Non-Confidential Business Information (Non-CBI)

Certification Test Report

Hearth and Home Technologies

Freestanding Wood Stove

Brand: Quadra-Fire

Model(s): 31M-ACC-C, Discovery-II-C**,** FF-WP-200

Prepared for:	Hearth and Home Technologies 1445 North Highway Colville, WA 99114
Prepared by:	OMNI-Test Laboratories, Inc. 13327 NE Airport Way Portland, OR 97230 (503) 643-3788
Test Period:	February 13, 2017 – February 16, 2017
Report Date:	March 21, 2017
Report Revision Date:	November 13, 2024
Report Number:	0061WS066E.REV002

-Report Edition Number (004) 11/13/24 -

AUTHORIZED SIGNATORIES

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

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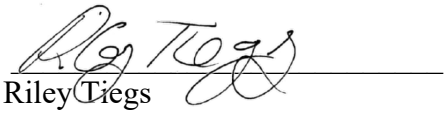

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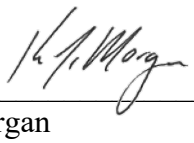

Ken Morgan
Technical Services Director
OMNI-Test Laboratories, Inc.

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Section 1

Sampling Procedures and Test Results

INTRODUCTION

Hearth and Home Technologies retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the 31M-ACC-C wood stove. The 31M-ACC-C wood stove is a freestanding-type room heater. The firebox is constructed of mild steel. Usable firebox volume was measured to be 1.89 cubic feet and the stove is vented through a 6" collar located on the top of the appliance near the rear of the firebox.

The testing was performed at Hearth & Home Technologies. The altitude of the laboratory is 1635 feet above sea level. The unit was received in good condition and logged in on February 12, 2017, then assigned and labeled with *OMNI* ID #2153. *OMNI* representative Bruce Davis conducted the certification testing and completed all testing by February 16, 2017.

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

SAMPLING PROCEDURE

The 31M-ACC-C wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters using EPA Method 28R, ASTM E2515 and ASTM E2780. Particulate emissions were measured using sampling trains consisting of two filters (front and back).

The model 31M-ACC-C was tested for thermal efficiency and carbon monoxide (CO) emissions in accordance with CSA B415.1-10. Efficiency results were calculated using spread sheet Version 2.2 created 12/14/2009 and distributed by CSA. Example calculations for CSA B415.1 were not provided by CSA; spreadsheet is protected from modifications by means of a password.

SUMMARY OF RESULTS

The weighted average emissions of the four test runs included in the results indicate a particulate emission rate of 1.9 grams per hour. Run number 4 was a fan confirmation test to confirm operation of the appliance without the optional fan in operation. The 31M-ACC-C results are within the emission limit of 2.0 g/hr for affected facilities manufactured on or after May 15, 2020.

The proportionality results for test runs 2 through 5 were acceptable, run number one had one data point outside of acceptable limits due to an equipment malfunction at the start of run 1. After loading the fuel, it was noted that the dry gas meter volume on box B was not increasing. An investigation found the pump to be working and the reference pressure (delta H) to be indicating flow to the gas meter. An inspection of wire connections found a loose connection between the totalizer on the gas meter and the data logger, this caused no signal to be sent even though sample flow was moving through the system normally. Additional evidence sampling was working normally is shown in the precision in emissions results between train A and train B. Any deviation in sampling between the two trains would generate unacceptable results. The loose connection was assumed to have been caused during shipping of the equipment, after fixing the issue no additional problems were encountered during the test series. Quality check results for each test run are presented in Section 2 of this report.

INDIVIDUAL RUN SUMMARIES

Run 1 - Attempted category 1 burn rate with a primary air setting of full closed. Observed burn rate of 0.99 kg/hr (category 2). An equipment problem caused one data point to be outside specified proportional rate limits, see summary of results for details. A filter change scheduled for one hour into the test was overlooked until 80 minutes, results shown in this report show calculated emissions at 60 and 80 minutes. Since this result is not used for certification and no other sampling anomalies occurred, this test run is valid and appropriate for inclusion in the weighted average.

Run 2 - Attempted category 2 burn rate at primary air setting of 1.29” open. Observed burn rate of 1.39 kg/hr (category 3). No sampling anomalies occurred, so this test run is valid and appropriate for inclusion in the weighted average.

Run 3 - Attempted category 2 burn rate at primary air setting of 1.00” open. Observed burn rate of 1.14 kg/hr (category 2). No sampling anomalies occurred, so this test run is valid and appropriate for inclusion in the weighted average.

Run 4 - Attempted category 2 burn rate at with primary air control fully closed. Observed burn rate of 1.04 kg/hr (category 2). No sampling anomalies occurred, the appliance was operated without the fan in operation as a fan confirmation test so this test run is not used in the weighted average.

Run 5 - Attempted category 4 burn rate at primary air setting of fully open. Observed burn rate of 2.26 kg/hr (category 4). Negative filter weights were found in both A and B sample trains, negative catch on the filters can be seen as positive transfer weight on the O-ring gaskets. Negative filter weights are added back into the total catch to prevent transfer weight on O-rings from being counted as emissions. No additional sampling anomalies occurred, so this test run is valid and appropriate for inclusion in the weighted average.

CATEGORY 1 BURN RATE RATIONALE

EPA Method 28 section 8.1.1.3.2 states the following:

> *Evidence that a wood heater cannot be operated at a burn rate less than 0.80 kg/hr shall include documentation of two or more attempts to operate the wood heater in burn rate Category 1 and fuel combustion has stopped, or results of two or more test runs demonstrating that the burn rates were greater than 0.80 kg/hr. when the air supply controls were adjusted to the lowest possible position or settings… NOTE: After July 1, 1990, if a wood heater cannot be operated at a burn rate less than 0.80 kg/hr., at least one test run with an average burn rate of 1.00 kg/hr. or less shall be conducted.*

The U.S. Environmental Protection Agency Applicability Determination Index, under Control Number WDS-109, states the following regarding this requirement of Method 28:

> *The purpose of this requirement is to ensure that a good-faith effort has been made to achieve a Category 1 burn rate. However, if the air supply control is tamper-proof, EPA will accept one test as adequate documentation that the stove cannot achieve a Category 1 burn rate. Note that this applies only to stoves which do not reach the low burn rate because of limits on the air supply; manufacturers of stoves which cannot sustain a burn rate at lower air settings will still be required to submit documentation of two or more attempts. In all cases, a test series consisting of at least four runs is required.*

As the Run Notes in Section 5 and Table 1.1a in Section 1 of this report show, run 1 was operated at a burn-rate of less than 1.0 kg/hr. with the combustion air inlet open an area of 0.44 in^2. The primary air control was designed and manufactured with a stop that provides an area of 0.44 in^2 when the control is set to the minimum position. See attached drawings of the primary air controls in the QC report. The air controls for this heater are tamper-proof. When tested in accordance with EPA Method 28 the heater cannot be induced to operate at a burn rate less than 0.80 kg/hr therefore Run 1 fulfills the requirements of the standard.

Model: 31M-ACC-C
Hearth and Home Technologies
1445 North Highway
Colville, WA 99114

Table 1 – Particulate Emissions

Run	**Burn Rate** (kg/hr dry)	**ASTM E2515 Emissions** (g/hr) Uncorrected[1]	**ASTM E2515 Emissions** (g/hr) Corrected[2]
1	0.99	1.93	1.93
2	1.39	1.09	1.09
3	1.14	0.97	0.97
4*	1.04	1.27	1.27
5	2.26	3.92	4.29
Weighted particulate emission average of 4 test runs: 1.9 grams per hour.			

*Fan confirmation run excluded from weighted average results

Table 2 – Particulate Emissions (First Hour)

Run	**ASTM E2515 Emissions – First Hour** (g/hr) Uncorrected[1]	**ASTM E2515 Emissions – First Hour** (g/hr) Corrected[2]
1	5.85*	5.85*
2	3.11	3.11
3	2.31	2.31
4	4.04	4.04
5	5.27	5.27

*Run 1 filter change occurred at 80 minutes.
Corrected Emissions at 80 minutes is 4.36 g/hr.

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

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

Table 3 – B415.1 Efficiency and CO Emissions

Run	Heat Output (BTU/hr)	HHV Efficiency (%)	LHV Efficiency (%)	CO Emissions (g/MJ Output)	CO Emissions (g/kg Dry Fuel)	CO Emissions (g/min)
1	13,951	75.2	81.3	6.36	94.71	1.56
2	17,979	69.7	75.3	4.08	56.38	1.29
3	15,810	74.9	80.9	4.17	61.93	1.16
4*	14,345	74.6	80.7	5.75	84.97	1.45
5	29,078	69.8	75.5	4.76	65.88	2.43
Weighted average HHV efficiency of 4 test runs: 72.5%.						
Average grams per minute CO Emissions: (1.56 + 1.29 + 1.16 + 2.43) / 4 = 1.61 g/min.						

*Fan confirmation run excluded from weighted average results

Table 4 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	74	78	28.95	28.93	<50	<50
2	70	78	28.82	28.73	<50	<50
3	78	75	28.47	28.35	<50	<50
4	76	80	27.99	27.95	<50	<50
5	79	76	27.95	27.98	<50	<50

Table 5 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	5.5	19.47	2.7
2	6.1	19.03	3.1
3	5.9	19.70	3.1
4	5.6	22.00	3.0
5	14.7	20.65	2.8

Table 6 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft^3)	Fuel Loading Density Wet Basis (lbs/ft^3)	Test Fuel Dry Basis (lbs)	Piece Length (in)	2x4s Used	4x4s Used
1	12.7	1.89	6.72	10.5	14	3	2
2	13.3	1.89	7.04	11.2	14	3	2
3	12.5	1.89	6.61	10.5	14	3	2
4	12.7	1.89	6.72	10.7	14	3	2
5	12.1	1.89	6.40	10.0	14	3	2

Table 7 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	290	13.08	142.8	80
2	220	15.13	162.8	84
3	250	15.98	169.6	84
4	280	15.90	165.4	87
5	120	17.31	178.8	91

Table 8 - Average Temperature Data

Run	Beginning Surface Temperature Average[a]	Ending Surface Temperature Average[a]	Surface Delta T[b]
1	351	277	74
2	366	310	56
3	324	309	15
4	410	347	63
5	453	392	60
a. All temperatures are in degrees F.			
b. Represents the difference between beginning and ending average surface temperatures.			

Table 9 – Pretest Configuration

Run	Combustion Air	Fuel Added	Fuel Removed	**Time** (min)
1	Fully Closed	2.6	0	60
2	1.29”	2.4	0	60
3	1.00”	2.8	0	70
4	Fully Closed	2.4	0	60
5	Fully Open	13.7	0	65

Table 10 – Test Configurations

Run	Five-Minute Startup Procedures	Combustion Air
1	Fuel Loading: Fuel loaded by 45 seconds. Door: Closed by 60 seconds. Primary Air: Fully open until 5:00 then immediately set to test setting. Secondary: Air opening is fixed without adjustment. Fan: On high the entire test. Boost Air: Boost air activated when door was closed at 60 seconds.	Air set at mechanical stop, measured at 0.692”
2	Fuel Loading: Fuel loaded by 60 seconds. Door: Closed by 80 seconds. Primary Air: Fully open until 5:00 then immediately set to test setting. Secondary: Air opening is fixed without adjustment. Fan: On high the entire test. Boost Air: Boost air activated when door was closed at 80 seconds.	1.29”
3	Fuel Loading: Fuel loaded by 55 seconds. Door: Closed by 80 seconds. Primary Air: At test setting full 5 minutes. Secondary: Air opening is fixed without adjustment. Fan: On high the entire test. Boost Air: Boost air activated at 0 minutes then again when door was closed at 80 seconds.	1.00”
4	Fuel Loading: Fuel loaded by 60 seconds. Door: Closed by 85 seconds. Primary Air: Fully open until 5:00 then immediately set to test setting. Secondary: Air opening is fixed without adjustment. Fan: Off for the entire test. Boost Air: Boost air activated at 0 minutes then again when door was closed at 85 seconds.	Air set at mechanical stop, measured at 0.692”
5	Fuel Loading: Fuel loaded by 38 seconds. Door: Closed by 42 seconds. Primary Air: Fully open entire test. Secondary: Air opening is fixed without adjustment. Fan: On high for the entire test. Boost Air: Boost air locked open for entire test.	Air set to mechanical stop fully open.

Section 2

Photographs/Appliance Description/Drawings

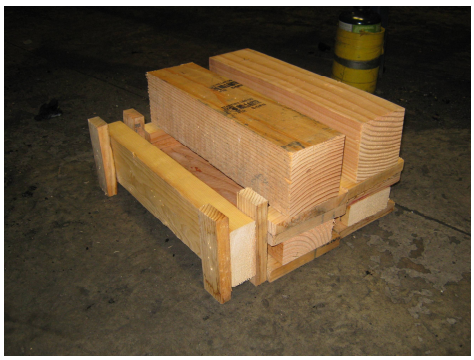
Hearth and Home Technologies

31M-ACC-C

Test Dates: February 13, 2017 – February 16, 2017

Hearth and Home Technologies
31M-ACC-C

Run 1 – Fuel



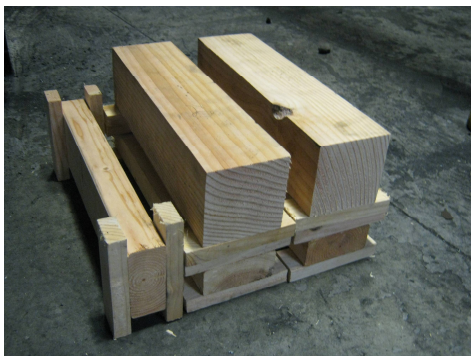
Run 1 – Newly Loaded Stove

Run 2 – Fuel

Run 2 – Newly Loaded Stove

Hearth and Home Technologies
31M-ACC-C

Run 3 – Fuel

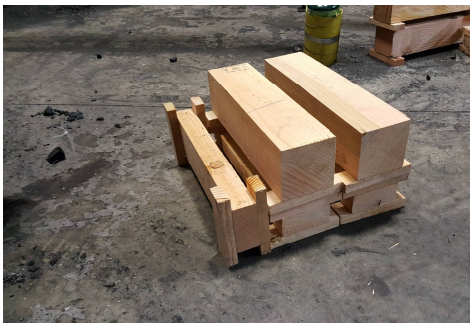


Run 3 – Newly Loaded Stove

Run 4 – Fuel

Run 4 – Newly Loaded Stove

Run 5 – Fuel



Run 5 – Newly Loaded Stove

WOOD HEATER DESCRIPTION

Appliance Manufacturer: Hearth and Home Technologies

Wood Stove Model: 31M-ACC-C / Discovery-II-C

Type: Freestanding

WOOD HEATER INFORMATION

Materials of Construction: The unit is constructed primarily of mild Steel. The firebox is lined with fire brick that measures 4.5 x 9 x 1.25" thick. The feed door has a 15.63" x 11.5" glass panel and ¾" gasket.

Air Introduction System: Primary combustion air enters the appliance through an opening located on the right side of the firebox near the top and front of the appliance. A control arm extends out the face of the unit, pushing the control downwards closes off the air opening. Air used for secondary has no user controls, combustion enters a manifold near the rear of the appliance and is channeled to four air tube mounted in the top of the firebox directly under the baffle. A third air source is located on the right side of the appliance near the bottom of the firebox. The control for this air source extends out the front of the appliance near the bottom right. Pushing the control in and releasing locks the control open providing combustion air to openings in the rear of the firebox and to an opening located in the front of the firebox near the floor. If this control is pushed in and then pulled out it activates a timer that slowly closes these openings over a time of approximately 22 minutes.

Combustion Control Mechanisms: All control mechanisms are manually controlled; the timer mechanism is manually set and once closed will not open again until manually reset.

Combustor: N/A.

Internal Baffles: A noncombustible baffle board is located above the secondary air tubes mounted in the top of the firebox. A ceramic wool blanket is used on top of the baffle for additional insulation.

Other Features: An optional fan is located near the bottom of the back of the appliance.

Flue Outlet: The 6" diameter flue outlet is in the top of the unit near the rear of the firebox.

Similar Models: Stove model Discovery-II-C and FF-WP-200 shares all firebox designs and K list components. The most notable change is a taller pedestal designed for wood storage for the Discovery and door styling for the FF-WP-200. Shielding is mounted in the same locations but extends down to make up the sides and back of the pedestal. See engineering drawings for details.

WOOD HEATER OPERATING INSTRUCTIONS

Specific Written Instructions: See Section 5 of this report. All markings and instruction materials were reviewed for content prior to printing.

Engineering Drawings/Blueprints (K List)

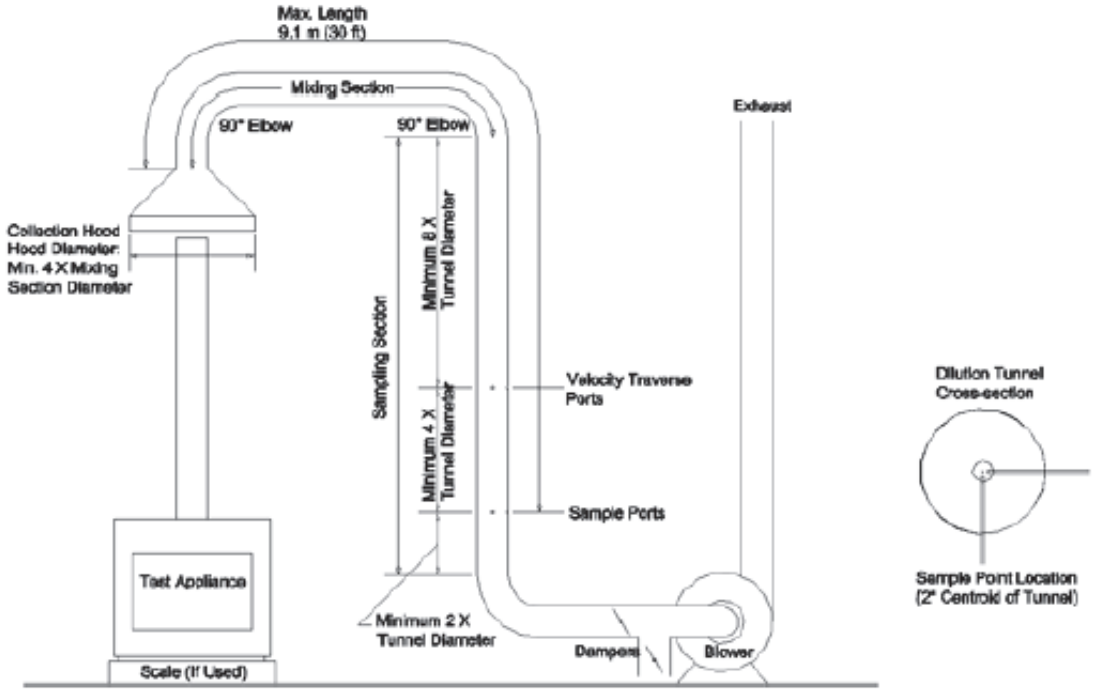
Removed as confidential business information

Engineering Drawings/Blueprints (Remainder) Removed as confidential business information

Section 3

Test Data by Run

Example of ASTM E2515-11 Dilution Tunnel

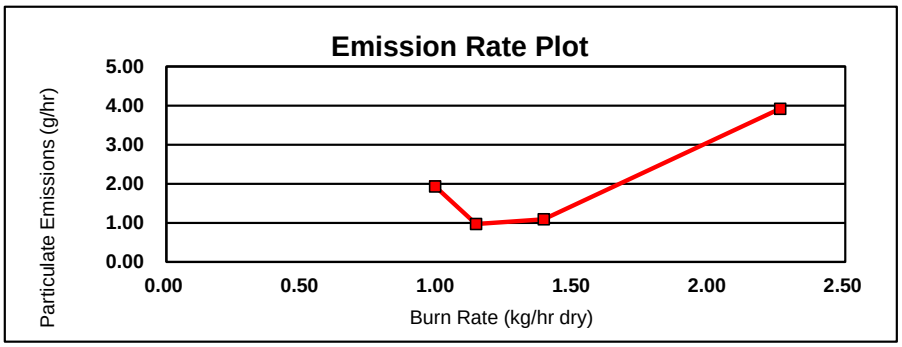


Prior to testing, sample point and travers point locations are verified to ensure placement is within specifications. Collection hood, tunnel diameter, and mixing section length are also verified to be within specifications.

EPA Weighted Average Emissions
EPA Method 28R

Client:	Hearth & Home	Status:	Final
Stove Model:	3100 ACC	Stove Type:	Non-Catalytic Stove
Test Dates:	2/13/17 - 2/17/17		
Project Number:	0061WS066E.R2		
Tracking Number:	2153		

Weighted Averages	**Emissions (g/hr):**	**1.9**
	HHV Efficeincy (%):	**72.5**
	LHV Efficeincy (%):	**78.3**



Run #	1	
Burn Rate (dry kg/hr)	0.99	
Category	2	
LHV Efficiency (%)	81.3	
HHV Efficiency (%)	75.2	
Emissions (g/hr)	1.93	
Weighting Factor	0.484	30.80%

Run #	3	
Burn Rate (dry kg/hr)	1.14	
Category	2	
LHV Efficiency (%)	80.9	
HHV Efficiency (%)	74.9	
Emissions (g/hr)	0.97	
Weighting Factor	0.317	20.19%

Run #	2	
Burn Rate (dry kg/hr)	1.39	
Category	3	
LHV Efficiency (%)	75.3	
HHV Efficiency (%)	69.7	
Emissions (g/hr)	1.09	
Weighting Factor	0.457	29.08%

Run #	5	
Burn Rate (dry kg/hr)	2.26	
Category	4	
LHV Efficiency (%)	75.5	
HHV Efficiency (%)	69.8	
Emissions (g/hr)	3.92	
Weighting Factor	0.313	19.93%

Wood Heater Conditioning Data - ASTM E2780/ ASTM E2515

Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	12-Feb-17
Technician:	B. Davis
Operation Category:	Cat II

Operated for 50 hours at a medium burn rate with fuel moisture between 19 and 25%.

Elapsed Time (hr)	Fuel weight	Flue Gas Temp (° F)
0	11.8	285.0
1	3.1	573.0
2	10.9	401.0
3	2.5	572.0
4	10.8	375.0
5	2.4	553.0
6	10.9	386.0
7	3.2	605.0
8	8.7	418.0
9	3.1	454.0
10	7.7	334.0
11	3.4	430.0
12	1.1	344.0
13	9.7	236.0
14	2.4	525.0
15	1.0	357.0
16	6.9	252.0
17	4.1	383.0
18	1.0	318.0
19	7.7	206.0
20	2.6	413.0
21	1.0	291.0
22	0.8	205.0
23	7.7	185.0
24	3.7	430.0
25	0.9	346.0

Elapsed Time (hr)	Fuel weight	Flue Gas Temp (° F)
26	0.9	208.0
27	6.4	192.0
28	4.1	371.0
29	1.1	310.0
30	0.8	199.0
31	6.7	176.0
32	5.0	377.0
33	1.6	325.0
34	0.9	192.0
35	0.7	166.0
36	5.8	157.0
37	4.6	325.0
38	1.4	321.0
39	5.5	204.0
40	4.9	323.0
41	1.4	314.0
42	5.9	205.0
43	4.4	355.0
44	1.2	318.0
45	4.8	206.0
46	5.2	288.0
47	2.1	315.0
48	6.2	218.0
49	4.3	327.0
50	3.4	279.0

Technician Signature:_____

Run 1

Gas Analyzer Pre-Service and Post-Service Performance Check and Calibration

Client: Hearth & Home
Model: 3100 ACC Project No: 0061WS066E Test Unit Tracking No.: 2153
Date: 2/13/17 Technician: B. Davis

Analyzer Type: CO, CO2 Analyzer I.D. No.: 419

Pretest Leak Check: Pass ☒ Fail ☐ Post Test Leak Check: Pass ☒ Fail ☐

Calibration Data

Note: Record Units of measure when recording Values and Responses (Resp.)

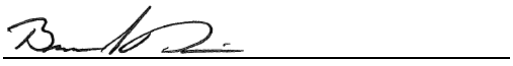
	Zero	Cal	Low	Cal	Mid	Cal	High	Cal
Certified Gas Or NIST Traceable ☐	**Cylinder#** _____		**Cylinder#** EB0088202		**Cylinder#** EB0088221		**Cylinder#** EB0088205	
	Value	*Resp.*	Value	*Resp.*	Value	Resp.	Value	*Resp.*
Pre Test Calibrations CO ppm	0	0.000	0.21	0.207	1.00	0.998	5.082	5.08
Pre Test Calibrations CO2 %	0	0.00	2.00	2.07	9.99	10.10	15.97	15.96
Pre Test Calibrations O2 %								
Pre Test Verifications NOX ppm								
Post Test Verifications CO ppm	0	-0.002	0.21	0.204	1.00	1.004	5.082	5.07
Post Test Verifications CO2 %	0	0.05	2.00	2.05	9.99	10.06	15.97	15.95
Post Test Verifications O2 %								
Post Test Verifications NOX ppm								
Allowable Drift ± 4% or per test method requirements	**Pass**	☒	**Pass**	☒	**Pass**	☒	**Pass**	☒
	Fail	☐	**Fail**	☐	**Fail**	☐	**Fail**	☐

Comments and/or routine adjustments: N/A

Equipment was ☒ or was not ☐ in good working order for the duration of the test:

Corrective action taken if equipment is/was out of acceptable perimeters NA

Date: 2/16/17

Technician signature: 

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 1
Test Date: 02/13/17

Burn Rate	**0.99 kg/hr dry**
Average Tunnel Temperature	80 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.08 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8565.8 dscf/hour
Average Delta p	0.040 inches H20
Total Time of Test	290 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	56.587 cubic feet	32.757 cubic feet	38.291 cubic feet	8.888 cubic feet
Average Gas Meter Temperature	76 degrees Fahrenheit	79 degrees Fahrenheit	80 degrees Fahrenheit	79 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	54.642 dscf	31.120 dscf	36.083 dscf	8.444 dscf
Total Particulates - m_n	0.1 mg	6.9 mg	8.4 mg	4.3 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000002 grams/dscf	0.00022 grams/dscf	0.00023 grams/dscf	0.00051 grams/dscf
Total Particulate Emissions - E_T	0.08 grams	9.10 grams	9.56 grams	5.82 grams
Particulate Emission Rate	0.02 grams/hour	1.88 grams/hour	1.98 grams/hour	4.36 grams/hour
Emissions Factor		1.90 g/kg	2.00 g/kg	1.45 g/kg
Difference from Average Total Particulate Emissions		0.23 grams	0.23 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS

Complete Test Run	
Total Particulate Emissions - E_T	9.33 grams
Particulate Emission Rate	**1.93 grams/hour**
Emissions Factor	1.95 grams/kg
First Hour Emissions (Changed @ 80 min)	
Total Particulate Emissions - E_T	5.82 grams
Particulate Emission Rate	4.36 grams/hour
Emissions Factor	1.45 grams/kg

QUALITY CHECKS

Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Train Precision ≤ 7.5%	0.51
Train Precision ±0.5 g/kg	0.10
Negative Probe Weight Eval.	OK
Pro-Rate Variation	NOT ACCEPTABLE
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Preburn Data - ASTM E2780

Run:	**1**
Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/13/2017
Beginning Clock Time:	10:36

Coal Bed Range (lb):	**2.5** (min)	**3.2** (max)

Technician Signature: _____

			Temperatures (°F)							
Elapsed Time (min)	Scale (lb)	Stack Draft (in H_2O)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. Firebox Surface	Stack	Ambient
0	5.5	-0.03	444	451	464	580	619	511.6	75	69
10	4.7	-0.03	437	465	428	551	598	495.8	74	69
20	4	-0.03	416	456	397	513	563	469	74	69
30	3.4	-0.03	435	439	381	486	545	457.2	75	70
40	2.9	-0.02	397	422	360	466	535	436	76	71
50	2.8	-0.02	309	408	321	434	501	394.6	142	72
60	2.7	-0.02	257	397	277	395	459	357	164	74

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 1

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 13-Feb-17
Beginning Clock Time: 11:37

Total Sampling Time: 290 min
Recording Interval: 10 min
Background Sample Volume: 56.587 cubic feet

Meter Box Y Factor: 1.001 (1) 0.993 (2) 1.014 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
28.95	28.95	28.93	28.94 "Hg

OMNI Equipment Numbers:

PM Control Modules: 371, 372
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.520 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 13.08 ft/sec.
Initial Tunnel Flow: 142.1 scfm
Average Tunnel Flow: 142.8 scfm
Post-Test Leak Check (1): 0.000 cfm @ 6 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 8 in. Hg
Average Test Piece Fuel Moisture: 20.74 Dry Basis %

Technician Signature:

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.034	0.032	0.038	0.034	0.038	0.040	0.040	0.036	0.040	"H2O
Temp:	79	79	79	79	79	79	79	79	79	°F

V_{strav} 13.07 ft/sec V_{scent} 13.62 ft/sec F_p 0.960

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft^3)	Gas Meter 2 (ft^3)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H_2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H_2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface Temp	Catalyst Exit Temp	Stack	Filter 1	Filter 2	Ambient	Draft ("H_2O)	CO_2 (%)	CO (%)
0	0.000	0.000			1.11	65	0.02	0.99	65	-0.8	79	0.040			12.7		251	395	271	387	451	351	N/A	160	75	76	74	-0.007	3.38	0.92
10	1.090	0.778	0.11	0.08	1.02	68	0.05	1.28	68	-1.5	77	0.040	98	60	11.9	-0.8	392	377	226	352	405	350	N/A	316	77	78	73	-0.033	7.85	0.84
20	2.168	2.110	0.11	0.13	1.00	71	0.05	1.11	72	-1.2	79	0.040	97	102	10.7	-1.2	505	357	215	341	374	358	N/A	381	78	80	73	-0.040	10.32	0.36
30	3.245	3.418	0.11	0.13	1.00	74	0.05	1.10	74	-1.2	80	0.040	96	100	9.6	-1.1	540	339	220	348	368	363	N/A	345	79	81	73	-0.039	10.9	0.39
40	4.368	4.731	0.11	0.13	1.08	76	-0.03	1.12	76	-1.2	80	0.040	100	100	8.5	-1.1	551	325	234	365	368	369	N/A	347	80	82	73	-0.039	11.52	0.49
50	5.496	6.050	0.11	0.13	1.07	78	-0.03	1.12	77	-1.2	80	0.040	100	100	7.4	-1.1	534	315	264	399	388	380	N/A	327	80	83	73	-0.037	10.86	0.37
60	6.624	7.378	0.11	0.13	1.09	79	-0.03	1.11	78	-1.2	80	0.040	100	101	6.5	-0.9	494	306	276	417	399	378	N/A	307	80	82	72	-0.034	10.46	0.6
70	7.753	8.710	0.11	0.13	1.09	79	-0.02	1.13	79	-1.2	80	0.040	100	101	5.7	-0.8	471	299	289	429	421	382	N/A	291	80	82	72	-0.032	10.81	0.78
80	8.888	10.045	0.11	0.13	1.08	80	-0.02	1.13	80	-1.2	80	0.040	100	101	4.7	-1	490	293	298	434	439	391	N/A	298	80	82	73	-0.033	11.45	0.49
90	10.017	11.379	0.11	0.13	1.08	80	-0.03	1.14	80	-1.3	82	0.040	100	101	3.9	-0.8	491	289	297	438	453	394	N/A	292	81	83	74	-0.031	10.79	0.46
100	11.148	12.714	0.11	0.13	1.09	81	-0.03	1.14	81	-1.3	82	0.040	100	101	3.3	-0.6	442	287	301	437	453	384	N/A	259	81	83	76	-0.030	9.61	0.51
110	12.286	14.049	0.11	0.13	1.09	82	-0.03	1.12	81	-1.2	82	0.040	100	101	2.8	-0.5	427	287	300	413	454	376	N/A	251	83	83	76	-0.028	8.47	0.72
120	13.416	15.388	0.11	0.13	1.08	82	-0.03	1.13	82	-1.3	81	0.040	100	101	2.4	-0.4	367	287	309	395	461	364	N/A	217	82	82	75	-0.025	7.75	1.02
130	14.552	16.729	0.11	0.13	1.09	83	-0.02	1.13	82	-1.2	81	0.040	100	101	2.2	-0.2	312	290	308	378	452	348	N/A	189	81	82	77	-0.021	6.44	1.16
140	15.689	18.072	0.11	0.13	1.09	82	-0.03	1.15	82	-1.3	81	0.040	100	101	2.0	-0.2	276	294	311	362	436	336	N/A	177	81	81	78	-0.018	6.32	1.07
150	16.825	19.418	0.11	0.13	1.09	82	-0.03	1.14	82	-1.2	80	0.040	100	102	1.9	-0.1	251	297	309	351	425	327	N/A	165	80	81	78	-0.017	5.87	1.18
160	17.965	20.760	0.11	0.13	1.10	82	-0.03	1.14	82	-1.2	80	0.040	100	101	1.8	-0.1	235	300	306	341	414	319	N/A	161	80	80	78	-0.016	5.94	1.37
170	19.102	22.105	0.11	0.13	1.09	81	-0.03	1.14	82	-1.2	79	0.040	100	101	1.6	-0.2	226	301	303	333	406	314	N/A	160	80	80	78	-0.015	5.85	1.51
180	20.241	23.453	0.11	0.13	1.09	81	-0.03	1.13	82	-1.2	79	0.040	100	102	1.5	-0.1	222	301	295	328	400	309	N/A	158	80	80	78	-0.015	5.93	1.75
190	21.383	24.801	0.11	0.13	1.08	81	-0.02	1.15	82	-1.2	79	0.040	101	102	1.3	-0.2	221	301	281	324	396	305	N/A	159	79	80	78	-0.015	6.47	1.42
200	22.517	26.148	0.11	0.13	1.10	81	-0.03	1.15	82	-1.2	79	0.040	100	101	1.2	-0.1	218	301	274	320	392	301	N/A	154	79	80	78	-0.015	5.9	1.57
210	23.656	27.493	0.11	0.13	1.09	82	-0.02	1.15	82	-1.2	79	0.040	100	101	1.1	-0.1	215	301	278	316	387	299	N/A	157	79	80	78	-0.015	5.87	1.73
220	24.795	28.841	0.11	0.13	1.09	81	-0.03	1.15	82	-1.3	79	0.040	100	102	0.9	-0.2	214	301	282	313	385	299	N/A	157	79	80	78	-0.015	5.8	1.71
230	25.929	30.192	0.11	0.14	1.09	81	-0.03	1.14	82	-1.2	79	0.040	100	102	0.8	-0.1	215	302	284	312	384	299	N/A	160	79	80	78	-0.015	6.02	1.71
240	27.071	31.542	0.11	0.14	1.09	81	-0.03	1.14	82	-1.2	79	0.040	101	102	0.6	-0.2	215	303	284	314	383	300	N/A	162	79	80	78	-0.016	6.01	1.56
250	28.206	32.891	0.11	0.13	1.09	82	-0.02	1.15	82	-1.3	79	0.040	100	102	0.5	-0.1	216	304	282	317	380	300	N/A	160	79	80	78	-0.015	5.34	1.85
260	29.344	34.238	0.11	0.13	1.08	82	-0.03	1.15	82	-1.2	79	0.040	100	101	0.4	-0.1	213	304	271	316	374	296	N/A	160	79	80	79	-0.016	4.94	1.82
270	30.482	35.587	0.11	0.13	1.09	82	-0.03	1.15	82	-1.3	79	0.040	100	102	0.3	-0.1	208	305	261	311	366	290	N/A	154	79	80	79	-0.015	4.54	1.89
280	31.616	36.939	0.11	0.14	1.10	82	-0.03	1.15	82	-1.2	79	0.040	100	102	0.1	-0.2	203	304	252	304	356	284	N/A	150	79	80	78	-0.015	4.51	1.82
290	32.757	38.291	0.11	0.14	1.09	82	-0.03	1.15	82	-1.2	79	0.040	100	102	0.0	-0.1	199	302	242	296	348	277	N/A	151	79	80	78	-0.014	4.38	1.88
Avg/Tot	32.757	38.291	0.11	0.13	1.08	79		1.14	80		80	0.040	100	100								73.6				81	76	-0.023		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Run #: 1
Date: 2/13/17

Equipment Numbers:

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D42	124.7	120.4	4.3
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: 4.3

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D46	123.5	122.6	0.9
C. Rear filter catch	Filter	D43	122.8	122.4	0.4
D. Probe catch*	Probe	1	122781.0	122779.9	1.1
E. Filter seals catch*	Seals	R435	3381.4	3381.2	0.2

Sub-Total Total Particulate, mg: 2.6

Train 1 Aggregate Total Particulate, mg: **6.9**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D44	130.9	123.7	7.2
B. Rear filter catch	Filter	D45	120.9	120.5	0.4
C. Probe catch*	Probe	4	114860.4	114859.9	0.5
D. Filter seals catch*	Seals	R436	3306.3	3306.0	0.3

Total Particulate, mg: **8.4**

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	D41	123.3	123.2	0.1

Total Particulate, mg: **0.1**

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

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

Technician Signature: _____

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/13/2017
Run No.:	1

Firebox Volume (ft^3):	1.89
Fuel Piece Length (in):	14
2x4 Crib Weight (lb):	5.5
4x4 Crib Weight (lb):	7.2

Total Fuel Weight (Dry Basis, lb):	10.5	
Fuel Density (lb/ft^3, Dry Basis):	27.86	OK
Loading Density (lb/ft^3, Wet Basis):	6.72	OK
2x4 Percentage:	43%	OK

Coal Bed Range (20-25%): **2.54 - 3.175**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.5	2"x 4"	19.5	19.3	19.3	1.26
2	1.4	2"x 4"	21.0	20.1	20.2	1.16
3	1.4	2"x 4"	19.5	21.0	20.9	1.16
4	3.4	4"x 4"	22.6	22.8	22.7	2.77
5	3.3	4"x 4"	20.8	20.2	21.2	2.73

Spacer Readings (Dry Basis %)			
9.6	17.3		
13.7	15.3		
6.8	14.3		
9.5			
18.1			
20.5			
19.7			
13.2			
18.7			
19.5			
23.8			
22.1			
17.8			

Technician Signature: _____

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 1

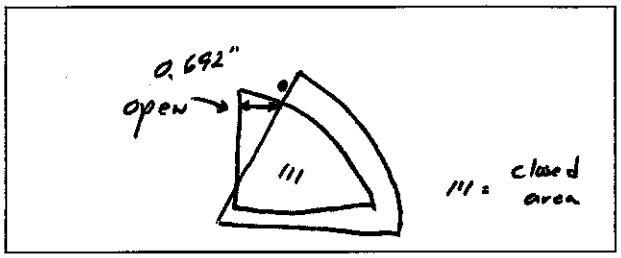
Model: 3100 ACC Tracking Number: 2153 Date: 2/13/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Run Notes

Air Control Settings

Primary:



Secondary: fixed

Tertiary/Pilot: Boost Air not used

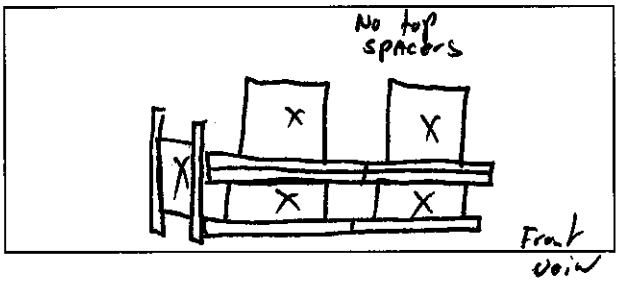
Fan: On high entire test

Preburn Notes

Time	Notes
50	Leveled cm/s

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: N/A

Fuel loaded by: 45 seconds

Door closed at: 60 seconds

Primary air: Fully open until SCW flow set to test setting

Boost Air activated @ 60 seconds

Notes: FAN on high entire test.

