

TEST REPORT

Intertek

REPORT NUMBER: 100719074PRT-002

REPORT DATE: July 3, 2012

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 OEM MEDIUM PELLET FIRED ROOM HEATER

PH35PS/PP60

Report of Testing Model OEM Medium 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 OEM Medium 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 OEM Medium 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 26, 2012

I.B LABORATORY

The test on the OEM Medium Pellet fired Solid Fuel Room Heater was conducted at the client facility located at 1445 North Highway, Colville Washington. The facility elevation is 1635 feet above sea level. Intertek Portland is accredited by the U.S. EPA, Certificate Number 8. The test was conducted by Bruce Davis.

I.C DESCRIPTION OF UNIT

The model OEM Medium Solid Fuel Room Heater is constructed of carbon steel. The outer dimensions are 22-inches deep, 30-inches high, and 21.75-inches wide. The unit has a door located on the front with a viewing glass for loading the fuel. Heat output is controlled via a control knob located on the right side of the appliance. Between minimum and maximum heat output settings is labeled as "Dynamic Mode". Within this mode are three individual heat output setting that the appliance will automatically modulate between in an attempt to maintain a predetermined temperature differential within the unit. Due to this modulation it was determined by the manufacture that the appliance would not operate on its own within a medium low and medium high burn rate category as specified by the test method. An approval was granted by EPA representative John Dupree to allow the appliance to be held in one of the three Dynamic mode settings via a computer interface in order to conduct a medium low and medium high burn rate test.

(See product drawings.)

Proprietary drawings and manufacturing methods are on file at Intertek in The Portland Oregon Office.

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 client facility, the sample was not independently selected for testing. The test unit was received at the client facility on April 24, 2012. The unit 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 26 through April 27, 2012 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 26, 2012: Control knob was set to maximum output, feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 1.68 kg/hr was achieved producing 25,081 BTU's per hour using EPA calculation.

RUN #2 April 27, 2012: Control knob on the appliance was set to maximum and the heat output was controlled via a computer interface (see stove description section I.C) Auger feed time set to 2.2 seconds on out of a 7 second duty cycle. Combustion blower was set to a program value of 2150. A burn rate of 1.41 kg/hr was achieved producing 21,050 BTU's per hour using EPA calculations.

RUN #3 April 27, 2012: Control knob on the appliance was set to maximum and the heat output was controlled via a computer interface (see stove description section I.C) Auger feed time set to 1.8 seconds on out of a 7 second duty cycle. Combustion blower was set to a program value of 2050. A burn rate of 1.13 kg/hr was achieved producing 16,870 BTU's per hour using EPA calculations.

RUN #4 April 27, 2012: Control knob was set to minimum output, feed rate, combustion blower, and convection fan automatically set to a predetermined setting via a printed circuit board. A burn rate of 0.64 kg/hr was achieved producing 9,555 BTU's per hour using EPA calculation.

II.D SUMMARY OF OTHER DATA

EMISSIONS

Run Number	Test Date	Burn Rate (kg/hr)	Emission Rate (g/hr)	Heating Efficiency* (% HHV)
1	4/26/12	1.68	0.37	82.2
2	4/27/12	1.41	0.40	82.9
3	4/27/12	1.13	0.16	84.7
4	4/27/12	0.64	0.27	84.3

LHV
 87.9
 88.6
 90.5
 91.0
 88.8
 89.5
 91.5
 91.0

*Efficiency determined per CSA B415.1-2012

WEIGHTED AVERAGE CALCULATION

Test No.	Burn Rate	(E) Average Emission Rate g/hr	Heat Output (Btu/hr)	Probability	(K) Weighting Factor	(KxE)
4	0.64	0.27	9,555	0.1168	0.4780	0.1291
3	1.13	0.16	16,870	0.4780	0.5836	0.0934
2	1.41	0.40	21,050	0.7004	0.3560	0.1424
1	1.68	0.37	25,081	0.8340	0.2996	0.1109
Totals:					1.7172	0.4757
Weighted average emission rate:						0.277

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	75	74	28.16	28.20	<50	<50
2	69	79	28.50	28.5	<50	<50
3	75	74	28.58	28.56	<50	<50
4	76	73	28.56	28.56	<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 (dscf/min)	Particulate Catch (mg)
1	120	13.25	135.63	549	62.157	2.86
2	120	12.88	133.69	548	63.364	3.16
3	120	12.37	128.36	549	61.822	1.26
4	120	12.28	129.07	542	62.118	2.15

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	1.68	13.0	-.05	120	-.05
2	1.41	24.6	-.047	120	-.045
3	1.13	16.4	-.040	120	-.038
4	0.64	7.8	-.030	120	-.030

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. 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.

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

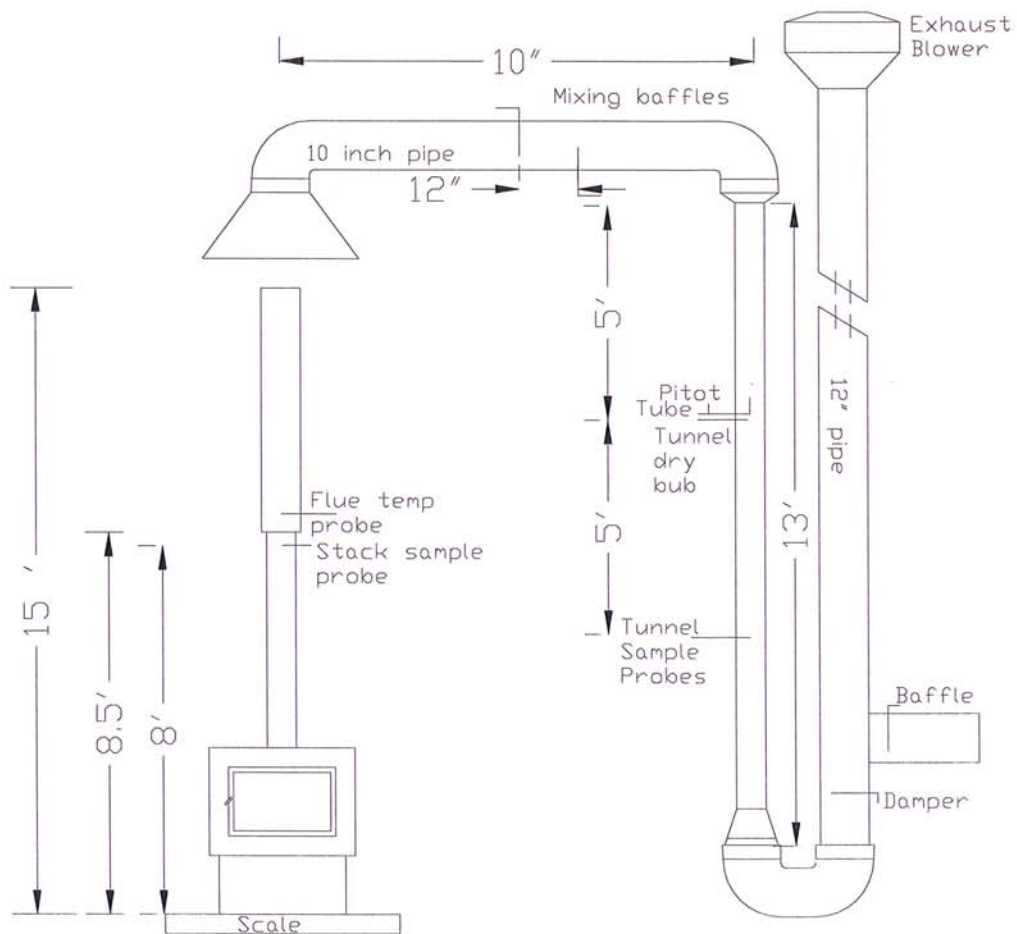
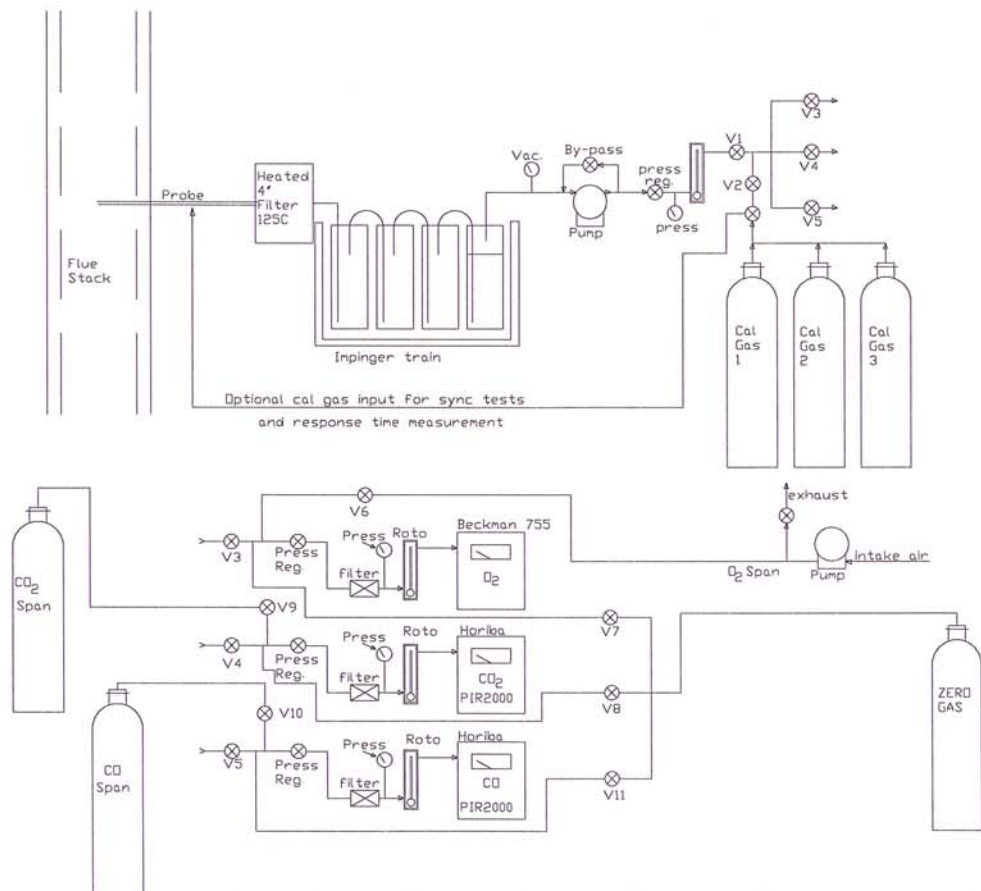


