.862	0.15	0.15	1.19	81	2.44	0.97	80	3.1	88	0.042	99	98	19.5	0	244	72	72	70	-0.025	2.1	0
337	52.160	52.016	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	99	19.5	0	242	72	72	70	-0.025	1.9	0
338	52.314	52.169	0.15	0.15	1.19	81	2.43	0.97	80	3.1	87	0.042	99	98	19.5	0	242	72	72	70	-0.024	2	0
339	52.469	52.323	0.16	0.15	1.19	81	2.44	0.97	80	3.1	88	0.042	99	99	19.5	0	243	72	72	70	-0.025	2.4	0
340	52.623	52.478	0.15	0.16	1.19	81	2.44	0.97	80	3.1	88	0.042	99	100	19.5	0	243	72	72	70	-0.024	2.4	0
341	52.778	52.630	0.16	0.15	1.18	81	2.43	0.97	80	3.1	88	0.042	99	98	19.4	-0.1	242	72	72	70	-0.024	2.2	0
342	52.932	52.785	0.15	0.15	1.19	81	2.43	0.97	80	3.1	88	0.042	99	100	19.4	0	241	72	72	70	-0.024	2	0
343	53.087	52.938	0.16	0.15	1.18	81	2.44	0.97	80	3.1	88	0.042	99	98	19.4	0	241	72	72	70	-0.025	2.2	0
344	53.241	53.092	0.15	0.15	1.19	81	2.44	0.97	80	3.1	88	0.042	99	99	19.3	-0.1	244	72	72	70	-0.025	2.6	0
345	53.396	53.246	0.16	0.15	1.19	81	2.43	0.97	80	3.1	88	0.042	99	99	19.3	0	244	72	72	70	-0.025	2.2	0
346	53.549	53.399	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	98	98	19.3	0	242	72	72	70	-0.025	2	0
347	53.704	53.553	0.16	0.15	1.18	81	2.44	0.97	80	3.1	87	0.042	99	99	19.3	0	243	72	72	70	-0.025	2.2	0
348	53.858	53.706	0.15	0.15	1.19	81	2.44	0.97	80	3.1	87	0.042	99	98	19.3	0	243	72	72	70	-0.025	2.4	0
349	54.013	53.860	0.16	0.15	1.18	81	2.44	0.97	80	3.1	87	0.042	99	99	19.3	0	243	72	72	70	-0.025	2.3	0

Run: 1
 Manufacturer: Harman
 Model: XXV
 Tracking No.: 2165
 Project No.: 0135PS033E.REV001
 Test Date: 22-Mar-16
 Beginning Clock Time: 10:26
 High Burn End Time: 62
 Medium Burn End Time: 183
 Total Sampling Time: 364 min
 Recording Interval: 1 min
 Background Sample Volume: 0 cubic feet
 Meter Box Y Factor: 1.001 (1) 1.001 (2) 0 (Amb)
 Barometric Pressure: Begin Middle End Average
30.14 30.17 30.2 30.17 "Hg
 OMNI Equipment Numbers: 335, 336, 410, 420

PM Control Modules: <u>335/336</u>		Avg. Tunnel Velocity: <u>12.08</u> ft/sec.	
Dilution Tunnel MW(dry): <u>29.00</u> lb/lb-mole		Initial Tunnel Flow: <u>130.0</u> scfm	
Dilution Tunnel MW(wet): <u>28.78</u> lb/lb-mole		Average Tunnel Flow: <u>134.2</u> scfm	
Dilution Tunnel H2O: <u>2.00</u> percent			
Dilution Tunnel Status: <u>-0.80</u> "H2O		Post-Test Leak Check (1): <u>0.04</u> cfm @ <u>-8</u> in. Hg	
Tunnel Area: <u>0.19635</u> ft2		Post-Test Leak Check (2): <u>0</u> cfm @ <u>-14</u> in. Hg	
Pitot Tube Cp: <u>0.99</u>		Fuel Moisture: <u>3.5</u> Dry Basis %	

Velocity Traverse Data										
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.020	0.038	0.036	0.026	0.024	0.040	0.038	0.028	0.042	"H ₂ O
Temp:	108	108	108	108	108	108	108	108	108	°F
	V _{strav}	12.25	ft/sec	V _{scnt}	14.04	ft/sec	F _D	0.873		

Control No. P-XXXX-0001, Effective date: xx/xx/xxxx

ASTM E2779 Pellet Heater Run SheetsClient: **Harman** Project Number: **0135PS033E.REV001** Run Number: **1**Model: **Absolute** Tracking Number: **2165** Date: **3/22/16**Test Crew: **A. Kravitz**OMNI Equipment ID numbers: **23, 131, 185, 132, 209, 283A, 335, 336, 410, 420, 559, 592****Pellet Heater Run Notes****Air Control Settings**High Burn Rate Target: 100%Settings: Temperature = 7.0

Combustion Blower:

Feed Limit = 90%Max = 2700 RPMDistribution Blower = 100%Min = 2600 RPMMedium Burn Rate Target: <50%Settings: Temperature = 2.5

Combustion Blower:

Feed Limit = 43%Max = 2700 RPMDistribution Blower = 100%Min = 2200 RPMLow Burn Rate Target: MinimumSettings: Temperature = 1.0

Combustion Blower:

Feed Limit = 25%Max = 2700 RPMDistribution Blower = OFFMin = 2200 RPMAdditional Settings
Notes:
N/A**Preburn Notes**


Time	Notes
60:00	PB End

Test Notes

Time	Notes
62:00	Switched to medium settings
183:00	Switched to low settings
364:00	Test end

Pellet Moisture Content: 3.51%

Technician Signature: _____



Date: _____

3/22/16

ASTM E2779 Pellet Heater Run SheetsClient: **Harman**Project Number: **0135PS033E.REV001** Run Number: **1**Model: **Absolute**Tracking Number: **2165**Date: **3/22/16**Test Crew: **A. Kravitz**OMNI Equipment ID numbers: **23, 131, 185, 132, 209, 283A, 335, 336, 410, 420, 559, 592****Pellet Heater Supplemental Data**Start Time: **9:54**Booth #: **E1**Stop Time: **15:57****Stack Gas Leak Check:**Initial: **0** Final: **0****Sample Train Leak Check:**A: **0.04** @ -8 "HgB: **0** @ -14 "HgCalibrations: Span Gas CO₂: **16.89** CO: **4.29**

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	9:07	9:08	16:02	16:04
CO ₂	0.00	16.89	.03	16.95
CO	0.000	4.293	-0.008	4.268

Air Velocity (ft/min): Initial: **<50**Final: **<50**Scale Audit (lbs): Initial: **10.0**Final: **10.0**Pitot Tube Leak Test: Initial: **0**Final: **0**Stack Diameter (in): **3**Induced Draft: **0**% Smoke Capture: **100**

Flue Pipe Cleaned Prior to First Test in Series:

Date: **9/1/15**Initials: **A**

	Initial	Middle	Ending
P _b (in/Hg)	30.14	30.17	30.20
Ambient (°F)	68	69	70

Tunnel Traverse		
Microtector Reading	dP (in H ₂ O)	T(°F)
0.010	0.020	108
0.019	0.038	108
0.018	0.036	108
0.013	0.026	108
0.012	0.024	108
0.020	0.040	108
0.019	0.038	108
0.014	0.028	108
Center:		
0.021	0.042	108
Static:		
--	-0.18	108

Background Filter Volume: **N/A**Technician Signature: **A**Date: **3/22/16**