Time	Notes
0	After loading fuel found DGM totalizer on Box B was not sending signal to Data-logger although pump was pulling sample. Removed cover from face of sample box and verified connections. Signal started working but some of the sample pulled was not shown in total cubic feet.
80	Changed train A Front filter

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 1
Model: 3100 ACC Tracking Number: 2153 Date: 2/13/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12
Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	8 in	20.1	7	____ in	____
2	8 in	18.9	8	____ in	____
3	8 in	19.4	9	____ in	____
4	____ in	____	10	____ in	____
5	____ in	____	11	____ in	____
6	____ in	____	12	____ in	____

Total Pre-Burn Fuel Weight: 2.6 Pre-Burn Fuel Average Moisture: 19.47

Time (clock): 10:15 Room Temperature (F): 67 Initials: BD

Test Fuel

Firebox Volume (ft³): 1.89 Test Fuel Piece Length (in): 14"
Load Weight Range (lb): 11.9 - 13.23 - 14.5 Total Wet Fuel Load Weight (lb): 12.7

Fuel Type & Amount: 2 x 4: 3 4 x 4: 2
Weight (with spacers): 5.5 Weight (with spacers): 7.2

Piece:	Weight (lbs):	Moisture Readings (%DB):			Fuel Type:
1	1.5	19.5	19.3	19.3	2x4
2	1.4	21.0	20.1	20.2	2x4
3	1.4	19.5	21.0	20.9	2x4
4	3.4	22.6	22.8	22.7	4x4
5	3.3	20.8	20.2	21.2	4x4
6					
7					

Spacer Moisture Readings (%DB)

9.6	6.8	18.1	18.7	17.8			
13.7	9.5	20.5	19.5	17.3			
		19.7	23.8	15.3			
		13.2	22.1	14.3			

Time (clock): 10:15 Room Temperature (F): 67 Initials: BD

Technician Signature: BD Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 1
Model: 3100 ACC Tracking Number: 2153 Date: 2/13/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Supplemental Data

Start Time: 11:37
Stop Time: 16:27

Booth #: E1

Stack Gas Leak Check:
Initial: good Final: good

Sample Train Leak Check:
A: 0.0 @ 6 "Hg
B: 0.0 @ 8 "Hg

Calibrations: Span Gas CO_2: 9.99 CO: 1.00

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	Ø	Ø	295	295
CO_2	0.00	9.99	0.02	9.90
CO	-0.001	1.00	-0.013	.987

Air Velocity (ft/min): Initial: <50 Final: <50
Scale Audit (lbs): Initial: 10.0 Final: 10.0
Pitot Tube Leak Test: Initial: good Final: good
Stack Diameter (in): 6"
Induced Draft: 0.0
% Smoke Capture: 100%
Flue Pipe Cleaned Prior to First Test in Series:
Date: 2/12/17 Initials: DL

	Initial	Middle	Ending
P_b (in/Hg)	28.95	28.95	28.93
RH (%)	N/A	N/A	N/A
Ambient (°F)	74	78	78

Background Filter Volume: 56.587

Tunnel Traverse		
Microtector Reading	dP (in H_2O)	T(°F)
1	0.034	79
2	0.032	79
3	0.038	79
4	0.034	79
1	0.038	79
2	0.040	79
3	0.040	79
4	0.036	79
Center:		
	.040	79

Tunnel Static Pressure (in H_2O):	
Beginning of Test	End of Test
-.520	-.520

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 1

Model: 3100 ACC Tracking Number: 2153 Date: 2/13/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

2/21/17 0805

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time:	2/22/17 0815	2/23/17 0850	2/24/17 0815		
R/H %:	10.2	11.5	6.4		
Temp:	68.2	73.4	69.6		
200 mg Audit:	0.2000	0.2000	0.1999		
2 g Audit:	1.9999	1.9999	1.9999		
100 g Audit:	99.9983	99.9984	99.9984		
Initials:	BL	BL	BL		

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D42	120.4	124.8	124.6	124.7		
	Rear Filter	N/A						
	Probe	N/A						
	O-Ring Set	N/A						
A (Remainder)	Front Filter	D46	122.6	123.6	123.5	123.5		
	Rear Filter	D43	122.4	122.9	122.8	122.8		
	Probe	1	122779.9	122781.3	122781.0	122781.0		
	O-Ring Set	R435	3381.2 ~~3381.4~~	3381.6	3381.5	3381.4		
B	Front Filter	D44	123.7	131.1	130.9	130.9		
	Rear Filter	D45	120.5	121.0	120.9	120.9		
	Probe	4	114859.9	114860.5	114860.3	114860.4		
	O-Ring Set	R436	3306.0	3306.3	3306.3	3306.3		
BG	Filter	D41	123.2	123.2	123.3	123.3		

Technician Signature: [signature] Date: 3/3/17

VERSION: 2.2 12/14/2009

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 2/13/2017
Run: 1
Control #: 0061WS066E.R2
Test Duration: 290
Output Category: 2

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

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

Wood Moisture (% wet): 17.18
Load Weight (lb wet): 12.70
Burn Rate (dry kg/h): 0.99
Total Particulate Emissions: N/A g

Fuel Data

	D. Fir	
HHV	19,810	kj/kg
%C	48.73	
%H	6.87	
%O	43.9	
%ASH	0.5	

Default Fuel Values

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

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

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

	Averages	1.17	7.34	#DIV/0!	217.50	76.13
					Temp. (ºF)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	12.70	0.92	3.38		160.0	74.0
10	11.90	0.84	7.85		316.0	73.0
20	10.70	0.36	10.32		381.0	73.0
30	9.60	0.39	10.90		345.0	73.0
40	8.50	0.49	11.52		347.0	73.0
50	7.40	0.37	10.86		327.0	73.0
60	6.50	0.60	10.46		307.0	72.0
70	5.70	0.78	10.81		291.0	72.0
80	4.70	0.49	11.45		298.0	73.0
90	3.90	0.46	10.79		292.0	74.0
100	3.30	0.51	9.61		259.0	76.0
110	2.80	0.72	8.47		251.0	76.0
120	2.40	1.02	7.75		217.0	75.0
130	2.20	1.16	6.44		189.0	77.0
140	2.00	1.07	6.32		177.0	78.0
150	1.90	1.18	5.87		165.0	78.0
160	1.80	1.37	5.94		161.0	78.0
170	1.60	1.51	5.85		160.0	78.0
180	1.50	1.75	5.93		158.0	78.0
190	1.30	1.42	6.47		159.0	78.0
200	1.20	1.57	5.90		154.0	78.0
210	1.10	1.73	5.87		157.0	78.0
220	0.90	1.71	5.80		157.0	78.0
230	0.80	1.71	6.02		160.0	78.0
240	0.60	1.56	6.01		162.0	78.0
250	0.50	1.85	5.34		160.0	78.0
260	0.40	1.82	4.94		160.0	79.0
270	0.30	1.89	4.54		154.0	79.0
280	0.10	1.82	4.51		150.0	78.0
290	0.00	1.88	4.38		151.0	78.0

OMNI-Test Laboratories

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 02/13/17
Run: 1
Control #:)061WS066E.R2
Test Duration: 290
Output Category: 2

Technicians: _____

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.2%	81.3%
Combustion Efficiency	93.3%	93.3%
Heat Transfer Efficiency	81%	87.1%

Output Rate (kJ/h)	14,707	13,951	**(Btu/h)**
Burn Rate (kg/h)	0.99	2.18	**(lb/h)**
Input (kJ/h)	19,560	18,555	**(Btu/h)**

Test Load Weight (dry kg)	4.77	10.52	**dry lb**
MC wet (%)	17.18		
MC dry (%)	20.74		
Particulate (g)	N/A		
CO (g)	452		
Test Duration (h)	4.83		

Emissions	**Particulate**	**CO**
g/MJ Output	#VALUE!	6.36
g/kg Dry Fuel	#VALUE!	94.71
g/h	#VALUE!	93.51
lb/MM Btu Output	#VALUE!	14.78

Air/Fuel Ratio (A/F)	14.31

VERSION: **2.2** **12/14/2009**

Run 2

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 2
Test Date: 02/14/17

Burn Rate	**1.39 kg/hr dry**
Average Tunnel Temperature	84 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	15.13 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	9770.3 dscf/hour
Average Delta p	0.053 inches H20
Total Time of Test	220 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	42.356 cubic feet	29.754 cubic feet	29.750 cubic feet	7.996 cubic feet
Average Gas Meter Temperature	78 degrees Fahrenheit	80 degrees Fahrenheit	80 degrees Fahrenheit	80 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	40.501 dscf	28.095 dscf	27.847 dscf	7.550 dscf
Total Particulates - m_n	0.2 mg	2.9 mg	3.6 mg	2.4 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000005 grams/dscf	0.00010 grams/dscf	0.00013 grams/dscf	0.00032 grams/dscf
Total Particulate Emissions - E_T	0.18 grams	3.52 grams	4.45 grams	3.11 grams
Particulate Emission Rate	0.05 grams/hour	0.96 grams/hour	1.21 grams/hour	3.11 grams/hour
Emissions Factor		0.69 g/kg	0.87 g/kg	0.95 g/kg
Difference from Average Total Particulate Emissions		0.47 grams	0.47 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E_T	3.99 grams
Particulate Emission Rate	**1.09 grams/hour**
Emissions Factor	0.78 grams/kg
First Hour Emissions	
Total Particulate Emissions - E_T	3.11 grams
Particulate Emission Rate	3.11 grams/hour
Emissions Factor	0.95 grams/kg

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Train Precision ≤ 7.5%	3.19
Train Precision ±0.5 g/kg	0.18
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Preburn Data - ASTM E2780

Run:	**2**
Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/14/2017
Beginning Clock Time:	9:54

Coal Bed Range (lb):	**2.7** (min)	**3.3** (max)

Technician Signature: 

			Temperatures (°F)							
Elapsed Time (min)	Scale (lb)	Stack Draft (in H_2O)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. Firebox Surface	Stack	Ambient
0	6.1	-0.04	617	442	535	627	668	577.8	388	68
10	5.2	-0.04	547	455	476	598	636	542.4	326	68
20	4.4	-0.04	512	445	435	555	596	508.6	357	68
30	3.7	-0.03	498	430	410	530	572	488	323	69
40	3.4	-0.02	372	416	365	494	538	437	247	70
50	3.3	-0.02	309	406	327	457	506	401	229	70
60	3.1	-0.02	271	399	288	420	472	370	200	69

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 2

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 14-Feb-17
Beginning Clock Time: 10:53

Total Sampling Time: 220 min
Recording Interval: 10 min
Background Sample Volume: 42.356 cubic feet

Meter Box Y Factor: 1.001 (1) 0.993 (2) 1.014 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
28.82	28.78	28.73	28.78 "Hg

OMNI Equipment Numbers:

PM Control Modules: 371, 372
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.650 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 15.13 ft/sec.
Initial Tunnel Flow: 163.1 scfm
Average Tunnel Flow: 162.8 scfm
Post-Test Leak Check (1): 0.000 cfm @ 8 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 6 in. Hg
Average Test Piece Fuel Moisture: 19.88 Dry Basis %

Technician Signature:

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.046	0.050	0.050	0.038	0.054	0.056	0.052	0.040	0.053	"H2O
Temp:	76	76	76	76	76	76	76	76	76	°F

V_{strav} 15.01 ft/sec V_{scent} 15.68 ft/sec F_p 0.958

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft^3)	Gas Meter 2 (ft^3)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H_2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H_2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface Temp	Catalyst Exit Temp	Stack	Filter 1	Filter 2	Ambient	Draft ("H_2O)	CO_2 (%)	CO (%)
0	0.000	0.000			1.42	66	-0.35	1.10	66	-1	76	0.053			13.3		267	397	283	415	466	366	N/A	198	75	75	70	-0.021	2.56	0.47
10	1.326	1.340	0.13	0.13	1.50	68	-0.44	1.14	68	-1.3	78	0.053	100	101	12.3	-1	462	383	237	374	418	375	N/A	444	77	78	72	-0.041	6.63	0.29
20	2.665	2.676	0.13	0.13	1.52	71	-0.47	1.14	71	-1.3	81	0.053	100	100	10.7	-1.6	597	363	235	365	406	393	N/A	500	80	82	73	-0.046	7.92	0.15
30	3.993	3.986	0.13	0.13	1.50	74	-0.48	1.17	74	-1.3	83	0.053	99	98	9.0	-1.7	632	344	260	401	416	411	N/A	489	82	85	73	-0.047	10.04	0.49
40	5.330	5.334	0.13	0.13	1.50	77	-0.48	1.15	76	-1.4	85	0.053	100	101	7.5	-1.5	676	328	287	457	438	437	N/A	492	84	86	73	-0.047	9.59	0.11
50	6.658	6.653	0.13	0.13	1.49	78	-0.48	1.15	78	-1.4	85	0.053	99	98	6.0	-1.5	661	315	316	497	463	450	N/A	476	85	87	73	-0.046	9.37	0.24
60	7.996	8.007	0.13	0.14	1.54	79	-0.53	1.16	79	-1.4	86	0.053	99	101	4.7	-1.3	648	307	345	525	488	463	N/A	464	85	88	73	-0.044	8.58	0.38
70	9.352	9.360	0.14	0.14	1.53	80	-0.47	1.15	80	-1.4	86	0.053	100	100	3.6	-1.1	602	302	370	538	506	464	N/A	417	86	88	74	-0.042	7.78	0.09
80	10.708	10.713	0.14	0.14	1.53	81	-0.47	1.15	81	-1.4	87	0.053	100	100	2.8	-0.8	525	302	398	535	515	455	N/A	361	86	88	77	-0.036	5.37	0.19
90	12.062	12.067	0.14	0.14	1.53	82	-0.46	1.15	82	-1.4	86	0.053	100	100	2.4	-0.4	444	306	395	522	514	436	N/A	301	86	87	79	-0.033	4.51	0.3
100	13.423	13.426	0.14	0.14	1.54	82	-0.46	1.16	82	-1.4	86	0.053	100	100	2.1	-0.3	376	312	378	493	503	412	N/A	262	86	87	80	-0.028	3.93	0.44
110	14.778	14.786	0.14	0.14	1.54	83	-0.46	1.14	83	-1.4	85	0.053	100	100	1.8	-0.3	336	318	363	471	483	394	N/A	245	85	86	81	-0.026	4.18	0.51
120	16.141	16.144	0.14	0.14	1.54	83	-0.46	1.15	83	-1.4	85	0.053	100	100	1.7	-0.1	312	324	353	456	465	382	N/A	236	85	86	82	-0.025	4.21	0.63
130	17.497	17.502	0.14	0.14	1.54	83	-0.45	1.16	83	-1.3	85	0.053	100	100	1.4	-0.3	297	328	342	444	451	372	N/A	231	85	86	82	-0.025	4.23	0.67
140	18.862	18.863	0.14	0.14	1.54	83	-0.46	1.14	83	-1.3	85	0.053	101	100	1.2	-0.2	285	330	333	436	439	365	N/A	223	85	86	82	-0.024	4.23	0.7
150	20.219	20.224	0.14	0.14	1.53	84	-0.46	1.14	83	-1.4	85	0.053	100	100	1.1	-0.1	275	332	327	427	430	358	N/A	217	84	85	82	-0.023	3.93	0.69
160	21.584	21.587	0.14	0.14	1.53	84	-0.46	1.15	84	-1.4	84	0.053	100	100	0.9	-0.2	267	332	323	420	422	353	N/A	213	84	85	83	-0.023	4.16	0.77
170	22.941	22.946	0.14	0.14	1.53	84	-0.46	1.16	84	-1.4	84	0.053	100	100	0.7	-0.2	263	332	317	414	418	349	N/A	211	84	85	82	-0.022	4.13	0.75
180	24.307	24.306	0.14	0.14	1.53	84	-0.46	1.14	84	-1.4	84	0.053	100	100	0.5	-0.2	256	332	306	407	415	343	N/A	204	84	85	83	-0.021	3.55	0.67
190	25.663	25.667	0.14	0.14	1.53	84	-0.46	1.14	84	-1.4	84	0.053	100	100	0.4	-0.1	246	331	286	387	408	332	N/A	197	84	85	83	-0.021	3.43	0.69
200	27.029	27.025	0.14	0.14	1.53	85	-0.46	1.15	85	-1.4	84	0.053	100	100	0.2	-0.2	239	328	276	370	402	323	N/A	195	84	85	83	-0.020	3.64	0.7
210	28.387	28.389	0.14	0.14	1.53	85	-0.46	1.15	85	-1.4	84	0.053	100	100	0.1	-0.1	235	326	267	357	399	317	N/A	191	84	85	83	-0.020	3.41	0.7
220	29.754	29.750	0.14	0.14	1.53	85	-0.46	1.16	84	-1.4	82	0.053	100	100	0.0	-0.1	230	323	256	344	395	310	N/A	191	84	84	78	-0.021	3.57	0.78
Avg/Tot	29.754	29.750	0.14	0.14	1.52	80		1.15	80		84	0.053	100	100								56.0				85	78	-0.031		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Run #: 2
Date: 2/14/17

Equipment Numbers:

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D48	123.6	121.2	2.4
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: 2.4

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D49	122.9	122.7	0.2
C. Rear filter catch	Filter	D50	124.1	124.0	0.1
D. Probe catch*	Probe	OES4	114145.5	114145.3	0.2
E. Filter seals catch*	Seals	R437	3415.6	3415.9	0.0

Sub-Total Total Particulate, mg: 0.5

Train 1 Aggregate Total Particulate, mg: **2.9**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D51	123.0	120.8	2.2
B. Rear filter catch	Filter	D52	122.4	122.4	0.0
C. Probe catch*	Probe	8	115594.4	115593.3	1.1
D. Filter seals catch*	Seals	R438	3402.9	3402.6	0.3

Total Particulate, mg: **3.6**

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	D47	123.4	123.2	0.2

Total Particulate, mg: **0.2**

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

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

Technician Signature: _____

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/14/2017
Run No.:	2

Firebox Volume (ft^3):	1.89
Fuel Piece Length (in):	14
2x4 Crib Weight (lb):	6.1
4x4 Crib Weight (lb):	7.2

Total Fuel Weight (Dry Basis, lb):	11.2	
Fuel Density (lb/ft^3, Dry Basis):	29.69	OK
Loading Density (lb/ft^3, Wet Basis):	7.04	OK
2x4 Percentage:	46%	OK

Coal Bed Range (20-25%): **2.66 - 3.325**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.6	2"x 4"	19.2	19.9	19.7	1.34
2	1.7	2"x 4"	19.5	19.8	19.3	1.42
3	1.5	2"x 4"	21.0	20.9	20.5	1.24
4	3.4	4"x 4"	19.1	19.3	19.2	2.85
5	3.4	4"x 4"	20.6	19.3	20.9	2.83

Spacer Readings (Dry Basis %)			
8.7	7.2		
7.4	6.9		
6.8	7.2		
7.2			
7.2			
6.6			
16.6			
6.9			
7.7			
7.9			
6.5			
21.9			
6.8			

Technician Signature: _____

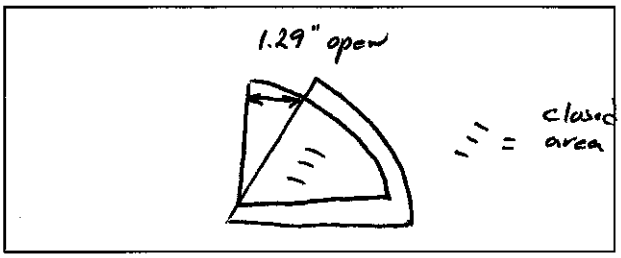
OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 2
Model: 3100 ACC Tracking Number: 2153 Date: 2/14/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Run Notes

Air Control Settings

Primary:



Secondary: fixed

Tertiary/Pilot: Boost Air not used

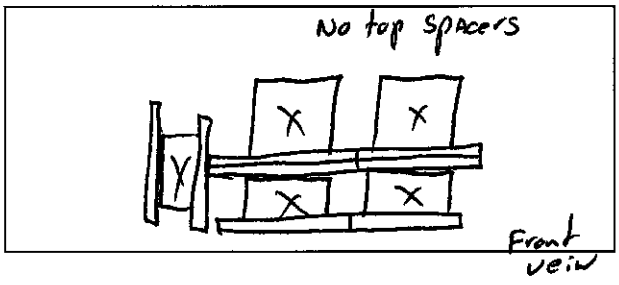
Fan: On high entire test

Preburn Notes

Time	Notes
50	Leveled coal bed.

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: N/A
Fuel loaded by: 1:00
Door closed at: 1:20
Primary air: fully open for 5 min then set to test setting.

Notes: Boost Air Activated @ 1:20
Blower on high entire test

Time	Notes
60	changed filter in train A.

Technician Signature: _____ Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 2

Model: 3100 ACC Tracking Number: 2153 Date: 2/14/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12

Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	8 in	19.0	7	____ in	____
2	8 in	18.7	8	____ in	____
3	8 in	19.4	9	____ in	____
4	____ in	____	10	____ in	____
5	____ in	____	11	____ in	____
6	____ in	____	12	____ in	____

Total Pre-Burn Fuel Weight: 24 Pre-Burn Fuel Average Moisture: 19.03

Time (clock): 9:30 Room Temperature (F): 65 Initials: BR

Test Fuel

Firebox Volume (ft³): 1.89 Test Fuel Piece Length (in): 14"

Load Weight Range (lb): 11.9 - 13.23 - 14.5 Total Wet Fuel Load Weight (lb): 13.3

Fuel Type & Amount: 2 x 4: 3 4 x 4: 2

Weight (with spacers): 6.1 Weight (with spacers): 7.2

Piece:	Weight (lbs):	Moisture Readings (%DB):			Fuel Type:
1	1.6	19.2	19.9	19.7	2x4
2	1.7	19.5	19.8	19.3	2x4
3	1.5	21.0	20.9	20.5	2x4
4	3.4	19.1	19.3	19.2	4x4
5	3.4	20.6	19.3	20.9	4x4
6	____	____	____	____	____
7	____	____	____	____	

Spacer Moisture Readings (%DB)

8.7	7.2	7.7	6.8	6.9	____	____	____
7.4	6.6	7.9	7.2	7.2	____	____	____
6.8	16.6	6.5	____	____	____	____	____
7.2	6.9	21.9	____	____	____	____	____

Time (clock): 9:30 Room Temperature (F): 65 Initials: BR

Technician Signature: [signature] Date: 3/3/17

ASTM E2780 Wood Heater Run Sheets

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 2
Model: 3100 ACC Tracking Number: 2153 Date: 2/14/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Supplemental Data

Start Time: 10:53
Stop Time: 2:33

Booth #: E1

Stack Gas Leak Check:
Initial: good Final: good

Sample Train Leak Check:
A: 0.0 @ 8 "Hg
B: 0.0 @ 6 "Hg

Calibrations: Span Gas CO_2: 9.99 CO: 1.00

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	Ø	Ø	225	225
CO_2	0.03	10.03	0.02	9.87
CO	-0.001	1.000	-0.022	0.948

Air Velocity (ft/min): Initial: <50 Final: <50
Scale Audit (lbs): Initial: 10.0 Final: 10.0
Pitot Tube Leak Test: Initial: good Final: good
Stack Diameter (in): 6"
Induced Draft: 0.0
% Smoke Capture: 100%
Flue Pipe Cleaned Prior to First Test in Series:
Date: 2/12/17 Initials: MA

	Initial	Middle	Ending
P_b (in/Hg)	28.82	28.78	28.73
RH (%)	N/A	N/A	N/A
Ambient (°F)	70	81	78

Tunnel Traverse

Microtector Reading	dP (in H_2O)	T(°F)
1	0.046	76
2	0.050	76
3	0.050	76
4	0.038	76
1	0.054	76
2	0.056	76
3	0.052	76
4	0.040	76
Center:		
	0.053	76

Tunnel Static Pressure (in H_2O):	
Beginning of Test	End of Test
-.65	-.65

Background Filter Volume: 42.356

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 2

Model: 3100 ACC Tracking Number: 2153 Date: 2/14/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

2/24/17 0805

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
	Date/Time: 2/23/17 0815	Date/Time: 2/23/17 0850	Date/Time: 2/24/17 0815	Date/Time: 2/24/17 0805	Date/Time: 3/1/17 0930
	R/H %: 10.2	R/H %: 11.5	R/H %: 6.5	R/H %: 7.4	R/H %: 7.1
	Temp: 68.2	Temp: 73.4	Temp: 69.6	Temp: 69.2	Temp: 68.9
	200 mg Audit: 0.2000	200 mg Audit: 0.2000	200 mg Audit: 0.1999	200 mg Audit: 0.1999	200 mg Audit: 0.1999
	2 g Audit: 1.9999	2 g Audit: 1.9999	2 g Audit: 1.9999	2 g Audit: 1.9999	2 g Audit: 1.9999
	100 g Audit: 99.9983	100 g Audit 99.9984	100 g Audit 99.9984	100 g Audit 99.9984	100 g Audit 99.9984
	Initials: BL	Initials: BL	Initials: BL	Initials: BL	Initials: BL

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D48	121.2	123.7	123.6	123.6		
	Rear Filter	N/A						
	Probe	N/A						
	O-Ring Set	N/A						
A (Remainder)	Front Filter	D49	122.7	123.0	122.9	122.9		
	Rear Filter	D50	124.0	124.2	124.1	124.1		
	Probe	OES4	114145.3	114145.7	114145.5	114145.5		
	O-Ring Set	R437	3415.9	3416.7	3416.6	3416.2	3415.7	3415.6
B	Front Filter	D51	120.8	123.2	123.0	123.0		
	Rear Filter	D52	122.4	122.5	122.4	122.4		
	Probe	8	115593.3	115594.6	115594.4	115594.4		
	O-Ring Set	R438	3402.6	3403.6	3403.4	3403.1	3402.9	3402.9
BG	Filter	D47	123.2	123.4	123.4	123.4		

Technician Signature: B Davis Date: 3/3/17

VERSION: 2.2 12/14/2009

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 2/14/2017
Run: 2
Control #: 0061WS066E.R2
Test Duration: 220
Output Category: 2

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

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

Wood Moisture (% wet): 16.58
Load Weight (lb wet): 13.30
Burn Rate (dry kg/h): 1.37
Total Particulate Emissions: N/A g

Fuel Data

	D. Fir	
HHV	19,810	kj/kg
%C	48.73	
%H	6.87	
%O	43.9	
%ASH	0.5	

Default Fuel Values

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

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

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

	Averages	0.50	5.35	#DIV/0!	302.52	78.30
					Temp. (ºF)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	13.30	0.47	2.56		198.0	70.0
10	12.30	0.29	6.63		444.0	72.0
20	10.70	0.15	7.92		500.0	73.0
30	9.00	0.49	10.04		489.0	73.0
40	7.50	0.11	9.59		492.0	73.0
50	6.00	0.24	9.37		476.0	73.0
60	4.70	0.38	8.58		464.0	73.0
70	3.60	0.09	7.78		417.0	74.0
80	2.80	0.19	5.37		361.0	77.0
90	2.40	0.30	4.51		301.0	79.0
100	2.10	0.44	3.93		262.0	80.0
110	1.80	0.51	4.18		245.0	81.0
120	1.70	0.63	4.21		236.0	82.0
130	1.40	0.67	4.23		231.0	82.0
140	1.20	0.70	4.23		223.0	82.0
150	1.10	0.69	3.93		217.0	82.0
160	0.90	0.77	4.16		213.0	83.0
170	0.70	0.75	4.13		211.0	82.0
180	0.50	0.67	3.55		204.0	83.0
190	0.40	0.69	3.43		197.0	83.0
200	0.20	0.70	3.64		195.0	83.0
210	0.10	0.70	3.41		191.0	83.0
220	0.00	0.78	3.57		191.0	78.0

OMNI-Test Laboratories

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 02/14/17
Run: 2
Control #: 0061WS066E.R2
Test Duration: 220
Output Category: 2

Technicians: _____

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	69.7%	75.3%
Combustion Efficiency	96.4%	96.4%
Heat Transfer Efficiency	72%	78.2%

Output Rate (kJ/h)	18,953	17,979	**(Btu/h)**
Burn Rate (kg/h)	1.37	3.03	**(lb/h)**
Input (kJ/h)	27,197	25,799	**(Btu/h)**

Test Load Weight (dry kg)	5.03	11.09	**dry lb**
MC wet (%)	16.58		
MC dry (%)	19.88		
Particulate (g)	N/A		
CO (g)	284		
Test Duration (h)	3.67		

Emissions	**Particulate**	**CO**
g/MJ Output	#VALUE!	4.08
g/kg Dry Fuel	#VALUE!	56.38
g/h	#VALUE!	77.41
lb/MM Btu Output	#VALUE!	9.49

Air/Fuel Ratio (A/F)	20.92

VERSION: **2.2** **12/14/2009**

Run 3

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 3
Test Date: 02/15/17

Burn Rate	**1.14 kg/hr dry**
Average Tunnel Temperature	84 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	15.98 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	10177.3 dscf/hour
Average Delta p	0.058 inches H20
Total Time of Test	250 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	47.715 cubic feet	34.037 cubic feet	34.023 cubic feet	8.073 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	83 degrees Fahrenheit	83 degrees Fahrenheit	83 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	45.010 dscf	31.557 dscf	31.257 dscf	7.485 dscf
Total Particulates - m_n	0.1 mg	3.2 mg	2.9 mg	1.7 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000002 grams/dscf	0.00010 grams/dscf	0.00009 grams/dscf	0.00023 grams/dscf
Total Particulate Emissions - E_T	0.09 grams	4.21 grams	3.84 grams	2.31 grams
Particulate Emission Rate	0.02 grams/hour	1.01 grams/hour	0.92 grams/hour	2.31 grams/hour
Emissions Factor		0.88 g/kg	0.81 g/kg	0.94 g/kg
Difference from Average Total Particulate Emissions		0.18 grams	0.18 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E_T	4.02 grams
Particulate Emission Rate	**0.97 grams/hour**
Emissions Factor	0.85 grams/kg
First Hour Emissions	
Total Particulate Emissions - E_T	2.31 grams
Particulate Emission Rate	2.31 grams/hour
Emissions Factor	0.94 grams/kg

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Train Precision ≤ 7.5%	1.09
Train Precision ±0.5 g/kg	0.08
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Preburn Data - ASTM E2780

Run:	**3**
Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/15/2017
Beginning Clock Time:	11:36

Coal Bed Range (lb):	**2.5** (min)	**3.1** (max)

Technician Signature: _____

			Temperatures (°F)							
Elapsed Time (min)	Scale (lb)	Stack Draft (in H_2O)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. Firebox Surface	Stack	Ambient
0	5.9	-0.048	496	464	490	602	654	541.2	378	78
10	5	-0.045	515	476	438	578	630	527.4	360	78
20	4.3	-0.043	495	463	405	537	596	499.2	349	77
30	3.6	-0.04	498	441	397	509	577	484.4	340	77
40	3.4	-0.03	408	421	357	485	552	444.6	254	76
50	3.1	-0.023	317	407	321	445	519	401.8	219	76
60	3.1	-0.02	268	397	282	407	479	366.6	196	75
70	3.1	-0.02	238	384	251	368	431	334.4	178	77

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 3

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 15-Feb-17
Beginning Clock Time: 12:36

Total Sampling Time: 250 min
Recording Interval: 10 min
Background Sample Volume: 47.715 cubic feet

Meter Box Y Factor: 1.001 (1) 0.993 (2) 1.014 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
28.47	28.42	28.35	28.41 "Hg

OMNI Equipment Numbers:

PM Control Modules: 371, 372
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.660 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 15.98 ft/sec.
Initial Tunnel Flow: 169.0 scfm
Average Tunnel Flow: 169.6 scfm
Post-Test Leak Check (1): 0.000 cfm @ 10 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 12 in. Hg
Average Test Piece Fuel Moisture: 21.17 Dry Basis %

Technician Signature: _____

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.052	0.058	0.056	0.046	0.052	0.058	0.056	0.046	0.058	"H2O
Temp:	83	83	83	83	83	83	83	83	83	°F

V_{strav} 15.94 ft/sec V_{scent} 16.61 ft/sec F_p 0.960

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft^3)	Gas Meter 2 (ft^3)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H_2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H_2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface Temp	Catalyst Exit Temp	Stack	Filter 1	Filter 2	Ambient	Draft ("H_2O)	CO_2 (%)	CO (%)
0	0.000	0.000			1.50	76	-0.4	1.11	76	-1	83	0.058			12.5		226	380	235	358	419	324	N/A	188	84	85	78	-0.025	1.12	0.15
10	1.337	1.319	0.13	0.13	1.43	77	-0.38	1.13	77	-1	84	0.058	99	98	11.7	-0.8	412	363	213	332	376	339	N/A	433	85	85	77	-0.052	10.29	0.27
20	2.676	2.655	0.13	0.13	1.49	79	-0.44	1.14	80	-1.1	87	0.058	99	99	10.4	-1.3	551	341	228	342	366	366	N/A	472	86	88	77	-0.058	12	0.15
30	4.019	4.003	0.13	0.13	1.49	81	-0.43	1.13	82	-1.1	87	0.058	99	100	9.0	-1.4	576	322	263	379	385	385	N/A	428	87	89	77	-0.055	12.19	0.17
40	5.360	5.370	0.13	0.14	1.49	83	-0.43	1.19	83	-1.2	85	0.058	99	101	7.9	-1.1	550	308	274	410	398	388	N/A	399	88	89	78	-0.050	10.94	0.19
50	6.718	6.761	0.14	0.14	1.51	84	-0.45	1.20	84	-1.2	87	0.058	100	102	6.9	-1	525	297	295	433	420	394	N/A	385	87	89	77	-0.050	10.81	0.39
60	8.073	8.150	0.14	0.14	1.53	85	-0.4	1.14	85	-1.1	88	0.058	100	102	5.9	-1	510	290	315	455	448	404	N/A	380	87	88	77	-0.050	11.27	0.27
70	9.453	9.509	0.14	0.14	1.55	86	-0.46	1.10	85	-1	87	0.058	101	100	4.9	-1	531	284	335	474	468	418	N/A	392	87	88	77	-0.050	11.87	0.23
80	10.829	10.844	0.14	0.13	1.56	86	-0.46	1.09	85	-1	88	0.058	101	98	4.0	-0.9	541	282	361	487	481	430	N/A	393	87	88	77	-0.050	11.9	0.26
90	12.211	12.195	0.14	0.14	1.55	86	-0.46	1.15	86	-1.1	88	0.058	101	99	3.2	-0.8	529	281	372	489	499	434	N/A	358	87	89	77	-0.043	10.06	0.19
100	13.588	13.562	0.14	0.14	1.52	86	-0.42	1.16	86	-1.1	87	0.058	101	100	2.6	-0.6	447	283	371	472	504	415	N/A	296	87	88	77	-0.039	7.75	0.46
110	14.949	14.938	0.14	0.14	1.52	87	-0.41	1.18	86	-1.2	86	0.058	99	101	2.3	-0.3	370	287	355	451	494	391	N/A	257	86	87	78	-0.030	6.73	0.76
120	16.318	16.289	0.14	0.14	1.52	86	-0.41	1.12	86	-1	87	0.058	100	99	2.0	-0.3	332	291	342	433	473	374	N/A	243	86	87	82	-0.030	6.06	1.14
130	17.683	17.641	0.14	0.14	1.52	86	-0.41	1.12	86	-1	86	0.058	100	99	1.8	-0.2	293	294	317	415	444	353	N/A	218	86	86	82	-0.025	5.21	1.74
140	19.054	19.005	0.14	0.14	1.52	85	-0.41	1.15	85	-1.1	86	0.058	101	100	1.6	-0.2	268	297	310	398	422	339	N/A	209	85	86	82	-0.022	5.45	1.75
150	20.402	20.376	0.13	0.14	1.49	85	-0.37	1.15	85	-1.1	85	0.058	99	100	1.4	-0.2	255	298	307	387	409	331	N/A	205	85	85	82	-0.022	5.35	1.78
160	21.751	21.743	0.13	0.14	1.48	84	-0.37	1.14	84	-1.1	84	0.058	99	100	1.2	-0.2	246	299	307	379	401	326	N/A	200	84	85	81	-0.020	5.5	1.54
170	23.110	23.117	0.14	0.14	1.54	84	-0.42	1.16	83	-1.1	83	0.058	100	101	1.1	-0.1	241	300	305	374	395	323	N/A	199	84	84	81	-0.020	5.28	1.48
180	24.480	24.486	0.14	0.14	1.53	83	-0.42	1.16	83	-1.1	83	0.058	101	101	0.9	-0.2	235	301	307	370	388	320	N/A	191	83	83	81	-0.018	5.93	1.07
190	25.852	25.854	0.14	0.14	1.54	83	-0.42	1.15	83	-1.1	82	0.058	101	100	0.7	-0.2	233	302	318	370	385	322	N/A	191	83	83	81	-0.018	5.88	1.09
200	27.218	27.219	0.14	0.14	1.54	83	-0.42	1.15	83	-1.1	81	0.058	100	100	0.6	-0.1	231	306	321	370	383	322	N/A	191	82	82	78	-0.018	5.74	1.1
210	28.594	28.580	0.14	0.14	1.53	82	-0.42	1.16	83	-1.1	81	0.058	101	100	0.5	-0.1	230	310	320	369	382	322	N/A	189	82	82	80	-0.018	5.61	1.16
220	29.958	29.934	0.14	0.14	1.53	82	-0.42	1.12	83	-1	81	0.058	100	99	0.3	-0.2	228	313	318	366	380	321	N/A	187	81	82	80	-0.018	5.54	1.21
230	31.328	31.286	0.14	0.14	1.53	82	-0.42	1.13	83	-1	81	0.058	101	99	0.2	-0.1	225	315	313	361	378	318	N/A	185	81	81	80	-0.018	5.24	1.22
240	32.691	32.647	0.14	0.14	1.49	82	-0.39	1.15	82	-1.1	80	0.058	100	100	0.1	-0.1	221	316	307	353	374	314	N/A	184	81	81	76	-0.018	5.09	1.31
250	34.037	34.023	0.13	0.14	1.48	82	-0.37	1.16	83	-1.1	79	0.058	99	101	0.0	-0.1	216	315	302	344	368	309	N/A	181	80	80	75	-0.017	4.8	1.45
Avg/Tot	34.037	34.023	0.14	0.14	1.51	83		1.14	83		84	0.058	100	100								14.6				85	79	-0.032		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Run #: 3
Date: 2/15/17

Equipment Numbers:

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D53	125.2	123.5	1.7
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total Total Particulate, mg: 1.7

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D54	121.4	120.7	0.7
C. Rear filter catch	Filter	D55	122.9	122.8	0.1
D. Probe catch*	Probe	9	115691.6	115691.2	0.4
E. Filter seals catch*	Seals	R439	3295.1	3294.8	0.3

Sub-Total Total Particulate, mg: 1.5

Train 1 Aggregate Total Particulate, mg: **3.2**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D56	125.8	123.4	2.4
B. Rear filter catch	Filter	D57	119.7	119.6	0.1
C. Probe catch*	Probe	11	114189.0	114188.8	0.2
D. Filter seals catch*	Seals	R440	3487.9	3487.7	0.2

Total Particulate, mg: **2.9**

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	D58	122.6	122.5	0.1

Total Particulate, mg: **0.1**

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

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

Technician Signature: _____

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/15/2017
Run No.:	3

Firebox Volume (ft^3):	1.89
Fuel Piece Length (in):	14
2x4 Crib Weight (lb):	5.4
4x4 Crib Weight (lb):	7.1

Total Fuel Weight (Dry Basis, lb):	10.5	
Fuel Density (lb/ft^3, Dry Basis):	27.60	OK
Loading Density (lb/ft^3, Wet Basis):	6.61	OK
2x4 Percentage:	43%	OK

Coal Bed Range (20-25%): **2.5 - 3.125**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.5	2"x 4"	19.7	20.2	19.2	1.25
2	1.2	2"x 4"	23.1	19.7	20.2	0.99
3	1.5	2"x 4"	22.6	22.5	24.5	1.22
4	3.2	4"x 4"	21.3	20.5	21.2	2.64
5	3.5	4"x 4"	21.0	20.5	21.3	2.89

Spacer Readings (Dry Basis %)			
7.9	7.7		
7.3	8.2		
8.7	7.8		
9.0			
7.0			
8.1			
8.7			
8.2			
9.0			
8.5			
9.0			
7.6			
7.0			

Technician Signature: _____

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 3

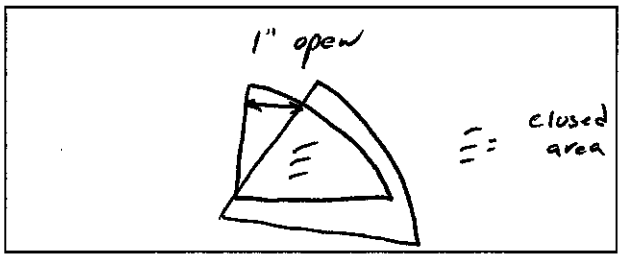
Model: 3100 ACC Tracking Number: 2153 Date: 2/15/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Run Notes

Air Control Settings

Primary:



Secondary: fixed

Tertiary/Pilot: boost Air not used

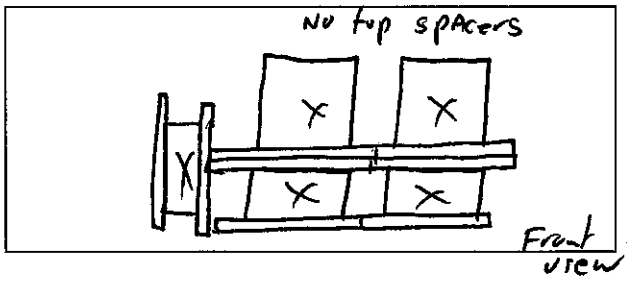
Fan: on high entire test

Preburn Notes

Time	Notes
50	Leveled coals

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: N/A
Fuel loaded by: 55 seconds
Door closed at: 1:20
Primary air: At test setting full 5:00

Notes: FAN on high entire test
Boost Air Activated @ 0 minutes
Then again @ 1:20.

Time	Notes
60	change Front filter in train A.