FIGURE 1

IV.B. OPERATIONAL DRAWINGS

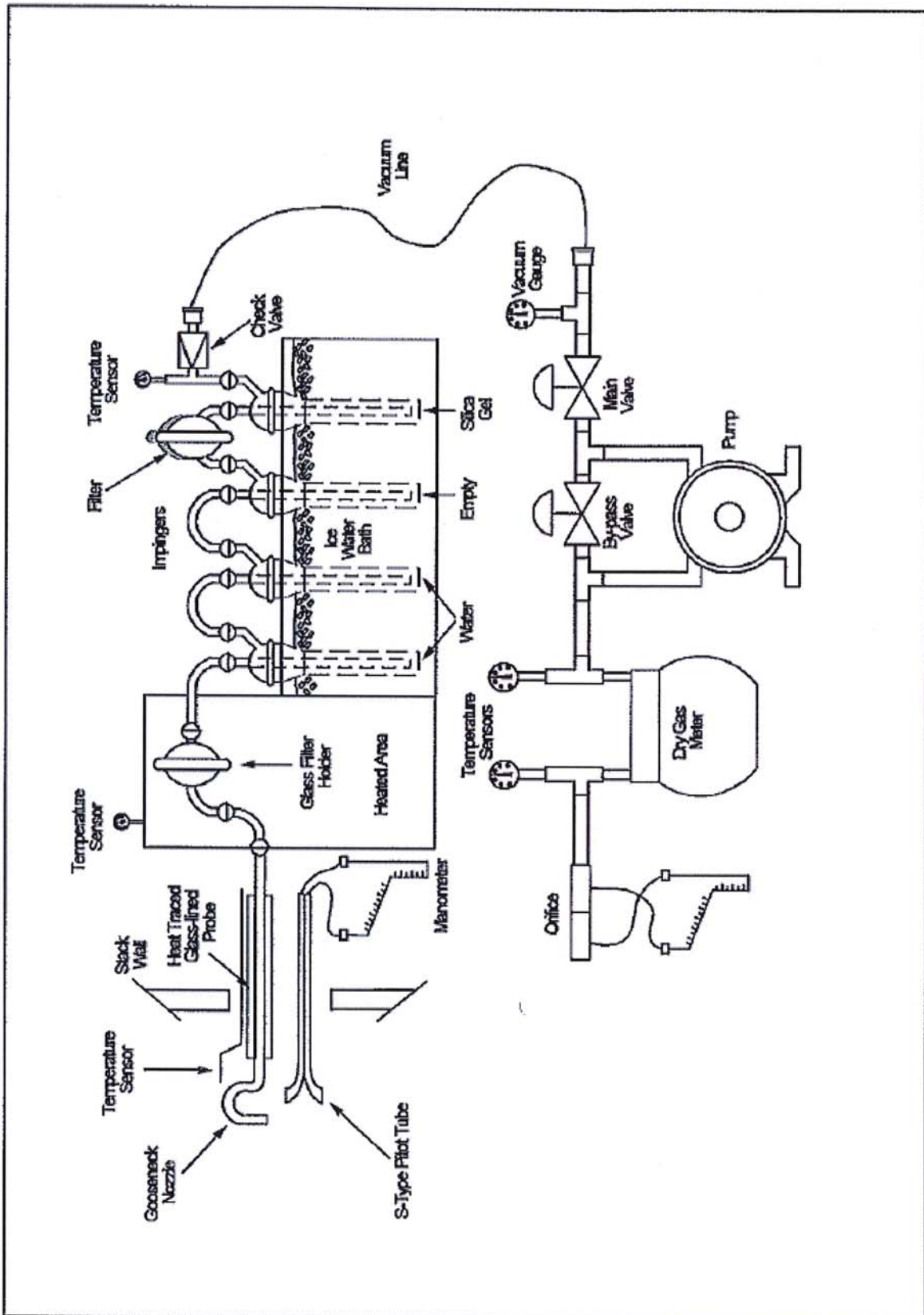
IV.B.(1) STACK GAS SAMPLE TRAIN



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.

At the conclusion of each unit test program, a five-point calibration check is made. This calibration check must meet accuracy requirements of the applicable standards. Consistent deviations between analyzer readings and calibration gas concentrations are used to correct data before computer processing. Data is also corrected for interferences as prescribed by the instrument manufacturer's instructions.

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 C.


VII. CONCLUSION

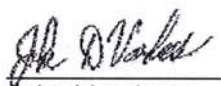
Results of this test show the OEM Medium when operated following guidelines specified in EPA method 28 does meet emissions limits regulating an affected facility in the EPA New Source Performance Standards.

VII.A RESULTS AND OBSERVATIONS

The Model OEM Medium 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."

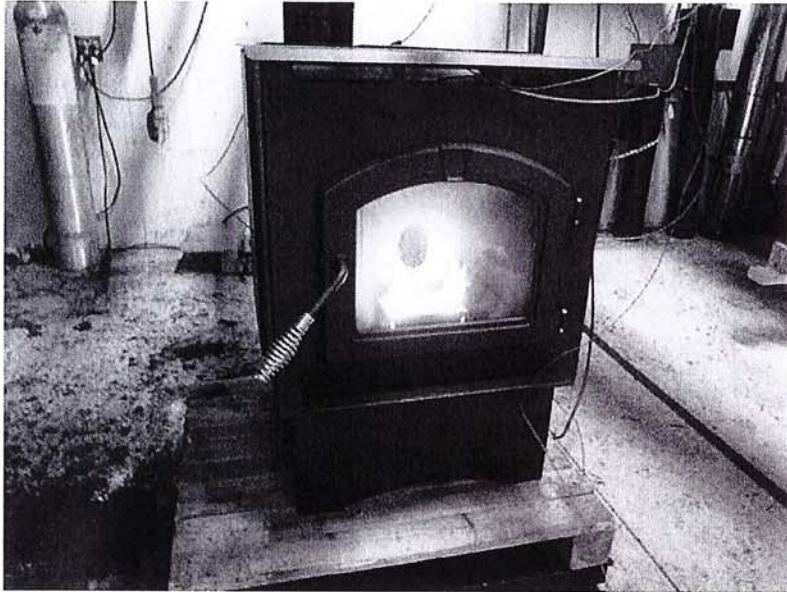
INTERTEK TESTING SERVICES NA

Reported by: 
Bruce S Davis
Test Engineer

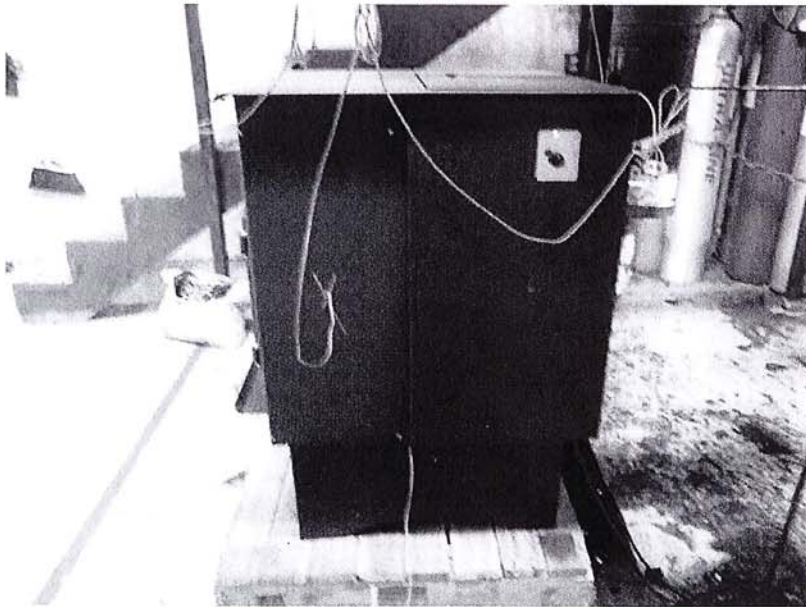
Reviewed by: 
John Voorhees
Operations Manager

