

TEST REPORT

The Intertek logo consists of the word "Intertek" in a white, sans-serif font, centered within a dark blue rounded rectangular background.

REPORT NUMBER: 102070238PRT-001
REPORT DATE: April 27, 2015

EVALUATION CENTER
Intertek Testing Services NA Inc.
22887 NE Townsend Way
Fairview Oregon 97024

RENDERED TO

Hearth & Home Technologies
1445 North Hwy
Colville Washington 99114

PRODUCT EVALUATED:

Model Mt. Vernon AE Freestanding and Insert pellet Fired Room Heater

Report of Testing Model Mt. Vernon AE Pellet fired Room Heater for compliance as an "Affected Facility" with the applicable requirements of the following criteria: EPA Method 28 "Certification and Auditing of Wood Heaters" and EPA Method 5G "Determination of Particulate Matter Emissions from Wood Heaters".

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I. INTRODUCTION

Intertek Testing Services NA (Intertek) has conducted testing for Hearth & Home Technologies, on model Mt. Vernon AE Pellet Fired Solid Fuel Room Heater, to evaluate all applicable performance requirements included in EPA Method 28 "Certification and auditing of wood heaters" and Method 5G "Determination of particulate matter emissions from wood heaters." Method 5G2 was used to evaluate emission rates from the Mt. Vernon AE Pellet stove. 5G2 utilizes a Method 5H sample train that extracts samples from a Dilution Tunnel. This method does not require results be corrected to obtain an EPA adjusted emission result.

I.A PURPOSE OF TEST

The test was conducted to determine if the unit is in accordance with U.S EPA requirements under 40 CFR 60 SUBPART AAA, NSPS for Residential Wood Heaters. This evaluation was conducted on April 22 through April 23, 2015

I.B LABORATORY

The test on the Mt. Vernon AE Pellet fired Solid Fuel Room Heater was conducted at the Intertek testing Services Laboratory located in Fairview Oregon. The laboratory elevation is 29 feet above sea level and is accredited by the U.S. EPA, Certificate Number 8. Certification testing was conducted by Associate Engineer Bruce S Davis.

I.C DESCRIPTION OF UNIT

The model Mt. Vernon AE Solid Fuel Room Heater is constructed of carbon steel. The outer dimensions are 26 7/8-inches deep, 32-inches high, and 28-inches wide. A remote controller is used to operate the appliance at desired heat outputs and fan speeds. This control can be operated in either manual or automatic mode, see operation manual for details. Unit operates by a combustion blower creating a negative pressure on the firebox and pulling combustion air through a fire pot. Pellet fuel is fed into the fire pot via an auger that is turned at a timed cycle depending on heat output settings. A viewing window is mounted in the front door; fuel is added through a door on the hopper. An insert version was not tested but shares all feed and air moving components. The firebox is identical but is covered by an insert shell consisting of a cast iron front and side shields constructed of cast iron.
(See product drawings.)

I.D REPORT ORGANIZATION

This report includes summaries of all data necessary to determine compliance with the regulations. Raw data, calibration records, intermediate calculations, drawings, specifications and other supporting information are contained in appendices to this report.

II. SUMMARIZATION

II.A PRETEST INFORMATION

A sample was submitted to Intertek directly from the client at the Hearth & Home test facility, the sample was not independently selected for testing. The test unit was received at the client facility on April 16, 2015. This appliance was inspected upon receipt and found to be in good condition. The unit was set up following the manufacturer's instructions without difficulty.

Following assembly, the unit was placed on the test stand and instrumented with thermocouples in the specified locations. Prior to beginning the emissions tests the unit had been operated in excess of 10 hours during research and development tests conducted by Hearth & Home personnel.

Prior to testing the unit's chimney system and laboratory dilution tunnels was cleaned using standard wire brush chimney cleaning equipment.

II.B INFORMATION LOG

TEST STANDARD

From April 22 through April 23, 2015 the unit was tested for EPA emissions using test method 5G2. A sample train described in EPA method 5H was used to extract a proportionate sample from the dilution tunnel. A heated front filter, four Impingers and a rear filter made up the sample train.

Deviation from Standard Method

No deviations from the standards were performed, however, only the applicable sections from each standard were used during all testing.

II.C SUMMARY OF TEST RESULTS

RUN #1 April 22, 2015: Digital controller was set to a flame height of +5, heat output on high, and fuel setting is on softwood. Feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 2.69 kg/hr was achieved producing 40,160 BTU's per hour using EPA calculation.

RUN #2 April 22, 2015: Digital controller was set to a flame height of +3, heat output on medium, and fuel setting is on softwood. Feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 1.52 kg/hr was achieved producing 22,692 BTU's per hour using EPA calculation.

RUN #3 April 23, 2015: Digital controller was set to a flame height of -1, heat output on medium low, and fuel setting is on softwood. Feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 1.06 kg/hr was achieved producing 15,825 BTU's per hour using EPA calculations.

RUN #4 April 23, 2015: Digital controller was set to a flame height of -5, heat output on low, and fuel setting is on softwood. Feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 0.84 kg/hr was achieved producing 12,541 BTU's per hour using EPA calculations.

II.D SUMMARY OF OTHER DATA

EMISSIONS

Run Number	Test Date	Burn Rate (kg/hr)	Emission Rate (g/hr)	Heating Efficiency* (% HHV)	Heating Efficiency* (% LHV)
1	4/22/15	2.69	3.29	75.9	82.0
2	4/22/15	1.52	2.08	72.6	78.4
3	4/23/15	1.06	1.15	69.5	75.1
4	4/23/15	0.84	0.90	68.6	74.2

*Efficiency determined per CSA B415.1-2010.

Run number 4 was conducted a minimum air and feed control settings. There are no adjustments available to the end user that would produce a slower burn rate. Program settings are locked and found to be tamper proof.

WEIGHTED AVERAGE CALCULATION

Test No.	Burn Rate	(E) Average Emission Rate g/hr	Heat Output (Btu/hr)	Probability	(K) Weighting Factor	(KxE)
4	.084	0.90	12,541	0.2472	0.4176	0.3758
3	1.06	1.15	15,825	0.4176	0.5144	0.5916
2	1.52	2.08	22,692	0.7616	0.5590	1.1627
1	2.69	3.29	40,160	0.9766	0.2384	0.7843
Totals:					1.7294	2.9145
Weighted average emission rate:						1.69

TEST FACILITY CONDITIONS

Run	Room Temp. °F before	Room Temp. °F after	Baro. Pres. In. Hg before	Baro. Pres. In. Hg after	Air Vel. Ft/min before	Air Vel. Ft/min after
1	74	74	30.15	30.12	<50	<50
2	74	75	30.12	30.03	<50	<50
3	71	72	29.94	29.86	<50	<50
4	71	72	29.85	29.80	<50	<50

DILUTION TUNNEL FLOW RATE MEASUREMENTS AND SAMPLING DATA (5G-2)

Run No.	Burn Time (min)	Velocity (ft/sec)	Volumetric Flow Rate (dscf/min)	Total Temp. (°R)	Volume of Sample	Particulate Catch (mg)
1	120	14.35	151.15	571	79.213	28.87
2	120	13.81	147.70	561	79.509	18.78
3	120	13.91	150.30	552	79.251	10.11
4	120	13.65	148.28	548	79.102	8.00

GENERAL SUMMARY OF RESULTS

Run No.	Burn Rate (kg/hr)	Change In Surface Temp (°F)	Initial Draft (in/H ₂ O)	Run Time (min)	Average Draft (in/H ₂ O)
1	2.69	19.2	-0.080	120	-0.080
2	1.52	0.6	-0.060	120	-0.060
3	1.06	3.4	-0.050	120	-0.050
4	0.84	1.0	-0.040	120	-0.040

III. PROCESS DESCRIPTION

III.A TEST SET-UP DESCRIPTON

A standard 6" diameter single wall pipe and insulated chimney system was installed to 15' above floor level as specified by EPA regulations. A 3 inch elbow was installed at the flue collar; a 3" to 6" adaptor was installed directly to the top of the 3" elbow which connected to the 6" single wall pipe. A 3" pellet vent transition to 6" single wall pipe stove pipe is shown as an option in manufactures installation instruction in addition to standard 3" and 4" pellet vent pipe.