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 3

Model: 3100 ACC Tracking Number: 2153 Date: 2/15/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12

Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	8 in	18.7	7	____ in	____
2	8 in	19.1	8	____ in	____
3	8 in	21.3	9	____ in	____
4	____ in	____	10	____ in	____
5	____ in	____	11	____ in	____
6	____ in	____	12	____ in	____

Total Pre-Burn Fuel Weight: 2.8 Pre-Burn Fuel Average Moisture: 19.7

Time (clock): 10:45 Room Temperature (F): 67 Initials: BL

Test Fuel

Firebox Volume (ft³): 1.89 Test Fuel Piece Length (in): 14"

Load Weight Range (lb): 11.9 - 13.23 - 14.5 Total Wet Fuel Load Weight (lb): 12.5

Fuel Type & Amount: 2 x 4: 3 4 x 4: 2

Weight (with spacers): 5.4 Weight (with spacers): 7.1

Piece:	Weight (lbs):	Moisture Readings (%DB):			Fuel Type:
1	1.5	19.7	20.2	19.2	2x4
2	1.2	23.1	19.7	20.2	2x4
3	1.5	22.6	22.5	24.5	2x4
4	3.2	21.3	20.5	21.2	4x4
5	3.5	21.0	20.5	21.3	4x4
6					
7					

Spacer Moisture Readings (%DB)

7.9	7.0	9.0	7.0	8.2			
7.3	8.1	8.5	7.7	7.8			
8.7	8.7	9.0					
9.0	8.2	7.6					

Time (clock): 10:45 Room Temperature (F): 67 Initials: DK

Technician Signature: Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 3
Model: 3100 ACC Tracking Number: 2153 Date: 2/15/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Supplemental Data

Start Time: 12:36
Stop Time: 16:46

Booth #: E1

Stack Gas Leak Check:
Initial: good Final: good

Sample Train Leak Check:
A: 0.0 @ 10 "Hg
B: 0.0 @ 12 "Hg

Calibrations: Span Gas CO_2: 9.99 CO: 1.0

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	Ø	Ø	255	255
CO_2	0.00	10.00	0.08	9.97
CO	-0.002	1.003	0.018	1.009

Air Velocity (ft/min): Initial: <50 Final: <50
Scale Audit (lbs): Initial: 10.0 Final: 10.0
Pitot Tube Leak Test: Initial: good Final: good
Stack Diameter (in): 6"
Induced Draft: 0.0
% Smoke Capture: 100%
Flue Pipe Cleaned Prior to First Test in Series:
Date: 2/12/17 Initials: BA

	Initial	Middle	Ending
P_b (in/Hg)	28.47	28.42	28.35
RH (%)	N/A	N/A	N/A
Ambient (°F)	78	82	75

Tunnel Traverse

Microtector Reading	dP (in H_2O)	T(°F)
1	0.052	83
2	0.058	83
3	0.056	83
4	0.046	83
1	0.052	83
2	0.058	83
3	0.056	83
4	0.046	83
Center:		
	0.058	83

Background Filter Volume: 47.715

Tunnel Static Pressure (in H_2O):	
Beginning of Test	End of Test
-.66	-.66

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 3

Model: 3100 ACC Tracking Number: 2153 Date: 2/15/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

2/21/17 0805

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time:	2/22/17 0915	2/23/17 0950	2/24/17 0805		
R/H %:	10.2	11.5	6.4		
Temp:	68.2	73.4	69.6		
200 mg Audit:	0.2000	0.2000	0.1999		
2 g Audit:	1.9999	1.9999	1.9999		
100 g Audit:	99.9983	99.9984	99.9984		
Initials:	DL	BH	DL		

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D53	123.5	125.5	125.4	125.2		
	Rear Filter	N/A						
	Probe	N/A						
	O-Ring Set	N/A						
A (Remainder)	Front Filter	D54	120.7	121.5	121.3	121.4		
	Rear Filter	D55	122.8	123.0	122.9	122.9		
	Probe	9	115691.2	115691.7	115691.5	115691.6		
	O-Ring Set	R439	3294.8	3295.2	3295.1	3295.1		
B	Front Filter	D56	123.4	126.8	125.9	125.8		
	Rear Filter	D57	119.6	120.0	119.8	119.7		
	Probe	11	114188.8	114189.2	114189.0	114189.0		
	O-Ring Set	R440	3487.7	3488.0	3487.8	3487.9		
BG	Filter	D58	122.5	122.8	122.7	122.6		

Technician Signature: B Davis Date: 3/3/17

VERSION: 2.2 12/14/2009

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 2/15/2017
Run: 3
Control #: 0061WS066E.R2
Test Duration: 250
Output Category: 2

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

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

Wood Moisture (% wet): 17.47
Load Weight (lb wet): 12.50
Burn Rate (dry kg/h): 1.12
Total Particulate Emissions: N/A g

Fuel Data

	D. Fir	
HHV	19,810	kj/kg
%C	48.73	
%H	6.87	
%O	43.9	
%ASH	0.5	

Default Fuel Values

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

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

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

	Averages	0.87	7.45	#DIV/0!	275.15	78.77
					Temp. (ºF)	
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	12.50	0.15	1.12		188.0	78.0
10	11.70	0.27	10.29		433.0	77.0
20	10.40	0.15	12.00		472.0	77.0
30	9.00	0.17	12.19		428.0	77.0
40	7.90	0.19	10.94		399.0	78.0
50	6.90	0.39	10.81		385.0	77.0
60	5.90	0.27	11.27		380.0	77.0
70	4.90	0.23	11.87		392.0	77.0
80	4.00	0.26	11.90		393.0	77.0
90	3.20	0.19	10.06		358.0	77.0
100	2.60	0.46	7.75		296.0	77.0
110	2.30	0.76	6.73		257.0	78.0
120	2.00	1.14	6.06		243.0	82.0
130	1.80	1.74	5.21		218.0	82.0
140	1.60	1.75	5.45		209.0	82.0
150	1.40	1.78	5.35		205.0	82.0
160	1.20	1.54	5.50		200.0	81.0
170	1.10	1.48	5.28		199.0	81.0
180	0.90	1.07	5.93		191.0	81.0
190	0.70	1.09	5.88		191.0	81.0
200	0.60	1.10	5.74		191.0	78.0
210	0.50	1.16	5.61		189.0	80.0
220	0.30	1.21	5.54		187.0	80.0
230	0.20	1.22	5.24		185.0	80.0
240	0.10	1.31	5.09		184.0	76.0
250	0.00	1.45	4.80		181.0	75.0

OMNI-Test Laboratories

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 02/15/17
Run: 3
Control #:)061WS066E.R2
Test Duration: 250
Output Category: 2

Technicians: _____

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	74.9%	80.9%
Combustion Efficiency	95.7%	95.7%
Heat Transfer Efficiency	78%	84.6%

Output Rate (kJ/h)	16,666	15,810	**(Btu/h)**
Burn Rate (kg/h)	1.12	2.48	**(lb/h)**
Input (kJ/h)	22,254	21,110	**(Btu/h)**

Test Load Weight (dry kg)	4.68	10.32	**dry lb**
MC wet (%)	17.47		
MC dry (%)	21.17		
Particulate (g)	N/A		
CO (g)	290		
Test Duration (h)	4.17		

Emissions	**Particulate**	**CO**
g/MJ Output	#VALUE!	4.17
g/kg Dry Fuel	#VALUE!	61.93
g/h	#VALUE!	69.57
lb/MM Btu Output	#VALUE!	9.70

Air/Fuel Ratio (A/F)	14.67

VERSION: **2.2** **12/14/2009**

Run 4

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 4
Test Date: 02/16/17

Burn Rate	**1.04 kg/hr dry**
Average Tunnel Temperature	87 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	15.90 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	9922.9 dscf/hour
Average Delta p	0.056 inches H20
Total Time of Test	280 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	53.004 cubic feet	38.259 cubic feet	38.264 cubic feet	8.108 cubic feet
Average Gas Meter Temperature	77 degrees Fahrenheit	86 degrees Fahrenheit	86 degrees Fahrenheit	86 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	49.385 dscf	34.750 dscf	34.450 dscf	7.364 dscf
Total Particulates - m_n	0.3 mg	4.8 mg	4.5 mg	3 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000006 grams/dscf	0.00014 grams/dscf	0.00013 grams/dscf	0.00041 grams/dscf
Total Particulate Emissions - E_T	0.28 grams	6.12 grams	5.77 grams	4.04 grams
Particulate Emission Rate	0.06 grams/hour	1.31 grams/hour	1.24 grams/hour	4.04 grams/hour
Emissions Factor		1.26 g/kg	1.19 g/kg	1.96 g/kg
Difference from Average Total Particulate Emissions		0.17 grams	0.17 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E_T	5.94 grams
Particulate Emission Rate	**1.27 grams/hour**
Emissions Factor	1.23 grams/kg
First Hour Emissions	
Total Particulate Emissions - E_T	4.04 grams
Particulate Emission Rate	4.04 grams/hour
Emissions Factor	1.96 grams/kg

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Train Precision ≤ 7.5%	0.63
Train Precision ±0.5 g/kg	0.07
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Preburn Data - ASTM E2780

Run:	**4**
Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/16/2017
Beginning Clock Time:	10:19

Coal Bed Range (lb):	**2.5** (min)	**3.2** (max)

Technician Signature: _____

			Temperatures (°F)							
Elapsed Time (min)	Scale (lb)	Stack Draft (in H_2O)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. Firebox Surface	Stack	Ambient
0	5.6	-0.045	588	436	533	641	551	549.8	414	76
10	4.9	-0.04	588	455	586	628	519	555.2	315	75
20	4.3	-0.038	549	451	553	579	485	523.4	292	75
30	3.8	-0.04	551	433	537	549	460	506	310	74
40	3.5	-0.031	523	415	521	533	447	487.8	274	74
50	3.1	-0.025	437	401	483	501	431	450.6	224	75
60	3	-0.02	377	390	435	464	411	415.4	204	75

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 4

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 16-Feb-17
Beginning Clock Time: 11:20

Total Sampling Time: 280 min
Recording Interval: 10 min
Background Sample Volume: 53.004 cubic feet

Meter Box Y Factor: 1.001 (1) 0.993 (2) 1.014 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
27.99	27.97	27.95	27.97 "Hg

OMNI Equipment Numbers:

PM Control Modules: 371, 372
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.620 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 15.90 ft/sec.
Initial Tunnel Flow: 165.0 scfm
Average Tunnel Flow: 165.4 scfm
Post-Test Leak Check (1): 0.000 cfm @ 14 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 12 in. Hg
Average Test Piece Fuel Moisture: 20.71 Dry Basis %

Technician Signature:

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.056	0.058	0.052	0.044	0.052	0.056	0.052	0.042	0.056	"H2O
Temp:	84	84	84	84	84	84	84	84	84	°F

V_{strav} 15.85 ft/sec V_{scent} 16.47 ft/sec F_p 0.962

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft^3)	Gas Meter 2 (ft^3)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H_2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H_2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface Temp	Catalyst Exit Temp	Stack	Filter 1	Filter 2	Ambient	Draft ("H_2O)	CO_2 (%)	CO (%)
0	0.000	0.000			1.46	74	-0.36	1.05	75	-0.9	84	0.056			12.7		371	387	428	457	407	410	N/A	202	81	84	76	-0.020	3.61	0.9
10	1.343	1.324	0.13	0.13	1.50	76	-0.47	1.12	77	-1.1	86	0.056	100	98	12.3	-0.4	494	372	367	416	377	405	N/A	360	85	87	76	-0.045	8.1	0.59
20	2.694	2.675	0.14	0.14	1.49	79	-0.45	1.17	79	-1.2	88	0.056	100	100	11.2	-1.1	601	353	353	393	360	412	N/A	391	86	89	75	-0.050	9.55	0.35
30	4.039	4.055	0.13	0.14	1.48	81	-0.45	1.17	81	-1.2	89	0.056	100	102	10.1	-1.1	636	335	364	395	357	417	N/A	376	88	90	75	-0.048	10.8	0.35
40	5.396	5.437	0.14	0.14	1.48	82	-0.45	1.15	83	-1.2	90	0.056	100	102	9.1	-1	662	320	365	400	355	420	N/A	379	88	89	75	-0.050	11.87	0.2
50	6.749	6.808	0.14	0.14	1.48	84	-0.45	1.12	84	-1.1	91	0.056	100	101	8.0	-1.1	667	308	401	433	358	433	N/A	382	88	89	75	-0.048	12.98	0.51
60	8.108	8.163	0.14	0.14	1.49	85	-0.44	1.11	85	-1.1	90	0.056	100	100	7.2	-0.8	606	298	421	463	366	431	N/A	329	88	89	76	-0.042	9.5	0.62
70	9.476	9.521	0.14	0.14	1.50	85	-0.42	1.12	85	-1.1	90	0.056	101	100	6.4	-0.8	589	290	439	477	371	433	N/A	343	88	89	76	-0.042	11.85	0.48
80	10.834	10.879	0.14	0.14	1.50	86	-0.43	1.12	86	-1.1	91	0.056	100	100	5.3	-1.1	640	284	457	491	379	450	N/A	371	88	89	76	-0.045	13.13	0.56
90	12.203	12.236	0.14	0.14	1.50	86	-0.42	1.12	86	-1.1	93	0.056	101	100	4.3	-1	675	280	490	506	392	469	N/A	372	89	89	77	-0.042	13.32	1.41
100	13.572	13.598	0.14	0.14	1.50	86	-0.42	1.13	86	-1.1	93	0.056	101	100	3.7	-0.6	626	279	515	513	407	468	N/A	315	89	90	77	-0.035	9.71	0.56
110	14.942	14.961	0.14	0.14	1.50	87	-0.41	1.15	87	-1.1	90	0.056	100	100	3.0	-0.7	534	281	514	504	412	449	N/A	275	88	90	77	-0.032	8.21	0.54
120	16.308	16.337	0.14	0.14	1.50	87	-0.41	1.09	87	-1.1	89	0.056	100	101	2.6	-0.4	482	284	505	491	409	434	N/A	255	88	89	77	-0.030	7.71	0.82
130	17.676	17.683	0.14	0.13	1.50	87	-0.41	1.10	87	-1.1	87	0.056	100	98	2.3	-0.3	438	288	484	472	403	417	N/A	233	87	89	78	-0.027	6.24	1.4
140	19.047	19.039	0.14	0.14	1.50	88	-0.41	1.12	87	-1.1	86	0.056	100	99	2.1	-0.2	402	292	481	454	391	404	N/A	220	87	88	76	-0.022	6.35	1.14
150	20.412	20.400	0.14	0.14	1.50	87	-0.41	1.12	87	-1.1	85	0.056	100	99	1.9	-0.2	380	295	476	444	382	395	N/A	213	86	88	76	-0.021	6.42	1.09
160	21.786	21.758	0.14	0.14	1.50	88	-0.41	1.12	87	-1.1	85	0.056	100	99	1.8	-0.1	367	298	469	436	376	389	N/A	210	86	88	76	-0.020	6.5	0.95
170	23.154	23.117	0.14	0.14	1.50	88	-0.41	1.12	88	-1.1	84	0.056	99	99	1.6	-0.2	359	301	462	427	372	384	N/A	208	85	88	76	-0.020	6.67	0.93
180	24.523	24.490	0.14	0.14	1.50	88	-0.41	1.17	87	-1.2	84	0.056	100	100	1.4	-0.2	354	303	459	417	370	381	N/A	206	85	88	76	-0.020	6.68	1.01
190	25.895	25.883	0.14	0.14	1.50	88	-0.41	1.16	88	-1.2	84	0.056	100	101	1.3	-0.1	349	305	465	411	368	380	N/A	204	85	88	76	-0.020	6.75	1.1
200	27.263	27.278	0.14	0.14	1.50	88	-0.41	1.17	88	-1.2	84	0.056	99	101	1.1	-0.2	339	306	442	405	364	371	N/A	196	85	88	77	-0.017	5.54	1.52
210	28.635	28.673	0.14	0.14	1.50	88	-0.41	1.18	88	-1.2	84	0.056	100	101	1.0	-0.1	331	307	429	398	358	365	N/A	194	85	87	77	-0.017	5.49	1.68
220	30.006	30.066	0.14	0.14	1.50	88	-0.41	1.17	88	-1.2	85	0.056	100	101	0.9	-0.1	325	306	424	391	353	360	N/A	192	85	88	79	-0.016	5.4	1.86
230	31.369	31.436	0.14	0.14	1.50	88	-0.42	1.13	88	-1.1	85	0.056	99	100	0.7	-0.2	320	304	421	387	348	356	N/A	190	85	88	79	-0.016	5.4	1.91
240	32.745	32.801	0.14	0.14	1.50	89	-0.41	1.12	88	-1.1	85	0.056	100	99	0.6	-0.1	318	302	418	384	344	353	N/A	191	85	88	79	-0.016	5.97	1.28
250	34.113	34.166	0.14	0.14	1.49	89	-0.41	1.12	89	-1.1	85	0.056	99	99	0.4	-0.2	319	301	416	384	341	352	N/A	193	85	88	79	-0.016	6	1.36
260	35.484	35.533	0.14	0.14	1.57	89	-0.48	1.13	89	-1.1	85	0.056	100	99	0.3	-0.1	320	301	416	384	339	352	N/A	194	86	89	80	-0.016	5.89	1.42
270	36.883	36.898	0.14	0.14	1.52	90	-0.44	1.13	89	-1.1	86	0.056	102	99	0.2	-0.1	319	302	410	384	338	351	N/A	191	86	89	80	0.016	5.6	1.36
280	38.259	38.264	0.14	0.14	1.52	90	-0.44	1.13	89	-1.1	86	0.056	100	99	0.0	-0.2	316	302	402	381	335	347	N/A	190	86	89	80	-0.016	4.99	1.45
Avg/Tot	38.259	38.264	0.14	0.14	1.50	86		1.13	86		87	0.056	100	100								62.8				88	77	-0.027		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Run #: 4
Date: 2/16/17

Equipment Numbers: 0023, 0283A

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D59	126.4	123.4	3.0
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total | Total Particulate, mg: | 3.0

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D61	122.8	122.0	0.8
C. Rear filter catch	Filter	D60	121.2	120.8	0.4
D. Probe catch*	Probe	13	114322.5	114322.3	0.2
E. Filter seals catch*	Seals	R441	3433.6	3433.2	0.4

Sub-Total | Total Particulate, mg: | 1.8

Train 1 Aggregate | Total Particulate, mg: | **4.8**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D62	127.3	123.7	3.6
B. Rear filter catch	Filter	D63	120.9	120.8	0.1
C. Probe catch*	Probe	15	114343.4	114343.1	0.3
D. Filter seals catch*	Seals	R442	3348.9	3348.4	0.5

Total Particulate, mg: **4.5**

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	D64	122.5	122.2	0.3

Total Particulate, mg: **0.3**

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

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

Technician Signature: _____

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 2/16/2017
Run No.: 4

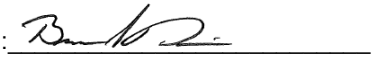
Firebox Volume (ft^3):	1.89
Fuel Piece Length (in):	14
2x4 Crib Weight (lb):	5.5
4x4 Crib Weight (lb):	7.2

Total Fuel Weight (Dry Basis, lb):	10.7	
Fuel Density (lb/ft^3, Dry Basis):	28.22	OK
Loading Density (lb/ft^3, Wet Basis):	6.72	OK
2x4 Percentage:	43%	OK

Coal Bed Range (20-25%): **2.54 - 3.175**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.4	2"x 4"	20.5	20.3	21.4	1.16
2	1.5	2"x 4"	19.9	19.7	20.1	1.25
3	1.4	2"x 4"	22.5	21.7	21.5	1.15
4	3.4	4"x 4"	20.5	20.6	20.8	2.82
5	3.4	4"x 4"	20.9	19.9	20.4	2.82

Spacer Readings (Dry Basis %)			
6.3	7.3		
6.3	11.3		
8.0	8.4		
6.5			
6.2			
12.4			
12.0			
10.4			
11.0			
9.4			
11.2			
9.0			
11.3			

Technician Signature: 

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 4

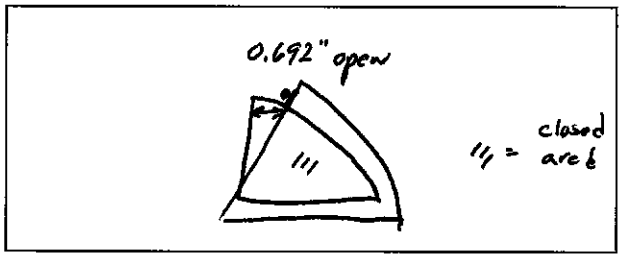
Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Run Notes

Air Control Settings

Primary:



Secondary: fixed

Tertiary/Pilot: Boost Air Not used

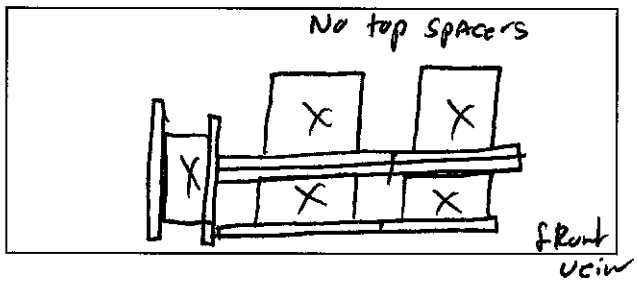
Fan: Off, Fan Confirmation

Preburn Notes

Time	Notes
35	Repositioned preburn fuel
50	Leveled coal bed

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: N/A

Fuel loaded by: 60 seconds

Door closed at: 1:25

Primary air: fully open full 5 min then set to test setting

Fan off entire test

Notes: Boost Air Activated @ 0 minutes Then again @ 1:25

Time	Notes
60	changed Front filter on train A.

Technician Signature: _____ Date: 3/3/17

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 4
Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12
Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	8 in	22.4	7	____ in	____
2	8 in	21.6	8	____ in	____
3	8 in	22.0	9	____ in	____
4	____ in	____	10	____ in	____
5	____ in	____	11	____ in	____
6	____ in	____	12	____ in	____

Total Pre-Burn Fuel Weight: 2.4 Pre-Burn Fuel Average Moisture: 22.0

Time (clock): 0950 Room Temperature (F): 67 Initials: BA

Test Fuel

Firebox Volume (ft³): 1.89 Test Fuel Piece Length (in): 14"
Load Weight Range (lb): 11.9 - 13.23 - 14.5 Total Wet Fuel Load Weight (lb): 12.7

Fuel Type & Amount: 2 x 4: 3 4 x 4: 2
Weight (with spacers): 5.5 Weight (with spacers): 7.2

Piece:	Weight (lbs):	Moisture Readings (%DB):			Fuel Type:
1	1.4	20.5	20.3	21.4	2x4
2	1.5	19.9	19.7	20.1	2x4
3	1.4	22.5	21.7	21.5	2x4
4	3.4	20.5	20.6	20.8	4x4
5	3.4	20.9	19.9	20.4	4x4
6					
7					

Spacer Moisture Readings (%DB)

6.3	6.2	11.0	11.3	11.3			
6.3	12.4	9.4	7.3	8.4			
8.0	12.0	11.2					
6.5	10.4	9.0					

Time (clock): 0950 Room Temperature (F): 67 Initials: BA

Technician Signature: Date: 3/3/17

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 4
Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Supplemental Data

Start Time: 11:20 Booth #: E1

Stop Time: 16:00

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 14 "Hg
B: 0.0 @ 12 "Hg

Calibrations: Span Gas CO_2: 9.99 CO: 1.00

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	Ø	Ø	284	284
CO_2	0.00	10.00	0.06	9.99
CO	0.000	1.000	0.000	0.986

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100 %

Flue Pipe Cleaned Prior to First Test in Series:

Date: 12/2/17 Initials: BL

	Initial	Middle	Ending
P_b (in/Hg)	27.99	27.97	27.95
RH (%)	N/A	N/A	N/A
Ambient (°F)	76	76	80

Tunnel Traverse

Microtector Reading	dP (in H_2O)	T(°F)
1	.056	84
2	.058	84
3	.052	84
4	.044	84
1	.052	84
2	.056	84
3	.052	84
4	.042	84
Center:		
	.056	84

Background Filter Volume: 53.004

Tunnel Static Pressure (in H_2O):	
Beginning of Test	End of Test
-.620	-.620

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 4

Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

2/21/17 0805

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
	Date/Time: 2/22/17 0815	Date/Time: 2/23/17 0850	Date/Time: 2/24/17 0815	Date/Time:	Date/Time:
	R/H %: 10.2	R/H %: 11.5	R/H %: 6.4	R/H %:	R/H %:
	Temp: 68.2	Temp: 73.4	Temp: 69.6	Temp:	Temp:
	200 mg Audit: 0.2000	200 mg Audit: 0.2000	200 mg Audit: 0.1999	200 mg Audit:	200 mg Audit:
	2 g Audit: 1.9999	2 g Audit: 1.9999	2 g Audit: 1.9999	2 g Audit:	2 g Audit:
	100 g Audit: 99.9983	100 g Audit 99.9984	100 g Audit 99.9984	100 g Audit	100 g Audit
	Initials: DL	Initials: DL	Initials: DL	Initials:	Initials:

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D59	123.4	126.5	126.4	126.4		
	Rear Filter	N/A						
	Probe	N/A						
	O-Ring Set	N/A						
A (Remainder)	Front Filter	D61	122.0	122.9	122.7	122.8		
	Rear Filter	D60	120.8	121.3	121.2	121.2		
	Probe	13	114322.3	114322.8	114322.6	114322.5		
	O-Ring Set	R441	3434.2	3434.0	3433.8	3433.6		
B	Front Filter	D62	123.7	127.5	127.2	127.3		
	Rear Filter	D63	120.8	121.2	120.9	120.9		
	Probe	15	114343.1	114343.6	114343.4	114343.4		
	O-Ring Set	R442	3348.4	3349.1	3349.0	3348.9		
BG	Filter	D64	122.2	122.6	122.5	122.5		

Technician Signature: [signature] Date: 3/3/17

VERSION: 2.2 12/14/2009

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 2/16/2017
Run: 4
Control #: 0061WS066E
Test Duration: 280
Output Category: 2

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

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

Wood Moisture (% wet): 17.16
Load Weight (lb wet): 12.70
Burn Rate (dry kg/h): 1.02
Total Particulate Emissions: N/A g

Fuel Data

	D. Fir	
HHV	19,810	kj/kg
%C	48.73	
%H	6.87	
%O	43.9	
%ASH	0.5	

Default Fuel Values

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

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

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

	Averages	**1.01**	**7.80**	**#DIV/0!**	**261.21**	**76.97**	
						Temp. (ºF)	
Elapsed Time (min)	**Fuel Weight Remaining (lb)**	**Flue Gas Composition (%) CO**	**CO_2**	**O_2**	**Flue Gas**	**Room Temp**	
0	12.70	0.90	3.61		202.0	76.0	
10	12.30	0.59	8.10		360.0	76.0	
20	11.20	0.35	9.55		391.0	75.0	
30	10.10	0.35	10.80		376.0	75.0	
40	9.10	0.20	11.87		379.0	75.0	
50	8.00	0.51	12.98		382.0	75.0	
60	7.20	0.62	9.50		329.0	76.0	
70	6.40	0.48	11.85		343.0	76.0	
80	5.30	0.56	13.13		371.0	76.0	
90	4.30	1.41	13.32		372.0	77.0	
100	3.70	0.56	9.71		315.0	77.0	
110	3.00	0.54	8.21		275.0	77.0	
120	2.60	0.82	7.71		255.0	77.0	
130	2.30	1.40	6.24		233.0	78.0	
140	2.10	1.14	6.35		220.0	76.0	
150	1.90	1.09	6.42		213.0	76.0	
160	1.80	0.95	6.50		210.0	76.0	
170	1.60	0.93	6.67		208.0	76.0	
180	1.40	1.01	6.68		206.0	76.0	
190	1.30	1.10	6.75		204.0	76.0	
200	1.10	1.52	5.54		196.0	77.0	
210	1.00	1.68	5.49		194.0	77.0	
220	0.90	1.86	5.40		192.0	79.0	
230	0.70	1.91	5.40		190.0	79.0	
240	0.60	1.28	5.97		191.0	79.0	
250	0.40	1.36	6.00		193.0	79.0	
260	0.30	1.42	5.89		194.0	80.0	
270	0.20	1.36	5.60		191.0	80.0	
280	0.00	1.45	4.99		190.0	80.0	

OMNI-Test Laboratories

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 02/16/17
Run: 4
Control #: 0061WS066E
Test Duration: 280
Output Category: 2

Technicians: _____

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	74.6%	80.7%
Combustion Efficiency	94.0%	94.0%
Heat Transfer Efficiency	79%	85.8%

Output Rate (kJ/h)	15,123	14,345	**(Btu/h)**
Burn Rate (kg/h)	1.02	2.25	**(lb/h)**
Input (kJ/h)	20,263	19,222	**(Btu/h)**

Test Load Weight (dry kg)	4.77	10.52	**dry lb**
MC wet (%)	17.16		
MC dry (%)	20.71		
Particulate (g)	N/A		
CO (g)	406		
Test Duration (h)	4.67		

Emissions	**Particulate**	**CO**
g/MJ Output	#VALUE!	5.75
g/kg Dry Fuel	#VALUE!	84.97
g/h	#VALUE!	86.91
lb/MM Btu Output	#VALUE!	13.36

Air/Fuel Ratio (A/F)	13.83

VERSION: **2.2** **12/14/2009**

Run 5

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 5
Test Date: 02/16/17

Burn Rate	**2.26 kg/hr dry**
Average Tunnel Temperature	91 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	17.31 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	10730.9 dscf/hour
Average Delta p	0.068 inches H20
Total Time of Test	120 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	23.625 cubic feet	16.257 cubic feet	16.416 cubic feet	8.052 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	84 degrees Fahrenheit	85 degrees Fahrenheit	84 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	21.927 dscf	14.813 dscf	14.798 dscf	7.337 dscf
Total Particulates - m_n	0.2 mg	4.9 mg	6.2 mg	3.6 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000009 grams/dscf	0.00033 grams/dscf	0.00042 grams/dscf	0.00049 grams/dscf
Total Particulate Emissions - E_T	0.20 grams	6.90 grams	8.80 grams	5.27 grams
Particulate Emission Rate	0.10 grams/hour	3.45 grams/hour	4.40 grams/hour	5.27 grams/hour
Emissions Factor		1.53 g/kg	1.95 g/kg	1.38 g/kg
Difference from Average Total Particulate Emissions		0.95 grams	0.95 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS	
Complete Test Run	
Total Particulate Emissions - E_T	7.85 grams
Particulate Emission Rate	**3.92 grams/hour**
Emissions Factor	1.74 grams/kg
First Hour Emissions	
Total Particulate Emissions - E_T	5.27 grams
Particulate Emission Rate	5.27 grams/hour
Emissions Factor	1.38 grams/kg

QUALITY CHECKS	
Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Train Precision ≤ 7.5%	6.03
Train Precision ±0.5 g/kg	0.42
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Test Results - ASTM E2780 / ASTM E2515

Manufacturer: Hearth & Home
Model: 3100 ACC
Project No.: 0061WS066E.REV002
Tracking No.: 2153
Run: 5
Test Date: 02/16/17

Corrected

Burn Rate	**2.26 kg/hr dry**
Average Tunnel Temperature	91 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	17.31 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	10730.9 dscf/hour
Average Delta p	0.068 inches H20
Total Time of Test	120 minutes

	AMBIENT	SAMPLE TRAIN 1	SAMPLE TRAIN 2	FIRST HOUR FILTER (TRAIN 1)
Total Sample Volume - Vm	23.625 cubic feet	16.257 cubic feet	16.416 cubic feet	8.052 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	84 degrees Fahrenheit	85 degrees Fahrenheit	84 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	21.927 dscf	14.813 dscf	14.798 dscf	7.337 dscf
Total Particulates - m_n	0.2 mg	5.5 mg	6.6 mg	3.6 mg
Particulate Concentration (dry-standard) - C_f/C_s	0.000009 grams/dscf	0.00037 grams/dscf	0.00045 grams/dscf	0.00049 grams/dscf
Total Particulate Emissions - E_T	0.20 grams	7.77 grams	9.38 grams	5.27 grams
Particulate Emission Rate	0.10 grams/hour	3.89 grams/hour	4.69 grams/hour	5.27 grams/hour
Emissions Factor		1.72 g/kg	2.07 g/kg	1.38 g/kg
Difference from Average Total Particulate Emissions		0.80 grams	0.80 grams	

Dual Train Comparison Results Are Acceptable

FINAL AVERAGE RESULTS

Complete Test Run	
Total Particulate Emissions - E_T	8.57 grams
Particulate Emission Rate	**4.29 grams/hour**
Emissions Factor	1.90 grams/kg
First Hour Emissions	
Total Particulate Emissions - E_T	5.27 grams
Particulate Emission Rate	5.27 grams/hour
Emissions Factor	1.38 grams/kg

QUALITY CHECKS

Filter Temps < 90 °F	OK
Filter Face Velocity (47 mm)	OK
Dryer Exit Temp < 80F	OK
Leakage Rate	OK
Ambient Temp (55-90°F)	OK
Negative Probe Weight Eval.	OK
Pro-Rate Variation	OK
Stove Surface ΔT	OK

Technician Signature:_____

Wood Heater Preburn Data - ASTM E2780

Run:	**5**
Manufacturer:	Hearth & Home
Model:	3100 ACC
Tracking No.:	2153
Project No.:	0061WS066E.REV002
Test Date:	2/16/2017
Beginning Clock Time:	16:31

Coal Bed Range (lb):	**2.4** (min)	**3.0** (max)

Technician Signature: _____

			Temperatures (°F)							
Elapsed Time (min)	Scale (lb)	Stack Draft (in H_2O)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Avg. Firebox Surface	Stack	Ambient
0	14.7	-0.025	247	303	234	332	315	286.2	244	82
10	13.7	-0.045	304	301	236	316	294	290.2	398	82
20	10.7	-0.07	618	298	299	357	306	375.6	659	80
30	7.4	-0.07	746	304	402	460	369	456.2	685	80
40	4.9	-0.065	772	320	483	541	443	511.8	654	81
50	3.9	-0.06	712	342	510	581	493	527.6	548	80
60	3.2	-0.05	602	366	489	585	508	510	477	80
65	2.8	-0.04	461	390	448	570	505	474.8	373	79

Wood Heater Test Data - ASTM E2780 / ASTM E2515

Run: 5

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 16-Feb-17
Beginning Clock Time: 17:32

Total Sampling Time: 120 min
Recording Interval: 10 min
Background Sample Volume: 23.625 cubic feet

Meter Box Y Factor: 1.001 (1) 0.993 (2) 1.014 (Amb)

Barometric Pressure:

Begin	Middle	End	Average
27.95	27.96	27.98	27.96 "Hg

OMNI Equipment Numbers:

PM Control Modules: 371, 372
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.78 lb/lb-mole
Dilution Tunnel H2O: 2.00 percent
Dilution Tunnel Static: -0.740 "H2O
Tunnel Area: 0.19635 ft2
Pitot Tube Cp: 0.99

Avg. Tunnel Velocity: 17.31 ft/sec.
Initial Tunnel Flow: 177.5 scfm
Average Tunnel Flow: 178.8 scfm
Post-Test Leak Check (1): 0.000 cfm @ 10 in. Hg
Post-Test Leak Check (2): 0.000 cfm @ 10 in. Hg
Average Test Piece Fuel Moisture: 23.84 Dry Basis %

Technician Signature:

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	Center	
Initial dP	0.062	0.066	0.064	0.050	0.060	0.068	0.066	0.048	0.068	"H2O
Temp:	92	92	92	92	91	91	91	91	92	°F

V_{strav} 17.34 ft/sec V_{scent} 18.30 ft/sec F_p 0.948

	Particulate Sampling Data														Fuel Weight (lb)		Temperature Data (°F)											Stack Gas Data		
Elapsed Time (min)	Gas Meter 1 (ft^3)	Gas Meter 2 (ft^3)	Sample Rate 1 (cfm)	Sample Rate 2 (cfm)	Orifice dH 1 ("H_2O)	Meter 1 Temp (°F)	Meter 1 Vacuum ("Hg)	Orifice dH 2 ("H_2O)	Meter 2 Temp (°F)	Meter 2 Vacuum ("Hg)	Dilution Tunnel (°F)	Dilution Tunnel Center dP	Pro. Rate 1	Pro. Rate 2	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Avg. Stove Surface Temp	Catalyst Exit Temp	Stack	Filter 1	Filter 2	Ambient	Draft ("H_2O)	CO_2 (%)	CO (%)
0	0.000	0.000			1.35	82	-0.34	1.04	81	-0.9	92	0.068			12.1		404	400	416	550	494	453	N/A	349	86	86	79	-0.040	4.87	0.64
10	1.343	1.371	0.13	0.14	1.50	81	-0.52	1.15	82	-1.1	94	0.068	100	101	9.9	-2.2	662	405	361	512	469	482	N/A	671	90	90	79	-0.070	16.97	1.79
20	2.688	2.724	0.13	0.14	1.47	82	-0.54	1.14	83	-1.1	96	0.068	100	100	7.1	-2.8	801	396	394	550	486	525	N/A	684	88	89	80	-0.070	17.68	1.22
30	4.019	4.087	0.13	0.14	1.44	83	-0.59	1.12	84	-1.1	99	0.068	99	101	4.7	-2.4	820	386	434	602	511	551	N/A	648	86	89	81	-0.070	16.7	0.53
40	5.359	5.443	0.13	0.14	1.46	84	-0.6	1.13	85	-1.1	97	0.068	99	100	3.2	-1.5	731	381	496	636	537	556	N/A	529	84	88	81	-0.060	11.07	0.04
50	6.707	6.806	0.13	0.14	1.47	85	-0.57	1.16	86	-1.1	93	0.068	100	100	2.4	-0.8	575	381	484	634	542	523	N/A	453	84	86	80	-0.052	8.78	0.08
60	8.052	8.177	0.13	0.14	1.47	85	-0.57	1.12	87	-1.1	91	0.068	99	100	1.7	-0.7	507	384	487	611	535	505	N/A	432	83	85	80	-0.050	8.5	0.09
70	9.414	9.548	0.14	0.14	1.49	85	-0.41	1.13	87	-1.1	90	0.068	100	100	1.2	-0.5	471	388	484	592	524	492	N/A	410	82	83	79	-0.050	7.48	0.2
80	10.777	10.921	0.14	0.14	1.49	85	-0.4	1.12	86	-1.1	87	0.068	100	100	0.9	-0.3	425	391	449	571	516	470	N/A	376	80	82	79	-0.043	6.56	0.44
90	12.132	12.293	0.14	0.14	1.49	85	-0.4	1.14	86	-1.1	86	0.068	99	100	0.6	-0.3	387	394	416	546	492	447	N/A	353	84	86	78	-0.040	6	0.58
100	13.492	13.667	0.14	0.14	1.49	85	-0.4	1.14	86	-1.1	85	0.068	100	100	0.4	-0.2	357	393	385	523	457	423	N/A	336	85	87	77	-0.040	5.51	0.72
110	14.876	15.042	0.14	0.14	1.54	85	-0.45	1.13	86	-1.1	84	0.068	101	100	0.1	-0.3	334	389	366	505	436	406	N/A	326	86	87	77	-0.040	5.49	0.72
120	16.257	16.416	0.14	0.14	1.54	85	-0.45	1.14	86	-1.1	83	0.068	101	100	0.0	-0.1	318	382	353	493	416	392	N/A	313	86	87	76	-0.037	4.68	0.83
Avg/Tot	16.257	16.416	0.14	0.14	1.48	84		1.13	85		91	0.068	100	100								60.4					87	79	-0.051		

Wood Heater Lab Data - ASTM E2780 / ASTM E2515

Manufacturer:	Hearth & Home	Equipment Numbers:	00023, 283A
Model:	3100 ACC		
Tracking No.:	2153		
Project No.:	0061WS066E.REV002		
Run #:	5		
Date:	2/16/17		

TRAIN 1 (First Hour emissions)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D65	126.0	122.4	3.6
C. Rear filter catch	Filter				0.0
D. Probe catch*	Probe				0.0
E. Filter seals catch*	Seals				0.0

Sub-Total	Total Particulate, mg:	3.6

TRAIN 1 (Post First Hour Change-out)

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
B. Front filter catch	Filter	D66	121.1	120.9	0.2
C. Rear filter catch	Filter	D67	121.1	121.7	-0.6
D. Probe catch*	Probe	23	114077.6	114076.9	0.7
E. Filter seals catch*	Seals	R443	3313.1	3312.1	1.0

Sub-Total	Total Particulate, mg:	1.3
Train 1 Aggregate	Total Particulate, mg:	**4.9**

TRAIN 2

Sample Component	Reagent	Filter, Probe or Dish #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	D68	127.8	122.8	5.0
B. Rear filter catch	Filter	D69	119.9	120.3	-0.4
C. Probe catch*	Probe	24	114128.3	114127.8	0.5
D. Filter seals catch*	Seals	R444	3369.6	3368.5	1.1

Total Particulate, mg:	**6.2**

AMBIENT

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch*	Filter	D70	122.5	122.3	0.2

Total Particulate, mg:	**0.2**

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

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

Technician Signature: _____

Wood Heater Test Fuel Data - ASTM E2780

Manufacturer: Hearth & Home
Model: 3100 ACC
Tracking No.: 2153
Project No.: 0061WS066E.REV002
Test Date: 2/16/2017
Run No.: 5

Firebox Volume (ft^3):	1.89
Fuel Piece Length (in):	14
2x4 Crib Weight (lb):	5.6
4x4 Crib Weight (lb):	6.5

Total Fuel Weight (Dry Basis, lb):	10.0	
Fuel Density (lb/ft^3, Dry Basis):	26.03	OK
Loading Density (lb/ft^3, Wet Basis):	6.40	OK
2x4 Percentage:	46%	OK

Coal Bed Range (20-25%): **2.42 - 3.025**

Test Fuel Piece	Weight (lb)	Size	Readings (Dry Basis %)			Dry Weight (lb)
1	1.4	2"x 4"	24.2	24.5	24.8	1.12
2	1.6	2"x 4"	22.0	24.7	22.4	1.30
3	1.4	2"x 4"	24.9	24.7	24.8	1.12
4	3.3	4"x 4"	22.2	23.4	23.8	2.68
5	2.8	4"x 4"	25.2	24.4	21.6	2.26

Spacer Readings (Dry Basis %)			
8.1	7.4		
8.2	7.4		
8.7	8.7		
8.6			
8.0			
8.0			
7.3			
7.4			
10.2			
8.3			
7.5			
7.9			
8.1			

Technician Signature: 

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 5

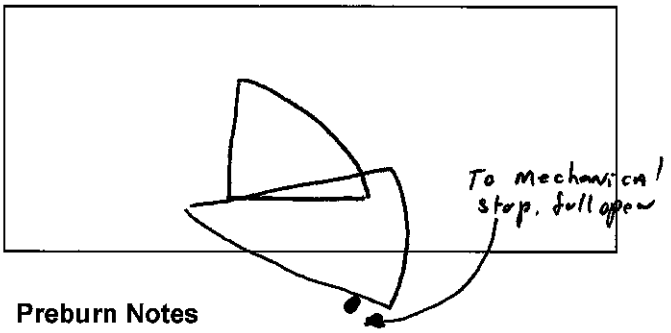
Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Run Notes

Air Control Settings

Primary:



Secondary: fixed

Tertiary/Pilot: Boost Air locked open

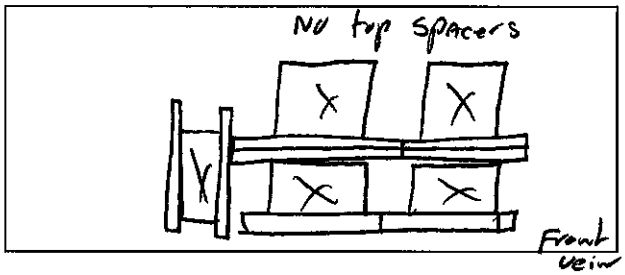
Fan: on high entire test

Preburn Notes

Time	Notes
55	Leveled coals

Test Notes

Sketch test fuel configuration:



Start up procedures & Timeline:

Bypass: N/A
Fuel loaded by: 38 seconds
Door closed at: 42 seconds
Primary air: Fully open, Boost Air Locked open entire test
Notes: FAN on high entire test

Time	Notes
60	Changed filter in trnin A.