Appendix F
Test Data

Hearth & Home Technologies
OEM Medium Pellet
G100719074



OEM Medium Front View



OEM Medium Side View

EPA NSPS WEIGHTED AVERAGE CALCULATION

Client: Hearth & Home
 Model: OEM Medium
 Date: 4/27/2012
 Sample: PRT1204201552-002
 Project: G100719074

Type of Stove: 3
 Weighted Average: 1=cat, 2=noncat, 3=pellet

Test No.	Burn Rate	(E) Ave.		Heat (K)			KxOHE
		Emission Rate g/hr	HHV (OHE)	Output (BTU/HR)	Prob.	Weighting Factor	
4	0.64	0.27	84.30	9554.69	0.1168	0.4780	40.30
3	1.13	0.16	84.70	16870.00	0.4780	0.5836	49.43
2	1.41	0.40	82.90	21050.17	0.7004	0.3560	29.51
1	1.68	0.37	82.20	25081.06	0.8340	0.2996	24.63
				0.00	1.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.00
				0.0000	0.0000	0.0000	0.00

Totals: 1.7172 0.4757 143.87

B...

Weighted average emissions rate:	0.2770
Weighted Average OHE:	83.78



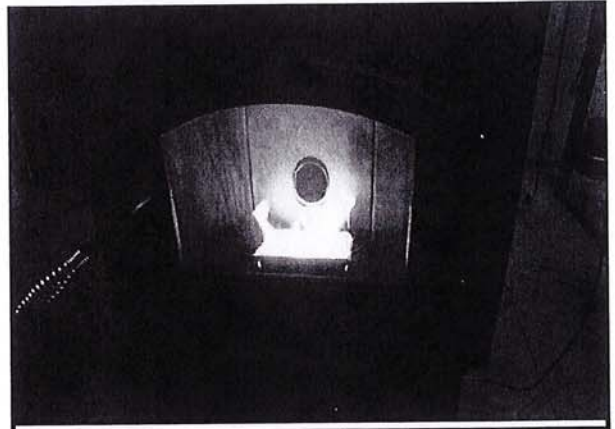
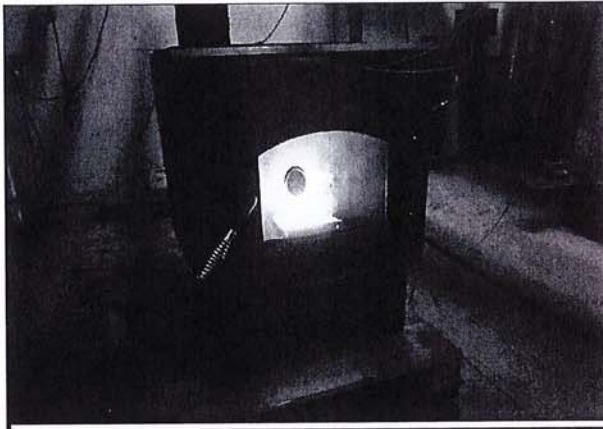
**TEST RESULTS
EPA METHOD 5G-3**

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 26-Apr-12
 Test Run Number: 1

Dry Burn-Rate, kg/hr:		1.68
Emission-Rate, g/hr:		0.37
Duration of Test, Minutes		120
Dry Gas Meter Standardization		
Train A		
Dry Gas Meter Beginning Reading, ft ³	565.7	
Dry Gas Meter Ending Reading, ft ³	632.51	
Barometric Pressure Correction Factor	0.942	
Dry Gas Meter Calibration Factors (γ factors)	0.994	
Dry Gas Meter Temperature Factors	0.991	
Dry Gas Meter Delta-H Correction Factors	1.002	
Dry Gas Meter STD Volume Sampled, ft ³	62.157	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm		135.634
Total Tunnel Volume, scf		16276.109
Emission Calculations		
Train A		
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	261.853	
Sample Particulate Mass, mg	2.9	
Total Emissions, grams	0.748	
Emission-Rate, g/hr	0.37	
Adjusted Emission Rates, g/hr	0.80	
Operating Parameters		
Train A		
Max Filter Temperature, °F	235	
Post-Test Leak Check, cfm @ in. Hg vac.	0.002 @ 5	
Average Firebox Surface Temperature delta-T, °F	13	
Maximum Ambient Temperature, °F	78	
Minimum Ambient Temperature, °F	73	
Fuel Properties		
Wet Fuel Load Weight, lb.	7.90	
Dry-Basis Fuel Load Moisture Content, %	6.48	
Wet-Basis Fuel Load Moisture Content, %	6.09	

PROJECT / TEST INFORMATION	
Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	26-Apr-12
Test Run Number:	1
Date tunnel cleaned:	4/25/2012
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	0	N/A for pellet type
Convection Blower	3	1 - No Fan 2 - Fan Optional 3 - Fan Standard



Test Settings	
Primary Air:	_____
Secondary Air:	_____
Control Board:	Control set at maximim
Blower/Fan:	_____
Pre- Burn Activities	
Time	Activity
	No activity was noted
Start-Up Procedure	
Loading of fuel, sec. :	_____
Fuel-loading door :	_____
Primary air:	_____
Secondary air:	_____
Control board:	Controls set at maximum
Blower / fan:	_____
Other Notes	

Test Engineer: BD

Date: 7-3-12

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	26-Apr-12
Test Run Number:	1

Firebox Volume, ft ³ :	0
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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: **0.0** to **0.0**

TEST FUEL LOAD PROPERTIES					
Eq. ID No.:	Time:	Temp., °F:			
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis	
		2x4	4x4		
1		7.90		6.5	6.5
2					
3					
4					
5					
6					
7					
8					
Totals		7.9	0.0		
% of Weight		100	0		
Total weight, wet, lb.		7.90		Average Moisture, dry	6.48
Total weight, dry, kg		3.37		Average Moisture, wet	6.09



TEST DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID No:	PRT1204201552-001
Test Date:	26-Apr-12
Test Run No:	1

Temperature Data

Firebox Temp Start	550.6
Firebox Temp End	563.6
Firebox Delta-T	13.0

Max Filter Temps	
Train A	
	235

Interval	10	Duration of Test, Min	120
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Time		Temperature Data												
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM	
0	0	75	89	273	646	522	488	537	560		233	71	75	
1	10	75	89	278	579	522	481	506	519		234	40	71	
2	20	74	89	267	652	505	485	531	552		234	42	71	
3	30	73	89	270	662	505	495	543	564		233	44	72	
4	40	74	89	274	684	527	514	563	587		233	44	72	
5	50	78	91	273	662	513	496	546	567		235	44	72	
6	60	74	89	272	635	511	488	533	554		232	45	73	
7	70	74	90	270	579	483	458	498	514		235	52	73	
8	80	74	89	268	649	485	488	539	558		234	52	73	
9	90	74	89	272	668	512	499	548	562		234	52	73	
10	100	76	90	274	660	514	507	549	571		234	54	73	
11	110	76	90	275	653	506	504	548	564		233	55	73	
12	120	74	89	273	660	514	514	557	573		234	55	73	

Test Engineer: BR

Date: 7-8-12



TEST DATA
EPA METHOD 5G-3

Gas Particulate Sampling Data

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 26-Apr-12
 Test Run Number: 1

Barometer, In. Hg	RH, %	Sample Box Correction (y) Factors	
Start	28.16	Meter Box (A) 0.994	
End	28.20		

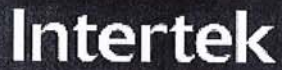
Leak Check, cfm @ in Hg
Train A
0.002 @ 5