III.B AIR SUPPLY SYSTEM

Combustion air enters through a tube located at the rear of the appliance. This tube is connected directly to the firebox and firepot. Air control is achieved by a programmed speed control of the combustion blower creating a vacuum to the air inlet tube.

IV. SAMPLING SYSTEMS

IV.A. SAMPLING LOCATIONS

Particulate samples are collected from the vertical sample section of the dilution tunnel. The tunnel has two elbows and two mixing baffles in the system ahead of the sampling section. The sampling section is a continuous section of 6 inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard Pitot tube located a minimum of 4 feet upstream of the sample location. The dry bulb thermocouple is located six inches downstream from the Pitot tube. Actual tunnel used was verified to meet EPA specifications and is similar to that shown in figure 1.

Stack gas samples are collected from the steel chimney section 8 feet \pm 6 inches above the scale platform. Actual gas sample collection train was similar to that shown in figure 2.

An emissions sample train similar to that shown in figure 3 was used; a glass probe was used in place of a heated probe and button hook nozzle.

IV.A.(1) DILUTION TUNNEL

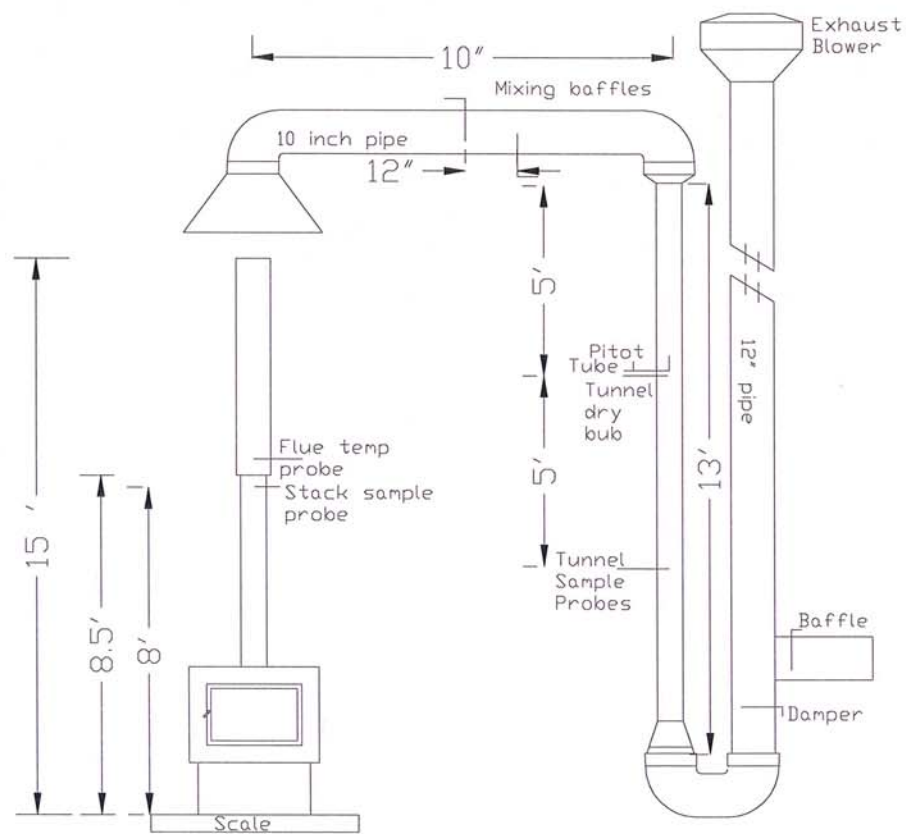
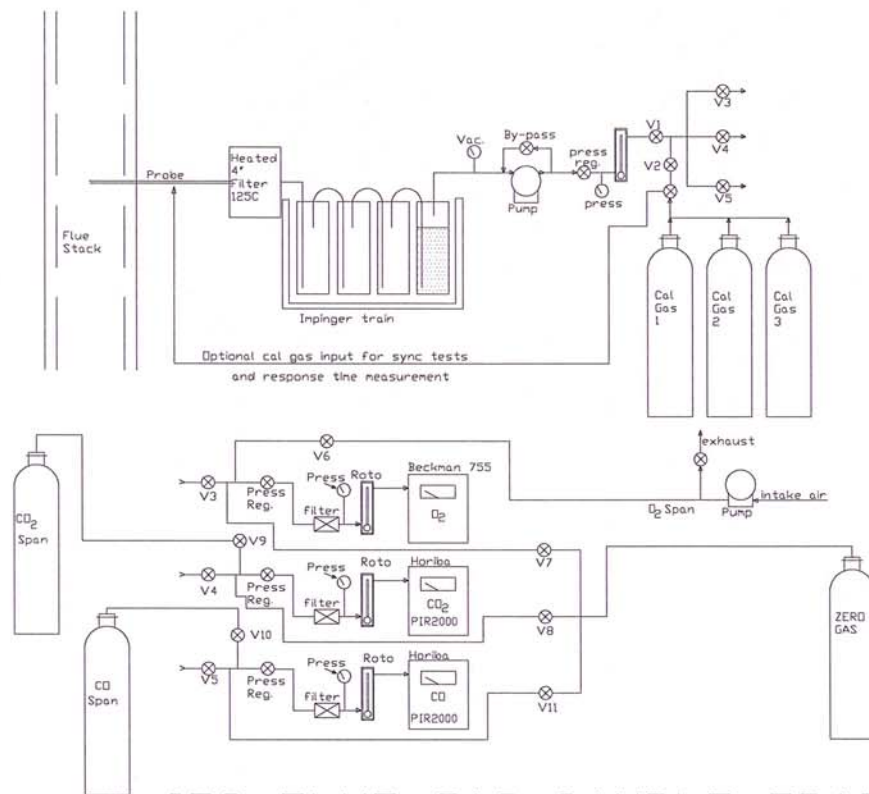