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 5

Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Fuel Data

Fuel: Douglas fir, untreated and air dried, standard grade or better dimensional lumber

Pre-Burn Fuel

Calibration: Cal Value (1) = 12% Actual Reading 12

Cal Value (2) = 22% Actual Reading 22

Piece:	Length:	Reading:	Piece:	Length:	Reading:
1	14 in	20.2	7	12 in	20.0
2	14 in	21.9	8	12 in	19.5
3	14 in	20.0	9	12 in	20.5
4	14 in	20.8	10	12 in	21.2
5	12 in	22.3	11	in	
6	12 in	20.1	12	in	

Total Pre-Burn Fuel Weight: 13.7 Pre-Burn Fuel Average Moisture: 20.65

Time (clock): 4:10 Room Temperature (F): 71 Initials: BL

Test Fuel

Firebox Volume (ft³): 1.89 Test Fuel Piece Length (in): 14"

Load Weight Range (lb): 11.9 - 13.23 - 14.5 Total Wet Fuel Load Weight (lb): 12.1

Fuel Type & Amount: 2 x 4: 3 4 x 4: 2

Weight (with spacers): 5.6 Weight (with spacers): 6.5

Piece:	Weight (lbs):	Moisture Readings (%DB):			Fuel Type:
1	1.4	24.2	24.5	24.8	2x4
2	1.6	22.0	24.7	22.4	2x4
3	1.4	24.9	24.7	24.8	2x4
4	3.3	22.2	23.4	23.8	4x4
5	2.8	25.2	24.4	21.6	4x4
6					
7					

Spacer Moisture Readings (%DB)

8.1	8.0	10.2	8.1	7.4			
8.2	8.0	8.3	7.4	8.7			
8.7	7.3	7.5					
8.6	7.4	7.9					

Time (clock): 4:40 Room Temperature (F): 71 Initials: BL

Technician Signature: Date: 3/3/17

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 5
Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17
Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

Wood Heater Supplemental Data

Start Time: 17:32 Booth #: E1

Stop Time: 19:32

Stack Gas Leak Check:

Initial: good Final: good

Sample Train Leak Check:

A: 0.0 @ 10 "Hg
B: 0.0 @ 10 "Hg

Calibrations: Span Gas CO_2: 9.99 CO: 1.00

	Pre Test		Post Test	
	Zero	Span	Zero	Span
Time	Ø	Ø	19:35	19:35
CO_2	0.06	9.98	0.12	10.06
CO	-0.001	1.000	-0.001	1.004

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

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: good Final: good

Stack Diameter (in): 6"

Induced Draft: 0.0

% Smoke Capture: 100 %

Flue Pipe Cleaned Prior to First Test in Series:

Date: 2/12/17 Initials: DL

	Initial	Middle	Ending
P_b (in/Hg)	27.95	27.96	27.98
RH (%)	N/A	N/A	N/A
Ambient (°F)	79	80	76

Background Filter Volume: 23.625

Tunnel Traverse		
Microtector Reading	dP (in H_2O)	T(°F)
1	0.062	92
2	0.066	92
3	0.064	92
4	0.050	92
1	0.060	91
2	0.068	91
3	0.066	91
4	0.048	91
Center:		
	0.068	92

Tunnel Static Pressure (in H_2O):	
Beginning of Test	End of Test
-.74	-.74

Technician Signature: [signature] Date: 3/3/17

OMNI-Test Laboratories, Inc. **ASTM E2780 Wood Heater Run Sheets**

Client: Hearth & Home Project Number: 0061WS066E.REV002 Run Number: 5

Model: 3100 ACC Tracking Number: 2153 Date: 2/16/17

Test Crew: B. Davis OMNI Equipment ID numbers: 567, 371, 372, 265, 255, 432, 413, 419, 23, 283A, 131, 592

ASTM E2515 Lab Sheet

Assembled By:

B Davis

Date/Time in Dessicator:

2/21/17 0805

	Weighing #1	Weighing #2	Weighing #3	Weighing #4	Weighing #5
Date/Time:	2/22/17 0815	2/23/17 0850	2/24/17 0815		
R/H %:	10.2	11.5	6.4		
Temp:	68.2	73.4	69.6		
200 mg Audit:	0.2000	0.2000	0.1999		
2 g Audit:	1.9999	1.9999	1.9999		
100 g Audit:	99.9983	99.9984	99.9984		
Initials:		BL	BL		

Train	Element	ID #	Tare (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)	Weight (mg)
A (First Hour)	Front Filter	D65	122.4	126.1	126.0	126.0		
	Rear Filter	N/A						
	Probe	N/A						
	O-Ring Set	N/A						
A (Remainder)	Front Filter	D66	120.9	121.2	121.1	121.1		
	Rear Filter	D67	121.7	121.2	121.1	121.1		
	Probe	23	114076.9	114077.8	114077.6	114077.6		
	O-Ring Set	R443	3312.1	3313.3	3313.1	3313.1		
B	Front Filter	D68	122.8	128.1	127.8	127.8		
	Rear Filter	D69	120.3	120.1	119.9	119.9		
	Probe	24	114127.8	114128.6	114128.3	114128.3		
	O-Ring Set	R444	3368.5	3370.0	3369.7	3369.6		
BG	Filter	D70	122.3	122.5	122.5	122.5		

Technician Signature: [signature] Date: 3/3/17

VERSION: 2.2 12/14/2009

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 2/16/2017
Run: 5
Control #: 0061WS066E.R2
Test Duration: 120
Output Category: 4

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

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

Wood Moisture (% wet): 19.25
Load Weight (lb wet): 12.10
Burn Rate (dry kg/h): 2.22
Total Particulate Emissions: N/A g

Fuel Data

	D. Fir	
HHV	19,810	kj/kg
%C	48.73	
%H	6.87	
%O	43.9	
%ASH	0.5	

Default Fuel Values

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

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

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

Averages	**0.61**	**9.25**	**#DIV/0!**	**452.31**	**78.92**	
				Temp. (ºF)		
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas Composition (%) CO	CO_2	O_2	Flue Gas	Room Temp
0	12.10	0.64	4.87		349.0	79.0
10	9.90	1.79	16.97		671.0	79.0
20	7.10	1.22	17.68		684.0	80.0
30	4.70	0.53	16.70		648.0	81.0
40	3.20	0.04	11.07		529.0	81.0
50	2.40	0.08	8.78		453.0	80.0
60	1.70	0.09	8.50		432.0	80.0
70	1.20	0.20	7.48		410.0	79.0
80	0.90	0.44	6.56		376.0	79.0
90	0.60	0.58	6.00		353.0	78.0
100	0.40	0.72	5.51		336.0	77.0
110	0.10	0.72	5.49		326.0	77.0
120	0.00	0.83	4.68		313.0	76.0

OMNI-Test Laboratories

Manufacturer: Hearth & Home
Model: 3100 ACC
Date: 02/16/17
Run: 5
Control #:)061WS066E.R2
Test Duration: 120
Output Category: 4

Technicians: _____

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	69.8%	75.5%
Combustion Efficiency	95.3%	95.3%
Heat Transfer Efficiency	73%	79.2%

Output Rate (kJ/h)	30,653	29,078	**(Btu/h)**
Burn Rate (kg/h)	2.22	4.89	**(lb/h)**
Input (kJ/h)	43,911	41,654	**(Btu/h)**

Test Load Weight (dry kg)	4.43	9.77	**dry lb**
MC wet (%)	19.25		
MC dry (%)	23.84		
Particulate (g)	N/A		
CO (g)	292		
Test Duration (h)	2.00		

Emissions	**Particulate**	**CO**
g/MJ Output	#VALUE!	4.76
g/kg Dry Fuel	#VALUE!	65.88
g/h	#VALUE!	146.03
lb/MM Btu Output	#VALUE!	11.07

Air/Fuel Ratio (A/F)	12.38

VERSION: **2.2** **12/14/2009**

Section 4

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

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

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

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

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

The manufacturing facilities and quality control system for the production of the 31M-ACC-C at Hearth and Home Technologies were evaluated to determine if sufficient to maintain conformance with OMNI's requirements for product certification. OMNI has concluded that the manufacturing facilities, processes, and quality control system are adequate to produce the appliance congruous with the standards and model codes to which it was evaluated.

Manufacturer's Quality Assurance Plan

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

Removed as confidential business information

Sample Analysis

Analysis Worksheets
Tared Filter, Probe, and O-Ring Data

Tare Sheet: Probes___ 47mm Filters___ 100mm Filters___ O-Ring Pair ✓

Date/time Placed in Dessicator: 1/30/17 0805

Thermohygrometer ID #: OMNI-00592

Prepared By: B Davis

Analytical Balance ID #: OMNI-00023

Audit Weight ID #/Mass: omni-00283A 1 5g/ 2g

ID #	Date: 1/31/17 Time: 0820 RH %: 12.5 T (°F): 65.8 Audit: 5.0000/1.9998	Date: 2/1/17 Time: 0815 RH %: 9.1 T (°F): 64.3 Audit: 5.0000/1.9998	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
R435	3.3812	3.3812			2/13/17	0061W SOLCE, R2	1
R436	3.3059	3.3060			2/13/17		1
R437	3.4160	3.4159			2/14/17		2
R438	3.4027	3.4026			2/14/17		2
R439	3.2948	3.2948			2/15/17		3
R440	3.4828	3.4827			2/15/17		3
R441	3.4334	3.4332			2/16/17		4
R442	3.3486	3.3484			2/16/17		4
R443	3.3121	3.3121			2/16/17		5
R444	3.3685	3.3685			2/16/17		5
R445	3.3724	3.3722					
R446	3.5502	3.5500					
	Initials: AM	Initials: AM	Initials:	Initials:			

Final Technician Signature: [signature] 2 Date: 2/3/17

Control No. P-SFDP-0001.xls, Effective date: 9/9/2015

Evaluator signature: [signature]

Tare Sheet: Probes ✓ **47mm Filters**___ **100mm Filters**___ **O-Ring Pair**___

Date/time Placed in Dessicator: 1/30/17 0805

Thermohygrometer ID #: OMNI-00592

Prepared By: B Davis

Analytical Balance ID #: OMNI-00023

Audit Weight ID #/Mass: OMNI-002834 / 100g

ID #	Date: 1/31/17 Time: 0820 RH %: 12.8 T (°F): 65.8 Audit: 99.9985	Date: 2/1/17 Time: 0815 RH %: 9.1 T (°F): 64.3 Audit: 99.9985	Date: 2/2/17 Time: 0830 RH %: 10.2 T (°F): 65 Audit: 99.9984	Date: 2/3/17 Time: 1115 RH %: 9.8 T (°F): 64.5 Audit: 99.9984	Date Used	Project Number	Run No.
1	122.7812	122.7808	122.7797	122.7799	✓ 2/13/17	0061WSOGE.R2	1
4	114.8601	114.8599	✓		2/13/17		1
OES 4	114.1453	114.1453	✓		2/14/17		2
8	115.5943	115.5940	115.5931	115.5933	2/14/17		2
9	115.6913	115.6912	✓		2/15/17		3
10	114.1889	114.1888	✓		2/15/17		3
13	114.3223	114.3223	✓		2/16/17		4
15	114.3432	114.3431	✓		2/16/17		4
23	114.0770	114.0769	✓		2/16/17		5
24	114.1280	114.1278	✓		2/16/17		5
25	114.2995	114.2993	✓				
28	114.7526	114.7525	✓				
	Initials: BA	Initials: BA	Initials: BA	Initials: BA			

Final Technician Signature: _____ Date: 2/3/17

Control No. P-SFDP-0001.xls, Effective date: 9/9/2015

Evaluator signature: _____

Tare Sheet: Probes___ 47mm Filters✓ 100mm Filters___ O-Ring Pair___

Date/time Placed in Dessicator: 1/30/17 0805

Thermohygrometer ID #: OMNI-00592

Prepared By: BTDavis

Analytical Balance ID #: OMNI-00023

Audit Weight ID #/Mass: 131/283A / 500/200

ID #	Date: 1/31/17 Time: 0820 RH %: 12.5 T (°F): 65.8 Audit: 0.5001/0.2000	Date: 2/1/17 Time: 0815 RH %: 9.1 T (°F): 64.3 Audit: 0.5001/0.2000	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
D41	0.1232	0.1232			2/13/17	006WSOWE.R2	1
D42	0.1204	0.1204					
D43	0.1224	0.1224					
D44	0.1238	0.1237					
D45	0.1205	0.1205					
D46	0.1226	0.1226					
D47	0.1232	0.1232			2/14/17		2
D48	0.1213	0.1212					
D49	0.1227	0.1227					
D50	0.1239	0.1240					
D51	0.1208	0.1208					
D52	0.1223	0.1224					
D53	0.1234	0.1235			2/15/17		3
D54	0.1207	0.1207					
D55	0.1228	0.1228					
D56	0.1233	0.1234					
D57	0.1196	0.1196					
D58	0.1224	0.1225					
D59	0.1233	0.1234			2/16/17		4
D60	0.1207	0.1208			2/16/17		4
	Initials: BT	Initials: BT	Initials:	Initials:			

Final Technician Signature: _____ Date: 2/3/17

Evaluator signature: _____

Tare Sheet: Probes___ 47mm Filters✓ 100mm Filters___ O-Ring Pair___

Date/time Placed in Dessicator: 1/31/17 0810

Thermohygrometer ID #: OMNI - 00592

Prepared By: B. Davis

Analytical Balance ID #: OMNI-00023

Audit Weight ID #/Mass: 131/283A 1 500g/200g

ID #	Date: 2/1/17 Time: 0815 RH %: 9.1 T (°F): 64.3 Audit: 0.5001/0.2000	Date: 2/2/17 Time: 0830 RH %: 10.2 T (°F): 65 Audit: 0.5001/0.2000	Date: Time: RH %: T (°F): Audit:	Date: Time: RH %: T (°F): Audit:	Date Used	Project Number	Run No.
D61	0.1220	0.1220			2/16/17	006WSOGGE.R2	4
D62	0.1238	0.1237					
D63	0.1208	0.1208					
D64	0.1223	0.1222					
D65	0.1224	0.1224			2/16/17		5
D66	0.1210	0.1207					
D67	0.1218	0.1217					
D68	0.1227	0.1228					
D69	0.1204	0.1203					
D70	0.1223	0.1223					
D71	0.1226	0.1225					
D72	0.1201	0.1200					
D73	0.1213	0.1212					
D74	0.1238	0.1237					
D75	0.1209	0.1208					
D76	0.1222	0.1221					
D77	0.1239	0.1237					
D78	0.1209	0.1208					
D79	0.1220	0.1218					
D80	0.1233	0.1231					
D81	0.1206	0.1204					
	Initials: DL	Initials: DL	Initials:	Initials:			

Final Technician Signature: _____ Date: 2/3/17

Control No. P-SFDP-0001.xls, Effective date: 9/9/2015

Evaluator signature: _____

Calibrations

Methods EPA 28R, ASTM E2515, ASTM E2780

ID #	Lab Name/Purpose	Log Name	Attachment Type
1	Calibrator Dry Gas Meter	Rockwell Int'l Standard Test Meter	Calibration Certificate
23	Scale-Analytical Balance	Mettler Analytical Balance	Calibration Certificate
131	500 mg Weight	Ohaus Weight Standard, 500 mg	Calibration Certificate
132	10 lb Weight	Weight Standard, 10 lb.	Calibration Certificate
5142132	Platform Scale	Panther Platform Scale	Calibration Certificate
209	Barometer	Barometer – Princo	Manual Cover
296-T54	Tape Measure	Stanley Tape Measure	Calibration Log
371	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
372	Sample Box / Dry Gas Meter	Apex Automated Emissions Sampling Box	Calibration Log
340	Wood Moisture Meter	Moisture Meter - Delmhorst	See Test Run Notes
592	Thermohygrometer	Omega Digital Thermohygrometer	Calibration Log
410	Microtector Model 1430, oil filled	Dwyer Microtector	Manual, Photograph
419	Combustion Gas Analyzer	Infrared Gas Analyzer	Manual, See Test Run Notes
432	Moisture Meter Calibrator	Delmhorst Moisture Content Calibrator	Calibration Log
265	Vaneometer	Dwyer Vaneometer	Manual
413	Ambient filter Dry Gas Meter	Dry Gas Meter	Calibration Log
283A	Weight set	Troemner 21 pc Mass Set	Calibration Log

- * - Equipment was leveled and zeroed prior to each test run as prescribed in the equipment manual.

CERTIFICATE OF CALIBRATION

CUSTOMER:	**OMNI TEST LABS INC.** PORTLAND OR	**CALIBRATION DATE:**	10/27/16
PO NUMBER:	160109	**CALIBRATION DUE:**	10/27/17
INST. MANUFACTURER:	ROCKWELL	**PROCEDURE:**	NAVAIR 17-20MG-02
INST. DESCRIPTION:	P.D. METER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70 F
MODEL NUMBER:	S-275	**STANDARD(S) USED:**	A4, A24 DUE 05-2017
SERIAL NUMBER:	684390L	**NIST TRACE #' S:**	1331545884, 1390386562, 1424683640
RATED UNCERTAINTY:	+/- .5 % RD.	**AMBIENT CONDITIONS:**	762 mm HGA 55 % RH 72 F
UNCERTAINTY GIVEN:	TOTAL measurement uncertainty: +/- .190 % RD. K=2	**CERTIFICATE FILE #:**	426663.16

NOTES: AS RECEIVED/ AS LEFT WITHIN SPECS. REFERENCE CONDITIONS ARE: 760 mm HGA 70 F **OMNI-00001**

TEST POINT NUMBER	UUT INDICATED SCFH	DM.STD. ACTUAL SCFH	CORRECTION FACTOR	K FACTOR
1	0.6115	0.55	0.89943	66.709
2	9.1412	8.75	0.95721	62.682
3	53.5324	54.27	1.01378	59.185
4	100.1887	101.02	1.00830	59.506
5	136.8205	137.38	1.00409	59.756
6	178.5292	176.92	0.99099	60.546
7	215.1102	212.24	0.98666	60.811
8	250.5044	249.92	0.99767	60.140
		AVERAGE (Y)=	0.98226405	

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

Dick Munns Company • 10572 Calle Lee #130 • Los Alamitos, CA 90720
Phone (714) 827-1215 • Fax (714) 827-0823

Date: 10/27/2016

Approved By:

Calibration Technician:

Page 1 of 1

Certificate of Calibration

Certificate Number: **632003**

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

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

OnSite

ACCREDITED
0723.01
Calibration

PO: **160104**
Order Date: **09/27/2016**
Authorized By: **N/A**

Property #: **OMNI-00023**
User: **N/A**
Department: **N/A**
Make: **Mettler**
Model: **AE200**
Serial #: **E17657**
Description: **Scale, 205g**
Procedure: **DCN 500818/500887**
Accuracy: **±0.0004g ±1 LSD**

Calibrated on: **09/27/2016**
*Recommended Due: **03/27/2017**
Environment: **20** °C **44** % RH
* As Received: **Out of Tolerance**
* As Returned: **Within Tolerance**
Action Taken: **Adjusted**
Technician: **123**

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

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
723A	Rice Lake	1mg-200g (Class 0)	Mass Set	12/01/2016	603626

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before							Accredited = Ü
Force							
	g	0.00100	0.0005	0.0015	0.0000	0.0010 g	5.7E-04 Ü
	g	0.01000	0.0095	0.0105	0.0000	0.0100 g	5.7E-04 Ü
	g	0.10000	0.0995	0.1005	0.0000	0.1000 g	5.7E-04 Ü
	g	0.50000	0.4995	0.5005	0.0000	0.5000 g	5.7E-04 Ü
	g	1.00000	0.9995	1.0005	0.0000	1.0000 g	5.7E-04 Ü
	g	40.00000	39.9995	40.0005	0.0005	40.0005 g	5.7E-04 Ü
	g	80.00000	79.9995	80.0005	0.0005	80.0005 g	5.7E-04 Ü
	g	120.00000	119.9995	120.0005	0.0008	120.0008 g	5.7E-04 Ü
	g	160.00000	159.9995	160.0005	0.0010	160.0010 g	5.8E-04 Ü
	g	200.00000	199.9995	200.0005	0.0012	200.0012 g	5.7E-04 Ü
After		Reference	Min	Max	*Error		Accredited = Ü
	g	0.00100	0.0005	0.0015	0.0000	0.0010 g	5.7E-04 Ü
	g	0.01000	0.0095	0.0105	0.0000	0.0100 g	5.7E-04 Ü
	g	0.10000	0.0995	0.1005	0.0000	0.1000 g	5.7E-04 Ü
	g	0.50000	0.4995	0.5005	0.0000	0.5000 g	5.7E-04 Ü
	g	1.00000	0.9995	1.0005	0.0000	1.0000 g	5.7E-04 Ü
	g	40.00000	39.9995	40.0005	0.0001	40.0001 g	5.7E-04 Ü
	g	80.00000	79.9995	80.0005	0.0002	80.0002 g	5.7E-04 Ü
	g	120.00000	119.9995	120.0005	0.0002	120.0002 g	5.7E-04 Ü
	g	160.00000	159.9995	160.0005	0.0003	160.0003 g	5.8E-04 Ü
	g	200.00000	199.9995	200.0005	0.0003	200.0003 g	5.7E-04 Ü

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

Reviewer

3 Issued 10/04/2016 Rev # 15

Inspector

Certificate of Calibration

Certificate Number: **547339**

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

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

ACCREDITED
0723.01
Calibration

PO: OTL-13-035
Order Date: 11/19/2013
Authorized By: N/A

Property #: OMNI-00131
User: N/A
Department: N/A
Make: Ohaus
Model: 500mg
Serial #: 27503
Description: Mass
Procedure: DCN 500901
Accuracy: CLASS F (±0.72mg)

Calibrated on: 12/02/2013
*Recommended Due: 12/02/2018
Environment: 20 °C 34 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 34

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

Refer to attachment for measurement results.

Standards Used

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

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

Reviewer

3 Issued 12/06/2013 Rev # 14

Inspector

JJ Calibrations, Inc.

Manufacturer: Ohaus
Model: 500mg
Nomenclature: Mass
Serial: 27503

Certificate #: 547339
Date: 02Dec2013
Technician: 34
Calibration Interval: 60 Months

Parameter		Nominal	JJ Standard	UUT	UUT ± Limit	Uncertainty ±
Mass Verification		500	499.99923	500.114	0.720	0.00576
Data in mg						

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 lb

ID Number: 132

Standard Calibration Weight: 10 lb

ID Number: 256

Scale Used: MTW-150K

ID Number: 353

Date: 2/19/13 By: A. Kravitz

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

*Acceptable tolerance is 1%.

This calibration is traceable to NIST using calibrated standard weights.

Technician signature: Date: 2/19/13

Becherini Scale Center, Inc.
317 E. Sprague
Spokane, WA 99202

SCALE CALIBRATION RECORD

Customer: Hearth + Home | Date: 11/4/2015

Work Order Number: 47099 | PO Number:

Equipment Mfg.	Serial Number	Specifications	Weight used	Initial Readings	Final Readings
1. MT	5142132	1000 x .1	Ø	Ø	Ø
Panther	(Pass).Fail	Lb	25	25.1	25.0
Notes:			100	100.1	100.0
Recalibrated Scale			200	200.3	200.0
Scale checks good			400	400.5	400.0
		ETC-7	Ø	Ø	Ø

Equipment Mfg.	Serial Number	Specifications	Weight used	Initial Readings	Final Readings
2. MT	5237590	1000 x .1	Ø	Ø	Ø
Panther	(Pass)..Fail	Lb	25.	25.0	25.0
Notes:			100	100.0	100.0
Recalibrated Scale			200	199.9	200.0
Scale checks good			400	400.1	400.0
		ETC-5	Ø	Ø	Ø

Equipment Mfg.	Serial Number	Specifications	Weight used	Initial Readings	Final Readings
3. MT	5208324	1000 x .1	Ø	Ø	Ø
Panther	(Pass).Fail	Lb	25	25.0	25.0
Notes:		ETC-8	100	100.1	100.0
Recalibrated Scale			200	200.1	200.0
Scale checks good			400	400.2	400.0
(Display going bad Display shows numerous trimarkers Lit)			Ø	Ø	Ø

Equipment Mfg.	Serial Number	Specifications	Weight used	Initial Readings	Final Readings
4. MT	5237589	1000 x .1	Ø	Ø	Ø
Panther	Pass...Fail	Lb	25	25.2	25.0
Notes:			100	100.6	100.0
Leveled Scale			200	201.2	200.0
Recalibrated Scale			400	402.5	400.0
Scale checks good		ETC6-1	Ø	Ø	Ø

Additional Comments:

Last Checked: 3/5/14 | Next Check Due: 5/2016

Weights Certified: 10/2014 | Technician: Dudley

Calibration checked IAW NIST handbook 44

453
National
Weather
Service
Type

OMNI 00209

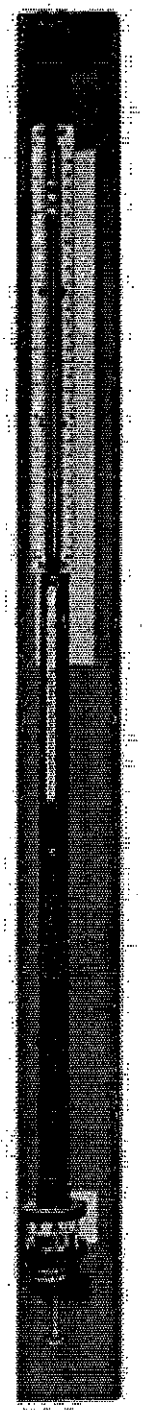
Instruction Booklet

for use with

PRINCO

Fortin type mercurial

Barometers



469
NOVA™
Economy
Model

Manufactured by

PRINCO INSTRUMENTS, INC.
1020 Industrial Blvd.
Southampton, Pa. 18966-4095
U.S.A.

Phone: 215 355-1500
Fax: 215 355-7766

OMNI Environmental Services, Inc.
OMNI-Test Laboratories, Inc.

Tape Measure Calibration Log

Place the calibrated 12" ruler under the tape measure and verify that each ½" (i.e. 1.5", 2", 2.5") between 0 and 36" is within 1/8".

CALIBRATED USING OMNI-00281

Tape Measure Number	Description	Cal Dates				Technician Initials			
00296-T32	Stanley FatMax 16'	7/25/12	7/2/13	7/8/14	7/20/15	JC	JC	JC	JC
00296-T51	Ace 26' Tape Measure	9/7/12	9/13/13	9/23/14	10/22/15	JC	JC	JC	BR
-T52	Stanley PowerLock 26'	9/7/12	9/13/13	9/22/14	10/22/15	JC	JC	JC	BR
-T53	Stanley PowerLock 16'	9/7/12				JC			
-T11	Stanley intermatic Tape Measure (cm)	11/30/12	2/28/14	2/25/15		JC	JC	JC	
-T21	MTH Tape Measure (cm)	11/30/12	11/21/13			JC	JC		
-T30	Workforce Tape Measure	11/30/12				JC			
-T31	Stanley Powerlock Tape Measure	11/30/12	11/21/13	11/18/14	11/25/15	JC	JC	JC	BR
-T47	Workforce Tape Measure	11/30/12	11/21/13	11/26/14	11/25/15	JC	JC	JC	BR
-T36 Removed from service 11/25/15	Stanley FatMax 16' Tape Measure	11/30/12	11/21/13	11/18/14	11/25/15 BR	JC	JC	JC	BR
~~-T42~~ -T40	Stanley FatMax 16' Tape Measure	11/30/12	11/21/13	11/18/14	11/25/15	JC	JC	JC	BR
-T54	DeWalt 16' Tape Measure	12/20/12	12/17/13	12/29/14	12/11/15	JC	JC	JC	BR
-T55	DeWalt 16' Tape Measure	12/20/12	12/18/13	12/29/14	12/11/15	JC	JC	JC	BR
-T56	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14	12/11/15	JC	JC	JC	BR
-T57	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14		JC	JC	JC	
-T58	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14	3/4/16	JC	JC	JC	BR
-T59	DeWalt 25' Tape Measure	12/20/12	12/17/13	12/16/14	12/11/15	JC	JC	JC	BR
-T42	Stanley PowerLock 26' Tape Measure	11/21/13	11/18/14	~~3/25/15~~ Removed from Service		JC	JC		BR
=T32	Stanley FATMAX 16'	7/26/16				BR			
-T51	Ace 26' Tape Measure	10/20/16				BR			
-T52	Stanley Powere Lock 26'	11/3/16				BR			
-T40	Stanley FATmax 16' Tape Measure	11/15/16				BR			
-T31	Stanley Power Loch Tap Measure	11/29/16				BR			
-T47	Work Force Tap Measure	11/29/16				BR			
-T54	Dewalt 16' Tape Measure	12/12/16				BR			

Thermal Metering System Calibration
Y Factor

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

Previous Calibration Comparision

Date	9/15/2015	Acceptable Deviation (5%)	Deviation
y Factor	1.011	0.05055	0.010
Acceptance	Acceptable		

Current Calibration

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

Average Gas Meter y Factor	Orifice Meter dH@
1.001	N/A

Calibration Date:	01/18/17	
Calibrated by:	B. Davis	
Calibration Frequency:	Six months	
Next Calibration Due:	7/18/2017	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.51	"Hg
Signature/Date:	1/20/17	
	1/20/2017	

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	27-Oct-16	
	Calib. Value	0.9823	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	3.29	1.50	0.80
Initial Reference Meter	279.203	290.3	295.8
Final Reference Meter	284.455	295.703	303.914
Initial DGM	0	0	0
Final DGM	5.191	5.37	8.09
Temp. Ref. Meter (°F), Tr	68.0	68.0	69.0
Temperature DGM (°F), Td	75.0	78.0	79.0
Time (min)	26.0	39.0	82.0
Net Volume Ref. Meter, Vr	5.252	5.403	8.114
Net Volume DGM, Vd	5.191	5.37	8.09
Gas Meter y Factor =	**0.999**	**1.003**	**1.002**
Gas Meter y Factor Deviation (from avg.)	0.002	0.002	0.001
Orifice dH@	**N/A**	**N/A**	**N/A**
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. y = [Vr x (y factor (ref)) x (Pb + (Pr/ 13.6)) x (Td + 460)]/ [Vd x (Pb + (Pd / 13.6)) x (Tr + 460)]

** 3. dH@ = 0.0317 x Pd / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

** Equations come from EPA Method 5

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

Temperature Calibration
EPA Method 28R, ASTM 2515

Booth:	Temperature Monitor Type:	Equipment Number:
N/A	National Instruments Logger	00371, 00372

Reference Meter Equipment Number: 00373	Calibration Due Date: 8/02/17

Calibration Performed By:	Date:	Ambient Temperature:	Barometric Pressure:
B. Davis	1/19/17	68	29.51

Input Temperature (F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	-1	-1	-1	-1	-1	-1	-1
100	99	99	99	99	99	99	99
300	299	299	299	299	299	298	299
500	499	499	499	499	499	499	499
700	699	699	699	699	698	699	699
1000	998	998	998	998	998	998	998

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	0	-1	-1	-1	-1	1
100	100	99	99	99	99	99	99	99	101
300	299	299	299	299	299	299	298	299	301
500	499	499	499	499	499	499	498	499	501
700	699	699	699	699	699	699	698	699	701
1000	999	999	999	999	999	998	998	998	1000
1500								1498	
2000								1997	

Technician signature: _____ Date: 1-19-17

Reviewed By: _____ Date: 1/20/2017

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer

Maximum Range: 0-1" WC ID Number: OMNI-00371B

Calibration Instrument: Digital Manometer ID Number: OMNI-00633

Date: 1/19/17 By: BDAVIS

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0 - 0.2	0.032	0.032	0	0
20-40% Max. Range 0.2 - 0.4	0.254	0.255	0.001	0.1
40-60% Max. Range 0.4 - 0.6	0.503	0.504	0.001	0.1
60-80% Max. Range 0.6 - 0.8	0.702	0.702	0	0
80-100% Max. Range 0.8 - 1.0	0.904	0.905	0.001	0.1

*Acceptable tolerance is 4%.

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

Technician signature: _____ Date: 1/19/17

Reviewed by: _____ Date: 1/20/2017

Thermal Metering System Calibration
Y Factor

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

Previous Calibration Comparision

Date	9/15/2015	Acceptable Deviation (5%)	Deviation
y Factor	1.003	0.05015	0.010
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.001
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Average Gas Meter y Factor	Orifice Meter dH@
0.993	N/A

Calibration Date:	01/18/17	
Calibrated by:	B. Davis	
Calibration Frequency:	Six months	
Next Calibration Due:	7/18/2017	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.51	"Hg
Signature/Date:	1/20/17	
	1/20/2017	

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	OMNI-00001	
	Calib. Date	27-Oct-16	
	Calib. Value	0.9823	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	2.34	1.50	0.80
Initial Reference Meter	304.4	312.9	320.9
Final Reference Meter	312.123	318	326.047
Initial DGM	0	0	0
Final DGM	7.723	5.088	5.184
Temp. Ref. Meter (°F), Tr	69.0	69.0	70.0
Temperature DGM (°F), Td	78.0	76.0	80.0
Time (min)	42.0	35.0	49.0
Net Volume Ref. Meter, Vr	7.723	5.100	5.147
Net Volume DGM, Vd	7.723	5.088	5.184
Gas Meter y Factor =	**0.993**	**0.994**	**0.992**
Gas Meter y Factor Deviation (from avg.)	0.000	0.001	0.001
Orifice dH@	**N/A**	**N/A**	**N/A**
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. y = [Vr x (y factor (ref)) x (Pb + (Pr/ 13.6)) x (Td + 460)]/ [Vd x (Pb + (Pd / 13.6)) x (Tr + 460)]

** 3. dH@ = 0.0317 x Pd / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

** Equations come from EPA Method 5

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

Temperature Calibration
EPA Method 28R, ASTM 2515

Booth:	Temperature Monitor Type:	Equipment Number:
N/A	National Instruments Logger	00371, 00372

Reference Meter Equipment Number: 00373	Calibration Due Date: 8/02/17

Calibration Performed By:	Date:	Ambient Temperature:	Barometric Pressure:
B. Davis	1/19/17	68	29.51

Input Temperature (F)	Ambient	Meter A	Meter B	Filter A	Filter B	Tunnel	FB Interior
0	-1	-1	-1	-1	-1	-1	-1
100	99	99	99	99	99	99	99
300	299	299	299	299	299	298	299
500	499	499	499	499	499	499	499
700	699	699	699	699	698	699	699
1000	998	998	998	998	998	998	998

Input (F)	FB Top	FB Bottom	FB Back	FB Left	FB Right	Imp A	Imp B	Cat	Stack
0	0	0	0	0	-1	-1	-1	-1	1
100	100	99	99	99	99	99	99	99	101
300	299	299	299	299	299	299	298	299	301
500	499	499	499	499	499	499	498	499	501
700	699	699	699	699	699	699	698	699	701
1000	999	999	999	999	999	998	998	998	1000
1500								1498	
2000								1997	

Technician signature: _____ Date: 1-19-17

Reviewed By: _____ Date: 1/20/2017

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET

Instrument to be calibrated: Pressure Transducer

Maximum Range: 0-1" ID Number: 00372 B

Calibration Instrument: Digital Manometer ID Number: OMNI- 00633

Date: 1/19/17 By: BDavis

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer Input ("WC)	Pressure Gauge Response ("WC)	Difference (Input - Response)	% Error of Full Span*
0-20% Max. Range 0. 0.2	0.052	0.052	0	0
20-40% Max. Range 0.2- 0.4	0.276	0.279	0.003	0.3
40-60% Max. Range 0.4- 0.6	0.575	0.575	0	0
60-80% Max. Range 0.6- 0.8	0.795 ~~0.788~~	0.797	0.002	0.2
80-100% Max. Range 0.8- 1.0	0.951	0.953	0.002	0.2

*Acceptable tolerance is 4%.

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

Technician signature: _____ Date: 1/19/17

Reviewed by: _____ Date: 1/20/2017

VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

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

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

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

Verification Data:

Date: 1/5/17 Technician: B Davis

Time in desiccate: 0900 Recording time: 0845 1/6/17

NIST Standard Temperature: 67.5 °F NIST Standard Humidity: 9.5

Test Unit Temperature Reading: 66.9 °F Test Unit Humidity Reading: 6.1

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

Technician Signature: [signature]

Comments: Humidity Results of 00592 are within ± 4% of Reference meter

Certificate of Calibration

Certificate Number: **629694**

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

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

0723.01
Calibration

PO: **160099**
Order Date: **08/18/2016**
Authorized By: **N/A**

Property #: **OMNI-00410**
User: **N/A**
Department: **N/A**
Make: **Dwyer**
Model: **1430**
Serial #: **OMNI-00410**
Description: **Microtector**
Procedure: **500908**
Accuracy: **±0.00025" WC**

Calibrated on: **08/29/2016**
*Recommended Due: **08/29/2017**
Environment: **19** °C **50** % RH
* As Received: **Other - See Remarks**
* As Returned: **Limited**
Action Taken: **Calibrated**
Technician: **34**

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

Calibrated micrometer head only per Bruce Davis.

Limited Calibration - Calibrated micrometer head only.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
541A	Select	E8FED2	8 Piece Gage Block Set	11/24/2016	607288

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	Min	Max	Error	UUT	Uncertainty
Before/After							Accredited = ✓
Length							
	Inch	0.1300	0.129	0.131	0.000	0.130 Inch	1.1E-03 ✓
	Inch	0.3850	0.384	0.386	0.000	0.385 Inch	1.1E-03 ✓
	Inch	0.6150	0.614	0.616	0.000	0.615 Inch	1.1E-03 ✓
	Inch	0.8700	0.869	0.871	0.001	0.871 Inch	1.1E-03 ✓
	Inch	1.0000	0.999	1.001	0.001	1.001 Inch	1.1E-03 ✓

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

Reviewer

3 Issued 08/31/2016 Rev # 15

Stacy Heath
Inspector

ZRE NDIR/O_2

USER'S MANUAL

1312 West Grove Avenue
Orange, CA 92865-4134
Phone: 714-974-5560 Fax: 714-921-2531
www.gasanalyzers.com

WOOD MOISTURE CONTENT CALIBRATION WORKSHEET

Moisture Content Standard OMNI ID #: 00432

Reference Moisture Content Standard: **OMNI # 00430**

Date	Temp.	Barometric Pressure	Fixed Moisture %	Fixed Moisture %	Observed Moisture %		Initials
5/20/2016	69°F	29.90 in Hg	22%	12%	22.0 %	12.0%	AL
11/14/16	68°F	30.10 in Hg	22%	12%	22.0 %	12.0%	DD
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
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			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			

Notes: _____

Technician signature: _____ Date: 5/20/16

CALIBRATION RECORD

VANEOMETER AIR VELOCITY METER OMNI #00265

CALIBRATIONS SERVICE RECORD			
DATE	**BY**	**RESULTS**	**DATE OF NEXT CALIBRATION**
10/5/10	[illegible]	INSTALLED NEW VANE FR. FACTORY	4/5/11
4/6/11	[illegible]	" " " " "	10/6/11
7/21/15	[illegible]	Installed new vane from manufacturer	1/21/16
3/4/16	[illegible]	Installed new VANE from MANUfacturer	9/4/16
8/30/16	[illegible]	Installed new VANE from MANUfacturer	~~3/[illegible]/16~~ 3/7/17
3/9/17	[illegible]	Installed new VANE from MANUfacturer	9/9/17

Thermal Metering System Calibration
Y Factor

Manufacturer:	APEX Instruments
Model:	DGM-SK25DA-TL
Serial Number:	8004298
OMNI Tracking No.:	OMNI-00413
Calibrated Orifice:	☐ Yes

Previous Calibration Comparision

Date	4/4/2016	Acceptable Deviation (5%)	Deviation
y Factor	1.004	0.0502	0.010
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.017
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Average Gas Meter y Factor	Orifice Meter dH@
1.014	N/A

Calibration Date:	09/22/16	
Calibrated by:	B. Davis	
Calibration Frequency:	Six month	
Next Calibration Due:	3/22/2017	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	30.12	"Hg
Signature/Date:		

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

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	-5.00	-2.15	-0.50
DGM Pressure ("H2O), Pd	0.00	0.00	0.00
Initial Reference Meter	997.2	1005.223	1017.7
Final Reference Meter	1004.097	1017.117	1032.573
Initial DGM	0	0	0
Final DGM	6.598	11.671	14.862
Temp. Ref. Meter (°F), Tr	70.0	71.0	71.0
Temperature DGM (°F), Td	70.0	71.0	71.0
Time (min)	6.0	24.0	59.0
Net Volume Ref. Meter, Vr	6.897	11.894	14.873
Net Volume DGM, Vd	6.598	11.671	14.862
Gas Meter y Factor =	**1.031**	**1.012**	**0.998**
Gas Meter y Factor Deviation (from avg.)	0.017	0.002	0.016
Orifice dH@	**N/A**	**N/A**	**N/A**
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. y = [Vr x (y factor (ref)) x (Pb + (Pr/ 13.6)) x (Td + 460)]/ [Vd x (Pb + (Pd / 13.6)) x (Tr + 460)]

** 3. dH@ = 0.0317 x Pd / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

** Equations come from EPA Method 5

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

Certificate of Calibration

Certificate Number: **543402**

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

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

ACCREDITED
0723.01
Calibration

PO: **OTL-13-031**
Order Date: **09/27/2013**
Authorized By: **N/A**

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

Calibrated on: **10/09/2013**
*Recommended Due: **10/09/2018**
Environment: **20** °C **41** % RH
As Received: **Other - See Remarks**
As Returned: **Within Tolerance**
Action Taken: **Calibrated**
Technician: **34**

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

Changed set from a Class 4 to a Class F per Jeremy Clark.
Received missing 1g weight.
Refer to attachment for measurement results.