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	1.00		-0.050	26.90	7.90	565.700		100.00		0.00
10	0.040	1.00		-0.050	26.30	0.60	571.240		99.74		0.00
20	0.040	1.00		-0.050	25.60	0.70	576.850		101.00		0.00
30	0.040	1.00		-0.050	25.00	0.60	582.350		98.83		0.00
40	0.040	1.00		-0.050	24.30	0.70	587.850		98.83		0.00
50	0.040	1.00		-0.050	23.60	0.70	593.580		103.15		0.00
60	0.040	1.00		-0.050	22.90	0.70	599.280		102.23		0.00
70	0.040	1.00		-0.050	22.30	0.60	604.450		92.81		0.00
80	0.040	1.00		-0.050	21.70	0.60	609.980		99.18		0.00
90	0.040	1.00		-0.050	21.00	0.70	615.670		102.05		0.00
100	0.040	1.00		-0.050	20.30	0.70	621.250		100.17		0.00
110	0.040	1.00		-0.050	19.70	0.60	626.880		101.07		0.00
120	0.040	1.00		-0.050	19.00	0.70	632.510		100.98		0.00

Test Engineer: BR

Date: 7-3-12



Dilution Tunnel Velocity Traverse EPA Method 5G-3

Project Number: G100719074
Manufacturer: Hearth N Home
Model: OEM Medium
Sample ID Number: PRT1204201552-001
Test Date: 26-Apr-12
Test Run Number: 1

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0300	88	0.1732
A2	0.0360	88	0.1897
A3	0.0400	88	0.2000
A4	0.0360	88	0.1897
A Center	0.0400	88	0.2000
B1	0.0300	88	0.1732
B2	0.0380	88	0.1949
B3	0.0400	88	0.2000
B4	0.0380	88	0.1949
B Center	0.0400	88	0.2000
Averages	0.0368	88	0.1895

Tunnel Diameter **6.000** inches
Tunnel Static **-0.310** in. H2O
Tunnel Area 0.19635 Ft²
Pitot Correction 0.9473 factor
Baro. Pressure 28.16
Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity 13.242 Ft/ Sec
Initial Flow **135.76** Ft³/min

Test Engineer: BOZ

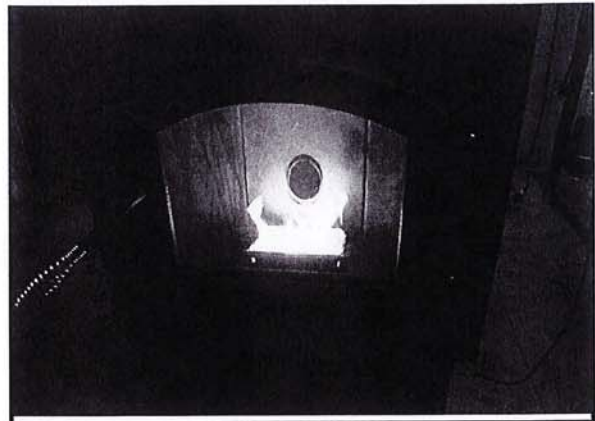
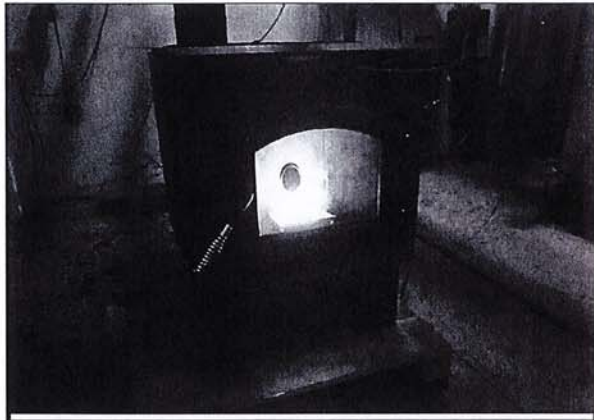
Date: 7-3-12



Run Notes
EPA Methods 28 and 5G-3

PROJECT / TEST INFORMATION	
Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	26-Apr-12
Test Run Number:	1
Date tunnel cleaned:	4/25/2012
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	0	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:	Control set at maximim
Blower/Fan:	Automatic
Pre- Burn Activities	
Time	Activity
	No activity was noted
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Controls set at maximum
Blower / fan:	Automatic
Other Notes	
NA	

Test Engineer: BD

Date: 7-3-12



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-3

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 26-Apr-12
 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	396	716.8	715.7		1.10
REAR FILTER CATCH	FILTER	406	164.5	165.2		-0.70
RINSE OF PROBE &	ACETONE	35	108062.3	108060.7	0.0005	1.58
RINSE OF IMPINGER SET	WATER	215	106928	106927.8	0	0.00
RINSE OF IMPINGER SET	METHANE	100	101922.3	101924	0.0002	0.00
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	50	102993.8	102992.9	0.0005	0.88
TOTAL:						2.86

CONDENSED WATER

IMPINGERS	WEIGHTS		
	FINAL, g	INITIAL, g	NET, g
1	714.5	709	5.50
2	696.2	690.7	5.50
3	607.3	606.3	1.00
4	793.5	785.6	7.90
TOTAL:			19.90

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: BD

Date: 2-3-12

Supplemental Data EPA 5G/5H

Client: Hearth N Home

Model: 0Em^m Project #: G100719074 Sample ID #: PRT1204201552-002

Date: 4/26/12 Run #: 1

Start Time: 17:14 Stop Time: 19:14

Intertek Equipment #'s: ETCS-4, ITC-11, ETC 7-1

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: good

Initial: NA

Final: good

Final:

Calibrations: Span Gas CO₂: 996 O₂: NA CO: .978 CO₂(DT): NA

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	<u>0</u>	<u>EOT</u>					
O ₂							
CO ₂	<u>-0.06</u>	<u>996</u>	<u>0.06</u>	<u>10.04</u>			
CO	<u>0.00</u>	<u>0.98</u>	<u>0.00</u>	<u>0.99</u>			
CO ₂ (DT)							

Stack Diameter (inches): 3 to 6"

Air Velocity (ft/min): Initial: ≤50 Final: ≤50

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 Post: 0.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 4/25/10 Initials: DR

	Initial	Middle	Ending
Pb (in/Hg)	<u>28.16</u>		<u>28.20</u>
Room Temp (°F)	<u>71</u>		<u>74</u>

Date: 7-2-12

Engineer signature: [Signature]



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

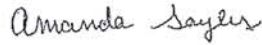
Report No: **USR:W212-0482-01**

Issue No: **1**

This report replaces all previous issues

Analytical Test Report

Client: HEARTH & HOME TECHNOLOGIES
 1915 W Saunders St
 Mount Pleasant IA 52641
Attention: Colin McCormick
PO No:

Signed:

 Amanda Sayles
 Chemistry Lab Technician
Date of Issue: 4/26/2012

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample Log No: W212-0482-01 **Sample Date:**
Sample Designation: Gallon sized pellet sample **Sample Time:**
Sample Recognized As: Pellets **Arrival Date:** 4/16/2012

Test Results

	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		6.48
Ash	ASTM D1102	wt. %	0.26	0.24
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3175	wt. %		
Sulfur	ASTM D4239	wt. %	0.030	0.028
SO ₂	Calculated	lb/mmbtu		0.065
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	19.24	17.84
Net Cal. Value at Const. Pressure	ISO 1928	J/g	19243	17839
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20581	19190
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8849	8251
Carbon	ASTM D5373	wt. %	50.33	46.93
Hydrogen	ASTM D5373	wt. %	6.15	5.73
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.19
Oxygen	ASTM D3176	wt. %	> 43.04	> 40.41
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		to
Diameter, Average	TPT CH-P-05	inch		
Stated Bag Weight	TPT CH-P-01	lbs		
Actual Bag Weight	TPT CH-P-01	lbs		

Comments



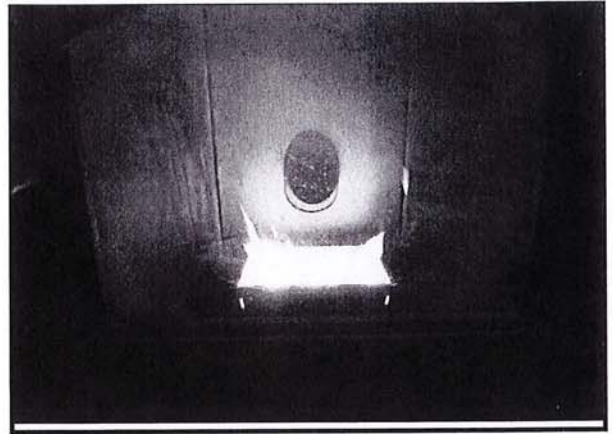
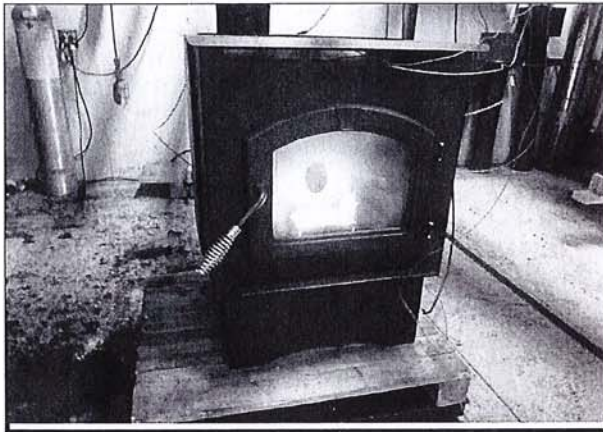
TEST RESULTS
EPA METHOD 5G-3