FIGURE 1

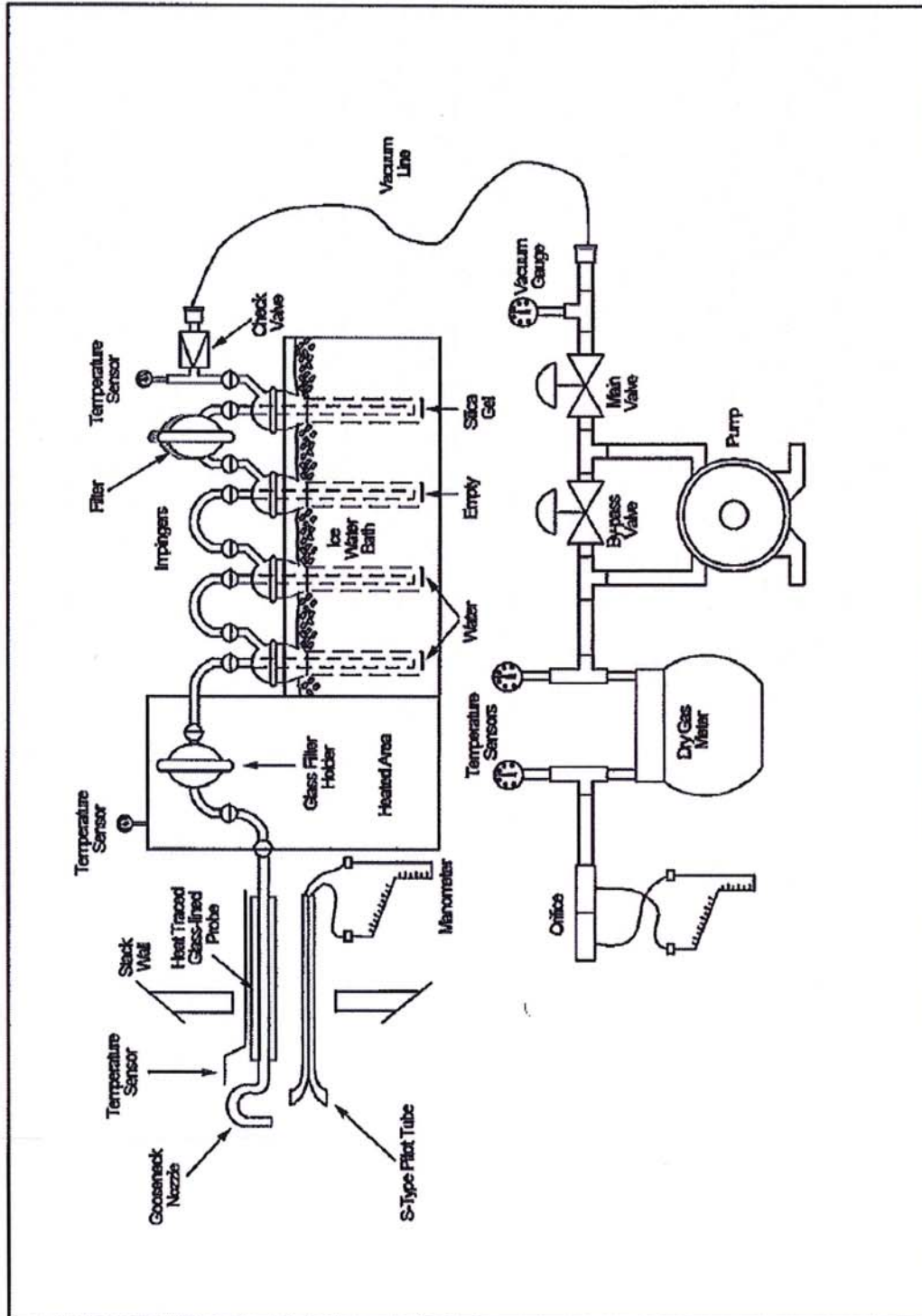
IV.B.(1) STACK GAS SAMPLE TRAIN



ITS FLUE GAS SAMPLE TRAIN

FIGURE 2

IV.B.(2). DILUTION TUNNEL SAMPLE SYSTEMS



V. SAMPLING METHODS

V.A. PARTICULATE SAMPLING

Particulates were sampled in strict accordance with EPA Method 5G-2 and 5H. A 5H sample train was used to extract particulate samples proportionally from a dilution tunnel. A glass probe was inserted into the tunnel and sample was drawn across a heated 110mm filter. After the heated front filter gasses entered a set of four Impingers, a rear 55mm filter was placed between number three and four Impingers. Sample analysis consisted of a front and back half acetone rinse. Impinger water was subjected to a Dichloromethane extraction to separate organics prior to oven drying.

VI. QUALITY ASSURANCE

VI.A. INSTRUMENT CALIBRATION

VI.A. (1) DRY GAS METERS

At the conclusion of each test program the dry gas meters are checked against our standard dry gas meter. Three runs are made on each dry gas meter used during the test program. The average calibration factors obtained are then compared with the six-month calibration factor and, if within 5%, the six-month factor is used to calculate standard volumes. Results of this calibration are contained in Appendix D.

An integral part of the post test calibration procedure is a leak check of the pressure side by plugging the system exhaust and pressurizing the system to 10" W.C. The system is judged to be leak free if it retains the pressure for at least 10 minutes.

The standard dry gas meter is calibrated every 12 months using an accredited calibration agency. All calibration values are verified to be within EPA specifications.

VI.A.(3). GAS ANALYZERS

The continuous analyzers are zeroed and spanned before each test with appropriate gases. A mid-scale multi-component calibration gas is then analyzed (values are recorded). At the conclusion of a test, the instruments are checked again with zero, span and calibration gases (values are recorded only). The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

VI.B. TEST METHOD PROCEDURES

VI.B.(1). LEAK CHECK PROCEDURES

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

VI.B.(2). TUNNEL VELOCITY/FLOW MEASUREMENT

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

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

VI.B.(3). PM SAMPLING PROPORTIONALITY (5G)

Proportionality was calculated in accordance with EPA Method 5G. The data and results are included in Appendix G.


VII. CONCLUSION


Results of this test show the Mt. Vernon AE Freestanding and Insert when operated following guidelines specified in EPA method 28 does meet emissions limits regulating an affected facility in the EPA New Source Performance Standards.

VII.A RESULTS AND OBSERVATIONS

The Model Mt. Vernon AE Freestanding and Insert Pellet fired Solid Fuel Room Heater has been found to be in compliance with the applicable performance and construction requirements of the following criteria: EPA Method 28 "Certification and auditing of wood heaters" and Method 5G Determination of particulate matter emissions from wood heaters."

INTERTEK TESTING SERVICES NA

Reported by: 
Bruce S Davis
Test Engineer

Reviewed by: 
Jared T Sorenson
Engineering Manager

Hearth & Home Technologies
Mt Vernon Pellet
G102070238



Front View



Side View

EPA NSPS WEIGHTED AVERAGE CALCULATION

V 1.1

8/27/2010

Project Number: G102070238

Manufacturer: Hearth & Home

Model: MT. Vernon AE

Sample ID No: PRT1504161152-001

Weighted Average

Type of

Stove:

3

1=cat

2=noncat

3=pellet

(E) Ave.				Heat		(K)		
Test	Burn	Emission	HHV	Output		Weighting		
No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	Prob.	Factor	(KxE)	KxOHE
4	0.84	0.90	68.60	12540.53	0.2472	0.4176	0.3758	28.65
3	1.06	1.15	69.50	15824.95	0.4176	0.5144	0.5916	35.75
2	1.52	2.08	72.60	22692.38	0.7616	0.5590	1.1627	40.58
1	2.69	3.29	75.90	40159.55	0.9766	0.2384	0.7843	18.09
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00

Totals: 1.7294 2.9145 123.08

Brian D.