Standards Used

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

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

Reviewer

3 Issued 10/11/2013 Rev # 14

Inspector

JJ Calibrations, Inc.

Manufacturer: Troemner Inc.
Model: 1mg-100g (Class F)
Nomenclature: Mass Set, 21 Pc.
Serial: 47883

Certificate #: 543402
Date: 09Oct2013
Technician: 34
Calibration Interval: 60 Months

Parameter		Nominal	JJ Standard	UUT	UUT ± Limit	Uncertainty ±
Mass Verification						
Data in mg		1	0.996	1.048	0.100	0.0115
	dot	2	2.002	1.973	0.120	0.0115
		2	2.002	2.048	0.120	0.0115
		5	4.996	5.033	0.170	0.0115
		10	10.000	10.053	0.210	0.0115
	dot	20	19.999	19.966	0.260	0.0115
		20	19.999	20.069	0.260	0.0115
		50	49.998	50.018	0.350	0.0115
		100	99.998	100.144	0.430	0.0115
	dot	200	199.999	200.045	0.540	0.0115
		200	199.999	199.967	0.540	0.0115
		500	499.996	500.334	0.720	0.0115
Data in grams		1		Missing		
	dot	2	2.000000	1.999888	0.0011	0.0000394
		2	2.000000	2.000335	0.0011	0.0000394
		5	5.000002	4.999996	0.0015	0.0000395
		10	9.99998	9.99984	0.0020	0.0000580
	dot	20	19.99999	20.00100	0.0040	0.0000855
		20	19.99999	20.00079	0.0040	0.0000855
		50	49.99997	49.99949	0.0100	0.0001390
		100	99.99999	99.99802	0.0200	0.0002900

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

Certificate of Calibration

Certificate Number: **543402**

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

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

0723.01
Calibration

PO: OTL-13-031
Order Date: 09/27/2013
Authorized By: N/A

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

Calibrated on: 10/09/2013
*Recommended Due: 10/09/2018
Environment: 20 °C 41 % RH
As Received: Other - See Remarks
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 34

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

Changed set from a Class 4 to a Class F per Jeremy Clark.
Received missing 1g weight.
Refer to attachment for measurement results.

Standards Used

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

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

Reviewer

3 Issued 10/11/2013 Rev # 14

Inspector

JJ Calibrations, Inc.

Manufacturer: Troemner Inc.
Model: 1mg-100g (Class F)
Nomenclature: Mass Set, 21 Pc.
Serial: 47883

Certificate #: 543402
Date: 09Oct2013
Technician: 34
Calibration Interval: 60 Months

Parameter		Nominal	JJ Standard	UUT	UUT ± Limit	Uncertainty ±
Mass Verification						
Data in mg		1	0.996	1.048	0.100	0.0115
	dot	2	2.002	1.973	0.120	0.0115
		2	2.002	2.048	0.120	0.0115
		5	4.996	5.033	0.170	0.0115
		10	10.000	10.053	0.210	0.0115
	dot	20	19.999	19.966	0.260	0.0115
		20	19.999	20.069	0.260	0.0115
		50	49.998	50.018	0.350	0.0115
		100	99.998	100.144	0.430	0.0115
	dot	200	199.999	200.045	0.540	0.0115
		200	199.999	199.967	0.540	0.0115
		500	499.996	500.334	0.720	0.0115
Data in grams		1		Missing		
	dot	2	2.000000	1.999888	0.0011	0.0000394
		2	2.000000	2.000335	0.0011	0.0000394
		5	5.000002	4.999996	0.0015	0.0000395
		10	9.99998	9.99984	0.0020	0.0000580
	dot	20	19.99999	20.00100	0.0040	0.0000855
		20	19.99999	20.00079	0.0040	0.0000855
		50	49.99997	49.99949	0.0100	0.0001390
		100	99.99999	99.99802	0.0200	0.0002900

Example Calculations

Equations and Sample Calculations – ASTM E2780 & E2515

Manufacturer:	Hearth & Home
Model:	3100 ACC
Run:	1
Category:	

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

M_{Sdb} – Weight of test fuel spacers, dry basis, kg

M_{Cdb}– Weight of test fuel crib, excluding nails and spacers, dry basis, kg

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft^3

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg

BR – Dry burn rate, kg/hr

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

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

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

m_n – Total particulate matter collected, mg

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

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_R – Particulate emissions for test run, g/hr

PM_F – Particulate emission factor for test run, g/dry kg of fuel burned

M_{Sdb} – Weight of test fuel spacers, dry basis, kg
ASTM E2780 equation (1)

$$M_{Sdb} = (M_{Swb})(100/(100 + FM_S))$$

Where,

FM_S = average fuel moisture of test fuel spacers, % dry basis

M_{Swb} = weight of test fuel spacers, wet basis, kg

Sample Calculation:

FM_S = 16.2 %

M_{Swb} = 1.7 lbs

0.4536 = Conversion factor from lbs to kg

M_{Sdb} = [(1.7 x 0.4536) (100/(100 + 16.2)

M_{Sdb} = **0.7** kg

M_{Cdb}– Weight of test fuel crib, excluding nails and spacers, dry basis, kg
ASTM E2780 equation (2)

$$M_{Cdb} = \Sigma[(M_{CPnwb})(100/(100 + FM_{CPn}))]$$

Where,

M_{CPnwb} = weight of each test fuel piece n in fuel crib, excluding nails and spacers, wet basis, kg

FM_{CPn} = Average fuel moisture of test fuel n in fuel crib, % dry basis

Sample Calculation (test fuel piece 1):

MC_{Pnwb} = 1.5

FM_{CPn} = 19.4

= 1.5 (100/(100+ 19.4)

= 1.3 lbs

Total crib weight, excluding spacer 9.09 lbs

M_{Cdb} = **4.12** kg

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft^3
ASTM E2780 equation (3)

$$D_{Cdb} = M_{Cdb}/V_C$$

Where,

V_C = Volume of fuel crib, ft^3

Sample calculation:

V_C = 564 in^3

1728 = conversion from in^3 to ft^3

D_{Cdb} = 9.09 / 564 * 1728

= **27.9** lbs/ft^3

M_{FTAdb} - Total weight of fuel crib excluding nails, dry basis, kg
ASTM E2780 equation (4)

$$M_{FTAdb} = M_{Sdb} + M_{Cdb}$$

Sample calculation:

$$M_{FTAdb} = 0.66 + 4.12$$

$$= \mathbf{4.78} \text{ kg}$$

BR – dry burn rate, kg/hr
ASTM E2780 equation (5)

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

Where,

θ = Total length of test run, min

Sample Calculation:

M_{Bdb} = 4.78 kg

θ = 290 min

$$BR = \frac{60 \times 4.78}{290}$$

BR = **0.99** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equations (9)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

F_p	=	Adjustment factor for center of tunnel pitot tube placement, Fp = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)
v_{scent}	=	Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec
v_{strav}	=	Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec
k_p	=	Pitot tube constant, 85.49
C_p	=	Pitot tube coefficient: 0.99, unitless
ΔP*	=	Velocity pressure in the dilution tunnel, in H_2O
T_s	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
P_{bar}	=	Barometric pressure at test site, in. Hg
P_g	=	Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)
M_s	=	**The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{13.07}{13.62} = 0.960$$

$$V_s = 0.960 \times 85.49 \times 0.99 \times 0.200 \times \left(\frac{79.7 + 460}{\left(28.94 + \frac{-0.52}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **13.08** ft/s

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

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

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr
ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
$T_{s(avg)}$	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 13.08 \times 0.196 \times \frac{528}{79.7 + 460} \times \frac{28.9 + \frac{-0.52}{13.6}}{29.92}$$

Q_{sd} = **8565.8** dscf/hr

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

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

Where:

K_1	=	17.64 °R/in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_{bar}	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 32.757 \times 1.001 \times \frac{\left(28.94 + \frac{1.08}{13.6}\right)}{(79.4 + 460)}$$

$V_{m(std)}$ = **31.120** dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 38.291 \times 0.993 \times \frac{\left(28.94 + \frac{1.14}{13.6}\right)}{(79.6 + 460)}$$

$V_{m(std)}$ = **36.083** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 56.59 \times 1.014 \times \frac{\left(\underline{28.94} + \frac{0.00}{13.6}\right)}{(76.1 + 460)}$$

$V_{m(std)}$ = **54.642** dscf

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train 1 (first hour):

m_n = 0.0 + 4.3 + 0.0

m_n = 4.3 mg

Using equation for Train 1 (post-first hour):

m_n = 1.1 + 1.3 + 0.2

m_n = 2.6 mg

Train 1 aggregate:

m_n = 4.3 + 2.6

m_n = **6.9** mg

Using equation for Train 2:

m_n = 0.5 + 7.6 + 0.3

m_n = **8.4** mg

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

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

Where:

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

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{6.9}{31.12}$$

C_s = **0.00022** g/dscf

For Train 2

$$C_s = 0.001 \times \frac{8.4}{36.08}$$

C_s = **0.00023** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.1}{54.64}$$

C_r = **0.000002** g/dscf

E_T – Total Particulate Emissions, g
ASTM E2515 equation (15)

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

Where:

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

Sample calculation:

For Train 1

E_T = (0.000222 - 0.000002) x 8565.8 x 290 /60

E_T = 9.10 g

For Train 2

E_T = (0.000233 - 0.000002) x 8565.8 x 290 /60

E_T = 9.56 g

Average

E = 9.33 g

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

7.5% of the average =	0.70
Train 1 difference =	0.23
Train 2 difference =	0.23

PR - Proportional Rate Variation
ASTM E2515 equation (16)

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

Where:

θ = Total sampling time, min

θ_i = Length of recording interval, min

V_{mi} = Volume of gas sample measured by the dry gas meter during the “ith” time interval, dcf

V_m = Volume of gas sample as measured by dry gas meter, dcf

V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec

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

T_{mi} = Absolute average dry gas meter temperature during the "ith" time interval, ^oR

T_m = Absolute average dry gas meter temperature, ^oR

T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, ^oR

T_s = Absolute average gas temperature in the dilution tunnel, ^oR

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

$$PR = \left(\frac{290 \times 1.09 \times 13.08 \times (77.0 + 460) \times (79.4 + 460)}{10 \times 32.76 \times 13.05 \times (79.7 + 460) \times (68.0 + 460)} \right) \times 100$$

PR = 98 %

PM_R – Particulate emissions for test run, g/hr
ASTM E2780 equation (6)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

E_T (Dual train average) = 9.33 g

θ = 290 min

$PM_R = 60$ x (9.33 / 290)

PM_R = **1.93** g/hr

PM_F – Particulate emission factor for test run, g/dry kg of fuel burned
ASTM E2780 equation (7)

$$PM_F = E_T/M_{FTAdb}$$

Sample Calculation:

E_T (Dual train average) = 9.33 g

M_{Bdb} = 4.78 kg

PM_F = 9.33 / 4.78

PM_F = **1.95** g/kg

Section 5

Test Instruction Recommendations, Labeling, & Owner's Manual

HEARTH & HOME technologies
The Hearth Experts

Test Instruction Recommendations: 3100 ACC / Discovery II

Created on/by: 02/07/17; C. Winslow Howe – HHT Design Engineer

Purpose: To create repeatability in test protocol for coal bed establishment and loading of the stove.

Coal Bed establishment (Low, Medium Low, Medium High)

Wood Load: 2 loads of 2x4's. Each load will consist of 4 pieces at 14" and 5 pieces at 12". The second wood load should be loaded when the first load has burnt down to around 2 pounds.

Air Settings: Unit air control should be fully open with the ACC locked open.

Fan Settings: Unit fan should be on high for the duration of the coal bed establishment

Coal Bed establishment (High)

Wood Load: 1 Load of 2x4's. Load will consist of 4 Pieces at 14" and 6 Pieces at 12"

Air Settings: Unit air control should be fully open with ACC locked open.

Fan Settings: Unit fan should be on high for the duration of the coal bed establishment

Pre-Burn (Low)

When the unit weight is .2lb below the top end of the coal bed for the test load, pre-burn should be started.

Pre-burn load: 3 pieces of 2x4's at 8" in length

Air Controls: Primary air control should be closed all the way to its mechanical stop. ACC should be fully closed as well.

Fan Settings: Unit fan should be on high for the duration of pre-burn.

Coal Bed Break Down: Coal Bed should be broken down at 50 minutes into pre-burn. Rake coals forward to create a slope parallel to the unit's baffle. Clear out coals directly in front of the primary air outlet.

HEARTH & HOME technologies
The Hearth Experts

Test Burn (Low)

Loading: When the test load is loaded into the stove the back of the bottom pieces Should be snugged down with the front of the bottom pieces just rested on the coals. This should place the front bottom of the wood about .25" above the lip of the Primary air outlet. The front of the wood should be even with the lip of the primary air outlet. The left side of the wood load should be about .25" off the firebrick on the left side of the unit. Clear out coals in front of primary air outlet.

Air Controls: Before opening the door to load set primary air control to full open and activate the ACC. After loading and the door is shut reactivate the ACC. At 5 minutes set the primary air control all the way down to the mechanical stop.

Pre-Burn (Medium-Low)

When the unit weight is .1lb above the top end of the coal bed for the test load, pre-burn should be started.

Pre-burn load: 3 pieces of 2x4's at 8" in length

Air Controls: primary air control should be set so that the base of the opening triangle is 1".

Fan Settings: Unit fan should be on high for the duration of pre-burn.

Coal Bed Break Down: Coal Bed should be broken down at 50 minutes into pre-burn. Rake coals forward to create a slope parallel to the unit's baffle. Clear out coals directly in front of the primary air outlet.

Test Burn (Medium-Low)

Loading: When the test load is loaded into the stove the back of the bottom pieces Should be snugged down with the front of the bottom pieces just rested on the coals. This should place the front bottom of the wood about .25" above the lip of the Primary air outlet. The front of the wood should be even with the lip of the primary air outlet. The left side of the wood load should be about .25" off the firebrick on the left side of the unit. Clear out coals in front of primary air outlet.

Air Controls: Before opening the door to load activate the ACC. After loading and the door is shut reactivate the ACC. Primary air control should not be changed from its pre-burn setting.

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Pre-Burn (Medium-High)

When the unit weight is .1lb above the top end of the coal bed for the test load, pre-burn should be started.

Pre-burn load: 3 pieces of 2x4's at 8" in length

Air Controls: Primary air control should be set so that the base of the opening triangle is 1.29". ACC should be fully closed as well.

Fan Settings: Unit fan should be on high for the duration of pre-burn.

Coal Bed Break Down: Coal Bed should be broken down at 50 minutes into pre-burn. Rake coals forward to create a slope parallel to the unit's baffle. Clear out coals directly in front of the primary air outlet.

Test Burn (Medium-High)

Loading: When the test load is loaded into the stove the back of the bottom pieces Should be snugged down with the front of the bottom pieces just rested on the coals. This should place the front bottom of the wood about .25" above the lip of the Primary air outlet. The front of the wood should be even with the lip of the primary air outlet. The left side of the wood load should be about .25" off the firebrick on the left side of the unit. Clear out coals in front of primary air outlet.

Air Controls: Before opening the door to load set primary air control to full open and activate the ACC. After loading and the door is shut reactivate the ACC. At 5 minutes set the primary air control to its pre-burn setting.

Pre-Burn (High)

When the unit weight is at 2.0lb, pre-burn should be started.

Pre-burn load: 4 pieces of 2x4's at 14" in length and 6 pieces of 2x4's at 12" in length

Air Controls: Primary air control should be opened all the way to the mechanical stop and the ACC should be locked open

Fan Settings: Unit fan should be on high for the duration of pre-burn.

Coal Bed Break Down: Coal Bed should be broken down when unit weight is at the top of the coal bed. Rake coals forward to create a slope parallel to the unit's baffle. Clear out coals directly in front of the primary air outlet.

Test Burn (High)

Loading: Left side of the wood should be .25" off the left side of the brick. The load should be placed snuggly into the coals as far back as possible.

Air Controls: Air controls do not change from their pre-burn setting.

ECO

ITEM	PART NUMBER	PART NAME	QTY
1	7033-354	SERIAL RATING PLATE	1

7.75

CAUTION: HOT WHILE IN OPERATION DO NOT TOUCH, KEEP CHILDREN AND CLOTHING AWAY. CONTACT MAY CAUSE SKIN BURNS. KEEP FURNISHINGS AND OTHER COMBUSTIBLE MATERIAL FAR AWAY FROM THE APPLIANCE. SEE NAMEPLATE AND INSTRUCTIONS.

ATTENTION: CHAUD LORS DE L'OPÉRATION. NE PAS TOUCHER. GARDEZ LES ENFANTS ET LES VÊTEMENTS LOIN DE L'ESPACE DÉSIGNÉ DE L'INSTALLATION. LE CONTACT PEUT CAUSER DES BRÛLURES À LA PEAU. GARDEZ LES MEUBLES ET LES MATÉRIAUX COMBUSTIBLES LOIN DE L'ESPACE DÉSIGNÉ DE L'APPAREIL. VOIR L'ÉTIQUETTE ET LES INSTRUCTIONS.

LISTED ROOM APPLIANCE, SOLID FUEL TYPE. ALSO FOR USE IN MOBILE HOMES. (UM) 84 HUD . **"For Use with Solid Wood Fuel Only"** / APPAREIL DE CHAUFFAGE DE PIÉCE, DE TYPE DE COMBUSTIBLE SOLIDE, POUR USAGE DANS LES MAISONS MOBILES. (UM) 84 HUD. **"Pour Usage Avec Bois Solide Seulement"**

PREVENT HOUSE FIRES / PRÉVENTION DES FEUX DE MAISON

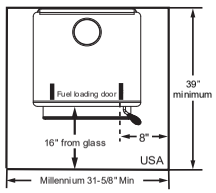
Install and use only in accordance with manufacturer's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspections in your area. Do not obstruct the space beneath appliance. **WARNING - For Mobile Homes:** Do not install in a sleeping room. An outside combustion air inlet must be provided and unrestricted while unit is in use. The structural integrity of the mobile home floor, ceiling and walls must be maintained. The appliance needs to be properly grounded to the frame of the mobile home. Components required for mobile home installation: Outside Air Kit, Part Number OAK-ACC. **Refer to manufacturer's instructions** and local codes for precautions required for passing chimney through a combustible wall or ceiling and maximum offsets. Inspect and clean chimney frequently - Under Certain Conditions of Use, Creosote Buildup May Occur Rapidly. Do not connect this unit to a chimney serving another appliance. Optional Blower, Part BK-ACC. Electrical Rating: 115 VAC, 1.2 Amps, 60 Hz. Route power cord away from unit. Do not route cord under or in front of appliance. **DANGER: Risk of electrical shock.** Disconnect power supply before servicing. Replace glass only with 5mm ceramic available from your dealer. Do not use grate or elevate fire. Build wood fire directly on hearth. Do not overfire - if appliance or chimney connector glows, you are overfiring. Operate only with the fuel loading door closed. Open only to add fuel to the fire. / Installez et utilisez en accord avec les instructions d'installation et d'opération du fabricant. Contactez le bureau de la construction ou le bureau des incendies au sujet des restrictions et des inspections d'installation dans votre voisinage. Ne pas obstruez l'espace en dessous de l'appareil. **AVIS - Pour Les Maisons Mobiles :** Ne pas installer dans une chambre à coucher. Un tuyau extérieur de combustion d'air doit être installé et ne doit pas être obstrué lorsque l'appareil est en usage. La structure intégrale du plancher, du plafond et des murs de la maison mobile doit être maintenue intacte. L'appareil de chauffage doit être fixé à la charpente de la maison mobile. Les composants requis pour l'installation des maisons mobiles: Assemblage d'air extérieur, Numéro de Pièce OAK-ACC. **Référez vous aux instructions** du fabricant et des codes locaux pour les précautions requises pour passer une cheminée à travers un mur ou un plafond combustibles, et les compensations maximums. Inspectez et nettoyez la cheminée fréquemment. Sous certaines conditions, il se peut que la créosote s'accumule rapidement. Ne pas connecter cet appareil à une cheminée servant un autre appareil. !Ventilateur Optionnel, Pièce BK-ACC. Puissance Électrique: 115 VAC, 1.2 Amps, 60 Hz. Éloignez le fil électrique de l'appareil. Ne pas faire passer le fil électrique au dessus ou en dessous de l'appareil. **DANGER : Il y a risque de décharge électrique.** Déconnectez le fil électrique de la prise de contact avant le service. Remplacez la vitre seulement avec une vitre céramique de 5 mm disponible chez votre fournisseur. N'élevez pas le feu. Bâtissez le feu de bois directement sur l'âtre. Ne pas surchauffer. Si l'appareil de chauffage ou le tuyau de cheminée rougissent, vous surchauffez. Opérez l'appareil seulement lorsque la porte de chargement est fermée. Ouvrez la porte seulement lorsque vous devez ajouter des combustibles dans le feu.

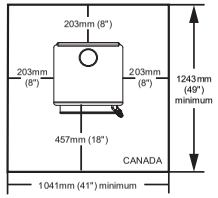
FLOOR PROTECTION:

Floor protector must be a 3/8 (9.5mm) inch min. thickness, non-combustible material or equivalent, extending beneath heater and to front/sides/rear as indicated on the diagram below. **Exception:** Non-combustible floor protections must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side.

PROTECTION DU PLANCHER:

Le protecteur de plancher doit être d'un minimum de 3/8 inch (9.5mm) d'épaisseur, de matériel incombustible ou équivalent, s'étendant du dessous de l'appareil de chauffage à l'avant, aux cotés et à l'arrière comme indiqué sur le diagramme suivant. **Exception :** Les protections incombustibles du plancher doivent s'étendre en dessous du conduit de cheminée lorsqu'installées avec une ventilation à l'horizontale et s'étendre de 2 inches (51mm) de chaque côté.





Report / Rapport
0061WS066S
0061WS066E

QUADRA-FIRE

3100 ACC Series-C

TESTED TO:/ TESTÉ À :
ASTM E2515, UL 1482-11 (R2015), ULC S627-00.

Serial No. / N° de série

HF

BARCODE LABEL

VENT SPECIFICATIONS: / SPÉCIFICATIONS DE LA VENTILATION :

SINGLE WALL: Six inch (6 inches) (152mm) diameter, minimum 24 MSG black or blued steel connector pipe, with a listed factory-built UL103HT* Class "A" chimney, suitable for use with solid fuels, or a masonry chimney, and the referenced clearances. / **MUR SIMPLE :** De six (6 inches) (152mm) de diamètre le connecteur de conduit de minimum d'acier noir ou bleu de minimum de 24MSG, avec une cheminée bâtit en usine UL103HT* de Classe "A", adéquate pour usage avec les combustions solides, ou une cheminée de briques, avec espaces libres référés.

DOUBLE WALL: Six inch (6 inches) (152mm) diameter, listed double wall air insulated connector pipe with listed factory-built UL103HT* Class "A" chimney, or a masonry chimney and the referenced clearances. / **MUR DOUBLE :** De six (6 inches) (152mm) de diamètre, le connecteur du conduit d'air isolé pour mur double avec une cheminée bâtit en usine UL103HT* de Classe "A:, ou une cheminée de briques, avec espaces libres alloués.

MOBILE HOME: Use double wall pipe by Dura-Vent DVL, Selkirk Metalbestos DS or Security DL double wall connector pipe. Must be equipped with a spark arrestor. Apply double wall clearances below when installing unit. / **MAISON MOBILE :** Utiliser un conduit de mur double par Dura-Vent DVL, Selkirk Metalbestos DS ou Security DL. Doit être équipé d'un arrêt d'étincelle. Utiliser les espaces libres pour mur double comme mentionné ci-bas.

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS : In Inches & (Millimeters) / ESPACES LIBRES MINIMUM DES MATÉRIAUX COMBUSTIBLES:En Pouces & (millimètres)

NOTE: All "A" , "C" and "F" Dimensions are to inside diameter of the flue collar. / REMARQUE : Toutes les dimensions "A", "C", et "F" sont à partir du diamètre intérieur de l'entrée du conduit.

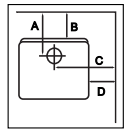
INSTALLATION: FULL VERTICAL OR HORIZONTAL WITH MINIMUM 2 FT VERTICAL OFF STOVE TOP / INSTALLATION : ENTIÈREMENT VERTICALE OU HORIZONTALE AVEC 609mm VERTICAL MINIMUM DU HAUT DU POÊLE

SINGLE WALL PIPE / CONDUIT DU MUR SIMPLE	A	B	C	D	E	F	G	H
Discovery-II-C	18.25 (464)	11.75 (298)	28.5 (724)	16 (406)	8 (203)	20 (508)	48 (1220)	12 (305)
31M-ACC-C	18.25 (464)	11.75 (298)	28.5 (724)	16 (406)	8 (203)	20 (508)	48 (1220)	12 (305)
DOUBLE WALL PIPE / CONDUIT DU MUR DOUBLE								
Discovery-II-C	13.5 (343)	6.5 (165)	25 (635)	13 (330)	6.5 (165)	18.5 (470)	48 (1220)	9 (229)
31M-ACC-C	13.5 (343)	6.5 (165)	25 (635)	13 (330)	6.5 (165)	18.5 (470)	48 (1220)	9 (229)

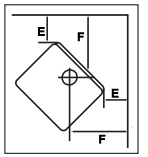
INSTALLATION: 90° ELBOW OFF TOP OF STOVE THROUGH BACKWALL / INSTALLATION: 90° DU COURBURE AU DESSUS DE HAUT DU POÊLE A TRAVERS LE MUR ARRIÈRE

SINGLE WALL PIPE / CONDUIT DU MUR SIMPLE								
Discovery-II-C	15 (381)	8.5 (216)	25 (635)	13 (330)	8 (203)	20 (508)	48 (1220)	12 (305)
31M-ACC-C	15 (381)	8.5 (216)	25 (635)	13 (330)	8 (203)	20 (508)	48 (1220)	12 (305)
DOUBLE WALL PIPE / CONDUIT DU MUR DOUBLE								
Discovery-II-C	11 (279)	4.5 (114)	20.5 (521)	8.5 (216)	6.5 (165)	18.5 (470)	48 (1220)	9 (229)
31M-ACC-C	11 (279)	4.5 (114)	20.5 (521)	8.5 (216)	6.5 (165)	18.5 (470)	48 (1220)	9 (229)

BACKWALL/SIDEWALL MUR ARRIÈRE/MUR DE CÔTÉ



CORNER INSTALLATION/ INSTALLATION DU COIN

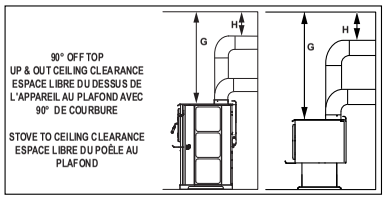


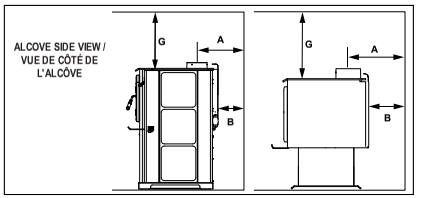
INSTALLATION: ALCOVE - Six inch (6 inches) (152mm) diameter listed DOUBLE WALL air insulated connector pipe with UL103 HT** listed factory-built Class "A" chimney, or a masonry chimney. (Mobile Home must be equipped with a spark arrestor.) Maximum depth of Alcove shall be no more than 48 inches (1219mm) and the referenced alcove clearances. / **INSTALLATION : ALCÔVE** - Six pouces (6 pouces) (152mm) de diamètre listé air isolé tuyau de raccordement à double paroi avec UL103 HT ** cotée Classe usine construite "A" cheminée ou une cheminée de maçonnerie. (Mobile Home doit être équipé d' un pare-étincelles.) Profondeur maximale de Alcove ne doit pas être plus de 48 pouces (1219mm) et les dégagements en alcôve référencés.

DOUBLE WALL PIPE / CONDUIT DU MUR DOUBLE								
Discovery-II-C	14.75 (375)	8.25 (210)	26.5 (673)	14.5 (368)	N/A	N/A	48 (1220)	*
31M-ACC-C	14.75 (375)	8.25 (210)	26.5 (673)	14.5 (368)	N/A	N/A	48 (1220)	*

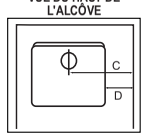
***In Canada must comply with Standard CAN/ULC-S629-M87 for the 650°C Factory-built chimney. / *Au Canada doit conformer a CAN/ULC-S629-M87 la norme pour 650°C cheminée bâtit en usine.**

*** SEE PIPE MANUFACTURERS CLEARANCES - NOT TESTED / VOIR LE FABRICANT POUR LES ESPACES LIBRES DES CONDUIT - PAS TESTÉ**





ALCOVE TOP VIEW / VUE DU HAUT DE L'ALCÔVE



Manufactured by:
Fabriqué par :

HEARTH & HOME technologies
352 Mountain House Road,
Halifax, PA 17032
www.quadrafire.com

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

Jan. ☐ Feb. ☐ Mar. ☐ Apr. ☐ May ☐ June ☐ July ☐ Aug. ☐ Sept. ☐ Oct. ☐ Nov. ☐ Dec. ☐

2020 ☐ 2021 ☐ 2022 ☐

31M-ACC-C ☐ DISCOVERY-II-C ☐

U.S. ENVIRONMENTAL PROTECTION AGENCY

Certified to comply with 2020 particulate emission standards using crib wood at 1.9 G/HR EPA Method 28 and 5G.

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

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER L'ÉTIQUETTE

7033-354D

9.5

NOTE:
1. MATERIAL: NON-ANODIZED ALUMINUM 0.020 THICK
2. BACKGROUND: SILVER
3. COPY: BLACK & RED
4. ADHESIVE: 3M #468 PERMANENT ACRYLIC
5. TEMPERATURE RATING: -50 F TO 350 F

REV	REVISIONS	ECO #	DATE	BY
D	NEW STANDIZE UPDATE	92923	02/26/20	IJW
C	UPDATE DATE RANGE	91024	06/05/19	IJW
B	MADE PRINT TO SCALE & ADD PART NAME W/DIMENSIONS	86508	10/10/17	IJW
A	CREATION	P16061	02/13/17	IJW

UNLESS OTHERWISE SPECIFIED DIMS ARE INCHES[MM] & : TOLERANCES ARE: (2) PLACE DEC : ± 0.03 (3) PLACE DEC: ± 0.005 ANGLE: ± 2° FRACTION: ± 1/16
OUTSIDE MATERIAL. NORMAL DIM & INSIDE MATERIAL. OUTSIDE APEX INSIDE APEX - DIMS ENCLOSED BY AN OVAL ARE CRITICAL DIMENSIONS

HEARTH & HOME technologies

PART NAME: SERIAL LABEL, 3100 ACC-C SERIES (9-1/2"X7-3/4")

DRAWN BY:	SCALE:	MATERIAL:
IJW	NTS	SEE NOTE

THIS PRINT IS CHECKED AND CONTROLLED BY THE ENGINEERING DEPARTMENTS OF HEARTH & HOME TECHNOLOGIES INC.

SHEET: 1 OF 1 | PART NUMBER: 7033-354 | REV: D

Owner's Manual

Operation & Care

INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.

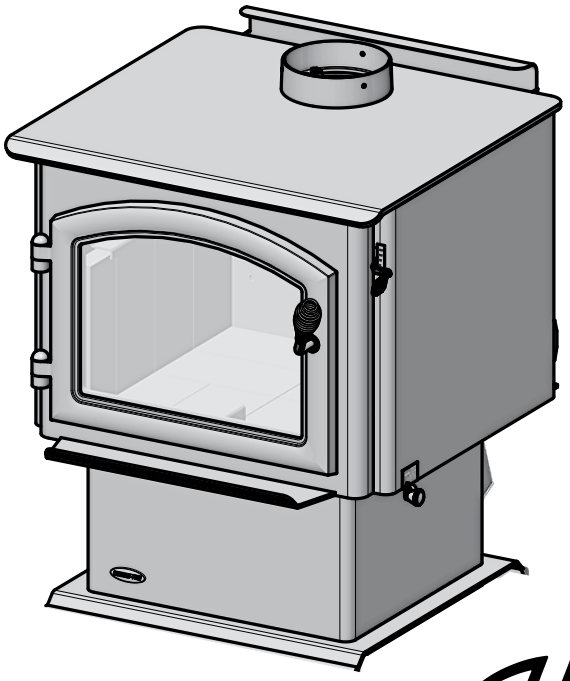
Contact your dealer with question on installation, operation, or service.

NOTICE: DO NOT DISCARD THIS MANUAL

QUADRA-FIRE®

3100 MILLENNIUM WOOD APPLIANCE AUTOMATIC COMBUSTION CONTROL (ACC)

MODEL NUMBER: 31M-ACC-C



EM
C US

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

hearthED FACTORY TRAINING Fuel Your Fire

NFI NATIONAL FIREPLACE INSTITUTE® A CERTIFICATION AGENCY

⚠ WARNING

If the information in these instructions is not followed exactly, a fire could result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over-fire - If appliance or chimney connector glows, you are over-firing. Over-firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified.

Failure to comply may cause house fire.

⚠ WARNING

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

Hot glass and appliance will cause burns.

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

⚠ WARNING

Fire Risk.
For use with solid wood fuel only.
Other fuels may over-fire and generate poisonous gases (i.e. carbon monoxide).

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

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

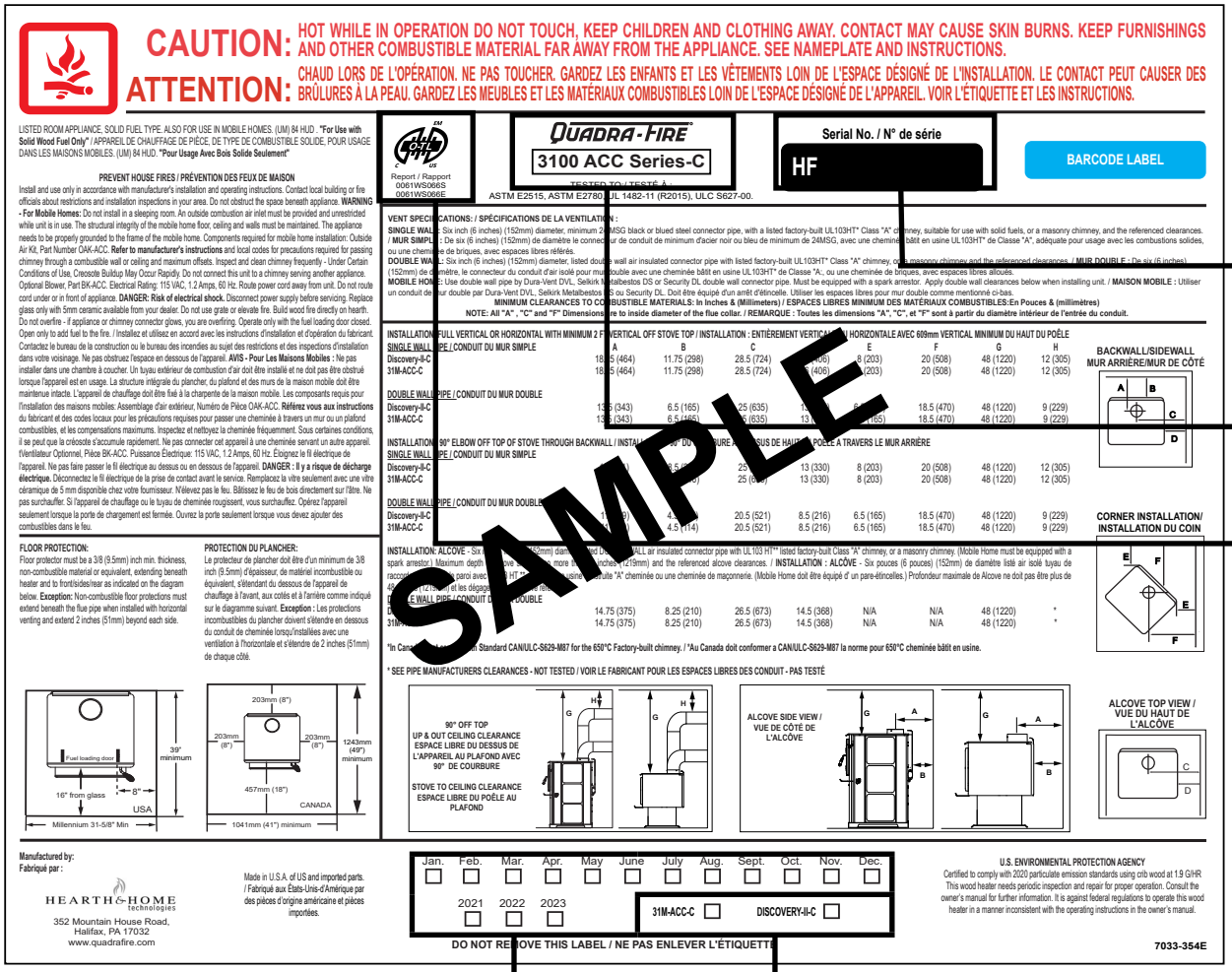
Congratulations

and Welcome to the Quadra-Fire Family!

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

A. Sample of Serial Number / Safety Label

LOCATION: Back of appliance



and Welcome to the Quadra-Fire Family!

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

A. Sample of Serial Number / Safety Label

LOCATION: Back of appliance

Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Indicates practices which may cause damage to the appliance or to property.

TABLE OF CONTENTS

➔ = Contains updated information

B. Warranty Policy

Hearth & Home Technologies LLC

LIMITED LIFETIME WARRANTY

Hearth & Home Technologies LLC ("HHT") extends the following warranty for HHT gas, wood, pellet and electric hearth appliances (each a "Product" and collectively, the "Product(s)") and certain component parts set forth in the table below ("Component Part(s)") that are purchased from a HHT authorized dealer or distributor.

WARRANTY COVERAGE:

HHT warrants that the Products and their Component Parts will be free from defects in materials and workmanship for the applicable period of Warranty coverage set forth in the table below ("Warranty Period"). If a Product or Component Parts are found to be defective in materials or workmanship during the applicable Warranty Period, HHT will, at its option, repair the applicable Component Part(s), replace the applicable Component Part(s), or refund the purchase price of the applicable Product(s). The maximum amount recoverable under this Warranty is limited to the purchase price of the Product. This Warranty is transferable from the original purchaser to subsequent owners, but the Warranty Period will not be extended in duration or expanded in coverage for any such transfer. This Warranty is subject to conditions, exclusions, and limitations as described below.

WARRANTY PERIOD:

Warranty coverage begins at the date of installation. In the case of new home constructions, Warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product(s) by an independent, authorized HHT dealer or distributor, whichever occurs earlier. However, the Warranty coverage shall commence no later than 24 months following the date of Product shipment from HHT, regardless of the installation or occupancy date.

The term "Lifetime" in the table below is defined as: 20 years from the beginning date of warranty coverage for gas appliances, and 10 years from the beginning date of warranty coverage for wood and pellet appliances. These time periods reflect the minimum expected useful lives of the designated Component Parts under normal operating conditions.

Warranty Period		HHT Manufactured Appliances and Venting					
Component Parts	Labor	Gas	Pellet	Wood	Electric	Venting	Component Parts Covered by this Warranty
1 Year		X	X	X		X	All parts including handles, external enameled components and other material except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 Years					X		All parts except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 years			X	X			Igniters, Auger Motors, Electronic Components, and Glass
		X					Electrical components limited to modules, remotes/wall switches, valves, pilots, blowers, junction boxes, wire harnesses, transformers and lights (excluding light bulbs)
		X		X			Molded Refractory Panels, Glass Liners
3 years			X				Firepots, burnpots, mechanical feeders/auger assemblies
5 years	1 year	X					Vent Free Burners, Vent Free Logs
			X	X			Castings, Medallions and Baffles
6 years	3 years			X			Catalysts
7 years	3 years		X	X			Manifold tubes, HHT Chimney and Terminations
10 years	1 year	X					Burners, logs and refractory
Limited Lifetime	3 years	X	X	X			Firebox and heat exchanger, FlexBurn® System (engine, inner cover, access cover and fireback)
1 Year	None	X	X	X	X	X	All purchased replacement parts

4021-645L 10/20

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WARRANTY CONDITIONS:

- Because HHT cannot control the quality of any Products sold by unauthorized sellers, this Warranty only covers Products that are purchased through an HHT authorized dealer or distributor unless otherwise prohibited by law; a list of HHT authorized dealers is available on the HHT branded websites.
- This Warranty is only valid while the applicable Product remains at the site of original installation.
- This Warranty is only valid in the country in which the HHT authorized dealer or distributor that sold the applicable Product is authorized to sell applicable Product.
- Contact your installing distributor or dealer for Warranty service. If the installing dealer or distributor is unable to provide necessary parts, contact the nearest HHT authorized dealer or supplier. Additional service fees may apply if you are seeking Warranty service from a dealer other than the dealer from whom you originally purchased the applicable Product.
- No HHT consumer should bear cost of warranty service or costs incurred while servicing warranty claims (i.e., travel, gas, or mileage) when the service is performed within the terms of this Warranty. Check with your dealer or distributor in advance for any costs to you when arranging a warranty call. Travel and shipping charges for parts are not covered by this Warranty.