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 2

Dry Burn-Rate, kg/hr:		1.41
Emission-Rate, g/hr:		0.40
Duration of Test, Minutes		120
Dry Gas Meter Standardization		
Train A		
Dry Gas Meter Beginning Reading, ft ³	632.68	
Dry Gas Meter Ending Reading, ft ³	699.662	
Barometric Pressure Correction Factor	0.953	
Dry Gas Meter Calibration Factors (γ factors)	0.994	
Dry Gas Meter Temperature Factors	0.997	
Dry Gas Meter Delta-H Correction Factors	1.002	
Dry Gas Meter STD Volume Sampled, ft ³	63.364	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm	133.692	
Total Tunnel Volume, scf	16043.034	
Emission Calculations		
Train A		
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	253.189	
Sample Particulate Mass, mg	3.2	
Total Emissions, grams	0.801	
Emission-Rate, g/hr	0.40	
Adjusted Emission Rates, g/hr	0.85	
Operating Parameters		
Train A		
Max Filter Temperature, °F	234	
Post-Test Leak Check, cfm @ in. Hg vac.	0.0 @ 6	
Average Firebox Surface Temperature delta-T, °F	24.6	
Maximum Ambient Temperature, °F	79	
Minimum Ambient Temperature, °F	69	
Fuel Properties		
Wet Fuel Load Weight, lb.	6.60	
Dry-Basis Fuel Load Moisture Content, %	6.48	
Wet-Basis Fuel Load Moisture Content, %	6.09	

PROJECT / TEST INFORMATION	
Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	2
Date tunnel cleaned:	4/25/2012
Purpose of Test	Run 2

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	0	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:	power level 4
Blower/Fan:	Automatic
Pre- Burn Activities	
Time	Activity
	No activity was noted
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Computer input to maintain a constant burn rate
Blower / fan:	Automatic
Other Notes	
Feed rate of 2.2 seconds on during a 7 second duty cycle. Combustion fan set at 2150.	

Test Engineer: BA

Date: 7-3-12

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	2

Firebox Volume, ft ³ :	0
-----------------------------------	---

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

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:	0.0	to	0.0
----------------------------	-----	----	-----

TEST FUEL LOAD PROPERTIES					
Eq. ID No.:	Time:	Temp., °F:			
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis	
		2x4	4x4		
1		6.60		6.5	6.5
2					
3					
4					
5					
6					
7					
8					
Totals		6.6	0.0		
% of Weight		100	0		
Total weight, wet, lb.		6.60		Average Moisture, dry	6.48
Total weight, dry, kg		2.81		Average Moisture, wet	6.09



TEST DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID No:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run No:	2

Temperature Data

Firebox Temp Start	482.2
Firebox Temp End	506.8
Firebox Delta-T	24.6

Max Filter Temps	
Train A	
234	

Interval	10	Duration of Test, Min	120											
Time		Temperature Data												
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM	
0	0	69	82	237	562	460	411	476	502		233	75	65	
1	10	71	85	256	517	463	415	458	475		232	39	66	
2	20	74	86	241	566	451	410	474	494		233	40	66	
3	30	74	87	243	576	458	423	484	511		233	44	68	
4	40	74	87	244	571	461	424	486	511		234	44	69	
5	50	72	87	245	558	465	424	480	507		233	48	70	
6	60	74	88	245	571	457	428	487	514		234	49	70	
7	70	75	90	253	514	441	419	462	484		234	50	71	
8	80	74	89	244	553	446	415	476	500		233	51	72	
9	90	76	90	248	582	459	434	496	519		234	52	72	
10	100	74	90	246	579	449	427	489	515		234	52	72	
11	110	75	91	249	576	460	432	494	523		233	53	73	
12	120	79	91	251	602	460	438	502	532		233	53	73	

Test Engineer: BOZ

Date: 7-3-12



TEST DATA
EPA METHOD 5G-3

Gas Particulate Sampling Data

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 2

Barometer, In. Hg	RH, %	Sample Box Correction (y) Factors	
Start	28.50	Meter Box (A)	0.994
End	28.50		

Leak Check, cfm @ in Hg	
Train A	
0.0 @ 6	

Maximum Vacuum	
Train A	
0.00	

Duration of Test, Min		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	0.039	1.00	-0.047	13.80	6.60	632.680	100.04	0.00				
10	0.039	1.00	-0.047	13.00	0.80	638.450	103.91	0.00				
20	0.039	1.00	-0.047	12.60	0.40	643.900	98.23	0.00				
30	0.039	1.00	-0.047	12.10	0.50	649.530	101.19	0.00				
40	0.039	1.00	-0.047	11.50	0.60	655.170	101.18	0.00				
50	0.039	1.00	-0.045	11.00	0.50	660.300	91.85	0.00				
60	0.039	1.00	-0.045	10.50	0.50	666.150	104.84	0.00				
70	0.039	1.00	-0.043	9.90	0.60	671.960	104.12	0.00				
80	0.039	1.00	-0.043	9.40	0.50	677.690	102.40	0.00				
90	0.039	1.00	-0.043	8.90	0.50	682.840	92.12	0.00				
100	0.039	1.00	-0.043	8.40	0.50	688.630	103.56	0.00				
110	0.039	1.00	-0.045	7.80	0.60	694.430	103.64	0.00				
120	0.039	1.00	-0.043	7.20	0.60	699.662	93.49	0.00				

Test Engineer: BD

Date: 7-3-12



**Dilution Tunnel Velocity Traverse
EPA Method 5G-3**

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 2

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0360	82	0.1897
A2	0.0400	82	0.2000
A3	0.0360	82	0.1897
A4	0.0300	82	0.1732
A Center	0.0380	82	0.1949
B1	0.0320	82	0.1789
B2	0.0360	82	0.1897
B3	0.0380	82	0.1949
B4	0.0280	82	0.1673
B Center	0.0400	82	0.2000
Averages	0.0354	82	0.1854

Tunnel Diameter **6.000** inches
 Tunnel Static **-0.300** in. H2O
 Tunnel Area 0.19635 Ft²
 Pitot Correction 0.9391 factor
 Baro. Pressure 28.50
 Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)
 Initial Velocity 12.814 Ft/ Sec
 Initial Flow **134.42** Ft³/min

Test Engineer: BD

Date: 7-3-12



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-3

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 2

Intertek Equipment No.'s 19683, 19684, 19726

SAMPLE COMPONENT	REAGENT	FILTER # OR	WEIGHTS			
			FINAL, mg	TARE, mg	BLANK, mg/ml	PARTICULATE, mg
FRONT FILTER CATCH	FILTER	397	718.5	717.5		1.00
REAR FILTER CATCH	FILTER	407	164.6	165.6		-1.00
RINSE OF PROBE &	ACETONE	25	96310.7	96309.3	0.0005	1.39
RINSE OF IMPINGER SET	WATER	205	102515.8	102514.8	0	1.00
RINSE OF IMPINGER SET	METHANE	100	97257.4	97258.1	0.0002	0.00
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	50	106070.6	106069.8	0.0005	0.78
TOTAL:						3.16

CONDENSED WATER

IMPINGERS	WEIGHTS		
	FINAL, g	INITIAL, g	NET, g
1	710.2	708.2	2.00
2	698.6	693.3	5.30
3	608.2	607.5	0.70
4	975.4	961.1	14.30
TOTAL:			22.30

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: BD

Date: 7-3-12



Supplemental Data EPA 5G/5H

Client: Hearth N Home

Model: OEM m Project #: G100719074 Sample ID #: PRT1204201652-002

Date: 4/27/12 Run #: 2

Start Time: 0906 Stop Time: 1106

Intertek Equipment #'s: ETCS-4, ETC-11, ETC7-ψ

Gas Analyzer Train Leak Check:

Stack:

Initial: good

Final: good

Dilution Tunnel (Method 5G Only):

Initial: NT

Final: _____

Calibrations: Span Gas CO₂: 9.96 O₂: NT CO: 9.98 CO₂(DT): NT

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	<u>∅</u>	<u>EOT</u>					
O ₂							
CO ₂	<u>0.08</u> <u>9.82</u>	<u>0.06</u> <u>9.90</u>					
CO	<u>0.00</u> <u>0.99</u>	<u>0.00</u> <u>1.02</u>					
CO ₂ (DT)							

Stack Diameter (inches): 31.6

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 100 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 Post: _____

Flue Pipe Cleaned Prior to First Test in Series: Date: 4/25/12 Initials: AK

	Initial	Middle	Ending
Pb (in/Hg)	<u>28.50</u>		<u>28.50</u>
Room Temp (°F)	<u>69</u>		<u>79</u>

Date: 7-2-12

Engineer signature: B.D.