Weighted average emissions rate:	1.6852
Weighted Average OHE:	71.17

Pellet Fuel Moisture Content Worksheet

Intertek

Intertek Portland

Client USS Company
 Model P24FSA
 Project No. G101216773
 Sample Description _____

Container	Container ID No.	Date Placed in Oven	Time Placed in Oven	Container Tare Weight, Grams	Initial Gross Weight, Grams	Date Removed from Oven	Time Removed From Oven	Final Gross Weight, Grams	Moisture Content, Wet Basis, %	Moisture Content, Dry Basis, %
1	2051	4/23/2015	13:35	99.1937	253.8025	4/24/2015	13:44	246.9176	4.4531	4.6607
2	2046	4/24/2015	14:35	99.5143	251.7701	4/25/2015	14:44	244.9055	4.5086	4.7215

Average Moisture Content, Wet Basis **4.48** %

Average Moisture Content, Dry Basis **4.69** %

Method: ASTM D4442-92 Method A -- Oven Drying Method

Dry Basis, % = (Initial net - Final net) / Final net x 100

Wet Basis, % = (Initial net - Final net) / Initial net x 100

Engineer Signature 

Date 4/24/2015

TEST RESULTS

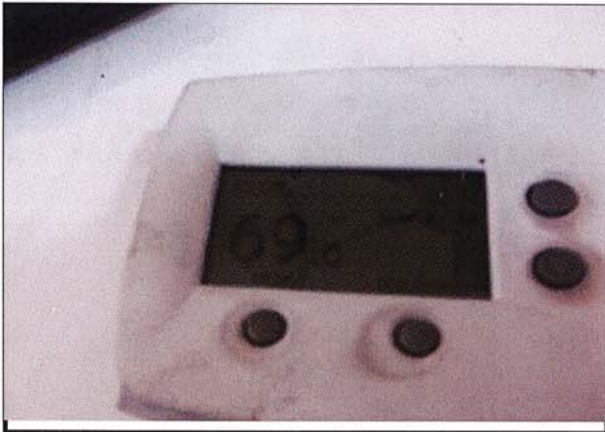
EPA METHOD 5G-2

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 22-Apr-15
 Test Run Number: 1

Dry Burn-Rate, kg/hr:		2.69
Emission-Rate, g/hr:		3.29
Duration of Test, Minutes		120
Dry Gas Meter Standardization		Train A
Dry Gas Meter Beginning Reading, ft ³		869.317
Dry Gas Meter Ending Reading, ft ³		950.51
Barometric Pressure Correction Factor		1.007
Dry Gas Meter Calibration Factors (γ factors)		0.975
Dry Gas Meter Temperature Factors		0.994
Dry Gas Meter Delta-H Correction Factors		1.004
Dry Gas Meter STD Volume Sampled, ft ³		79.574
Dillution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm		151.146
Total Tunnel Volume, scf		18137.576
Emission Caclulations		Train A
Sample Ratios (Total Tunnel Volume / Total Sample Volume)		227.934
Sample Particulate Mass, mg		28.9
Total Emissions, grams		6.581
Emission-Rate, g/hr		3.29
Adjusted Emission Rates, g/hr		4.89
Operating Parameters		Train A
Max Filter Temperature, °F		132
Post-Test Leak Check, cfm @ in. Hg vac.		0
Average Firebox Surface Temperture delta-T, °F		19.2
Maximum Ambient Temperture, °F		75
Mimimum Ambient Temperature, °F		73
Fuel Properties		
Wet Fuel Load Weight, lb.		12.40
Dry-Basis Fuel Load Moisture Content, %		4.69
Wet-Basis Fuel Load Moisture Content, %		4.48

PROJECT / TEST INFORMATION	
Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	22-Apr-15
Test Run Number:	1
Date tunnel cleaned:	4/21/2015
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	NA	N/A for pellet type
Convection Blower	3	1 - No Fan 2 - Fan Optional 3 - Fan Standard



Test Settings	
Primary Air:	NA
Secondary Air:	NA
Control Board:	Heat output on high, flame height adjust on +5
Blower/Fan:	Automatic to heat output (normal)
Pre- Burn Activities	
Time	Activity
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Heat output on high, flame height adjust on +5
Blower / fan:	Automatic to heat output
Other Notes	

Test Engineer: B.D.

Date: 4/29/15

Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	22-Apr-15
Test Run Number:	1

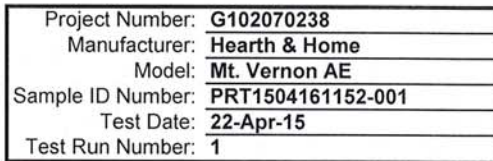
Firebox Volume, ft ³ :	NA
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Calibration Reference ID	
Set meter to Species 1	
Set Temperature to 70F	12% 12.0
Set pin setting to 444	22% 22.0

PRE-BURN FUEL PROPERTIES					
Eq. ID No.:		Time:		Temp., °F:	
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight		0.0	Average, %db	#DIV/0!	

Allowable Fuel Load Range:	#VALUE!	to	#VALUE!
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TEST FUEL LOAD PROPERTIES						
Eq. ID No.:		Time:	9:30	Temp., °F:	65	
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis		
		2x4	4x4			
1			12.40	4.7	4.7	4.7
2						
3						
4						
5						
6						
7						
8						
Totals		0.0	12.4			
% of Weight		0	100			
Total weight, wet, lb.		12.40		Average Moisture, dry	4.69	
Total weight, dry, kg		5.37		Average Moisture, wet	4.48	



Coal Bed Range	2.5	to	3.1
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Average Firebox Temp, °F	0
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Final Coal Bed Wt, lb	51.8
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Test Engineer: BA

Date: 4/29/15

Project Number: **G102070238**
 Manufacturer: **Hearth & Home**
 Model: **MT. Vernon AE**
 Sample ID No: **PRT1504161152-001**
 Test Date: **22-Apr-15**
 Test Run No: **1**

Temperature Data

Firebox Temp Start	249.6
Firebox Temp End	268.8
Firebox Delta-T	19.2

Max Filter Temps	
Train A	
132	

Interval	10	Duration of Test, Min		120		Firebox Data 1				Firebox Data 2		Firebox Data 3		Firebox Data 4	
Time		Temperature Data													
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Right	Firebox Left	Firebox Back	Firebox Bottom	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM		
0	0	74	110	350	630	237	112	140	129		132	68	68		
1	10	74	109	356	648	242	113	142	130		131	49	69		
2	20	73	109	360	669	246	114	144	135		131	47	70		
3	30	73	110	360	667	248	114	144	132		131	50	70		
4	40	74	111	359	657	244	115	143	134		131	53	71		
5	50	73	111	362	678	248	116	145	134		131	57	71		
6	60	74	111	363	693	254	116	147	135		131	61	71		
7	70	74	111	364	688	254	116	147	135		132	65	72		
8	80	75	112	363	685	251	117	149	137		132	66	72		
9	90	74	112	364	692	250	117	148	136		132	58	72		
10	100	75	112	366	690	254	117	149	137		131	56	72		
11	110	74	112	365	687	256	117	146	137		131	57	72		
12	120	74	112	363	687	254	117	149	137		131	58	73		

Test Engineer: B. D.

Date: 4/22/15

Gas Particulate Sampling Data

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 22-Apr-15
 Test Run Number: 1

Barometer, In. Hg	RH, %	Sample Box Correction (y) Factors
Start 30.15		Meter Box (A) 0.975
End 30.12		
Duration of Test, Min	120	

Leak Check, cfm @ in Hg
Train A 0.0@4

Maximum Vacuum
Train A 0.00

Particulate Sampling Data											
Time	Tunnel Delta-P	Train A Delta-H	Flue Draft	Fuel Weight	Weight Loss	Train A Volume	Train A Proportional Rate	Train A Vacuum, In. Hg			
0	0.040	1.50	-0.080	51.10	12.40	869.317	100.01	0.00			
10	0.040	1.50	-0.080	50.00	1.10	876.250	102.73	0.00			
20	0.040	1.50	-0.080	49.00	1.00	882.900	98.35	0.00			
30	0.040	1.50	-0.080	48.10	0.90	889.600	99.18	0.00			
40	0.040	1.50	-0.080	47.10	1.00	896.480	101.74	0.00			
50	0.040	1.50	-0.080	45.90	1.20	903.240	99.96	0.00			
60	0.040	1.50	-0.080	44.90	1.00	909.925	98.85	0.00			
70	0.040	1.50	-0.080	43.90	1.00	916.920	103.24	0.00			
80	0.040	1.50	-0.080	42.90	1.00	923.420	96.02	0.00			
90	0.040	1.50	-0.080	41.90	1.00	930.150	99.42	0.00			
100	0.040	1.50	-0.080	40.80	1.10	937.210	104.29	0.00			
110	0.040	1.50	-0.080	39.80	1.00	943.660	95.28	0.00			
120	0.040	1.50	-0.080	38.70	1.10	950.510	101.00	0.00			