WARRANTY EXCLUSIONS:

This Warranty does not cover the following:

- Changes in surface finishes as a result of normal use. As a heating appliance, some changes in color of interior and exterior surface finishes may occur. This is not a flaw and is not covered under the Warranty.
- Damage to printed, plated, or enameled surfaces caused by fingerprints, accidents, misuse, scratches, melted items or other external sources and residues left on the plated surfaces from the use of abrasive cleaners or polishes.
- Repair or replacement of parts that are subject to normal wear and tear during the Warranty Period are not covered. These parts include: paint, wood and pellet gaskets, firebricks, grates, flame guides, batteries and the discoloration of glass.
- Minor expansion, contraction, or movement of certain parts causing noise. These conditions are normal and complaints related to this noise are not covered by this Warranty.
- Damages resulting from: (1) failure to install, operate, or maintain the applicable Product in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the applicable Product; (2) failure to install the applicable Product in accordance with local building codes; (3) shipping or improper handling; (4) improper operation, abuse, misuse, continued operation with damaged, corroded or failed components, accident, or improperly/incorrectly performed repairs; (5) environmental conditions, inadequate ventilation, negative pressure, or drafting caused by tightly sealed constructions, insufficient make-up air supply, or handling devices such as exhaust fans or forced air furnaces or other such causes; (6) use of fuels other than those specified in the operation instructions; (7) installation or use of components not supplied with the applicable Product or any other components not expressly authorized and approved by HHT; (8) modification of the appliance not expressly authorized and approved by HHT in writing; and/or (9) interruptions or fluctuations of electrical power supply to the applicable Product.
- Non-HHT venting components, hearth connections or other accessories used in conjunction with the applicable Product.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas applicable Product is installed.
- HHT's obligation under this Warranty does not extend to the Product's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper Product for the application. Consideration must be given to the Product location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The applicable Product has been over-fired, operated in atmospheres contaminated by chlorine, fluorine, or other damaging chemicals. Over-firing can be identified by, but not limited to, warped plates or tubes, deformation/warping of interior cast iron structure or components, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The applicable Product is subjected to prolonged periods of dampness or condensation.
- There is any damage to the applicable Product due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF REMEDIES AND LIABILITY:

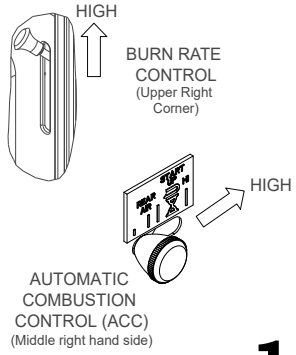
- **EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. The owner's exclusive remedy and HHT's sole obligation under this Warranty or in contract, tort or otherwise, shall be limited to replacement of the Component Part(s), repair of the Component Part(s), or refund of the original purchase price of the applicable Product(s), as specified above; provided, however, that (i) if HHT is unable to provide replacement of the Component Part(s) and repair of the Component Part(s) is not commercially practicable or cannot be timely made, or (ii) the customer is willing to accept a refund of the purchase price of the applicable Product(s), HHT may discharge all such obligations by refunding the purchase price of the applicable Product. In no event will HHT be liable for any incidental or consequential damages caused by defects in the applicable Product. Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights and you may also have other rights which vary from State to State. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE FOR THE APPLICABLE PRODUCT. Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.**

C. Quick Start Guide

NOTE: These are generic drawings and may not represent your specific model.

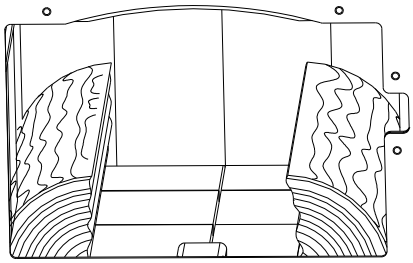
ITEMS NEEDED FOR FIRST FIRE: 10 Pieces of Newspaper, 10-20 Pieces of Dry Kindling and Few Pieces of Dry Split Wood.

OPEN AIR CONTROLS



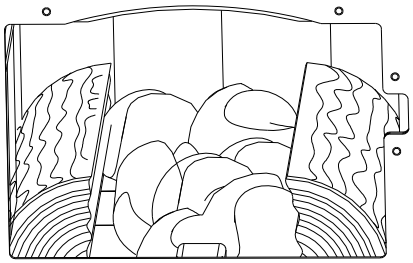
1

LOAD WOOD



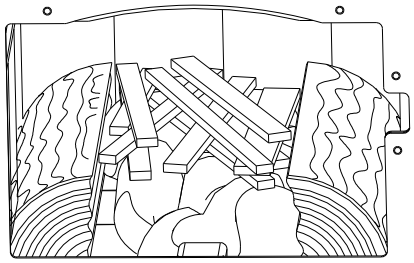
2

ADD NEWSPAPER



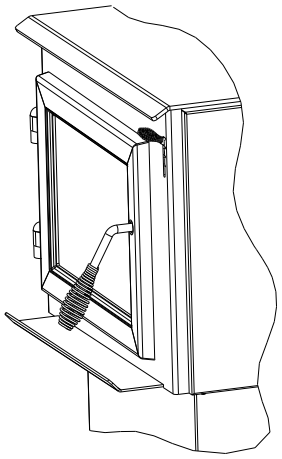
3

ADD KINDLING



LIGHT THE PAPER

4



Warning! Risk of Fire.

Close and securely latch the door after the fire has started, and after refueling, to prevent:

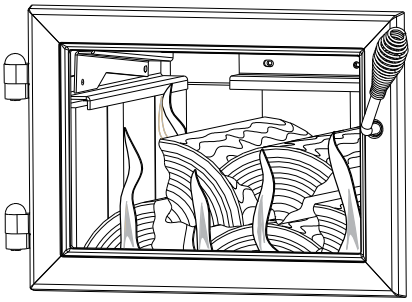
- Spillage of smoke, flame and carbon monoxide
- Spillage of sparks, coals, and logs
- Over firing

DO NOT leave the appliance unattended with the door open.

Starting a fire may not require an open door for draft. The air control should supply adequate draft.

5

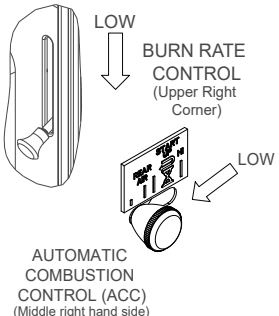
ADD MORE WOOD



6

REDUCE AIR CONTROLS

Set to desired heat output.



7

The appliance is ready for normal operation.

1 Listing and Code Approvals

A. Appliance Safety Certification

Model Number:	3100 Millennium Wood Appliance
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066S
Type:	Listed Room Appliance, Solid Fuel Type
Standard:	UL1482-11 (R2015) and ULC S627-00 and (UM) 84-HUD, Mobile Home Approved.

B. Appliance Emissions Certification

Model Number:	31M-ACC-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066E
➔ **Standard:**	ASTM E2515, ASTM E2780
Can be found at: www.quadrafire.com/about-us/epa-certification	

The 31M-ACC-C is Certified to comply with 2020 crib wood particulate emission standards.

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

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with **(UM) 84-HUD and NFPA211 in the U.S.A. and CAN/CSA-B365 Installation Codes in Canada**.

C. BTU & Efficiency Specifications

EPA Certification Number:	Number: 86-17
EPA Certified Emissions:	1.9 grams per hour
***LHV Tested Efficiency:**	78.3%
****HHV Tested Efficiency:**	72.5%
*****EPA BTU Output:**	13,900 to 29,100 / hr
******Peak BTU/Hour Output:**	51,000
Vent Size:	6 inches
Firebox Size:	1.89 cubic feet
Recommended Log Length:	16 inches
Fuel:	Seasoned Cord Wood (20% moisture)

* Weighted average LHV (Low Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. LHV assumes the moisture is already in a vapor state so there is no loss in energy to vaporize.

** Weighted average HHV (High Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. HHV includes the energy required to vaporize the water in the fuel.

*** A range of BTU outputs calculated using HHV Efficiency and the burn rates from the EPA tests, using Douglas Fir dimensional lumber.

**** A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and BTU content of seasoned cordwood (8600) times the efficiency.

D. Glass Specifications

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

E. Mobile Home Approved

- This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to **UL103 HT or a listed UL-1777** full length six inch (152mm) diameter liner must be used.
- Outside Air Kit, part OAK-ACC must be installed in a mobile home installation.

F. Sleeping Room

When installed in a sleeping room it is recommended that a smoke and/or CO alarm be installed in the bedroom. The size of the room must be at least 50ft³ per 1,000 Btu/hr stove input, if the stove exceeds the room size, outside air must be installed.

G. California - Prop65

WARNING

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

WARNING

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

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

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

Hearth & Home Technologies WILL NOT warranty stoves that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:

- Warped air tube
- Deteriorated refractory brick retainers
- Deteriorated baffle and other interior components

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

2 Operating Instructions

A. Over-Firing Your Appliance

WARNING

Fire Risk. Do not over-fire.
Over-firing may ignite creosote or will damage the appliance and chimney.

To prevent over-firing your appliance, DO NOT:

- Use flammable liquids
- Overload with wood
- Burn trash or large amounts of scrap lumber
- Permit too much air to the fire

Visit www.quadrafire.com/shopping-tools/videos to view product and use & care videos.

1. Symptoms of Over-Firing

Symptoms of over-firing may include one or more of the following:

- Chimney connector or appliance glowing
- Roaring, rumbling noises
- Loud cracking or banging sounds
- Metal warping
- Chimney fire

2. What To Do if Your Appliance is Over-Firing

- Immediately close the door and air controls to reduce air supply to the fire.
- If you suspect a chimney fire, call the fire department and evacuate your house.
- Contact your local chimney professional and have your appliance and appliance pipe inspected for any damage.
- Do not use your appliance until the chimney professional informs you it is safe to do so.

Hearth & Home Technologies WILL NOT warranty appliances that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:

- Warped air tube
- Deteriorated refractory brick retainers
- Deteriorated baffle and other interior components

B. Wood Selection & Storage

Burn only dry seasoned wood. Store wood under cover, out of the rain and snow. Dry and well-seasoned wood will not only minimize the chance of creosote formation, but will give you the most efficient fire. Even dry wood contains at least 15% moisture by weight, and should be burned hot enough to keep the chimney hot for as long as it takes to dry the wood out - about one hour. It is a waste of energy to burn unseasoned wood of any kind.

Dead wood lying on the forest floor should be considered wet, and requires full seasoning time. Standing dead wood can be considered to be about 2/3 seasoned. To tell if wood is dry enough to burn, check the ends of the logs. If there are cracks radiating in all directions from the center, it is dry. If your wood sizzles in the fire, even though the surface is dry, it may not be fully cured.

Splitting wood before it is stored reduces drying time. Wood should be stacked so that both ends of each piece are exposed to air, since more drying occurs through the cut ends than the sides. This is true even with wood that has been split. Store wood under cover, such as in a shed, or covered with a tarp, plastic, tar paper, sheets of scrap plywood, etc., as uncovered wood can absorb water from rain or snow, delaying the seasoning process.

C. Burning Process

In recent years there has been an increasing concern about air quality. Much of the blame for poor air quality has been placed on the burning of wood for home heating. In order to improve the situation, we at Quadra-Fire have developed cleaner-burning wood appliances that surpass the requirements for emissions established by our governing agencies. These wood appliances, like any other appliances, must be properly operated in order to insure that they perform the way they are designed to perform. Improper operation can turn most any wood appliance into a smoldering environmental hazard.

1. Kindling or First Stage

It helps to know a little about the actual process of burning in order to understand what goes on inside a appliance. The first stage of burning is called the kindling stage. In this stage, the wood is heated to a temperature high enough to evaporate the moisture which is present in all wood. The wood will reach the boiling point of water (212°F) and will not get any hotter until the water is evaporated. This process takes heat from the coals and tends to cool the appliance.

Fire requires three things to burn - fuel, air and heat. So, if heat is robbed from the appliance during the drying stage, the new load of wood has reduced the chances for a good clean burn. For this reason, it is always best to burn dry, seasoned firewood. When the wood isn't dry, you must open the air controls and burn at a high burn setting for a longer time to start it burning. The heat generated from the fire should be warming your home and establishing the flue draft, not evaporating the moisture out of wet, unseasoned wood, resulting in wasted heat.

2. Second Stage

The next stage of burning, the secondary stage, is the period when the wood gives off flammable gases which burn above the fuel with bright flames. During this stage of burning it is very important that the flames be maintained and not allowed to go out. This will ensure the cleanest possible fire. If the flames tend to go out, it is set too low for your burning conditions. The air control located at the upper right hand corner is used to adjust for burn rates. This is called the Burn Rate Air Control **(Figure 10.1)**.

3. Final Stage

The final stage of burning is the charcoal stage. This occurs when the flammable gases have been mostly burned and only charcoal remains. This is a naturally clean portion of the burn. The coals burn with hot blue flames.

It is very important to reload your appliance while enough lively hot coals remain in order to provide the amount of heat needed to dry and rekindle the next load of wood. It is best to open the Burn Rate Air and Start-Up Air Controls before reloading. This livens up the coal bed and reduces excessive emissions (opacity/smoke). Open door slowly so that ash or smoke does not exit appliance through opening. You should also break up any large chunks and distribute the coals so that the new wood is laid on hot coals.

Air quality is important to all of us, and if we choose to use wood to heat our homes we should do so responsibly. To do this we need to learn to burn our appliances in the cleanest way possible. Doing this will allow us to continue using our wood appliances for many years to come.

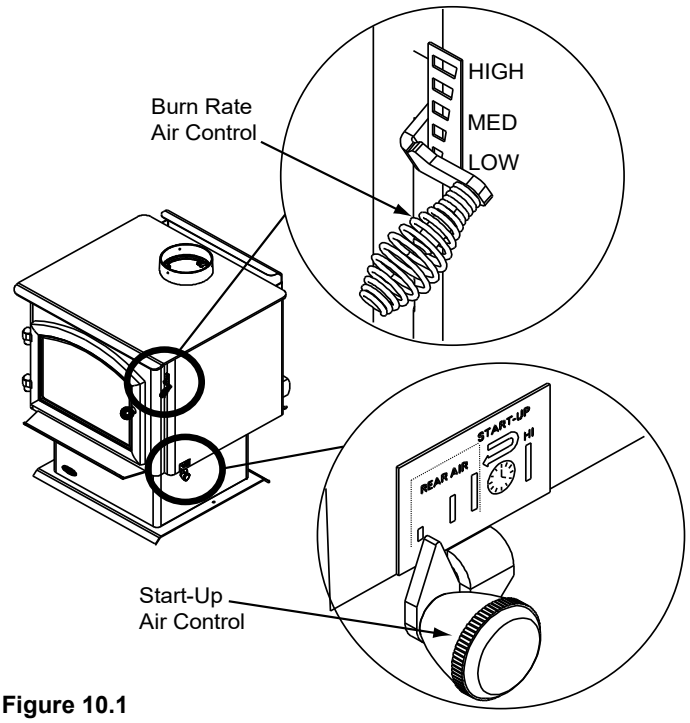


Figure 10.1

D. Air Controls

Users will need to find their preferred setting between high and low based on desired heat output, installation configuration, and fuel type.

1. Burn Rate Air Control

This air supply enters at the upper front of the firebox, near the top of the glass door. This preheated air supplies the necessary fresh oxygen to mix with the unburned gases, helping to create second, third and fourth combustions. This air is regulated by the Burn Rate Air Control. When the control is moved all the way up it is on the High setting and when moved all the way down it is on the Low setting **(Figure 10.1)**.

2. Automatic Combustion Control System (ACC)

To engage the Automatic Combustion Control (ACC) timer system push the lever towards the back of the appliance to the “HI” position, then pull forwards towards the front of the appliance until the knob stops. The timer will slowly close in about 25 minutes. Use this feature when reloading fuel or if you want more air supplied to the fire **(Figures 10.1 and Figure 10.2)**.

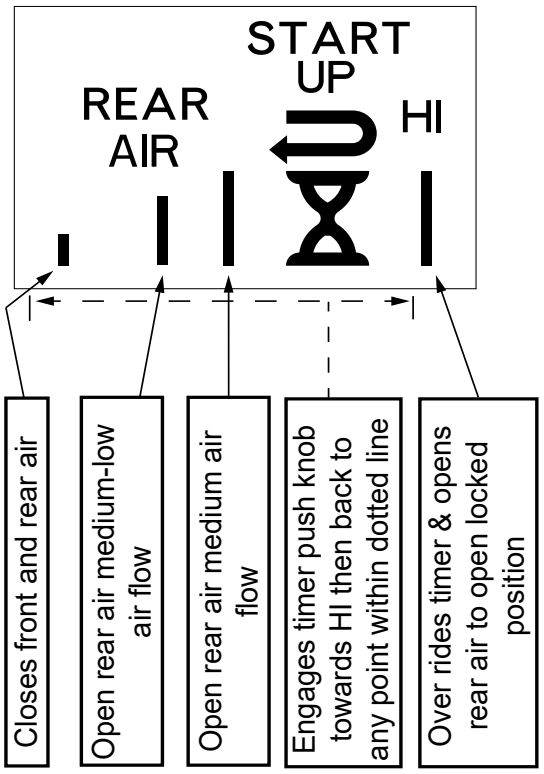


Figure 10.2

E. Using Burn Rate Air Control & ACC System

CAUTION

Injury Risk.
- Gloves recommended

1. **Start up and Reloading Fuel**
   Open both Burn Rate Air Control and ACC systems fully. To do this with the Burn Rate Air Controls push spring handle up to high. For the ACC timer system push knob towards back of appliance until the knob is located under the high position (**Figure 11.1).**

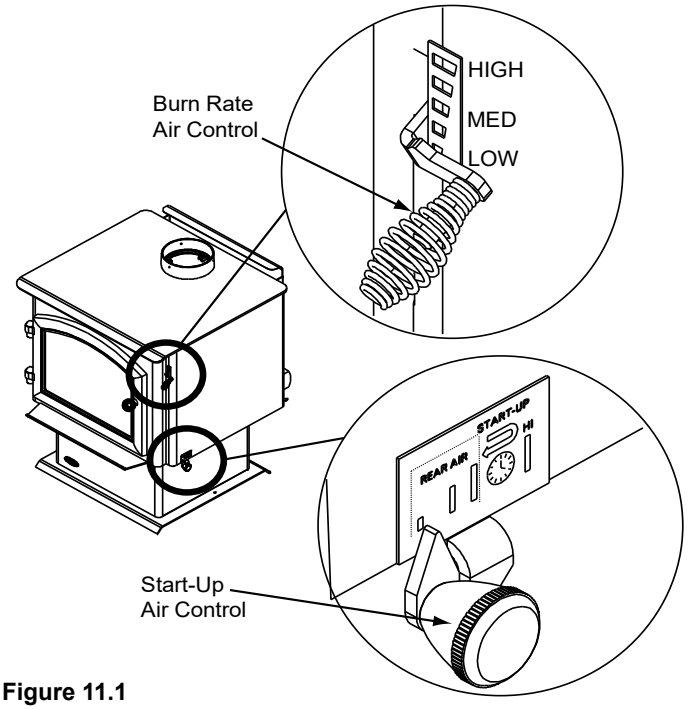


Figure 11.1

2. **Maximize Heat with The ACC System**
   To maximize heat output with the ACC timer System or also known as high burn push the ACC Air Control lever towards the back of the appliance and leave. This combined with having the main burn rate control lever pushed up will deliver the most amount of air needed to achieve the highest amount of heat output (**Figure 11.1).**

3. **Manual Timer Over-Ride**
   If you need to shut the ACC system off before it goes through the cycle of shutting itself off; 25 minutes, reach towards the back of the appliance on the right side and pull the lever towards the front of the appliance (**Figure 11.2).**

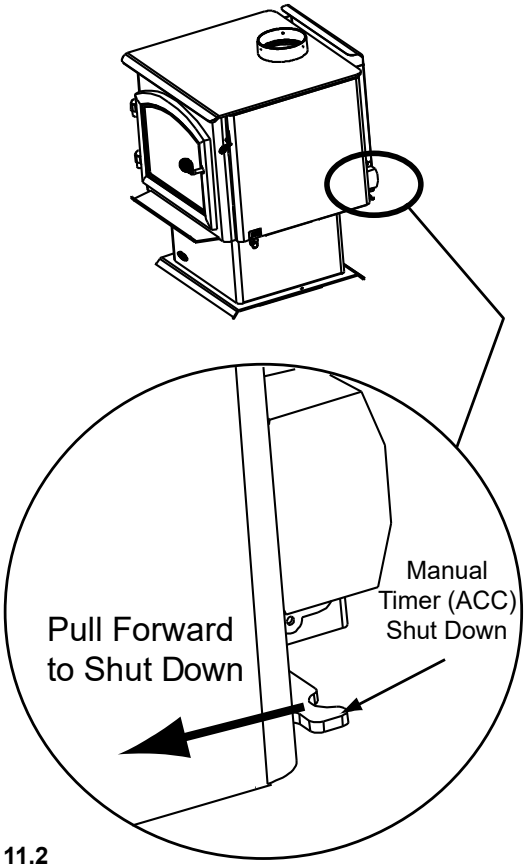


Figure 11.2

F. Burn Rates and Operating Efficiency

For maximum operating efficiency

This wood appliance has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood appliance in a manner inconsistent with operating instructions in this manual.

- Burn dry, well-seasoned wood.

Burn Rates

1. **Low burn setting:**
   - Burn Rate Air Control spring handle up to high position for 5 minutes.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops **(Figure 10.1 on page 10)**.
   - At that point close the Burn Rate Air Control by moving the spring handle to the low setting.

2. **Medium low burn setting:**
   - Burn Rate Air Control spring handle up to high position for 5 minutes.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops.
   - At that point move the Burn Rate Air Control spring handle to 1/8”-1/2” from the low setting.

3. **Medium high burn setting:**
   - Burn Rate Air Control spring handle up to high position.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops.
   - At that point move the Burn Rate Air Control spring handle to 1/2” – high.

4. **High burn setting:**
   - Burn Rate Air Control spring handle up to high position
   - Also activate ACC timer system knob pushed back to the “HI” position.

NOTE: If using the optional blower, for burn rate settings 1-3, the blower shall be off for the first 30 minutes and then be operated in the high position at 30 minutes. For high burn setting, blower may continue to be on full after the loading of the fuel.

NOTE: The above information is provided as a guideline only. Altitude and other circumstances may require control adjustments to achieve the desired burn rates.

NOTE: Operate appliance on High Burn 45 minutes a day to help keep flue/chimney clean.

WARNING

Risk of Fire.
When set on High Burn Rate and over-riding the Automatic Combustion Control system an over fire situation can occur and may result in a chimney fire.
Over firing will void the appliance warranty.

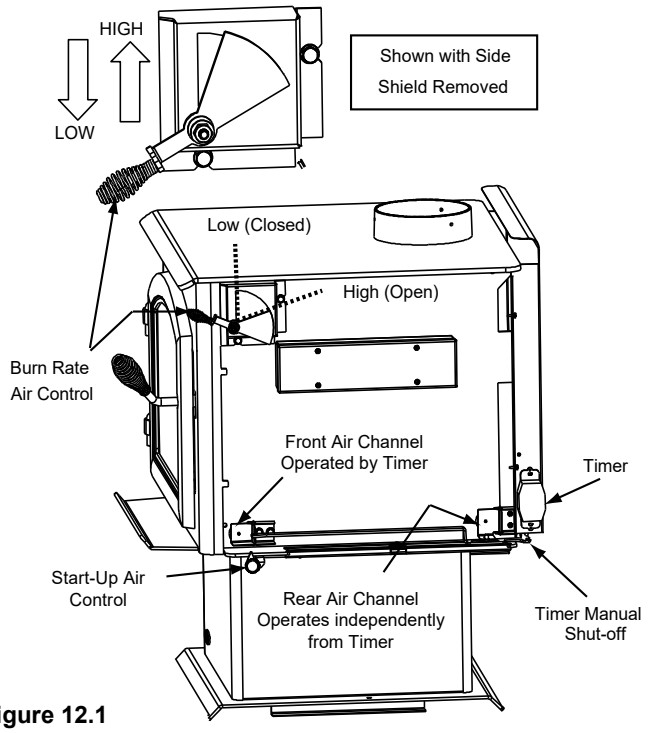


Figure 12.1

After activating the timer (ACC), if the control is placed within the rear air section on the label it will allow rear air to enter the firebox. This will not interfere with the timer gradually closing the front air channel in 25 minutes. If control is set on “HI” it over-rides the timer (ACC).

G. Building A Fire

Before lighting your first fire in the appliance:

NOTE: The special high temperature paint that your appliance is finished with will cure as your appliance heats. You will notice an odor and perhaps see some vapor rise from the appliance surface; this is normal. We recommend that you open a window until the odor dissipates and paint is cured.

1. Confirm the baffle is correctly positioned. It should be even with the front tube and resting on all tubes **(Figure 13.1 and Figure 13.2).**
2. Remove all labels from glass and inside of appliance.

There are many ways to build a fire. The basic principle is to light easily-ignitable tinder or paper, which ignites the fast burning kindling, which in turn ignites the slow-burning firewood. Here is one method that works well:

1. Open the Burn Rate Air and ACC Controls fully (Refer to **Start-Up Guide** on page 6).
2. Place several wads of crushed paper on the firebox floor. Heating the flue with slightly crumpled newspaper before adding kindling keeps smoke to a minimum.
3. Lay small dry sticks of kindling on top of the paper.
4. Make sure that no matches or other combustibles are in the immediate area of the appliance. Be sure the room is adequately ventilated and the flue unobstructed.
5. Light the paper in the appliance. NEVER light or rekindle fire with kerosene, gasoline, or charcoal lighter fluid; the results can be fatal.
6. Once the kindling is burning quickly, add several full-length logs 3 inches (76mm) or 4 inches (102mm) in diameter. Be careful not to smother the fire. Stack the pieces of wood carefully; near enough to keep each other hot, but far enough away from each other to allow adequate air flow between them.
7. Set the Burn Rate Air Control and activate the ACC timer system.
8. When ready to reload, It is best to fully open both the Burn Rate Air and Start-up Air Controls ***before reloading***. This livens up the coal bed and reduces excessive emissions (opacity/smoke). Open door slowly so that ash or smoke does not exit appliance through opening. Large logs burn slowly, holding a fire longer. Small logs burn fast and hot, giving quick heat.
9. As long as there are hot coals, repeating steps 6 through 8 will maintain a continuous fire.

WARNING

Fire Risk.

- Do not leave the fire unattended when the door is unlatched or when using the fire screen.
- Unstable firewood could fall out of the firebox creating a fire hazard to your home.

NOTE:

- Build fire on brick firebox floor.
- Do NOT use grates, andirons or other methods to support fuel. It will adversely affect emissions.

WARNING

Fire Risk.

Do NOT store wood:

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

Do NOT operate appliance:

- With appliance door open.
- With ash removal system door open.

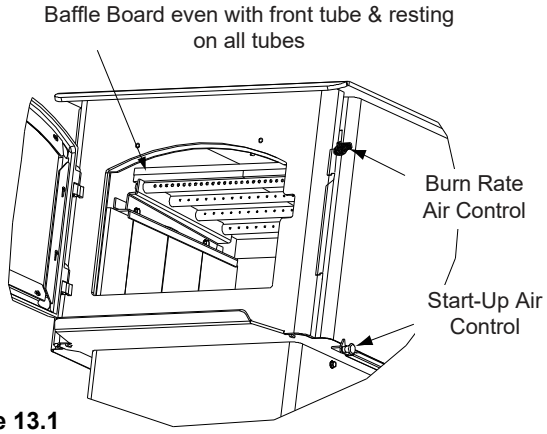


Figure 13.1

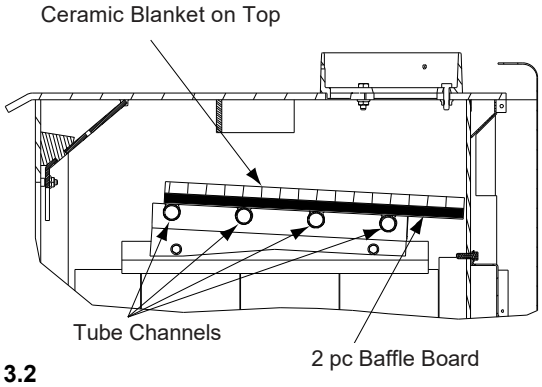


Figure 13.2

WARNING

Fire Risk.

- Do NOT burn wet or green wood.
- Store wood in dry location.
- Stack wood so both ends are exposed to air.

Wet, unseasoned wood can cause accumulation of creosote.

H. Blower Operating Instructions

NOTE: If your Quadra-Fire wood appliance is equipped with an optional blower, you should follow these guidelines:

1. **Initial (cold) start-up and all Burn Settings**
   The blower can be plugged in and turned on right away. The blower fan is turned on and off by a snap disc. When your appliance has reached a certain temperature the blower will turn on and when your appliance has cooled down to a certain temperature it will turn off. Switch on blower control must be set to auto for this feature to work.
2. The blower is equipped with a speed control. Adjust the fan speed by turning the speed control clockwise to “Low” or counterclockwise to “High”.
3. **Snap Disc Location**
   If you find the blower coming on and off at undesirable temperatures, relocate the snap disc to another location in the designated zone on the back of the appliance (**Figure 14.1).** There is a manual over-ride switch to deactivate the snap disc, if necessary **(Figure 14.2)**.

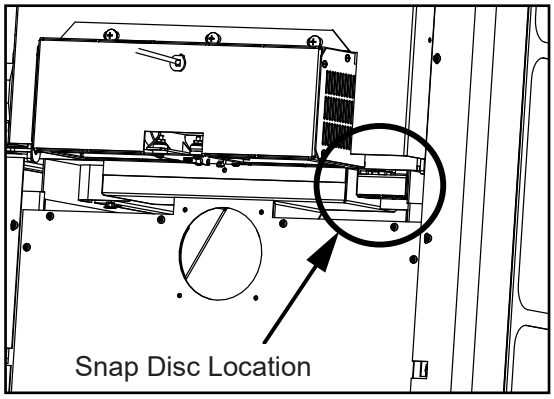


Figure 14.1

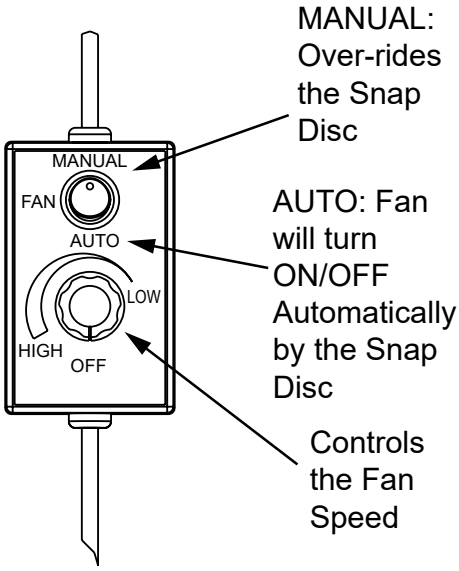


Figure 14.2

I. Opacity (Smoke)

This is the measure of how cleanly your appliance is burning. Opacity is measured in percent; 100% opacity is when an object is totally obscured by the smoke column from a chimney, and 0% opacity means that no smoke column can be seen. As you become familiar with your appliance, you should periodically check the opacity. This will allow you to know how to burn as nearly smoke-free as possible (goal of 0% opacity).

⚠ WARNING

Fire Risk.

- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.
- Do NOT burn treated wood or wood with salt (driftwood).
- May generate carbon monoxide if burn material other than wood.

May result in illness or possible death.

⚠ WARNING

Fire Risk.

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

- Do NOT store flammable materials in the appliance’s vicinity.
- DO NOT USE GASOLINE, LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR “FRESHEN UP” A FIRE IN THIS Appliance.
- Keep all such liquids well away from the appliance while it is in use.
- Combustible materials may ignite.

⚠ CAUTION

When burning your first fire, you will experience smoke and odor from the appliance resulting from the curing of paint and burning off of any oils remaining from manufacturing.

OPEN WINDOWS DURING INITIAL BURN TO DISSIPATE SMOKE AND ODORS!

- Odors may be irritating to sensitive individuals.
- Smoke detectors may activate.

J. Clear Space

NOTE: Do NOT place combustible objects within 4 ft (1.2m) of the front of appliance **(Figure 15.1)**.

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

WARNING

Do NOT place combustible objects in front of the appliance. High temperatures may ignite clothing, furniture or draperies.

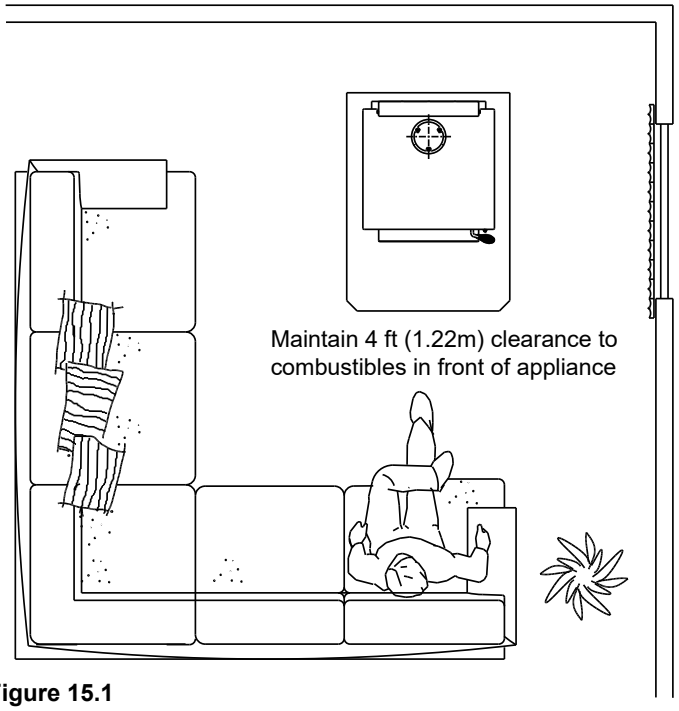


Figure 15.1

K. Negative Pressure

WARNING

Asphyxiation Risk.

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

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

Causes include:

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

To minimize the effects of negative air pressure:

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

L. Frequently Asked Questions

ISSUES	SOLUTIONS
Odor from appliance	When first operated, this appliance may release an odor for the first several hours. This is caused by the curing of the paint and the burning off of any oils remaining from manufacturing.
Metallic noise	Noise is caused by metal expanding and contracting as it heats up and cools down, similar to the sound produced by a furnace or heating duct. This noise does not affect the operation or longevity of the appliance.
Whirring sound	If the optional blower has been installed, the blower produces a whirring sound which increases in volume as the speed is increased.

CONTACT YOUR DEALER for additional information regarding operation and troubleshooting.
Visit www.quadrafire.com to find a dealer.

Table 16.1

WARNING

Fire Risk.

- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.
- Do NOT burn treated wood or wood with salt (driftwood).
- May generate carbon monoxide if burn material other than wood.

May result in illness or possible death.

WARNING

Fire Risk.

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

- Do NOT store flammable materials in the appliance's vicinity.
- DO NOT USE GASOLINE, LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS APPLIANCE.
- Keep all such liquids well away from the appliance while it is in use.
- Combustible materials may ignite.

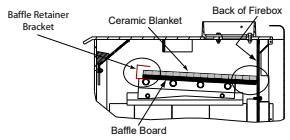
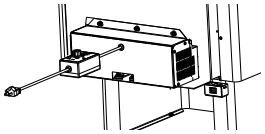
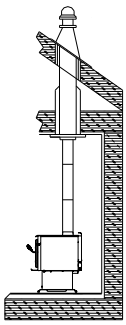
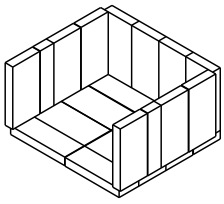
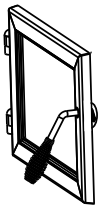
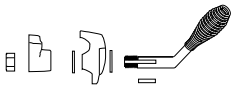
3 Maintenance and Service

A. Quick Reference Maintenance Guide

When properly maintained, your fireplace will give you many years of trouble-free service. Contact your dealer to answer questions regarding proper operation, troubleshooting and service for your appliance. Visit www.quadrafire.com/owner-resources to view basic troubleshooting, FAQs, use & care videos.

CAUTION

Allow the appliance to completely cool down before performing any cleaning or maintenance. Start the first inspection after the first 2 months of use, or if performance changes, and adjust your schedule accordingly. Maintenance is required for safe operation and must be performed to maintain your warranty.

	FREQUENCY	TASK
Baffle & Blanket 	MONTHLY or after every one (1) cord of wood	Baffle and blanket placement is critical to heat output, efficiency and overall life of the appliance. Make sure the baffle is pushed all of the way to the back of the firebox and the blanket is laying flat. Inspect baffle for cracks.
Optional Blower 	YEARLY or after every four (4) cords of wood	Vacuum the blower impellers.
Chimney System 	EVERY TWO MONTHS or after every four (4) cords of wood	The chimney and chimney cap must be inspected for soot and creosote every two months during the burn season or more frequency if chimney exceeds or is under 14-16 ft (4.3m-4.8m) measured from bottom of appliance. This will prevent pipe blockage, poor draft, and chimney fires. Always burn dry wood to help prevent cap blockage and creosote build-up.
Firebrick & Ash Removal 	WEEKLY or after every 25 loads of wood	Ashes must be cool before you can dispose of the ashes in a non-combustible container. Firebrick is designed to protect your firebox. After ashes are removed, inspect the firebrick and replace firebricks that are crumbling, cracked or broken.
Door & Glass Assemblies 	WEEKLY or after every 25 loads of wood	Keep door and glass gasket in good shape to maintain good burn. To test: place a dollar bill between the appliance and door and then shut the door. If you can pull the dollar out, remove one washer from door handle behind latch cam and try again. If you can still pull it out, replace the door gasket. Check the glass frame for loose screws to prevent air leakage. Check glass for cracks.
Door Handles 	WEEKLY or after every 25 loads of wood	Check the door latch for proper adjustment. This is very important especially after the door rope has formed to the appliance face. Check door handle for smooth cam operation.

These are generic drawings and may not represent your model.

Table 17.1

B. General Maintenance

1. Creosote (Chimney) Cleaning

- **Frequency:** Every 2 months during heating season or as recommended by a certified chimney sweep; more frequently if chimney exceeds or is under 14-16 ft. (measured from bottom of appliance)
- **By:** Certified Chimney Sweep

Remove all ash from the firebox and extinguish all hot embers before disposal. Allow the appliance to cool completely. Disconnect flue pipe or remove baffle and ceramic blanket from appliance before cleaning chimney. Otherwise residue can pile up on top of the baffle and ceramic blanket and the appliance will not work properly. (See **Baffle Removal** on page 24). Close the door tightly. The creosote or soot should be removed with a brush specifically designed for the type of chimney in use. Clean out fallen ashes from the firebox.

It is also recommended that before each heating season the entire system be professionally inspected, cleaned and repaired if necessary.

Inspection:

Inspect the system at the appliance connection and at the chimney top. Cooler surfaces tend to build creosote deposits quicker, so it is important to check the chimney from the top as well as from the bottom.

Formation and Need For Removal:

When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote.

The creosote vapors condense in the relatively cool chimney flue of a newly-started or a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote creates an extremely hot fire which may damage the chimney or even destroy the house.

The chimney connector and chimney should be inspected once every 2 months during the heating season to determine if a creosote or soot buildup has occurred. If creosote or soot has accumulated, it should be removed to reduce the risk of a chimney fire.

WARNING

Fire Risk.
Prevent creosote buildup.

- Inspect chimney connector and chimney once every two months during heating season.
- Remove creosote to reduce risk of chimney fire.
- Ignited creosote is extremely HOT.

WARNING

Fire Risk.

- Do not use chimney cleaners or flame colorants in your appliance. Will corrode chimney pipe.

2. Disposal of Ashes

- **Frequency:** When ash is within 1-3/4 in. (44mm) of firebox lip
- **By:** Homeowner

WARNING

Fire Risk.
Ashes could contain hot embers.

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

WARNING

Fire Risk. Disposal of Ashes

- Ashes should be placed in metal container with tight fitting lid.
- Do not place metal container on combustible surface.
- Ashes should be retained in closed container until all cinders have thoroughly cooled.

3. Appliance Inspection

- **Frequency:** Every 2 months at the same time the chimney and chimney connector are inspected.
- **By:** Homeowner

Check for:

- Cracks in glass
- Door handle - smooth cam operation
- Baffle and ceramic blanket correct placement
- Baffle for warp-age
- Firebrick for cracks, broken or crumbly
- Door gasket (Dollar bill test): Place a dollar bill between the stove and the door and then shut the door. If you can pull the dollar bill out, replace the door gasket.
- Glass frame for loose screws

4. Glass Cleaning

- **Frequency:** As desired
- **By:** Homeowner

CAUTION

Handle glass assembly with care. Glass is breakable.

- Avoid striking, scratching or slamming glass
- Avoid abrasive cleaners
- Do not clean glass while it is hot

Clean glass with a non-abrasive glass cleaner. Abrasive cleaners may scratch and cause glass to crack. If the deposits on the glass are not very heavy, normal glass cleaners work well. Heavier deposits may be removed by using a damp cloth dipped in wood ashes or by using a commercially available oven cleaner.