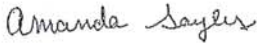
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 www.twinportstesting.com

Report No: USR:W212-0482-01
Issue No: 1

This report replaces all previous issues

Analytical Test Report

Client: HEARTH & HOME TECHNOLOGIES
 1915 W Saunders St
 Mount Pleasant IA 52641
Attention: Colin McCormick
PO No:

Signed:

 Amanda Sayles
 Chemistry Lab Technician
Date of Issue: 4/26/2012

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details
Sample Log No: W212-0482-01 **Sample Date:**
Sample Designation: Gallon sized pellet sample **Sample Time:**
Sample Recognized As: Pellets **Arrival Date:** 4/16/2012

	METHOD	UNITS	MOISTURE		AS RECEIVED
			FREE		
Moisture Total	ASTM E871	wt. %			6.48
Ash	ASTM D1102	wt. %	0.26		0.24
Volatile Matter	ASTM D3175	wt. %			
Fixed Carbon by Difference	ASTM D3175	wt. %			
ur	ASTM D4239	wt. %	0.030		0.028
SO ₂	Calculated	lb/mmbtu			0.065
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	19.24		17.84
Net Cal. Value at Const. Pressure	ISO 1928	J/g	19243		17839
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20581		19190
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8849		8251
Carbon	ASTM D5373	wt. %	50.33		46.93
Hydrogen	ASTM D5373	wt. %	6.15		5.73
Nitrogen	ASTM D5373	wt. %	< 0.20	<	0.19
Oxygen	ASTM D3176	wt. %	> 43.04	>	40.41
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			to
Diameter, Average	TPT CH-P-05	inch			
Stated Bag Weight	TPT CH-P-01	lbs			
Actual Bag Weight	TPT CH-P-01	lbs			

Comments



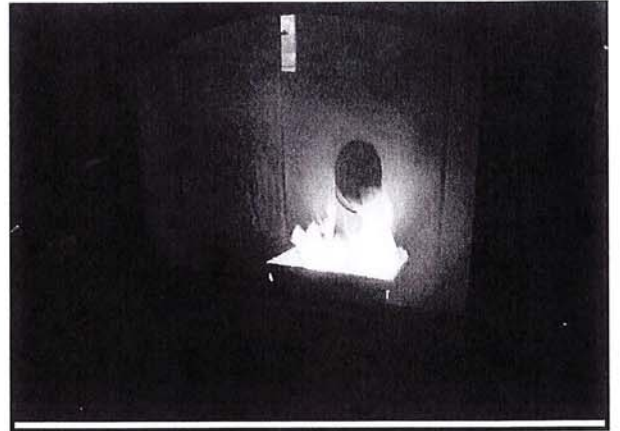
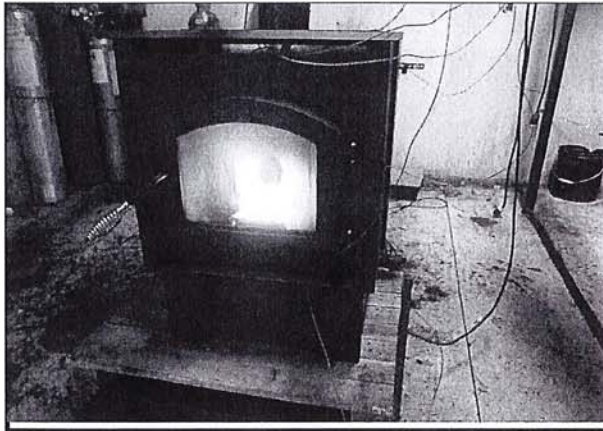
TEST RESULTS
EPA METHOD 5G-3

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 3

Dry Burn-Rate, kg/hr:		1.13
Emission-Rate, g/hr:		0.16
Duration of Test, Minutes		120
Dry Gas Meter Standardization		
		Train A
Dry Gas Meter Beginning Reading, ft ³	699.9	
Dry Gas Meter Ending Reading, ft ³	766.01	
Barometric Pressure Correction Factor	0.955	
Dry Gas Meter Calibration Factors (γ factors)	0.994	
Dry Gas Meter Temperature Factors	0.983	
Dry Gas Meter Delta-H Correction Factors	1.002	
Dry Gas Meter STD Volume Sampled, ft ³	61.822	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm		128.363
Total Tunnel Volume, scf		15403.523
Emission Calculations		
		Train A
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	249.160	
Sample Particulate Mass, mg	1.3	
Total Emissions, grams	0.314	
Emission-Rate, g/hr	0.16	
Adjusted Emission Rates, g/hr	0.39	
Operating Parameters		
		Train A
Max Filter Temperature, °F	235	
Post-Test Leak Check, cfm @ in. Hg vac.	0.002@6	
Average Firebox Surface Temperature delta-T, °F	16.4	
Maximum Ambient Temperature, °F	78	
Minimum Ambient Temperature, °F	74	
Fuel Properties		
Wet Fuel Load Weight, lb.	5.30	
Dry-Basis Fuel Load Moisture Content, %	6.45	
Wet-Basis Fuel Load Moisture Content, %	6.06	

PROJECT / TEST INFORMATION	
Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	3
Date tunnel cleaned:	4/25/2012
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	0	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:	Power level 3
Blower/Fan:	Automatic
Pre- Burn Activities	
Time	Activity
	No activity noted
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Computer input in maintain a constant burn rate
Blower / fan:	Automatic
Other Notes	
1.8 second on time out of a 7 second duty cycle. Combustion blower set at a speed of 2050.	



TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	3

Firebox Volume, ft ³ :	0
-----------------------------------	---

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:	0.0	to	0.0
----------------------------	-----	----	-----

TEST FUEL LOAD PROPERTIES						
Eq. ID No.:	Time:	Temp., °F:				
Piece No.	Length, In.	Weight, Lb.		Moisture, %, Dry Basis		
		2x4	4x4			
1		5.30		6.5	6.5	6.4
2						
3						
4						
5						
6						
7						
8						
Totals		5.3	0.0			
% of Weight		100	0			
Total weight, wet, lb.		5.30		Average Moisture, dry	6.45	
Total weight, dry, kg		2.26		Average Moisture, wet	6.06	



TEST DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID No:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run No:	3

Temperature Data

Firebox Temp Start	457.6
Firebox Temp End	441.2
Firebox Delta-T	16.4

Max Filter Temps	
Train A	
	235

Interval	10	Duration of Test, Min	120											
Time		Temperature Data												
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM	
0	0	75	90	222	546	421	383	458	480		235	78	77	
1	10	77	90	223	527	424	387	455	474		235	47	77	
2	20	77	91	217	497	395	357	424	444		234	50	77	
3	30	78	90	215	491	411	365	429	448		234	51	77	
4	40	75	88	216	521	412	377	443	463		235	52	77	
5	50	77	90	216	496	411	371	431	453		234	54	77	
6	60	75	88	215	519	512	377	444	467		234	54	77	
7	70	75	89	218	521	422	382	450	470		234	55	77	
8	80	74	89	217	509	398	366	429	450		234	55	77	
9	90	77	90	217	525	408	375	441	462		234	56	78	
10	100	77	89	215	518	404	371	438	457		234	56	78	
11	110	74	87	215	518	415	378	444	461		233	57	78	
12	120	74	87	216	508	418	379	444	457		234	57	77	

Test Engineer: BD

Date: 7-3-12



Dilution Tunnel Velocity Traverse EPA Method 5G-3

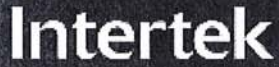
Project Number: G100719074
Manufacturer: Hearth N Home
Model: OEM Medium
Sample ID Number: PRT1204201552-001
Test Date: 27-Apr-12
Test Run Number: 3

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0280	90	0.1673
A2	0.0320	90	0.1789
A3	0.0340	90	0.1844
A4	0.0320	90	0.1789
A Center	0.0360	90	0.1897
B1	0.0280	90	0.1673
B2	0.0320	90	0.1789
B3	0.0360	90	0.1897
B4	0.0320	90	0.1789
B Center	0.0360	90	0.1897
Averages	0.0326	90	0.1780

Tunnel Diameter **6.000** inches
Tunnel Static **-0.280** in. H2O
Tunnel Area 0.19635 Ft²
Pitot Correction 0.9384 factor
Baro. Pressure 28.58
Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity 12.374 Ft/ Sec
Initial Flow **128.28** Ft³/min

Test Engineer: BD

Date: 7-3-12



DILLUTION TUNNEL PARTICULATE CALCULATIONS
EPA Method 5G-3

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 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	398	720.9	720.2		0.70
REAR FILTER CATCH	FILTER	408	165	165.6		-0.60
RINSE OF PROBE &	ACETONE	25	102995.5	102995.2	0.0005	0.29
RINSE OF IMPINGER SET	WATER	200	103645.2	103644.9	0	0.30
RINSE OF IMPINGER SET	METHANE	100	98320.6	98320.9	0.002	0.00
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	55	100161.1	100160.5	0.0005	0.57
TOTAL:						1.26