Dilution Tunnel Velocity Traverse EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 22-Apr-15
Test Run Number: 1

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0400	109	0.2000
A2	0.0420	109	0.2049
A3	0.0440	109	0.2098
A4	0.0420	109	0.2049
A Center	0.0400	109	0.2000
B1	0.0380	109	0.1949
B2	0.0420	109	0.2049
B3	0.0440	109	0.2098
B4	0.0460	109	0.2145
B Center	0.0380	109	0.1949
Averages	0.0416	109	0.2055

Tunnel Diameter **6.000** inches

Tunnel Static **-0.470** in. H2O

Tunnel Area 0.19635 Ft²

Pitot Correction 1.0405 factor

Baro. Pressure 30.15

Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)

Initial Velocity 14.145 Ft/ Sec

Initial Flow **149.53** Ft³/min

Test Engineer: BD

Date: 4/24/15



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 22-Apr-15
Test Run Number: 1

Intertek Equipment No.'s 19683, 19684

SAMPLE COMPONENT	REAGENT	FILTER # OR	WEIGHTS			
			FINAL, mg	TARE, mg	BLANK, mg/ml	PARTICULATE, mg
FRONT FILTER CATCH	FILTER	513	772.1	745.5		26.60
REAR FILTER CATCH	FILTER	500	136.8	137.1		-0.30
RINSE OF PROBE &	ACETONE	30	105068.4	105067	0.0027	1.32
RINSE OF IMPINGER SET	WATER	200	94734.4	94733.7	0.0035	0.00
RINSE OF IMPINGER SET	METHANE	100	100625.2	100625.1	0.002	-0.10
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	55	95090.1	95088.6	0.0027	1.35
TOTAL:						28.87

EQUATIONS

FRONT FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
REAR FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
RINSE OF PROBE & FILTER ASSEMBLY - FRONT	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF IMPINGER SET	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF FILTER ASSEMBLY & GAS TRAIN - BACK	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Test Engineer: 

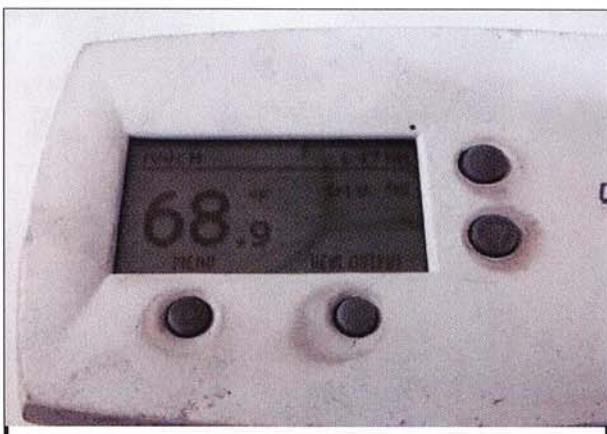
Date: 4/29/15

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 22-Apr-15
 Test Run Number: 2

Dry Burn-Rate, kg/hr:		1.52
Emission-Rate, g/hr:		2.08
Duration of Test, Minutes		120
Dry Gas Meter Standardization		Train A
Dry Gas Meter Beginning Reading, ft ³		950.802
Dry Gas Meter Ending Reading, ft ³		1032.742
Barometric Pressure Correction Factor		1.005
Dry Gas Meter Calibration Factors (γ factors)		0.975
Dry Gas Meter Temperature Factors		0.991
Dry Gas Meter Delta-H Correction Factors		1.004
Dry Gas Meter STD Volume Sampled, ft ³		79.845
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm		147.703
Total Tunnel Volume, scf		17724.300
Emission Calculations		Train A
Sample Ratios (Total Tunnel Volume / Total Sample Volume)		221.983
Sample Particulate Mass, mg		18.8
Total Emissions, grams		4.170
Emission-Rate, g/hr		2.08
Adjusted Emission Rates, g/hr		3.35
Operating Parameters		Train A
Max Filter Temperature, °F		132
Post-Test Leak Check, cfm @ in. Hg vac.		0
Average Firebox Surface Temperature delta-T, °F		0.6
Maximum Ambient Temperature, °F		76
Minimum Ambient Temperature, °F		74
Fuel Properties		
Wet Fuel Load Weight, lb.		7.00
Dry-Basis Fuel Load Moisture Content, %		4.69
Wet-Basis Fuel Load Moisture Content, %		4.48

PROJECT / TEST INFORMATION	
Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	22-Apr-15
Test Run Number:	2
Date tunnel cleaned:	4/21/2015
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	NA	N/A for pellet type
Convection Blower	3	1 - No Fan 2 - Fan Optional 3 - Fan Standard



Test Settings	
Primary Air:	NA
Secondary Air:	NA
Control Board:	Heat output on medium, flame height adjust on +3
Blower/Fan:	Automatic to heat output (normal)
Pre- Burn Activities	
Time	Activity
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Heat output on medium, flame height adjust on +3
Blower / fan:	Automatic to heat output
Other Notes	

Test Engineer: *BD*

Date: 4/29/15

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 22-Apr-15
 Test Run Number: 2

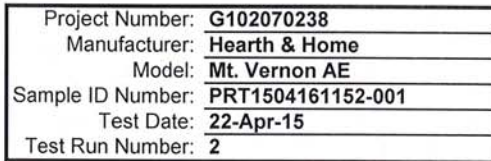
Firebox Volume, ft³: NA

Calibration Reference ID	
Set meter to Species 1	
Set Temperature to 70F	12% 12.0
Set pin setting to 444	22% 22.0

PRE-BURN FUEL PROPERTIES					
Eq. ID No.:		Time:		Temp., °F:	
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight	0.0	Average, %db	#DIV/0!		

Allowable Fuel Load Range: #VALUE! to #VALUE!

TEST FUEL LOAD PROPERTIES						
Eq. ID No.:		Time:	9:30	Temp., °F:	65	
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis		
		2x4	4x4			
1			7.00	4.7	4.7	4.7
2						
3						
4						
5						
6						
7						
8						
Totals		0.0	7.0			
% of Weight		0	100			
Total weight, wet, lb.		7.00		Average Moisture, dry	4.69	
Total weight, dry, kg		3.03		Average Moisture, wet	4.48	



Coal Bed Range	1.4	to	1.7
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Average Firebox Temp, °F	0
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Final Coal Bed Wt, lb	54.1
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Test Engineer: B.D.