After using an oven cleaner, it is advisable to remove any residue with a glass cleaner or soap and water. Oven cleaner left on during the next firing can permanently stain the glass and damage the finish on metal surfaces.

A portion of the combustion air entering the firebox is deflected down over the inside of the door glass. This air flow “washes” the glass, helping to keep smoke from adhering to its surface.

When operated at a low burn rate, less air will be flowing over the glass and the smokey, relatively cool condition of a low fire will cause the glass to become coated.

Operating the appliance with the Burn Rate Air Control and Start-Up Air Control all the way open for 30-45 minutes should remove the built up coating.

CAUTION

- Do not use polishes with abrasives. It will scratch surfaces.

5. Cleaning Plated Surfaces

- **Frequency:** Prior to first burn and then as desired
- **By:** Homeowner

Clean all the fingerprints and oils from plated surfaces **BEFORE** firing the appliance for the first time. If not cleaned properly before lighting your first fire, the oils can cause permanent markings on the plating.

After the plating is cured, the oils will not affect the finish and little maintenance is required. Wipe clean as needed.

CAUTION

- Do not use polishes with abrasives. It will scratch plated surfaces.

6. Inspect Firebrick

- **Frequency:** After each ash removal
- **By:** Homeowner

Replace the firebrick if they become crumbly and/or if there is a 1/4 inch (6.35mm) gap between the bricks.

The firebox is lined with firebrick, which has exceptional insulating properties. Do not use a grate; simply build a fire on the firebox floor. Do not operate appliance without firebrick.

1. After the coals have completely cooled, remove all old brick and ash from unit and vacuum firebox.
2. Remove new brick set from box and lay out to the diagram shown in the instructions that come with the brick set or refer to the diagram on the service parts list at the end of this manual.
3. Lay bottom bricks in unit.
4. Install rear bricks on the top of the bottom bricks. Slide top of bricks under clip on back of firebox wall and push bottom of bricks back.
5. Install side bricks. Slide top of brick under clips on side of firebox and push the bottom of the brick until it is flush with the side of the unit.

C. Correct Baffle & Blanket Placement

WARNING

Fire Risk.
Firebox damage due to improper baffle placement is not covered by warranty. Operate the wood burning appliance with the baffle in the correct position only.

Not doing so could result in:
- Reduced efficiency
- Overheating the chimney
- Overheating the rear of the firebox
- Poor performance

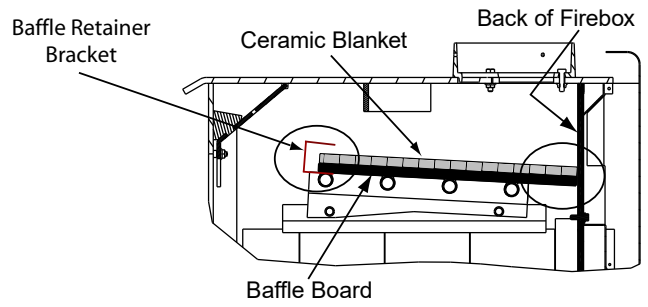
Ensure correct baffle placement and replace baffle components if damaged or missing.

CAUTION

The baffle boards are FRAGILE. Use extreme caution when loading firewood to prevent:
- Cracking, breaking or damaging the baffle boards

DO NOT operate the appliance without baffle boards

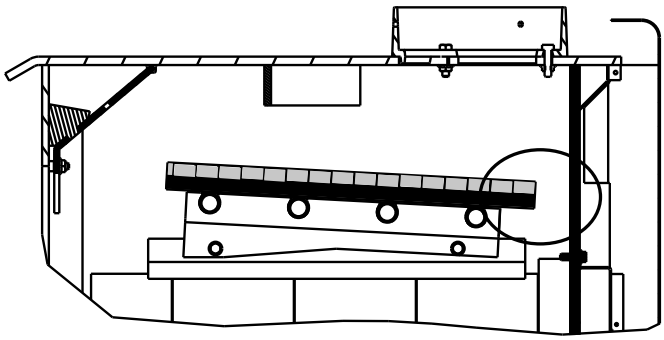
CORRECT POSITION



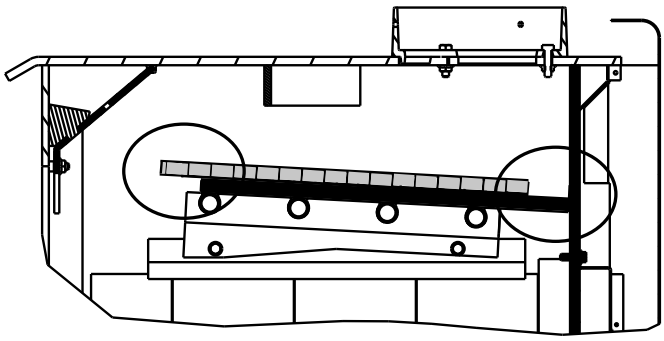
Ceramic Blanket and Baffle Board MUST be in contact with the back of the firebox and even with each other in the front.

Figure 20.1

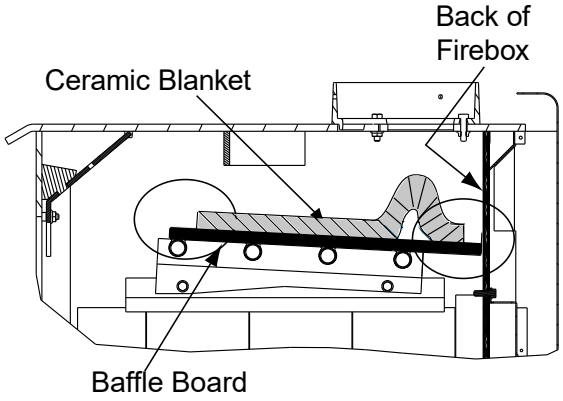
INCORRECT POSITIONS



Ceramic Blanket and Baffle Board are NOT in contact with the back of the firebox.



Ceramic Blanket is NOT in contact with the back of the firebox and NOT even with the Baffle Board in the front.



Ceramic Blanket is bunched up at the back of the firebox and NOT even with the Baffle Board in the front.

Figure 20.2

4 Troubleshooting Guide

With proper installation, operation, and maintenance your wood appliance will provide years of trouble-free service. If you do experience a problem, this troubleshooting guide will assist you or a qualified service person in the diagnosis of a problem and the corrective action to be taken.

Start Fire Problems	Possible Cause	Solution
Can not get fire started Excessive smoke or spillage Burns too slowly Not enough heat output	Not enough kindling/paper or no kindling/paper	Use dry kindling, more paper. Arrange kindling & wood for air movement.
	Not enough air for fire to ignite	Check for restricted termination cap
		Check for blockage of outside air kit (if installed).
		Check for flue blockage.
		Pre-warm flue before starting fire (refer to **Building a Fire** on page 13).
		Check for adequate vent height (refer to **Chimney Height / Rise and Run** on **page 13** of the Installation manual).
		Open window below the appliance towards the wind.
	Wood condition is too wet, too large	Use dry, seasoned wood (refer to **Wood Selection and Storage** on page 9).
	Bed of coals not established before adding wood	Start with paper & kindling to establish bed of coals (refer to **Building a Fire** on page 13).
	Flue blockage such as birds' nests or leaves in termination cap	Have chimney inspected for creosote and cleaned by a certified chimney sweep.
	Down draft or negative pressure Competition with exhaust devices	Do not use exhaust fans during start-up (refer to **Negative Pressure** on page 15).
		Open window below the appliance towards the wind.
Fire burns too fast	Extremely dry or soft wood	Mix in hardwood.
		Mix in less seasoned wood after fire is established (refer to **Wood Selection and Storage** on page 9).
	Over drafting	Check for correct vent height; too much vertical height creates over drafting.
		Check location of vent termination (refer to **Chimney Termination Requirements** on **page 12** of the Installation manual).

Table 21.1

5 Service Part Replacement

A. Glass

NOTE: Replace with 5mm ceramic glass only.

Service Part: 7000-012

1. Ensure that the fire is out and the appliance is cool to the touch.
2. Protect a table or counter top with padding or towels. Protect your hands and wear gloves to prevent injury.
3. Remove the door with the broken glass by lifting the door up and off of the hinges.
4. Lay door face down on a table or counter making sure the handle hangs over the edge so the door lays flat, on a soft surface.
5. Remove the screws from each glass retainer and remove the glass. (If screws are difficult to remove, soak with penetrating oil first).
6. Center the glass with edges evenly overlapping the opening in the door, (i.e. same space top and bottom, left and right sides).
7. Replace the glass retainers. Be careful not to cross thread the screws.
8. Tighten each retainer just a few turns until each is secured. Check again for centering of glass in door frame. Continue to tighten each retainer alternately, a few turns at a time, until the glass is secure.

NOTE: DO NOT OVER TIGHTEN RETAINERS - can cause glass to break.

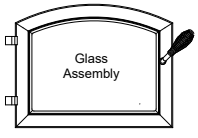
9. Replace the door on the appliance.

Quadra-Fire appliances are equipped with ceramic super heat-resistant glass, which can only be broken by impact or misuse.

WARNING

Injury Risk.
- Use only glass specified in manual.
- DO NOT REPLACE with any other material.

CAUTION



Handle glass assembly with care.
When cleaning glass:

- Avoid striking, scratching or slamming glass.
- Do NOT clean glass when hot.
- Do NOT use abrasive cleaners.
- Use a hard water deposit glass cleaner on white film.
- Use commercial oven cleaner on heavier deposits.
- Remove all residue of oven cleaner or will permanently stain glass on next firing.

Refer to maintenance instructions.

B. Firebrick

Service Part: SRV7033-006

Replace the firebrick if they become crumbly and/or if there is a 1/4 inch (6.35mm) gap between the bricks.

Inspect the firebrick after each ash removal.

The firebox is lined with high quality firebrick, which has exceptional insulating properties. There is no need to use a grate; simply build a fire on the firebox floor. Do not operate appliance without firebrick.

1. After the coals have completely cooled, remove all old brick and ash from appliance and vacuum firebox.
2. Remove new brick set from box and lay out to diagram shown.
3. Lay bottom bricks in appliance.
4. Install rear bricks on the top of the bottom bricks. Slide top of bricks under clip on back of firebox wall and push bottom of brick back.
5. Install side bricks. Slide top of brick under clips on side of firebox and push the bottom of the brick until it is flush with the side of the appliance.

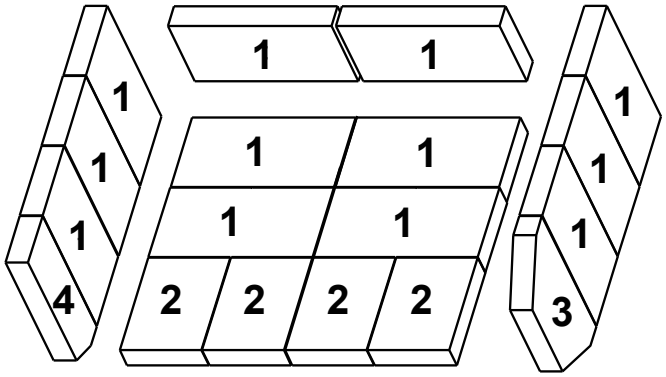


Figure 22.1

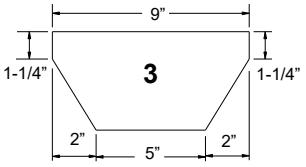


Figure 22.2

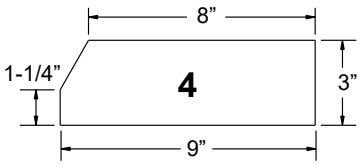


Figure 22.3

Placement	Dimensions	Qty Required
1	9” x 4.5” x 1.25”	12
2	6” x 4.5” x 1.25”	4
3	9” x 4.5” x 1.25” w/Angles	1
4	9” x 3” x 1.25” w/Angle	1

Table 22.1

C. Snap Disc

Service Part: SRV230-0470

1. Locate the snap disc bracket assembly at the bottom left rear corner of the appliance.
2. A magnet holds the bracket to the appliance. Pull the bracket down away from the appliance to expose the snap disc.
3. Pull the snap disc and spade connectors up and out of bracket as shown in **Figure 23.1**
4. Using a Phillips head screw driver, remove the 2 screws from the snap disc and then remove the snap disc from the spade connectors. Replace with new snap disc and re-connect to spade connectors.
5. Push the snap disc and spade connectors back inside bracket and re-attach the bracket to the appliance.

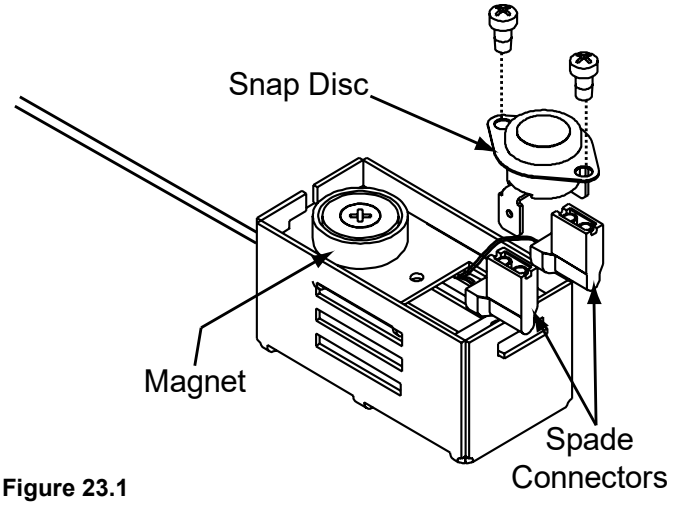


Figure 23.1

D. Door Handle Assembly

CAUTION

Do not over tighten lock nut. The door handle needs to move smoothly.

Service Part: 832-0540

1. Install washer on door handle shaft.
2. Slide door handle through door.
3. Install second washer(s) as shown in **Figure 23.2.**
4. Install key in groove.
5. Align groove in latch cam with key; slide latch cam over shaft
6. Install locknut but do not over tighten, the handle needs to move smoothly.
7. Install spring handle turning in a counter-clockwise motion to **<u>required</u>** 2 inch (51mm) clearance location on door handle rod (**Figure 23.2).**

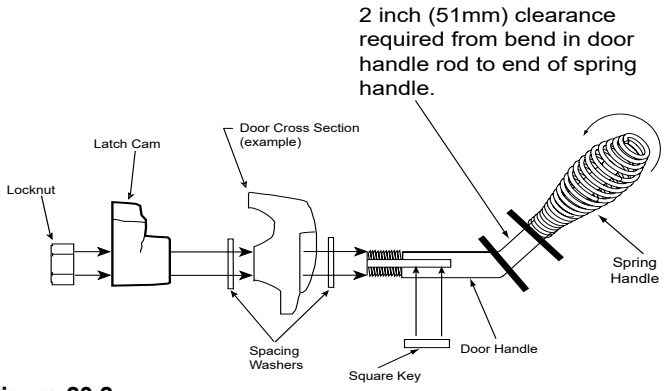


Figure 23.2

E. Baffle Removal

Service Part: SRV7033-209

1. Remove all ash from the firebox, and extinguish all hot embers before disposal into a metal container.
2. The baffle board has 2 pieces; with the ceramic blanket still in place, slide one baffle piece over the top of other one and pull out top piece through the door opening and then remove bottom baffle piece **(Figure 24.1)**.
3. Remove the ceramic blanket **(Figure 24.2)**.
4. Re-install the baffle pieces one piece at a time. Be sure the baffle boards are even with the front manifold tube and is resting on all tubes **(Figures 243.1, Figure 24.3, and Figure 24.4)**.
5. To re-install the ceramic blanket, it is easier to fold it in half first. Place on top of baffle board, open up and flatten and smooth out the blanket. Re-check the baffle board for correct positioning **(Figure 24.3)**.

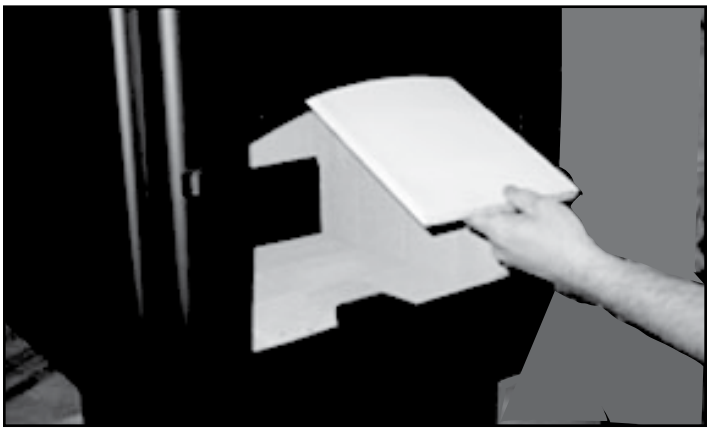


Figure 24.1 - Baffle

Figure 24.2 - Ceramic Blanket

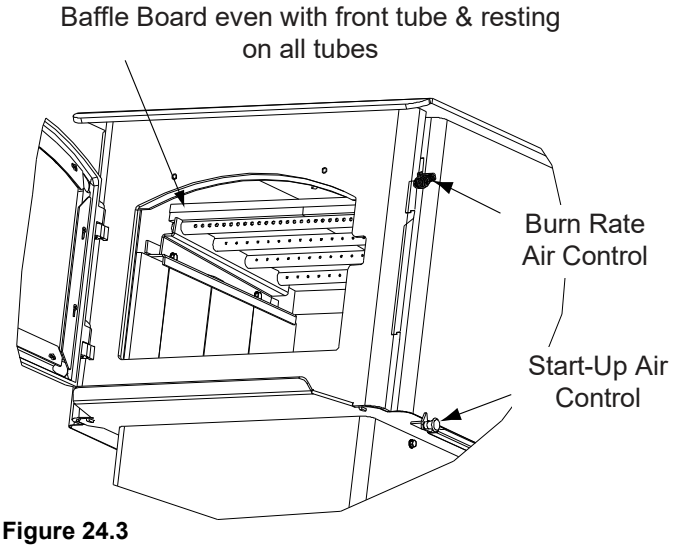


Figure 24.3

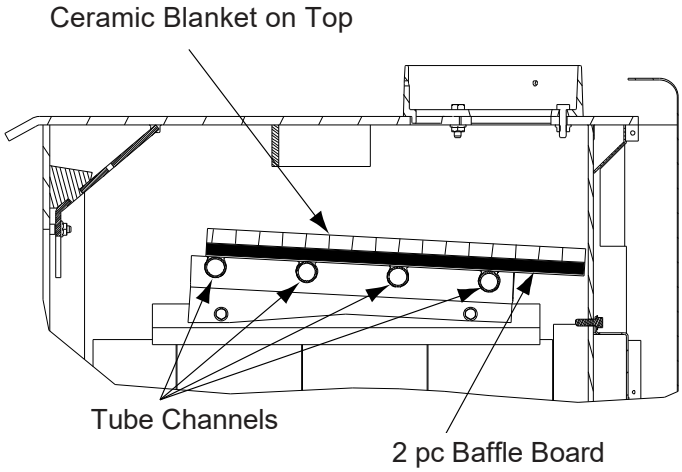


Figure 24.4

F. Tube Channel Assembly

Service Part: SRV7033-023

Removing Tube Channel Assembly

1. Remove the right side shield by removing 2 screws in the back using a Phillips head screw driver.
2. Remove 4 screws from channel access cover and remove cover.
3. Locate 2 channel nuts inside of chamber and remove using a 7/16 socket wrench. Slide out tube channel assembly.

NOTE: Soak the bolts with penetrating oil for at least 15 minutes before trying to remove them.

Replacing Tube Channel Assembly

1. Slide one gasket onto each tube.
2. Slide the tube channel assembly into side of firebox and insert each tube into the corresponding hole in the tube channel rack starting with the back hole first.
3. Make sure tube channel assembly is flush against the side of the appliance and secure with channel nuts.
4. Re-install channel cover and side shield.

NOTE: Service Space
In order to replace the tube channel assembly a clearance of 19 inches (483mm) is required on the right side of appliance in order to remove the tubes with the appliance in place.

If space is not available, the appliance will have to be disconnected from the chimney to proceed with the tube replacement.

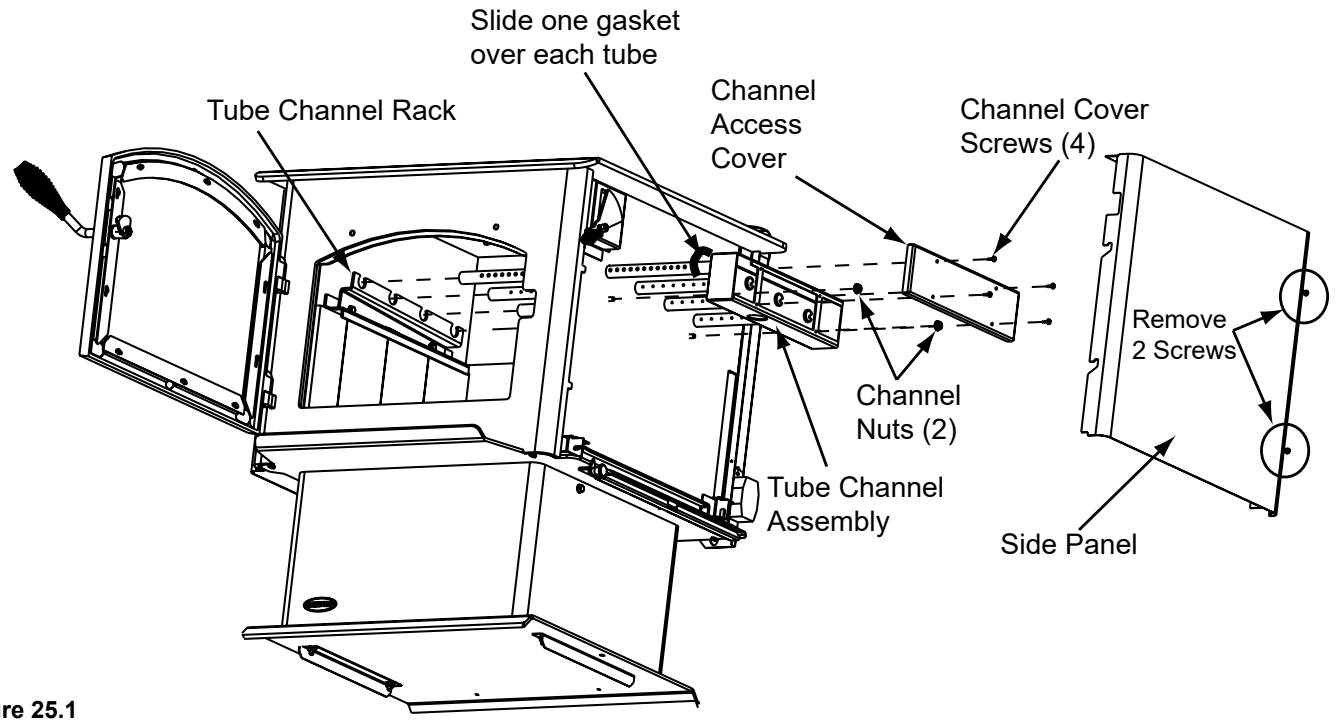


Figure 25.1

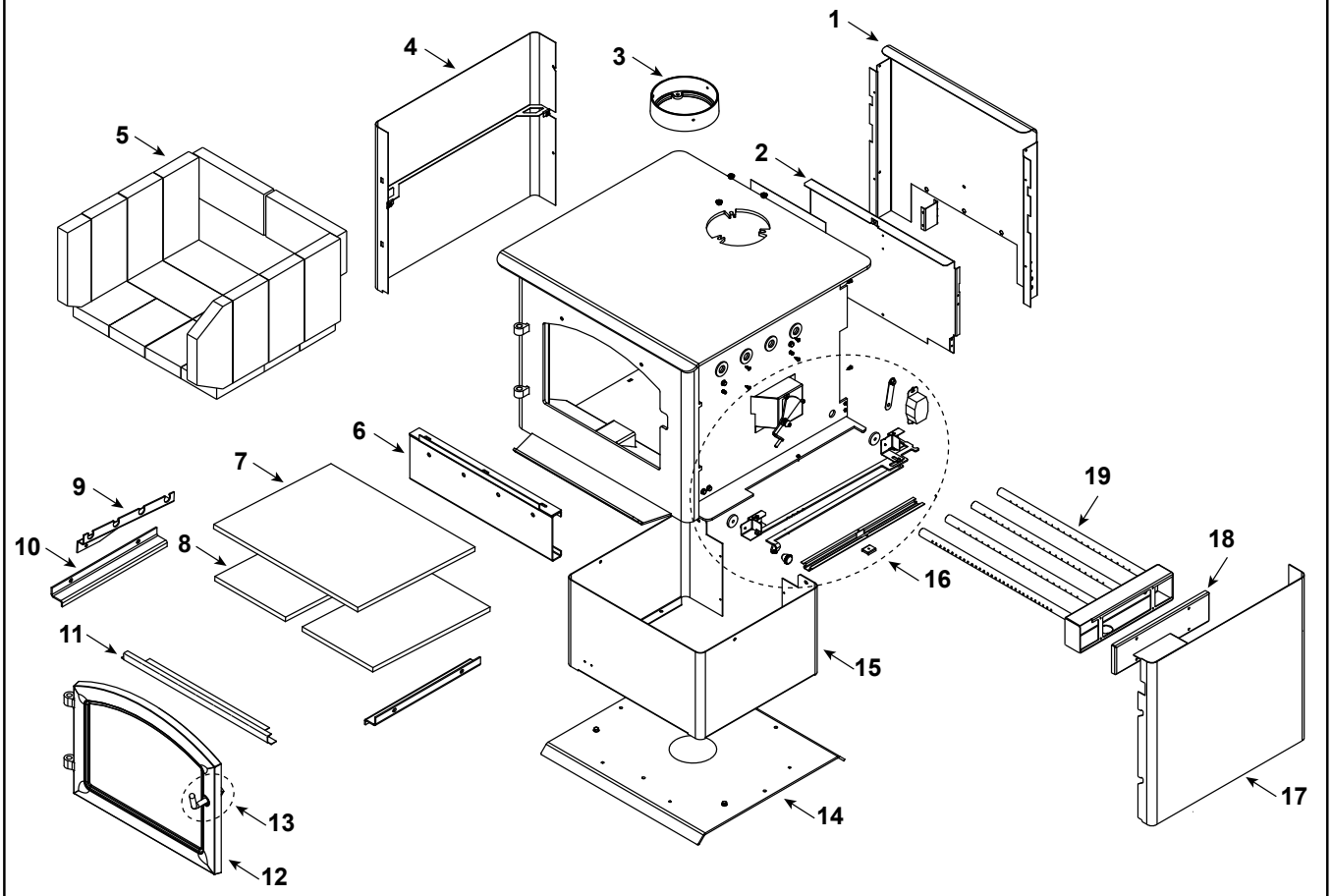
6 Reference Materials

A. Service and Maintenance Log

Date of Service	Performed By	Description of Service

Date of Service	Performed By	Description of Service

B. Exploded View



Part number list on following page.

07/21

C. Service Parts

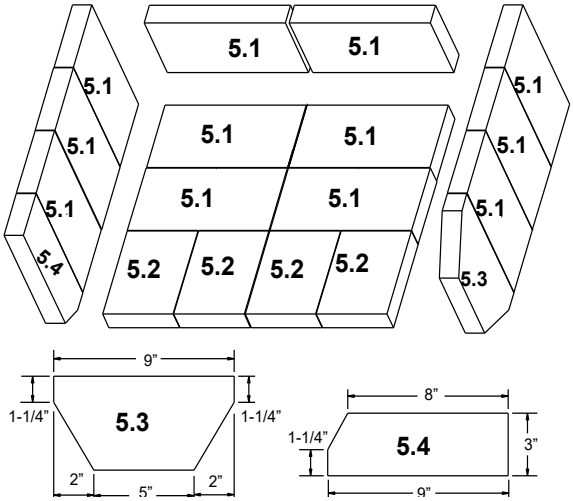
QUADRA-FIRE® **Service Parts** **31M-ACC-C**

Beginning Manufacturing Date: June 2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
1	Air Channel, Convection w/Bracket (Retain Original SN Label)		SRV7033-144	
2	Air Supply Back		SRV7033-134	
3	Flue Collar		SRV7000-302	Y
4	Panel Assembly, Side, Left		SRV7033-019	

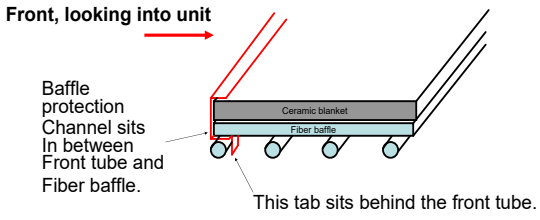
 # 5 Brick Set



5	Brick Assembly - Complete Set	Pkg of 18	SRV7033-006	
5.1	Brick, 9 x 4-1/2 x 1-1/4" (Qty. 12 Req.)	Pkg of 1	832-0550	
		Pkg of 6	832-3040	
5.2	Brick, 6 x 4-1/2 x 1-1/4"	Qty. 4 Req.	SRV7128-002	
5.3	Brick, 9 x 4-1/2 x 1-1/4" w/angles, see diagram	Qty. 1 Req.	SRV7128-805	
5.4	Brick, 9 x 3 x 1-1/4" w/angle, see diagram	Qty. 1 Req.	SRV7128-617	
6	Rear Channel Assembly		SRV7033-002	Y
7	Ceramic Fiber Blanket, 1/2" Thick (19" W x 13-3/4" H)		832-3390	Y
8	Baffle Board - 9-1/2 in W x 13-3/4 in H	Pkg of 2	SRV7033-209	Y
9	Tube Support Rack		SRV7033-148	
10	Brick Retainer		SRV7033-149	

#11 Baffle Protection Channel

Side view

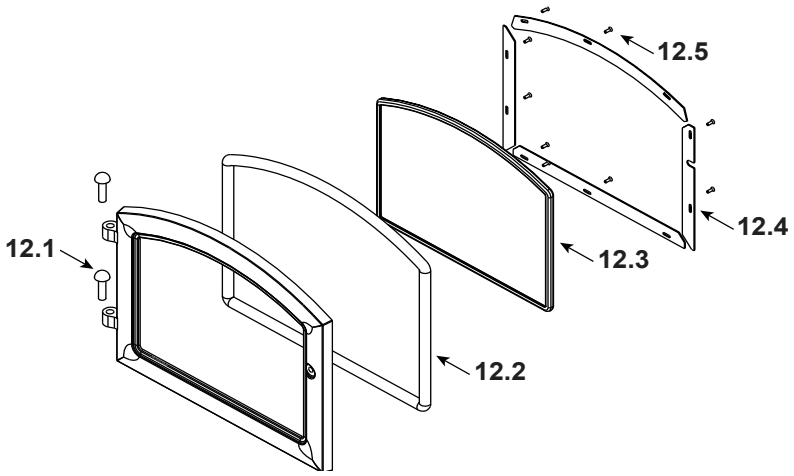


11	Baffle Protection channel		SRV7033-298	

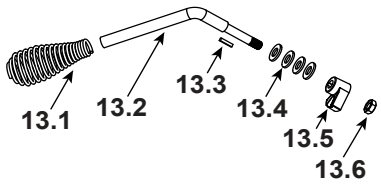
Additional service part numbers appear on following page.

Beginning Manufacturing Date: June 2017
Ending Manufacturing Date: Active

#12 Door Assembly



#13 Handle Assembly



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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
12	Door Assembly	Black	DR-31/43BK-FH	Y
		Nickel	DR-31/43NL-FH	Y
12.1	Hinge Pins, 1/2”	Black	7000-606/2	Y
		Nickel	SRV430-5320	
12.2	Rope, Door, 3/4” x 84” - Field cut to Size	7 Ft Length	832-1680	Y
12.3	Door Glass Assembly - 15-1/2” W x 13-3/8” H		SRV7000-012	Y
	Gasket, Glass Tape - Field cut to Size	5 Ft Length	832-0460	Y
12.4	Glass Frame Set		832-0350	
12.5	Screw, Flat Head Philips 8-32 x 1/2	Pkg of 12	220-0490/12	Y
13	Door Handle Assembly		832-0540	
13.1	Handle, Spring	Black	SRV7000-613	Y
		Nickel	250-8330	Y
13.2	Door Handle, Formed		SRV430-1131	Y
13.3	Key, Cam Latch		SRV430-1151	
13.4	Washer, SAE, 3/8	Pkg of 3	832-0990	Y
13.5	Cam Latch		SRV430-1141	
13.6	Nut, Locking Door Handle	Pkg of 24	226-0100/24	Y
	Component Pack: (Spring Handles(1) 1/2” & (2) 1/4”, 2 Hinge Pins, & Quadra-Fire Logo)	Nickel	436-5360	

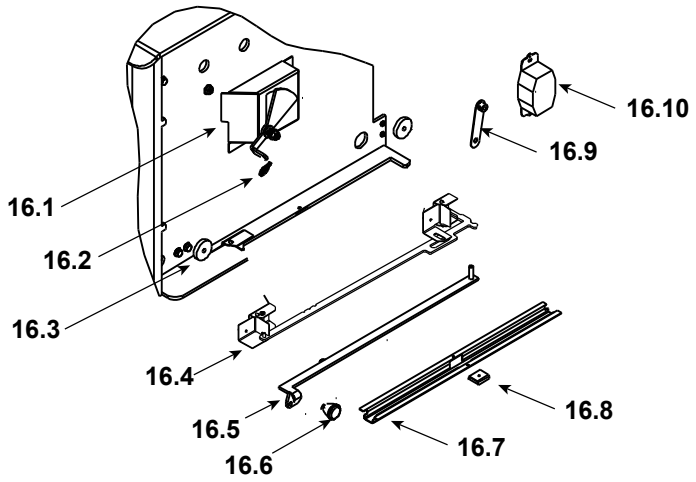
Additional service part numbers appear on following page.

Beginning Manufacturing Date: June 2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
14	Pedestal Riser		SRV7033-207	
15	Pedestal Base		SRV7033-163	
	Logo, Quad Black	Pkg of 10	7000-649/10	

#16 Burn Rate Controls & Accociated Parts



16.1	Burn Rate Control Assembly		SRV7033-033	Y
16.2	Spring Handle, 1/4”, Black		SRV7000-614	Y
16.3	Door Gasket - Front & Rear Air Timer Doors		7033-282	Y
16.4	Timer Air Control Assembly		SRV7033-052	Y
	Rear Air Door Assembly		SRV7033-024	Y
16.5	Rear Air Control Arm Assembly		SRV7033-035	Y
16.6	Start-Up Control Knob		SRV7000-343	
16.7	Air Control Rod Guide		SRV7033-210	
16.8	Latch, Magnet	For Air Control	SRV229-0631	
16.9	Timer Arm Assembly		SRV7033-034	Y
16.10	Timer (Only) Replacement Assembly		SRV480-1940	Y
17	Panel Assembly, Side, Right		SRV7033-017	
18	Tube Channel Top - Tube Channel Access Cover		SRV7033-237	
19	Tube, Channel Assembly	Manifold Tubes	SRV7033-023	Y
	Gasket, Manifold	Pkg of 4	7038-168/4	Y
	Component Pack (Includes Touch-Up Paint, Spring Handles (1) 1/2” and (2) 1/4”, Trimount Plug, Owners Manual and Warranty Card).	Black & Gold Trim	SRV7033-075	
	Paint Touch-Up		3-42-19905	
	Plug, Trimount, .250”	Pkg of 24	229-0880/24	Y

Additional service part numbers appear on following page.

QUADRA-FIRE® **Service Parts** **31M-ACC-C**

Beginning Manufacturing Date: June 2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
	ACCESSORIES			
	Blower Assembly		BK-ACC	
	Blower, Convection - Replacement Blower		812-4900	**Y**
	Blower Control Box w/Switch		SRV7000-194	**Y**
	Component Pack		7033-051	
	Snap Disc Bracket Assembly		SRV7033-036	
	Snap Disc, # 1, Convection Blower		SRV230-0470	**Y**
	Wire Harness, Blower		7033-262	
	Outside Air Kit, Floor & Rear		OAK-ACC	
	Outside Air Collar Assembly		SRV7033-039	
	Outside Air Shield		SRV33271	**Y**
	Outside Air Cover Plate Assembly		SRV7033-041	**Y**
	Upgrade, Door, Nickel		UK-DRNL	
	FASTENERS			
	Avk Rivnut Repair Kit - 1/4-20 & 3/8-16 Rivnut Tools		RIVNUT-REPAIR	**Y**
	Bolt, Hex Head, 1/4-20 x 1	Pkg of 10	25221A/10	**Y**
	Button Head 1/4-20 x .5	Pkg of 20	32328/20	**Y**
	Nut, Keps Lock, 10-32	Pkg of 40	226-0050/40	**Y**
	Nut, Keps Lock, 8-32	Pkg of 40	226-0060/40	**Y**
	Nut, Ser Flange Small 1/4-20	Pkg of 24	226-0130/24	**Y**
	Screw, Sheet Metal #8 x 1/2 S-Grip	Pkg of 40	12460/40	**Y**
	Washer, 1/4 Sae	Pkg of 24	28758/24	**Y**

QUADRA-FIRE®

NOTHING BURNS LIKE A QUAD

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032
Division of HNI INDUSTRIES

**Please contact your Quadra-Fire dealer with any questions or concerns.
For the number of your nearest Quadra-Fire dealer
log onto www.quadrafire.com**

CAUTION

DO NOT DISCARD THIS MANUAL

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

We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed:	
Serial Number:	Location on appliance:
Dealership purchased from:	Dealer Phone: 1( ) -
Notes:	

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.

HEARTH&HOME technologies™

Installation Manual

Installation & Appliance Set-Up

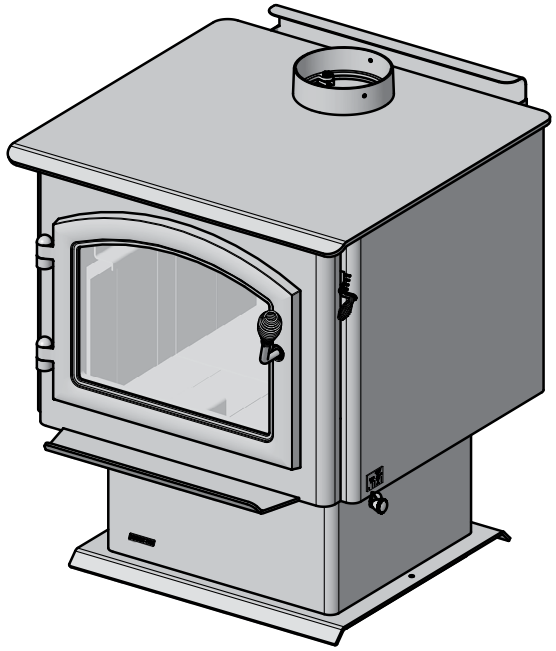
INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.

NOTICE: DO NOT DISCARD THIS MANUAL

QUADRA-FIRE®

3100 MILLENNIUM WOOD APPLIANCE AUTOMATIC COMBUSTION CONTROL (ACC)

MODEL NUMBER: 31M-ACC-C



EM
C-TL
C US

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

hearthED FACTORY TRAINING Fuel Your Fire

NFI NATIONAL FIREPLACE INSTITUTE® A CERTIFICATION AGENCY

⚠ WARNING

If the information in these instructions is not followed exactly, a fire could result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over-fire - If appliance or chimney connector glows, you are over-firing. Over-firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified.

Failure to comply may cause house fire.

⚠ WARNING

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

Hot glass and appliance will cause burns.

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

⚠ WARNING

Fire Risk.
For use with solid wood fuel only.
Other fuels may over-fire and generate poisonous gases (i.e. carbon monoxide).

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

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

Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Indicates practices which may cause damage to the appliance or to property.

TABLE OF CONTENTS

➔ = Contains updated information

1 Important Safety Information

A. Appliance Safety Certification

Model Number:	31M-ACC-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066S
Type:	Listed Room Appliance, Solid Fuel Type
Standard:	UL1482-11 (R2015), ULC S627-00 and (UM) 84-HUD. Mobile Home Approved.

B. Appliance Emissions Certification

Model Number:	31M-ACC-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066E
Standard:	ASTM E2515, ASTM E2780
Can be found at: www.quadrafire.com/about-us/epa-certification	

The 31M-ACC-C is Certified to comply with 2020 crib wood particulate emission standards.

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

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with **(UM) 84-HUD and NFPA211 in the U.S.A. and CAN/CSA-B365 Installation Codes in Canada**.

C. BTU & Efficiency Specifications

EPA Certification Number:	Number: 86-17
EPA Certified Emissions:	1.9 grams per hour
***LHV Tested Efficiency:**	78.3%
****HHV Tested Efficiency:**	72.5%
*****EPA BTU Output:**	13,900 to 29,100 / hr
******Peak BTU/Hour Output:**	51,000
Vent Size:	6 inches
Firebox Size:	1.89 cubic feet
Recommended Log Length:	16 inches
Fuel:	Seasoned Cord Wood (20% moisture)
* Weighted average LHV (Low Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. LHV assumes the moisture is already in a vapor state so there is no loss in energy to vaporize.	
** Weighted average HHV (High Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. HHV includes the energy required to vaporize the water in the fuel.	
*** A range of BTU outputs calculated using HHV Efficiency and the burn rates from the EPA tests, using Douglas Fir dimensional lumber.	
**** A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and BTU content of seasoned cordwood (8600) times the efficiency.	

D. Mobile Home Approved

- This appliance is approved for mobile home installations; when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to **UL103 HT or a listed UL-1777** full length six inch (152mm) diameter liner must be used
- Outside Air Kit, part OAK-ACC must be installed in a mobile home installation.