CONDENSED WATER

IMPINGERS	WEIGHTS		
	FINAL, g	INITIAL, g	NET, g
1	711.2	710.6	0.60
2	696.1	692.2	3.90
3	608.4	606.8	1.60
4	986	975.4	10.60
TOTAL:			16.70

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: BD

Date: 7-3-12

Supplemental Data EPA 5G/5H

Client: Hearth N Home

Model: Open M Project #: G100719074 Sample ID #: PRT1204201552-002

Date: 4/27/12 Run #: 3
 Start Time: 12:20 Stop Time: 13:20
13:45 15:45

Intertek Equipment #'s: ETS-4, ETC-11, ETC7-1

Gas Analyzer Train Leak Check:

Stack:

Initial: good
 Final: good

Dilution Tunnel (Method 5G Only):

Initial: NA
 Final:

Calibrations: Span Gas CO₂: 9.96 O₂: NA CO: .978 CO₂(DT): NA

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	0	EUT					
O ₂							
CO ₂	0.02	10.22	0.02	9.94			
CO	0.00	1.02	0.00	1.02			
CO ₂ (DT)							

Stack Diameter (inches): 3 to 6"

Air Velocity (ft/min): Initial: 450 Final: 450

Scale Audit (lbs): Pretest: 100 Post Test: 100

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: good Post: good

Flue Pipe Cleaned Prior to First Test in Series: Date: 4/25/10 Initials: BL

	Initial	Middle	Ending
Pb (in/Hg)	28.58		28.56
Room Temp (°F)	75		74

Date: 7-2-12

Engineer signature: BD



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:W212-0482-01**

Issue No: **1**

This report replaces all previous issues

Analytical Test Report

Client: HEARTH & HOME TECHNOLOGIES
 1915 W Saunders St
 Mount Pleasant IA 52641
Attention: Colin McCormick
PO No:

Signed:

 Amanda Sayles
 Chemistry Lab Technician
Date of Issue: 4/26/2012
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details
Sample Log No: W212-0482-01 **Sample Date:**
Sample Designation: Gallon sized pellet sample **Sample Time:**
Sample Recognized As: Pellets **Arrival Date:** 4/16/2012

	METHOD	UNITS	MOISTURE		AS
			FREE	RECEIVED	
Moisture Total	ASTM E871	wt. %			6.48
Ash	ASTM D1102	wt. %	0.26		0.24
Volatile Matter	ASTM D3175	wt. %			
Fixed Carbon by Difference	ASTM D3175	wt. %			
Char	ASTM D4239	wt. %	0.030		0.028
SO ₂	Calculated	lb/mmbtu			0.065
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	19.24		17.84
Net Cal. Value at Const. Pressure	ISO 1928	J/g	19243		17839
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20581		19190
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8849		8251
Carbon	ASTM D5373	wt. %	50.33		46.93
Hydrogen	ASTM D5373	wt. %	6.15		5.73
Nitrogen	ASTM D5373	wt. %	< 0.20	<	0.19
Oxygen	ASTM D3176	wt. %	> 43.04	>	40.41
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			to
Diameter, Average	TPT CH-P-05	inch			
Stated Bag Weight	TPT CH-P-01	lbs			
Actual Bag Weight	TPT CH-P-01	lbs			

Comments



**TEST RESULTS
EPA METHOD 5G-3**

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 4

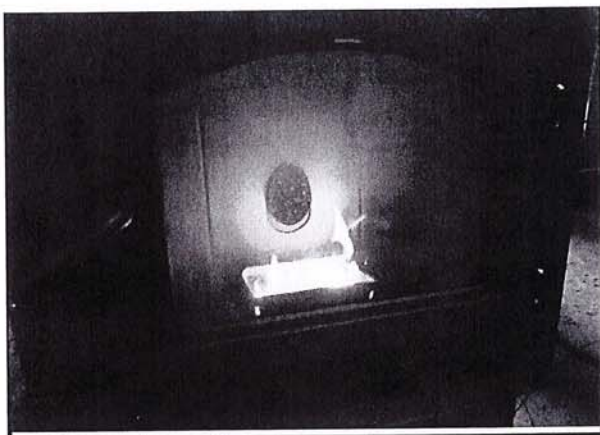
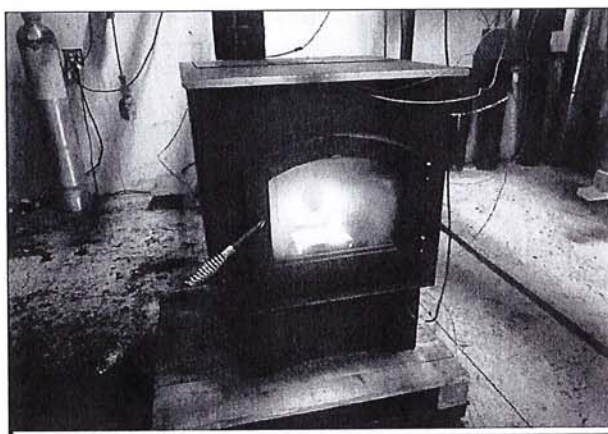
Dry Burn-Rate, kg/hr:		0.64
Emission-Rate, g/hr:		0.27
Duration of Test, Minutes	120	
Dry Gas Meter Standardization		
	Train A	
Dry Gas Meter Beginning Reading, ft ³	766.203	
Dry Gas Meter Ending Reading, ft ³	832.51	
Barometric Pressure Correction Factor	0.955	
Dry Gas Meter Calibration Factors (γ factors)	0.994	
Dry Gas Meter Temperature Factors	0.985	
Dry Gas Meter Delta-H Correction Factors	1.002	
Dry Gas Meter STD Volume Sampled, ft ³	62.118	
Dilution Tunnel Flow / Volume		
Standardized Tunnel Flow, dscfm	129.068	
Total Tunnel Volume, scf	15488.143	
Emission Caclulations		
	Train A	
Sample Ratios (Total Tunnel Volume / Total Sample Volume)	249.336	
Sample Particulate Mass, mg	2.2	
Total Emissions, grams	0.537	
Emission-Rate, g/hr	0.27	
Adjusted Emission Rates, g/hr	0.61	
Operating Parameters		
	Train A	
Max Filter Temperature, °F	234	
Post-Test Leak Check, cfm @ in. Hg vac.	0.0 @ 6	
Average Firebox Surface Temperture delta-T, °F	7.8	
Maximum Ambient Temperature, °F	77	
Mimimum Ambient Temperature, °F	71	
Fuel Properties		
Wet Fuel Load Weight, lb.	3.00	
Dry-Basis Fuel Load Moisture Content, %	6.48	
Wet-Basis Fuel Load Moisture Content, %	6.09	



Run Notes
EPA Methods 28 and 5G-3

PROJECT / TEST INFORMATION	
Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	4
Date tunnel cleaned:	4/25/2012
Purpose of Test	Certification

Appliance Information		
Appliance Type:	3	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft ³ :	0	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:	Power level 1
Blower/Fan:	Automatic
Pre- Burn Activities	
Time	Activity
	No activity noted
Start-Up Procedure	
Loading of fuel, sec. :	NA
Fuel-loading door :	NA
Primary air:	NA
Secondary air:	NA
Control board:	Computer input to maintain a constant burn rate
Blower / fan:	Automatic
Other Notes	
Feed time 1second out of seven second duty cycle and a combustion blower speed of 2000.	

Test Engineer: BD

Date: 7-3-12



TEST FUEL DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	4

Firebox Volume, ft ³ :	0
-----------------------------------	---

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.:	Length, In.	Weight, Lb.	Moisture, %, Dry Basis	Temp., °F:
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Total Weight		0.0	Average, %db	#DIV/0!