Date: 4/29/15

TEST DATA EPA METHOD 5G-2

Project Number: **G102070238**
 Manufacturer: **Hearth & Home**
 Model: **MT. Vernon AE**
 Sample ID No: **PRT1504161152-001**
 Test Date: **22-Apr-15**
 Test Run No: **2**

Temperature Data

Firebox Temp Start	200.6
Firebox Temp End	200
Firebox Delta-T	0.6

Max Filter Temps	
Train A	
132	

Interval	10	Duration of Test, Min		120		Firebox Delta T					0.0		102		0.0	
Time		Temperature Data														
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Right	Firebox Left	Firebox Back	Firebox Bottom	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM			
0	0	74	100	283	473	183	105	122	120		132	66	72			
1	10	74	100	281	464	185	105	123	121		131	36	72			
2	20	75	101	284	480	187	105	123	119		131	36	72			
3	30	74	100	284	478	186	105	123	119		131	38	72			
4	40	75	101	284	472	186	105	123	119		131	41	73			
5	50	74	101	282	466	187	105	123	120		132	42	73			
6	60	75	101	280	467	185	105	123	119		131	44	73			
7	70	76	104	281	459	187	107	122	120		131	45	73			
8	80	75	101	281	468	185	106	123	120		131	45	73			
9	90	75	101	285	479	185	105	123	119		132	46	74			
10	100	75	101	284	468	184	106	123	120		132	47	74			
11	110	75	101	287	488	186	106	124	120		131	47	74			
12	120	75	102	284	467	186	106	123	118		131	47	74			

Test Engineer:

Date: 4/22/15

Gas Particulate Sampling Data

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 22-Apr-15
 Test Run Number: 2

Barometer, In. Hg	RH, %	Sample Box Correction (γ) Factors
Start 30.12		Meter Box (A) 0.975
End 30.03		
Duration of Test, Min		120

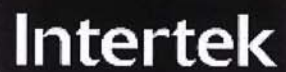
Leak Check, cfm @ in Hg	
Train A	.008@4

Maximum Vacuum	
Train A	
	0.00

Particulate Sampling Data											
Time	Tunnel Delta-P	Train A Delta-H		Flue Draft	Fuel Weight	Weight Loss	Train A Volume		Train A Proportional Rate		Train A Vacuum, In. Hg
0	0.044	1.50		-0.060	54.10	7.00	950.802		100.01		0.00
10	0.044	1.50		-0.060	53.40	0.70	957.910		104.21		0.00
20	0.044	1.50		-0.060	52.80	0.60	964.560		97.58		0.00
30	0.044	1.50		-0.060	52.30	0.50	971.530		102.18		0.00
40	0.044	1.50		-0.060	51.70	0.60	978.420		100.91		0.00
50	0.044	1.50		-0.060	51.10	0.60	985.050		97.10		0.00
60	0.044	1.50		-0.060	50.60	0.50	991.810		99.01		0.00
70	0.044	1.50		-0.060	50.00	0.60	998.760		102.06		0.00
80	0.044	1.50		-0.060	49.40	0.60	1005.620		100.47		0.00
90	0.044	1.50		-0.060	48.90	0.50	1012.560		101.45		0.00
100	0.044	1.50		-0.060	48.30	0.60	1019.370		99.55		0.00
110	0.044	1.50		-0.060	47.70	0.60	1026.010		97.07		0.00
120	0.044	1.50		-0.060	47.10	0.60	1032.742		98.50		0.00

Test Engineer: 

Date: 4/29/15



Dilution Tunnel Velocity Traverse
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 22-Apr-15
Test Run Number: 2

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0400	100	0.2000
A2	0.0420	100	0.2049
A3	0.0420	100	0.2049
A4	0.0400	100	0.2000
A Center	0.0440	100	0.2098
B1	0.0420	101	0.2049
B2	0.0420	101	0.2049
B3	0.0420	101	0.2049
B4	0.0360	101	0.1897
B Center	0.0440	101	0.2098
Averages	0.0414	100.5	0.2018

Tunnel Diameter **6.000** inches

Tunnel Static **-0.460** in. H2O

Tunnel Area 0.19635 Ft²

Pitot Correction 0.9621 factor

Baro. Pressure 30.12

Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)

Initial Velocity 13.794 Ft/ Sec

Initial Flow **147.89** Ft³/min

Test Engineer: 

Date: 4/29/15



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 22-Apr-15
Test Run Number: 2

Intertek Equipment No.'s 19683, 19684

SAMPLE COMPONENT	REAGENT	FILTER # OR	WEIGHTS			
			FINAL, mg	TARE, mg	BLANK, mg/ml	PARTICULATE, mg
FRONT FILTER CATCH	FILTER	514	756.7	742.9		13.80
REAR FILTER CATCH	FILTER	518	137.1	137.6		-0.50
RINSE OF PROBE &	ACETONE	30	126680.7	126678.3	0.0027	2.32
RINSE OF IMPINGER SET	WATER	200	106315	106311.5	0.0035	2.80
RINSE OF IMPINGER SET	METHANE	100	108637	108637	0.002	-0.20
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	50	97395.7	97395	0.0027	0.56
TOTAL:						18.78

EQUATIONS

FRONT FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
REAR FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
RINSE OF PROBE & FILTER ASSEMBLY - FRONT	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF IMPINGER SET	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF FILTER ASSEMBLY & GAS TRAIN - BACK	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Test Engineer:

Date: 4/23/15

TEST RESULTS
EPA METHOD 5G-2

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 23-Apr-15
 Test Run Number: 3

Dry Burn-Rate, kg/hr:		1.06
Emission-Rate, g/hr:		1.15
Duration of Test, Minutes		120
Dry Gas Meter Standardization		Train A
Dry Gas Meter Beginning Reading, ft ³	33.002	
Dry Gas Meter Ending Reading, ft ³	114.757	
Barometric Pressure Correction Factor	0.999	
Dry Gas Meter Calibration Factors (γ factors)	0.975	
Dry Gas Meter Temperature Factors	0.996	
Dry Gas Meter Delta-H Correction Factors	1.004	
Dry Gas Meter STD Volume Sampled, ft ³	79.592	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm	150.299	
Total Tunnel Volume, scf	18035.915	
Emission Calculations		Train A
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	226.605	
Sample Particulate Mass, mg	10.1	
Total Emissions, grams	2.291	
Emission-Rate, g/hr	1.15	
Adjusted Emission Rates, g/hr	2.04	
Operating Parameters		Train A
Max Filter Temperature, °F	132	
Post-Test Leak Check, cfm @ in. Hg vac.	0	
Average Firebox Surface Temperature delta-T, °F	3.4	
Maximum Ambient Temperature, °F	73	
Minimum Ambient Temperature, °F	71	
Fuel Properties		
Wet Fuel Load Weight, lb.	4.90	
Dry-Basis Fuel Load Moisture Content, %	4.69	
Wet-Basis Fuel Load Moisture Content, %	4.48	

PROJECT / TEST INFORMATION	
Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	23-Apr-15
Test Run Number:	3
Date tunnel cleaned:	4/21/2015
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	NA	N/A for pellet type
Convection Blower	3	1 - No Fan 2 - Fan Optional 3 - Fan Standard



Test Settings	
Primary Air:	NA
Secondary Air:	NA
Control Board:	Heat output on medium low, flame height adjust on -1
Blower/Fan:	Automatic to heat output (normal)
Pre- Burn Activities	
Time	Activity
	At 48 minutes changed flame height from -1 to -3 due to burn rate close to edge of category
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Heat output on medium low, flame height adjust on -3
Blower / fan:	Automatic to heat output
Other Notes	

Test Engineer: B. D.

Date: 4/23/15

Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	23-Apr-15
Test Run Number:	3

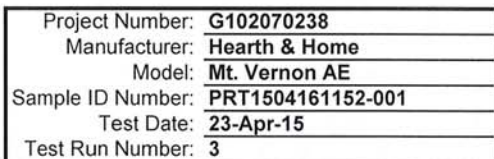
Firebox Volume, ft ³ :	NA
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Calibration Reference ID	
Set meter to Species 1	
Set Temperature to 70F	12% 12.0
Set pin setting to 444	22% 22.0

PRE-BURN FUEL PROPERTIES				
Eq. ID No.:		Time:		Temp., °F:
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Total Weight	0.0	Average, %db	#DIV/0!	

Allowable Fuel Load Range:	#VALUE!	to	#VALUE!
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TEST FUEL LOAD PROPERTIES						
Eq. ID No.:		Time:	9:30	Temp., °F:	65	
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis		
		2x4	4x4			
1			4.90	4.7	4.7	4.7
2						
3						
4						
5						
6						
7						
8						
Totals		0.0	4.9			
% of Weight		0	100			
Total weight, wet, lb.		4.90		Average Moisture, dry	4.69	
Total weight, dry, kg		2.12		Average Moisture, wet	4.48	



Coal Bed Range	1.0	to	1.2
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Average Firebox Temp, °F	0
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Final Coal Bed Wt, lb	42.5
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Test Engineer: B. D.

Date: 7/29/05

Project Number: **G102070238**
 Manufacturer: **Hearth & Home**
 Model: **MT. Vernon AE**
 Sample ID No: **PRT1504161152-001**
 Test Date: **23-Apr-15**
 Test Run No: **3**

Temperature Data

Firebox Temp Start	177.2
Firebox Temp End	173.8
Firebox Delta-T	3.4

Max Filter Temps	
Train A	
132	

Interval	10	Duration of Test, Min			120		Firebox Data 1			67		132		69	
Time		Temperature Data													
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Right	Firebox Left	Firebox Back	Firebox Bottom	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM		
0	0	71	93	244	391	167	100	115	113		132	67	69		
1	10	72	94	244	391	167	100	114	113		131	44	69		
2	20	73	94	243	392	165	101	116	116		132	45	69		
3	30	73	93	240	387	161	100	116	116		132	45	70		
4	40	73	92	237	379	160	100	115	115		132	45	70		
5	50	73	92	243	393	158	100	114	114		131	46	71		
6	60	72	92	243	391	160	99	114	113		131	46	71		
7	70	72	92	244	397	161	99	114	113		131	45	71		
8	80	72	92	242	390	160	99	114	113		131	46	71		
9	90	72	91	240	385	159	99	114	113		131	45	71		
10	100	72	91	236	377	155	99	113	113		132	45	71		
11	110	72	91	241	387	157	99	113	112		131	45	71		
12	120	72	91	240	385	158	99	114	113		131	45	71		

Test Engineer: B. De

Date: 4/29/15

Gas Particulate Sampling Data

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 23-Apr-15
 Test Run Number: 3

Barometer, In. Hg	RH, %	Sample Box Correction (γ) Factors
Start 29.94		Meter Box (A) 0.975
End 29.86		

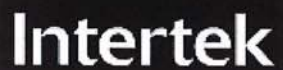
Leak Check, cfm @ in Hg
Train A .006@4

Maximum Vacuum
Train A 0.00

Duration of Test, Min		120		Particulate Sampling Data								
Time	Tunnel Delta-P	Train A Delta-H		Flue Draft	Fuel Weight	Weight Loss	Train A Volume		Train A Proportional Rate		Train A Vacuum, In. Hg	
0	0.044	1.50		-0.050	42.50	4.90	33.002		99.99		0.00	
10	0.044	1.50		-0.050	42.00	0.50	39.870		101.26		0.00	
20	0.044	1.50		-0.050	41.60	0.40	46.900		103.65		0.00	
30	0.044	1.50		-0.050	41.20	0.40	53.150		91.89		0.00	
40	0.044	1.50		-0.050	40.80	0.40	60.070		101.65		0.00	
50	0.044	1.50		-0.050	40.40	0.40	66.700		97.21		0.00	
60	0.044	1.50		-0.050	40.00	0.40	73.570		100.73		0.00	
70	0.044	1.50		-0.050	39.50	0.50	80.130		96.18		0.00	
80	0.044	1.50		-0.050	39.20	0.30	87.206		103.75		0.00	
90	0.044	1.50		-0.050	38.80	0.40	94.007		99.63		0.00	
100	0.044	1.50		-0.050	38.40	0.40	101.080		103.61		0.00	
110	0.044	1.50		-0.050	38.00	0.40	107.950		100.64		0.00	
120	0.044	1.50		-0.050	37.60	0.40	114.757		99.71		0.00	

Test Engineer: 

Date: 4/29/15



Dilution Tunnel Velocity Traverse EPA Method 5G-3

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 23-Apr-15
Test Run Number: 3

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0380	92	0.1949
A2	0.0440	92	0.2098
A3	0.0460	92	0.2145
A4	0.0440	92	0.2098
A Center	0.0440	92	0.2098
B1	0.0380	92	0.1949
B2	0.0460	92	0.2145
B3	0.0460	92	0.2145
B4	0.0400	92	0.2000
B Center	0.0460	92	0.2145
Averages	0.0432	92	0.2066

Tunnel Diameter **6.000** inches

Tunnel Static **-0.460** in. H2O

Tunnel Area 0.19635 Ft²

Pitot Correction 0.9740 factor

Baro. Pressure 29.94

Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)

Initial Velocity 14.058 Ft/ Sec

Initial Flow **152.12** Ft³/min

Test Engineer: 

Date: 4/29/15



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 23-Apr-15
Test Run Number: 3

Intertek Equipment No.'s 19683, 19684

SAMPLE COMPONENT	REAGENT	FILTER # OR	WEIGHTS			
			FINAL, mg	TARE, mg	BLANK, mg/ml	PARTICULATE, mg
FRONT FILTER CATCH	FILTER	515	756	746.7		9.30
REAR FILTER CATCH	FILTER	519	126.6	127.2		-0.60
RINSE OF PROBE &	ACETONE	25	97226.9	97226.2	0.0027	0.63
RINSE OF IMPINGER SET	WATER	200	96039.8	96039.8	0.0035	0.00
RINSE OF IMPINGER SET	METHANE	100	100159.9	100159.4	0.002	0.30
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	45	99039.9	99039.3	0.0027	0.48
TOTAL:						10.11

EQUATIONS

FRONT FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
REAR FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
RINSE OF PROBE & FILTER ASSEMBLY - FRONT	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF IMPINGER SET	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF FILTER ASSEMBLY & GAS TRAIN - BACK	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Test Engineer: B.D.

Date: 4/29/15

TEST RESULTS
EPA METHOD 5G-2

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 23-Apr-15
 Test Run Number: 4

Dry Burn-Rate, kg/hr:		0.84
Emission-Rate, g/hr:		0.90
Duration of Test, Minutes		120
Dry Gas Meter Standardization		
		Train A
Dry Gas Meter Beginning Reading, ft ³	115	
Dry Gas Meter Ending Reading, ft ³	196.742	
Barometric Pressure Correction Factor	0.997	
Dry Gas Meter Calibration Factors (γ factors)	0.975	
Dry Gas Meter Temperature Factors	0.996	
Dry Gas Meter Delta-H Correction Factors	1.004	
Dry Gas Meter STD Volume Sampled, ft ³	79.437	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm		148.283
Total Tunnel Volume, scf		17793.955
Emission Calculations		
		Train A
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	224.000	
Sample Particulate Mass, mg	8.0	
Total Emissions, grams	1.791	
Emission-Rate, g/hr	0.90	
Adjusted Emission Rates, g/hr	1.66	
Operating Parameters		
		Train A
Max Filter Temperature, °F	131	
Post-Test Leak Check, cfm @ in. Hg vac.	0	
Average Firebox Surface Temperature delta-T, °F	1	
Maximum Ambient Temperature, °F	72	
Minimum Ambient Temperature, °F	71	
Fuel Properties		
Wet Fuel Load Weight, lb.	3.90	
Dry-Basis Fuel Load Moisture Content, %	4.69	
Wet-Basis Fuel Load Moisture Content, %	4.48	

PROJECT / TEST INFORMATION	
Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	23-Apr-15
Test Run Number:	4
Date tunnel cleaned:	4/21/2015
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	NA	N/A for pellet type
Convection Blower	3	1 - No Fan 2 - Fan Optional 3 - Fan Standard



Test Settings	
Primary Air:	NA
Secondary Air:	NA
Control Board:	Heat output on low, flame height adjust on -5
Blower/Fan:	Automatic to heat output (normal)
Pre- Burn Activities	
Time	Activity
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Heat output on low, flame height adjust on -5
Blower / fan:	Automatic to heat output
Other Notes	

Test Engineer:

Date: 4/23/15

Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	MT. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	23-Apr-15
Test Run Number:	4

Firebox Volume, ft ³ :	NA
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Calibration Reference ID	
Set meter to Species 1	
Set Temperature to 70F	12% 12.0
Set pin setting to 444	22% 22.0

PRE-BURN FUEL PROPERTIES					
Eq. ID No.:		Time:		Temp., °F:	
Piece No.	Length, In.	Weight, Lb.	Moisture, %, Dry Basis		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Total Weight		0.0	Average, %db	#DIV/0!	