Allowable Fuel Load Range: 0.0 to 0.0

TEST FUEL LOAD PROPERTIES					
Eq. ID No.:	Length, In.	Weight, Lb.		Moisture, %, Dry Basis	
		2x4	4x4		
1		3.00		6.5	6.5
2					
3					
4					
5					
6					
7					
8					
Totals		3.0	0.0		
% of Weight		100	0		
Total weight, wet, lb.		3.00		Average Moisture, dry	6.48
Total weight, dry, kg		1.28		Average Moisture, wet	6.09

Test Engineer: BID

Date: 7-3-12



Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID Number:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run Number:	4

EPA Method 28
Pre Burn Data

Coal Bed Range	0.6	to	0.7
----------------	-----	----	-----

Average Firebox Temp, °F	301.4
--------------------------	-------

Final Coal Bed Wt, lb	19.2
-----------------------	------

Duration, Minutes	Temperature Data									Flue Draft	Fuel Weight	Weight Loss
	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Outlet			
0	76	86	164	329	263	259	293	298		-0.028	20.70	1.50
10	74	84	165	346	285	254	302	311		-0.03	20.40	0.30
20	75	84	161	342	297	251	301	312		-0.027	20.20	0.20
30	73	83	164	352	304	260	308	319		-0.028	19.90	0.30
40	72	83	170	370	310	266	320	330		0.028	19.60	0.30
50	73	83	169	358	315	266	315	324		-0.028	19.40	0.20
60	73	83	172	339	292	262	303	311		-0.028	19.20	0.20

Test Engineer: BD

Date: 7-3-12



TEST DATA
EPA METHOD 5G-3

Project Number:	G100719074
Manufacturer:	Hearth N Home
Model:	OEM Medium
Sample ID No:	PRT1204201552-001
Test Date:	27-Apr-12
Test Run No:	4

Temperature Data

Firebox Temp Start	294.8
Firebox Temp End	302.6
Firebox Delta-T	7.8

Max Filter Temps	
Train A	
	234

Interval	10	Duration of Test, Min		120	Temperature Data									
Time														
Interval	Duration	Room	Dilution Tunnel	Flue Gas	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Outlet	Train A Filter	Impinger Exit	Train A DGM	
0	0	76	85	171	323	291	258	297	305		231	72	77	
1	10	76	84	168	343	299	257	303	310		232	54	76	
2	20	73	82	165	331	301	253	298	306		232	57	76	
3	30	72	82	167	360	308	265	315	325		232	58	76	
4	40	75	84	168	358	303	262	314	323		232	58	76	
5	50	73	82	167	362	310	267	318	327		232	58	76	
6	60	75	83	172	344	303	267	309	317		232	58	77	
7	70	77	82	169	361	304	263	314	325		232	58	77	
8	80	75	82	168	341	304	260	305	314		232	58	76	
9	90	71	80	168	347	303	262	307	318		232	58	76	
10	100	73	80	167	333	300	257	301	310		233	59	76	
11	110	72	79	164	346	344	296	258	303		234	60	75	
12	120	73	80	167	343	291	260	305	314		233	60	75	

Test Engineer:

Date: 7-3-12



TEST DATA
EPA METHOD 5G-3

Gas Particulate Sampling Data

Project Number: G100719074
 Manufacturer: Hearth N Home
 Model: OEM Medium
 Sample ID Number: PRT1204201552-001
 Test Date: 27-Apr-12
 Test Run Number: 4

Barometer, In. Hg	RH, %	Sample Box Correction (y) Factors	
Start 28.56		Meter Box (A)	0.994
End 28.56			
Duration of Test, Min		120	

Leak Check, cfm @ in Hg	
Train A	
0.0 @ 6	

Maximum Vacuum	
Train A	
0.00	

Time	Particulate Sampling Data										
	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	0.036	1.00	-0.030	19.20	3.00	766.203	99.98	0.00			
10	0.036	1.00	-0.029	19.00	0.20	771.980	104.75	0.00			
20	0.036	1.00	-0.030	18.70	0.30	777.550	100.81	0.00			
30	0.036	1.00	-0.030	18.40	0.30	783.230	102.80	0.00			
40	0.036	1.00	-0.029	18.20	0.20	788.550	96.46	0.00			
50	0.036	1.00	-0.028	18.00	0.20	793.970	98.10	0.00			
60	0.036	1.00	-0.030	17.70	0.30	799.500	99.99	0.00			
70	0.036	1.00	-0.030	17.50	0.20	805.080	100.80	0.00			
80	0.036	1.00	-0.030	17.20	0.30	810.510	98.28	0.00			
90	0.036	1.00	-0.030	17.00	0.20	815.970	98.64	0.00			
100	0.036	1.00	-0.030	16.80	0.20	821.470	99.36	0.00			
110	0.036	1.00	-0.030	16.50	0.30	826.980	99.63	0.00			
120	0.036	1.00	-0.030	16.20	0.30	832.510	100.09	0.00			

Test Engineer: BD

Date: 7-3-12



Dilution Tunnel Velocity Traverse EPA Method 5G-3

Project Number: G100719074
Manufacturer: Hearth N Home
Model: OEM Medium
Sample ID Number: PRT1204201552-001
Test Date: 27-Apr-12
Test Run Number: 4

	Dilution Tunnel		Square Root
	Delta P In. H2O	Temp, °F	
A1	0.0260	84	0.1612
A2	0.0320	84	0.1789
A3	0.0360	84	0.1897
A4	0.0340	84	0.1844
A Center	0.0360	84	0.1897
B1	0.0260	84	0.1612
B2	0.0320	84	0.1789
B3	0.0360	84	0.1897
B4	0.0320	84	0.1789
B Center	0.0360	84	0.1897
Averages	0.0326	84	0.1779

Tunnel Diameter **6.000** inches
Tunnel Static **-0.300** in. H2O
Tunnel Area 0.19635 Ft²
Pitot Correction 0.9375 factor
Baro. Pressure 28.56
Pitot Factor **0.99** (0.99 for standard, 0.84 or Cal. For S-Type)
Initial Velocity 12.299 Ft/ Sec
Initial Flow **128.82** Ft³/min

Test Engineer: BO

Date: 7-3-12

Project Number: G100719074
Manufacturer: Hearth N Home
Model: OEM Medium
Sample ID Number: PRT1204201552-001
Test Date: 27-Apr-12
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	399	723	723		0.00
REAR FILTER CATCH	FILTER	409	164.1	164.4		-0.30
RINSE OF PROBE &	ACETONE	40	107223.5	107222.6	0.0005	0.88
RINSE OF IMPINGER SET	WATER	200	100627.8	100626.9	0	0.90
RINSE OF IMPINGER SET	METHANE	100	106754.9	106755.8	0.002	0.00
RINSE OF FILTER ASSEMBLY & GAS TRAIN -	ACETONE	50	102105.8	102105.1	0.0005	0.67
TOTAL:						2.15

CONDENSED WATER

IMPINGERS	WEIGHTS		
	FINAL, g	INITIAL, g	NET, g
1	701.1	709.8	-8.70
2	697.5	692.9	4.60
3	608	607.8	0.20
4	992.4	986.6	5.80
TOTAL:			1.90

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: 7-3-12



Supplemental Data EPA 5G/5H

Client: Hearth N Home

Model: QEM m Project #: G100719074 Sample ID #: PRT 1204201552-002

Date: 4/27/12 Run #: 4

Start Time: 16:38 Stop Time: 18:38

Intertek Equipment #'s: ETC-4, ETC-11, ETC 7-1

Gas Analyzer Train Leak Check:

Stack:

Initial: good

Final: good

Dilution Tunnel (Method 5G Only):

Initial: NA

Final:

Calibrations: Span Gas CO₂: 9.96 O₂: NA CO: 9.78 CO₂(DT): NA

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
O ₂	<u>NA</u>						
CO ₂	<u>9.94</u>	<u>9.94</u>	<u>0.04</u>	<u>9.78</u>			
CO	<u>1.02</u>	<u>1.02</u>	<u>0.00</u>	<u>0.98</u>			
CO ₂ (DT)	<u>NA</u>						

Stack Diameter (inches): 3 1/2"

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 Post: 0.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 4/25/12 Initials: BA

	Initial	Middle	Ending
Pb (in/Hg)	<u>28.56</u>		<u>28.56</u>
Room Temp (°F)	<u>76</u>		<u>73</u>

Date: 7-2-12

Engineer signature: BA



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:W212-0482-01**

Issue No: **1**

This report replaces all previous issues

Analytical Test Report

Client: HEARTH & HOME TECHNOLOGIES
 1915 W Saunders St
 Mount Pleasant IA 52641
Attention: Colin McCormick
PO No:

Signed:
Amanda Sayles
 Amanda Sayles
 Chemistry Lab Technician
Date of Issue: 4/26/2012
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details
Sample Log No: W212-0482-01
Sample Designation: Gallon sized pellet sample
Sample Recognized As: Pellets
Sample Date:
Sample Time:
Arrival Date: 4/16/2012

Test Results				
	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		6.48
Ash	ASTM D1102	wt. %	0.26	0.24
Volatile Matter	ASTM D3175	wt. %		
Fixed Carbon by Difference	ASTM D3175	wt. %		
fur	ASTM D4239	wt. %	0.030	0.028
SO ₂	Calculated	lb/mmbtu		0.065
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	19.24	17.84
Net Cal. Value at Const. Pressure	ISO 1928	J/g	19243	17839
Gross Cal. Value at Const. Vol.	ASTM E711	J/g	20581	19190
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8849	8251
Carbon	ASTM D5373	wt. %	50.33	46.93
Hydrogen	ASTM D5373	wt. %	6.15	5.73
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.19
Oxygen	ASTM D3176	wt. %	> 43.04	> 40.41
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		to
Diameter, Average	TPT CH-P-05	inch		
Stated Bag Weight	TPT CH-P-01	lbs		
Actual Bag Weight	TPT CH-P-01	lbs		

Comments