Allowable Fuel Load Range:	#VALUE!	to	#VALUE!
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TEST FUEL LOAD PROPERTIES						
Eq. ID No.:		Time:	9:30	Temp., °F:	65	
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis		
		2x4	4x4			
1			3.90	4.7	4.7	4.7
2						
3						
4						
5						
6						
7						
8						
Totals		0.0	3.9			
% of Weight		0	100			
Total weight, wet, lb.		3.90		Average Moisture, dry	4.69	
Total weight, dry, kg		1.69		Average Moisture, wet	4.48	



Project Number:	G102070238
Manufacturer:	Hearth & Home
Model:	Mt. Vernon AE
Sample ID Number:	PRT1504161152-001
Test Date:	23-Apr-15
Test Run Number:	4

EPA Method 28
Pre Burn Data

Coal Bed Range	0.8	to	0.9
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Average Firebox Temp, °F	0
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Final Coal Bed Wt, lb	34.7
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[illegible]

Test Engineer: [Signature]

Date: 4/29/15

TEST DATA EPA METHOD 5G-2

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID No: PRT1504161152-001
 Test Date: 23-Apr-15
 Test Run No: 4

Temperature Data

Firebox Temp Start	165.2
Firebox Temp End	166.2
Firebox Delta-T	1.0

Max Filter Temps	
Train A	
131	

Interval	10	Duration of Test, Min			120											
Time		Temperature Data														
Interval	Duration	Room	Dillution Tunnel	Flue Gas	Firebox Top	Firebox Right	Firebox Left	Firebox Back	Firebox Bottom	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM			
0	0	71	87	216	360	148	97	110	111		130	66	69			
1	10	71	87	215	356	147	97	110	111		131	46	69			
2	20	71	87	219	376	148	97	111	111		131	46	69			
3	30	71	87	220	371	149	97	111	110		131	46	70			
4	40	71	87	217	364	149	97	111	111		131	46	70			
5	50	71	87	216	365	149	97	110	111		131	46	70			
6	60	71	87	215	365	149	97	111	111		131	47	70			
7	70	71	88	217	363	150	97	111	110		131	47	70			
8	80	72	89	218	371	151	97	110	109		131	47	70			
9	90	72	89	217	366	152	97	110	109		131	47	70			
10	100	72	90	220	370	152	97	110	109		131	49	71			
11	110	72	90	218	363	153	97	110	109		131	50	71			
12	120	72	87	221	372	154	87	109	109		131	50	71			

Test Engineer: 

Date: 4/29/15

Gas Particulate Sampling Data

Project Number: G102070238
 Manufacturer: Hearth & Home
 Model: MT. Vernon AE
 Sample ID Number: PRT1504161152-001
 Test Date: 23-Apr-15
 Test Run Number: 4

Barometer, In. Hg	RH, %	Sample Box Correction (y) Factors
Start 29.85		Meter Box (A) 0.975
End 29.80		

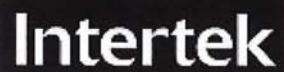
Leak Check, cfm @ in Hg
Train A .002@4

Maximum Vacuum
Train A 0.00

Duration of Test, Min		120	Particulate Sampling Data									
Time	Tunnel Delta-P	Train A Delta-H		Flue Draft	Fuel Weight	Weight Loss	Train A Volume		Train A Proportional Rate		Train A Vacuum, In. Hg	
0	0.044	1.50		-0.040	34.70	3.90	115.000		100.01		0.00	
10	0.044	1.50		-0.040	34.40	0.30	121.780		99.66		0.00	
20	0.044	1.50		-0.040	34.00	0.40	128.610		100.39		0.00	
30	0.044	1.50		-0.040	33.70	0.30	135.450		100.35		0.00	
40	0.044	1.50		-0.040	33.40	0.30	142.150		98.30		0.00	
50	0.044	1.50		-0.040	33.00	0.40	148.890		98.88		0.00	
60	0.044	1.50		-0.040	32.70	0.30	155.570		98.00		0.00	
70	0.044	1.50		-0.040	32.40	0.30	162.380		100.00		0.00	
80	0.044	1.50		-0.040	32.10	0.30	169.350		102.45		0.00	
90	0.044	1.50		-0.040	31.80	0.30	176.350		102.89		0.00	
100	0.044	1.50		-0.040	31.40	0.40	183.180		100.29		0.00	
110	0.044	1.50		-0.040	31.10	0.30	189.880		98.38		0.00	
120	0.044	1.50		-0.040	30.80	0.30	196.742		100.48		0.00	

Test Engineer: 

Date: 4/29/15



Dilution Tunnel Velocity Traverse
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 23-Apr-15
Test Run Number: 4

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0400	87	0.2000
A2	0.0420	87	0.2049
A3	0.0440	87	0.2098
A4	0.0420	87	0.2049
A Center	0.0440	87	0.2098
B1	0.0340	87	0.1844
B2	0.0400	87	0.2000
B3	0.0460	87	0.2145
B4	0.0360	87	0.1897
B Center	0.0440	87	0.2098
Averages	0.0412	87	0.2010

Tunnel Diameter **6.000** inches

Tunnel Static **-0.460** in. H2O

Tunnel Area 0.19635 Ft²

Pitot Correction 0.9584 factor

Baro. Pressure 29.85

Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)

Initial Velocity 13.636 Ft/ Sec

Initial Flow **148.46** Ft³/min

Test Engineer: BD

Date: 4/23/15



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-2

Project Number: G102070238
Manufacturer: Hearth & Home
Model: MT. Vernon AE
Sample ID Number: PRT1504161152-001
Test Date: 23-Apr-15
Test Run Number: 4

Intertek Equipment No.'s 19683, 19684

SAMPLE COMPONENT	REAGENT	FILTER # OR	WEIGHTS			
			FINAL, mg	TARE, mg	BLANK, mg/ml	PARTICULATE, mg
FRONT FILTER CATCH	FILTER	516	758.8	753.3		5.50
REAR FILTER CATCH	FILTER	520	130.1	130.6		-0.50
RINSE OF PROBE &	ACETONE	25	102269.4	102267.5	0.0027	1.83
RINSE OF IMPINGER SET	WATER	200	96379.1	96378.8	0.0035	0.00
RINSE OF IMPINGER SET	METHANE	100	131559.1	131558.7	0.002	0.20
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	50	101546	101544.9	0.0027	0.97
TOTAL:						8.00

EQUATIONS

FRONT FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
REAR FILTER CATCH	Final, mg - Tare, mg = Particulate, mg
RINSE OF PROBE & FILTER ASSEMBLY - FRONT	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF IMPINGER SET	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg
RINSE OF FILTER ASSEMBLY & GAS TRAIN - BACK	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Test Engineer: BA

Date: 4/29/15