E. Glass Specifications

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

F. Non-Combustible Materials

Material which will not ignite and burn, composed of any combination of the following:

- Steel
- Plaster
- Brick
- Iron
- Concrete
- Tile
- Glass
- Slate

Materials reported as passing **ASTM E 136, Standard Test Method for Behavior of Metals, in a Vertical Tube Furnace of 750°C.**

G. Combustible Materials

Material made of/or surfaced with any of the following materials:

- Wood
- Compressed Paper
- Plant Fibers
- Plastic
- Plywood/OSB
- Sheet Rock (drywall)

Any material that can ignite and burn: flame proofed or not, plastered or non-plastered.

H. Sleeping Room

When installed in a sleeping room it is recommended that a smoke and/or CO alarm be installed in the bedroom. The size of the room must be at least 50ft³ per 1,000 Btu/hr stove input, if the stove exceeds the room size, outside air must be installed.

I. California - Prop65

⚠ WARNING

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

⚠ WARNING

Fire Risk

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

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

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

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

Hearth & Home Technologies WILL NOT warranty appliances that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:

- Warped air tube
- Deteriorated refractory brick retainers
- Deteriorated baffle and other interior components

2 Getting Started

A. Design and Installation Considerations

Consideration must be given to:

- Safety
- Convenience
- Traffic flow
- Chimney and chimney connector required

It is a good idea to plan your installation on paper, using exact measurements for clearances and floor protection, before actually beginning the installation. If you are not using an existing chimney, place the appliance where there will be a clear passage for a factory-built listed chimney through the ceiling and roof.

We recommend that a qualified building inspector and your insurance company representative review your plans before and after installation.

If this appliance is in an area where children may be near it is recommended that you purchase a decorative barrier to go in front of the appliance. Remember to always keep children away while it is operating and do not let anyone operate this appliance unless they are familiar with these operating instructions.

CAUTION

Check building codes prior to installation.

- Installation MUST comply with local, regional, state and national codes and regulations.
- Consult insurance carrier, local building, fire officials or authorities having jurisdiction about restrictions, installation inspection, and permits.

WARNING

Asphyxiation Risk.

- Do NOT connect this appliance to a chimney flue servicing another appliance.
- Do NOT connect to any air distribution duct or system.

May allow flue gases to enter the house.

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

- Inadequate draft due to environmental conditions
- Down drafts
- Tight sealing construction of the structure
- Mechanical exhausting devices
- Over drafting caused by excessive chimney heights
- Ideal performance is with height of chimney between 14-16 feet (4.26-4.88m) measured from the base of the appliance.

B. Fire Safety

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

1. Install at least one smoke detector on each floor of your home to ensure your safety. They should be located away from the heating appliance and close to the sleeping areas. Follow the smoke detector manufacturer's placement and installation instructions, and be sure to maintain regularly.
2. A conveniently located Class A fire extinguisher to contend with small fires resulting from burning embers.
3. A CO detector should be installed in the room with the appliance.
4. A practiced evacuation plan, consisting of at least two escape routes.
5. A plan to deal with a chimney fire as follows:
   - In the event of a chimney fire:
     — Evacuate the house immediately
     — Notify fire department.

C. Negative Pressure

WARNING

Asphyxiation Risk.

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

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

Causes include:

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

To minimize the effects of negative air pressure:

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

WARNING

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

D. Tools And Supplies Needed

Before beginning the installation be sure the following tools and building supplies are available:

- Reciprocating saw
- Framing material
- Pliers
- High temp caulking material
- Hammer
- Gloves
- Phillips screwdriver
- Framing square
- Flat blade screwdriver
- Electric drill and bits
- Plumb line
- Safety glasses
- Level
- Tape measure
- Misc. screws and nails
- 7/16 socket or wrench

1/2-3/4 in. length, #6 or #8 self-drilling screws

E. Inspection of Appliance and Components

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

F. Removal of Appliance from Shipping Materials

1. Remove box and 2x4 structural boards being careful not to damage product.
2. Using 7/16 socket or wrench remove one bolt located inside front part of appliance **(Figure 6.1)**.
3. Moving to the back of the appliance and using 7/16 socket or wrench remove two bolts **(Figure 6.1)**.
4. Carefully pull appliance off of pallet and put in desired location following **Hearth Pad Requirements** on page 9 and **Clearance to Combustibles** on pages 10.

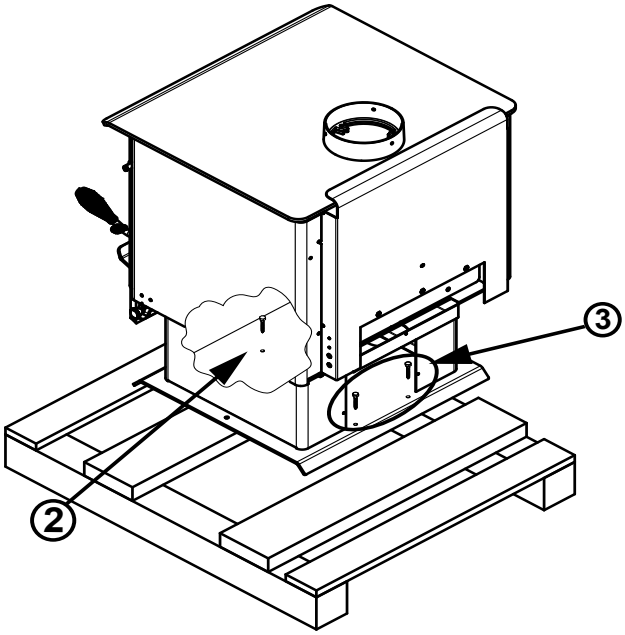


Figure 6.1

WARNING

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

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

Report damaged parts to dealer.

G. Install Checklist

ATTENTION INSTALLER:

Follow this Standard Work Checklist

This standard work checklist is to be used by the installer in conjuction with, not instead of, the instructions contained in this installation manual.

Customer: _____
Date Installed: _____
Lot / Address: _____
Location of Appliance: _____
Installer: _____
Dealer / Distributor Phone #: _____
Serial #: _____
Model: _____

WARNING! Risk of Fire or Explosion! Failure to install appliance according to these instructions can lead to a fire or explosion.

Appliance Install	**YES**	**IF NO, WHY?**
Verified clearances to combustibles.	☐	_____
Appliance is leveled and connector is secured to appliance.	☐	_____
Hearth extension size/height decided.	☐	_____
Outside air kit installed.	☐	_____
Floor protection requirements have been met.	☐	_____
If appliance is connected to a masonry chimney, it should be cleaned and inspected by a professional. If installed to a factory built metal chimney, the chimney must be installed according to the manufacturer's instructions and clearances.	☐	_____

Chimney		
Chimney configuration complies with diagrams.	☐	_____
Chimney installed, locked and secured in place with proper clearance.	☐	_____
Chimney meets recommended height requirements (14-16 feet).	☐	_____
Roof flashing installed and sealed.	☐	_____
Terminations installed and sealed.	☐	_____

Clearances		
Combustible materials not installed in non-combustible areas.	☐	_____
Verified all clearances meet installation manual requirements.	☐	_____
Mantels and wall projections comply with installation manual requirements.	☐	_____
Protective hearth strips and hearth extension installed per manual requirements.	☐	_____

Appliance Setup		
All packaging and protective materials removed.	☐	_____
Firebrick, baffle and ceramic blanket installed correctly.	☐	_____
All labels have been removed from the door.	☐	_____
All packaging materials are removed from inside/under the appliance.	☐	_____
Manual bag and all of its contents are removed from inside/under the appliance and given to the party responsible for use and operation.	☐	_____

Hearth & Home Technologies recommends the following:

- Photographing the installation and copying this checklist for your file.
- That this checklist remain visible at all times on the appliance until the installation is complete.

Comments: Further description of the issues, who is responsible (Installer/Builder/Other Trades, etc.) and corrective action needed:

Comments communicated to party responsible _____ by _____ on _____
(Builder / Gen. Contractor) (Installer) (Date)

3 Dimensions and Clearances

A. Appliance Dimensions

NOTE: Flue Collar size is 6 inch (152mm) diameter (ID)

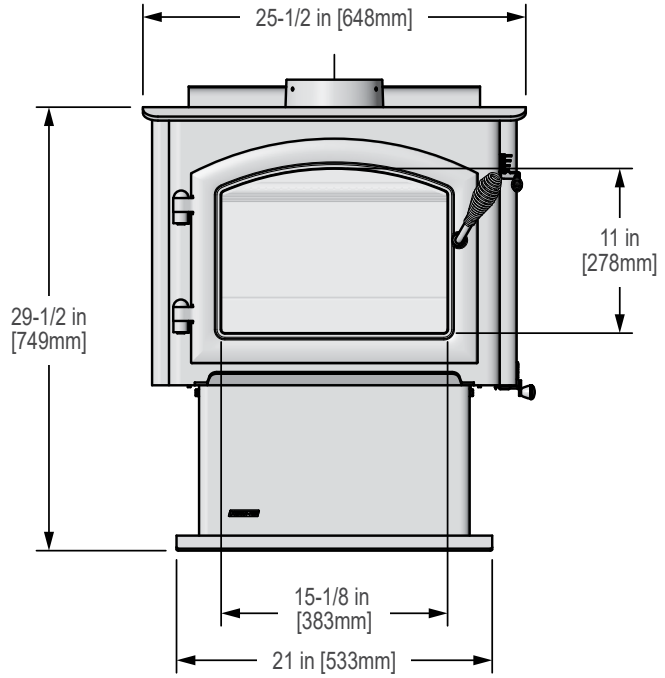


Figure 8.1 - Front View

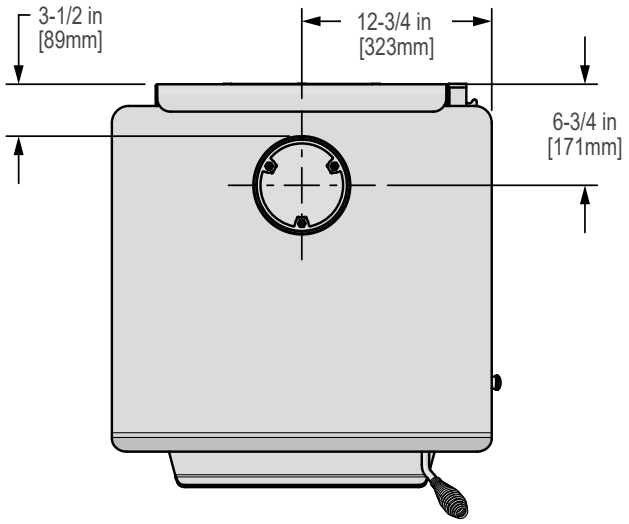


Figure 8.2 - Top View

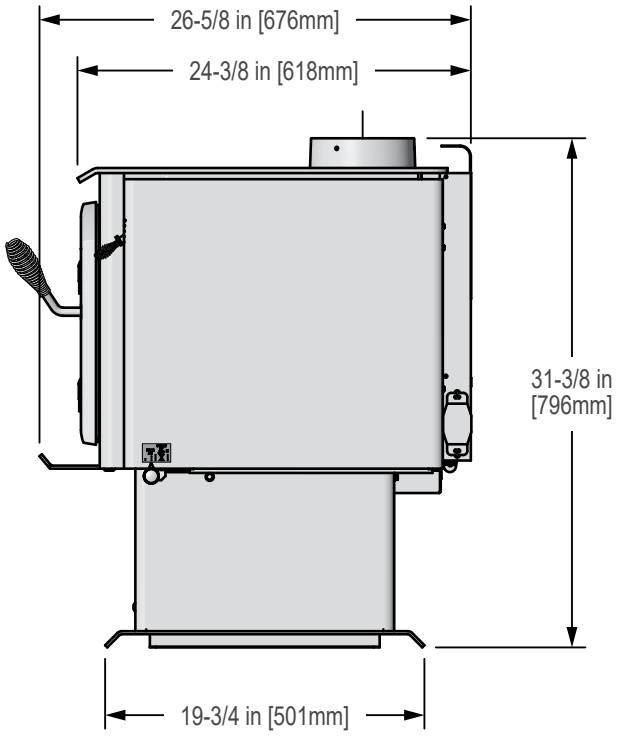


Figure 8.3 - Side View

B. Hearth Protection Requirements

EMBER PROTECTION: Ember protection shall be either a Type 1 floor protector or made of non-combustible material to the requirements below.

Floor protector must be non-combustible material, extending beneath appliance with a minimum of 16 inches (406mm) in front of glass and 8 inches (203mm) to both sides of the fuel loading door. Open the door and measure 8 inches (203mm) from the side edge of the opening in the face of the appliance. ***See Exception.**

In Canada, similar floor protection must be provided 18 inches (457mm) in front and 8 inches (203mm) from the sides and rear of the appliance unless the hearth pad is placed against the wall **(Figure 9.2)**. Then the clearance may be reduced using double wall pipe and the **Clearance to Combustibles** table listed on page 10.

***Exception:** Non-combustible floor protector must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side **(Figure 9.2)**.

WARNING

Fire Risk.
Hearth pads must be installed exactly as specified. High temperatures or hot embers may ignite concealed combustibles.

USA, minimum flat wall hearth pad dimensions

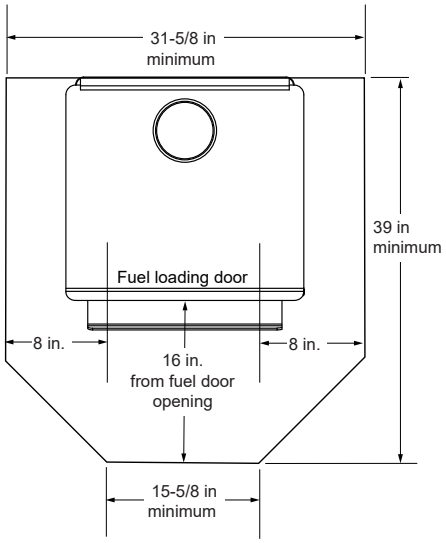


Figure 9.1

**Canada, flat wall hearth pad dimensions with double wall horizontal venting

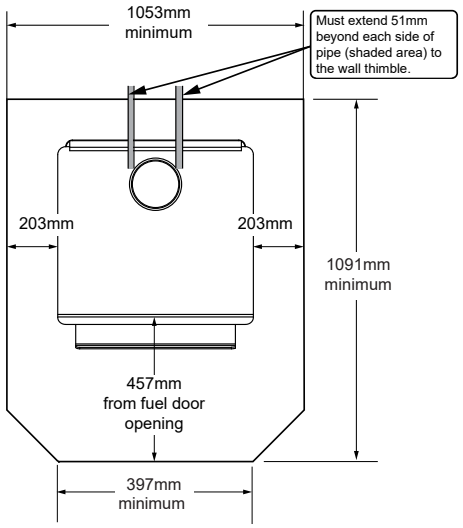


Figure 9.2

**This dimension will vary depending installation.

Corner hearth pad dimensions with single wall pipe

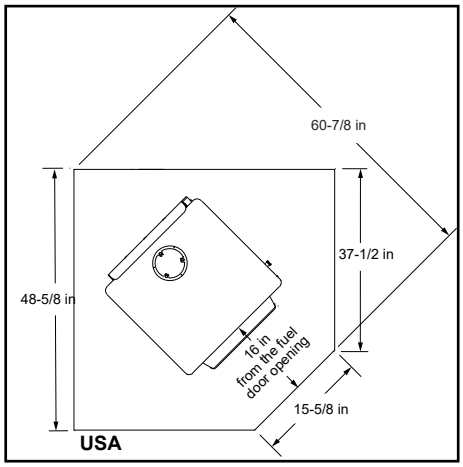


Figure 9.3

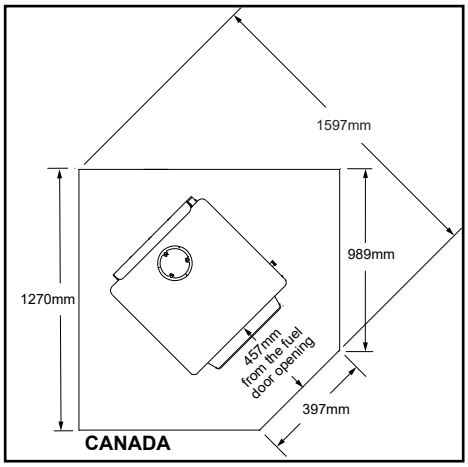


Figure 9.5

Corner hearth pad dimensions with double wall pipe

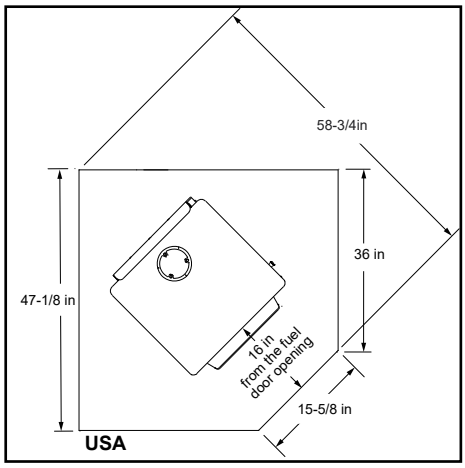


Figure 9.4

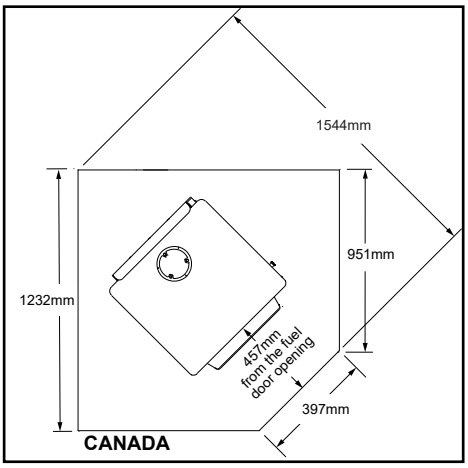


Figure 9.6

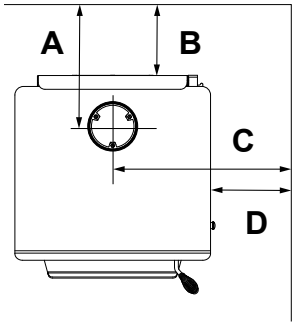
C. Clearances to Combustibles

Note: If mantle clearance specifications are not listed or to reduce mantle clearances you can follow NFPA211 regulations to assure safe installation of this product. Please consult with your local building inspector before attempting any clearance reductions.

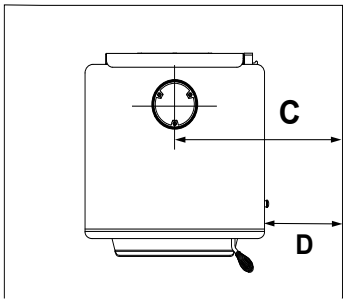
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS IN INCHES (MILLIMETERS) **NOTE:** A, C, AND F DIMENSIONS ARE TO THE CENTER OF THE FLUE COLLAR **31M-ACC-C WOOD APPLIANCE (2020)**								
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
INSTALLATION: FULL VERTICAL								
SINGLE WALL PIPE								
31M-ACC-C	18-1/4 (464)	11-3/4 (298)	28-1/2 (724)	16 (406)	8 (203)	20 (208)	48 (1220)	12 (305)
DOUBLE WALL PIPE								
31M-ACC-C	13-1/2 (343)	6-1/2 (165)	25 (635)	13 (330)	6-1/2 (165)	18-1/2 (470)	48 (1220)	9 (229)
INSTALLATION: 90 DEGREE ELBOW OFF TOP OF APPLIANCE THROUGH BACKWALL								
SINGLE WALL PIPE								
31M-ACC-C	15 (381)	8-1/2 (216)	25 (635)	13 (330)	8 (203)	20 (508)	48 (1220)	12 (305)
DOUBLE WALL PIPE								
31M-ACC-C	11 (279)	4-1/2 (114)	20-1/2 (521)	8-1/2 (216)	6-1/2 (165)	18-1/2 (470)	48 (1220)	9 (229)
INSTALLATION: ALCOVE								
DOUBLE WALL PIPE								
31M-ACC-C	14-3/4 (375)	8-1/4 (210)	26-1/2 (673)	14-1/2 (368)	N/A	N/A	48 (1220)	N/A
For alcove only: Six inch diameter listed Double wall air insulated connector pipe with **UL103 HT** listed factory built Class A chimney or masonry chimney. Maximum depth of Alcove shall be no more than 48 inches (1219mm) and the referenced alcove clearances. Canada must comply with **CAN/ULC-S269 M87** for the 650° factory built chimney. *** FOLLOW PIPE MANUFACTURES CLEARANCES AS REQUIRED**								

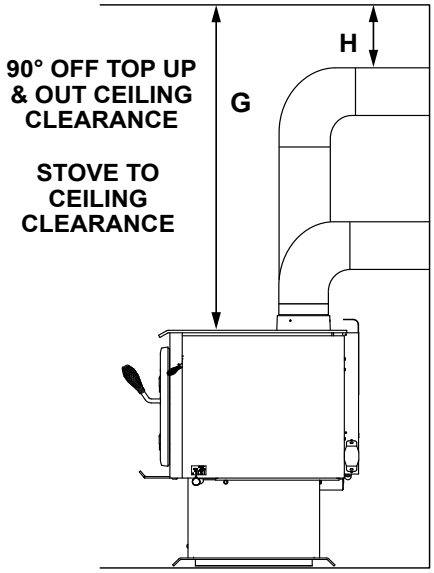
Table 10.1

BACKWALL / SIDEWALL

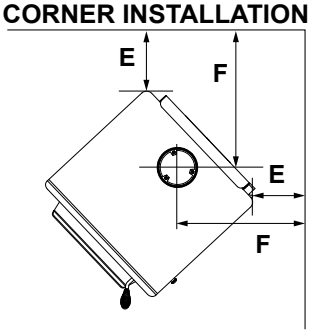


ALCOVE TOP VIEW

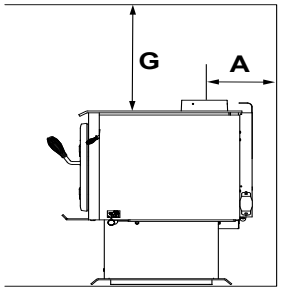




CORNER INSTALLATION



ALCOVE SIDE VIEW



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

WARNING

Fire Risk.

- Comply with all minimum clearances to combustibles as specified.
- Failure to comply may cause house fire.

NOTE: Service Space

In order to replace the tube channel assembly a clearance of 19 inches (483mm) is required on the right side of appliance in order to remove the tubes with the appliance in place.

If space is not available, the appliance will have to be disconnected from the chimney to proceed with the tube replacement.

A. Locating Your Appliance & Chimney

Location of the appliance and chimney will affect performance. As shown in **Figure 11.1** the chimney should:

- Install through the warm space enclosed by the building envelope. This helps to produce more draft, especially during lighting and die down of the fire.
- Penetrate the highest part of the roof. This minimizes the affects of wind turbulence and down drafts.
- Consider the appliance location in order to avoid floor and ceiling attic joists and rafters.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.

Your local dealer is the expert in your geographic area and can usually make suggestions or discover solutions that will easily correct your flue problem.

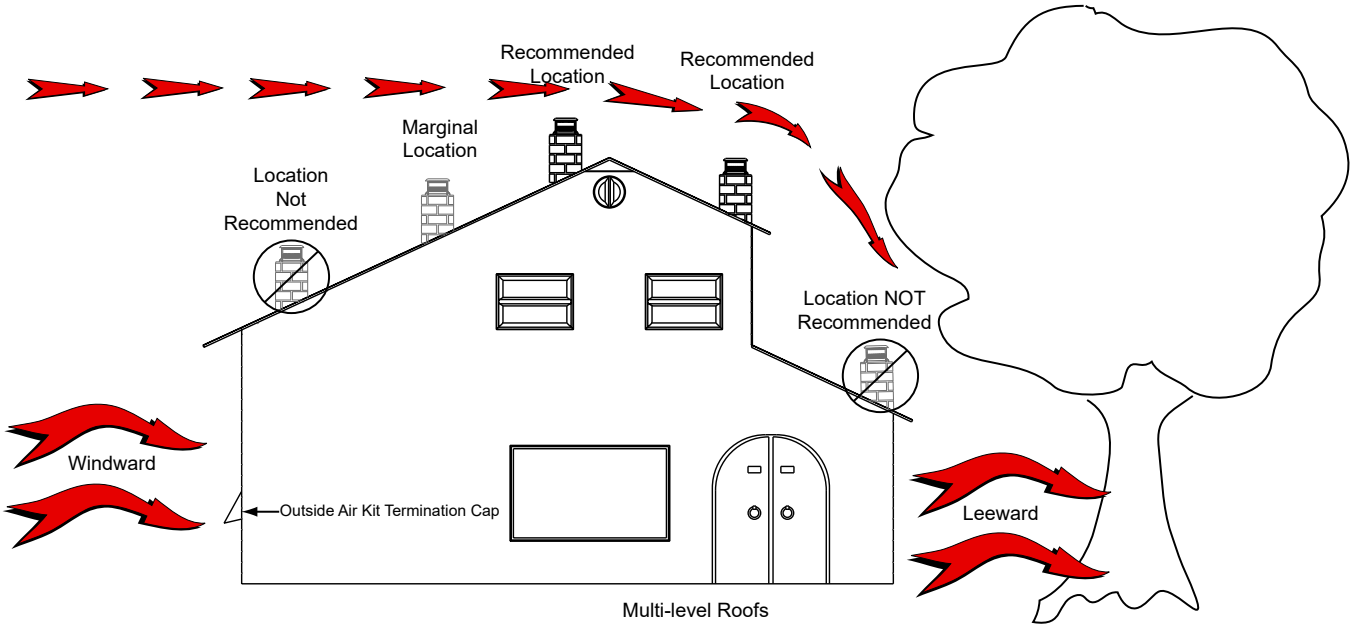


Figure 11.1

B. Chimney Termination Requirements

Follow manufacturer's instructions for clearance, securing flashing and terminating the chimney (**Figure 12.1 and Figure 12.2).**

- Must have an approved and Listed cap
- Must not be located where it will become plugged by snow or other material
- Must terminate at least 3 feet (91cm) above the roof **and** at least 2 feet (61cm) above any portion of the roof within 10 feet (305cm).
- Must be located away from trees or other structures

NOTICE:

- Chimney performance may vary.
- Trees, buildings, roof lines and wind conditions affect performance.
- Chimney height may need adjustment if smoking or overdraft occurs.

NOTICE: Locating the appliance in a basement or in a location of considerable air movement can cause intermittent smoke spillage from appliance. Do not locate appliance near

- Frequently open doors
- Central heat outlets or returns

C. 2-10-3 Rule

These are safety requirements and are not meant to assure proper flue draft.

This appliance is made with a 6 inch (152mm) diameter chimney connector as the flue collar on the appliance.

- Changing the diameter of the chimney can affect draft and cause poor performance.
- It is not recommended to use offsets and elbows at altitudes above 4000 feet above sea level and or when there are other factors that affect flue draft.

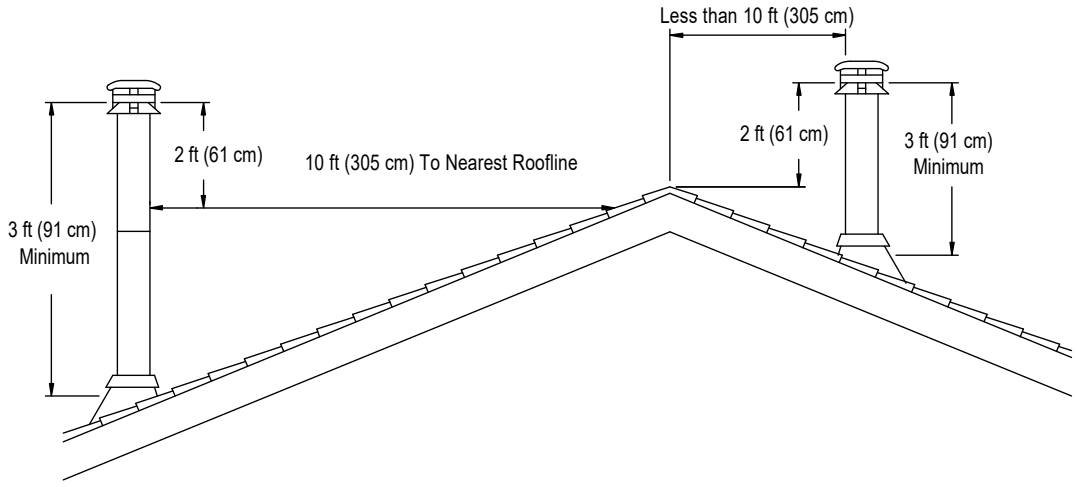


Figure 12.1

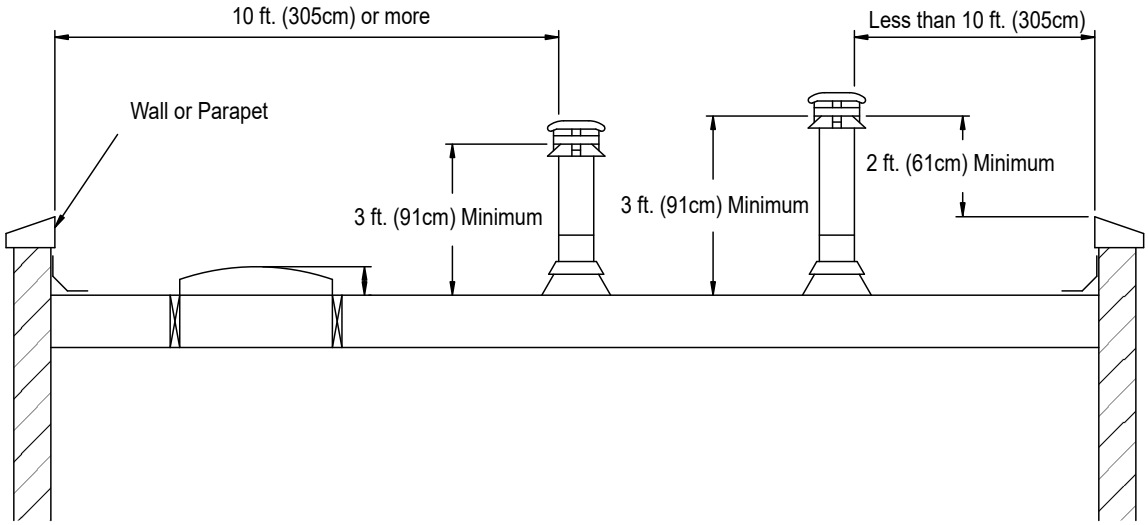


Figure 12.2

D. Chimney Height / Rise and Run

This product was designed for and tested on a 6 inch (152mm) chimney, 14 to 16 feet (420-480cm) high, (includes appliance height) measured from the base of the appliance. The further your stack height or diameter varies from this configuration, the greater the likelihood it may affect performance.

Chimney height may need to be increased by 2 - 3% per each 1000 feet above sea level. It is not recommended to use offsets or elbows at altitudes above 4000 feet above sea level or when there are other factors that affect flue draft.

WARNING

Fire Risk. Inspection of Chimney:

- Chimney must be in good condition.
- Meets minimum standard of **NFPA 211**
- Factory-built chimney must be 6 inch (152mm) **UL103 HT**.

WARNING

Asphyxiation Risk.

- DO NOT CONNECT THIS APPLIANCE TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.
- DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the owner's information manual provided with this appliance. For assistance or additional information consult a qualified installer, service agency or your dealer.

Chimney:

The chimney can be new or existing, masonry or prefabricated and must meet the following minimum requirements and as specified in **Chimney Systems** on page 13.

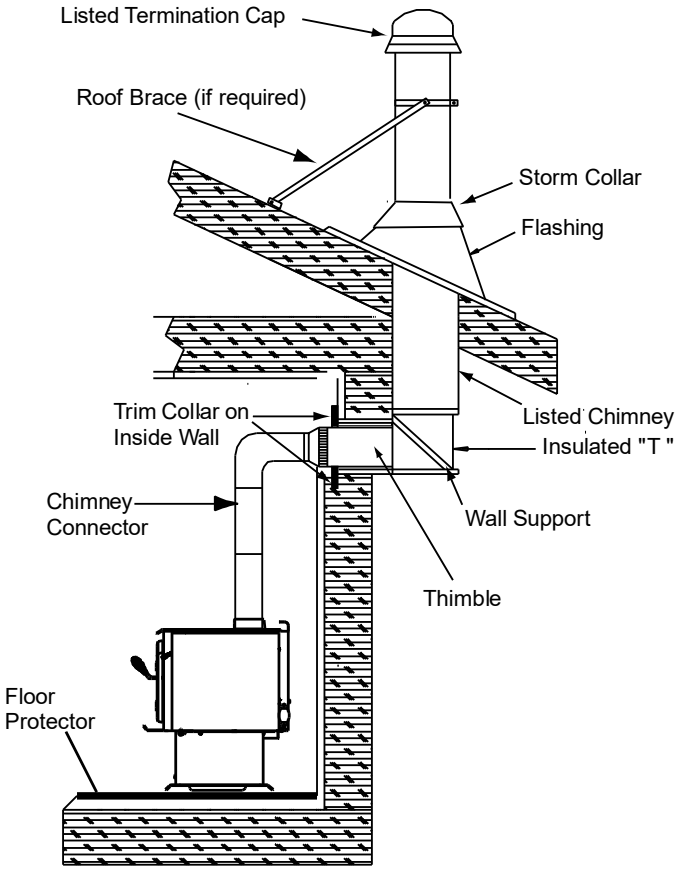


Figure 13.1 - Prefabricated Exterior Chimney

E. Venting Components

Chimney Connector:

It is also known as flue pipe or appliance pipe. The chimney connector joins the appliance to the chimney. It must be a 6 inch (152mm) minimum diameter 24 gauge mild steel black or 26 gauge blued steel, or an approved air-insulated double wall venting pipe.

Thimble:

A manufactured or site-constructed device installed in combustible walls through which the chimney connector passes to the chimney. It is intended to keep the walls from igniting. Site constructed thimbles must meet **NFPA 211 Standards**. Prefabricated must be suitable for use with selected chimney and meet **UL103 Type HT Standards**. Follow instructions provided by the manufacturer for manufactured thimbles for masonry chimney and prefabricated chimneys.

F. Chimney Systems

Prefabricated Metal Chimney

- Must be minimum 6 inch (152mm) diameter (ID) high temperature chimney listed to **UL 103 HT (2100°F) or ULC S629M**.
- Must use components required by the manufacturer for installation.
- Must maintain clearances required by the manufacturer for installation.
- Refer to manufacturers instructions for installation.

NOTE: In Canada when using a factory-built chimney it must be safety listed, **Type UL103 HT (2100°F) CLASS "A" or conforming to CAN/ULC-S629M, STANDARD FOR 650°C FACTORY-BUILT CHIMNEYS**.

Thimble
Site constructed for masonry chimney installation:

Components
A minimum length of 12 inches [305mm] (longer for thicker walls) of solid insulated factory-built chimney length constructed to **UL 103 Type HT** 6 inch (152mm) inside diameter. Chimney needs to extend a minimum of 2 inches (51mm) from the interior wall and a minimum of 1 inch (25mm) from the exterior wall.

Wall spacer, trim collar and wall band to fit solid pack chimney selected.

Minimum 8 inch (203mm) diameter clay liner section (if not already present in chimney) and refractory mortar.

When jurisdiction requires install approved chimney liner in masonry chimney.

Air Clearances
- Masonry chimney clearance must meet **NFPA 211** minimum requirement of 2 inches (51mm) to sheet metal supports and combustibles.
- Minimum of 1 inch (25mm) clearance around the chimney connector.
- Top of wall opening is a minimum of 13-1/2 inches (343mm) from ceiling or 4-1/2 inches (114mm) below minimum clearance specified by chimney connector manufacturer. **NFPA 211** minimum vertical clearance of 18 inches (457mm) from chimney connector and ceiling or minimum recommended by chimney connector manufacturer **(Figure 14.2)**.

Instructions:
1. Open inside wall at proper height for the chimney connector to entry the masonry chimney **(Figure 14.2)**.
2. Entry hole to masonry chimney must be lined with an 8 inch (203mm) minimum diameter clay liner, or equivalent, secured with refractory mortar.
3. Construct a 17 inch x 17 inch (432mm x 432mm) outside dimension frame from 2 x 2 framing lumber to fit into wall opening. Inside opening of frame should be no less than 14 inch x 14 inch (356mm x 356mm) **(Figure 14.2)**.
4. Attach the wall spacer to the chimney side of the frame.
5. Nail the frame into the wall opening. The spacer should be on the chimney side.
6. Insert the section of the solid insulated chimney into the outer wall of the masonry chimney.
7. Tightly secure the length of the solid insulated chimney with the wall band to the masonry chimney.
8. Insert a section of chimney connector into the chimney. Make sure it does not protrude past the edge of the clay chimney liner inside the chimney.
9. Seal the end of the chimney connector to the clay liner with refractory mortar.
10. Install trim collar around the solid pack chimney section.

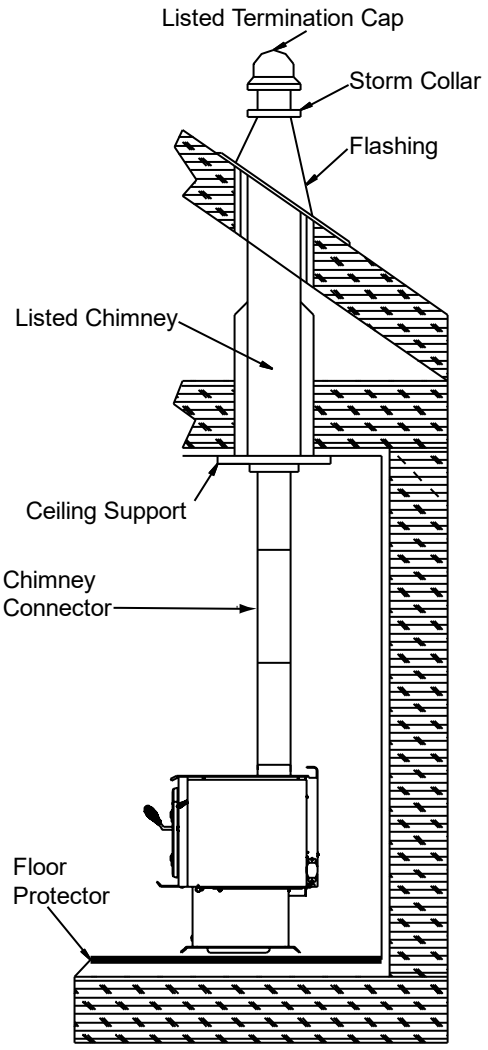


Figure 14.1 - Prefabricated Interior Chimney

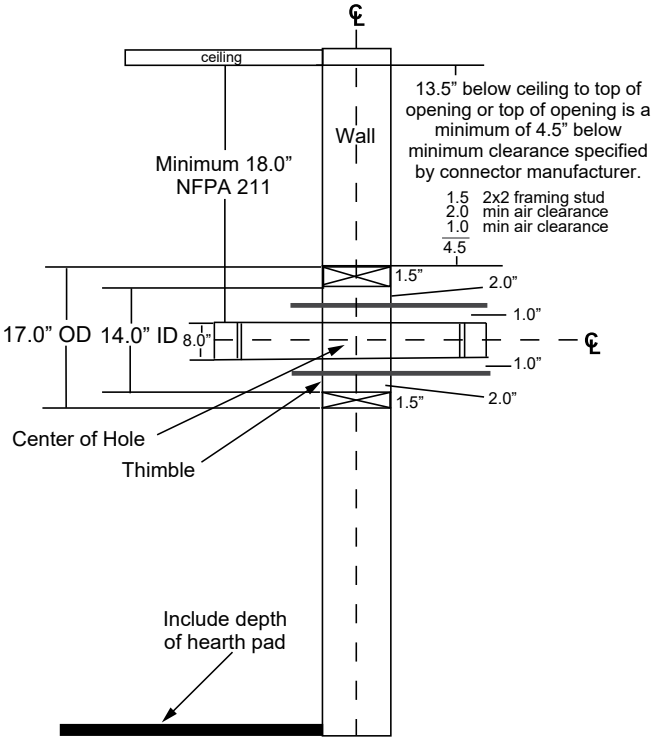


Figure 14.2

Solid Pack Chimney with Metal Supports as a Thimble

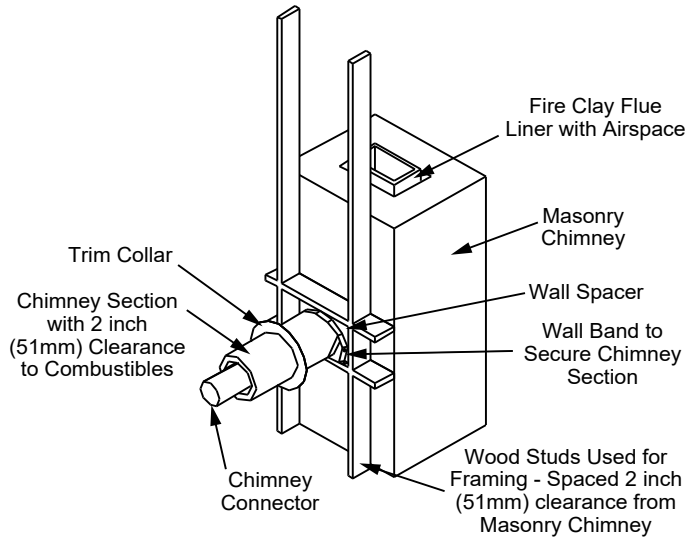


Figure 15.1

WARNING

Fire Risk.
Do NOT pack insulation or other combustibles between spacers.
- ALWAYS maintain specified clearances around venting and spacers.
- Install spacers as specified.

Failure to keep insulation or other material away from vent pipe may cause fire.

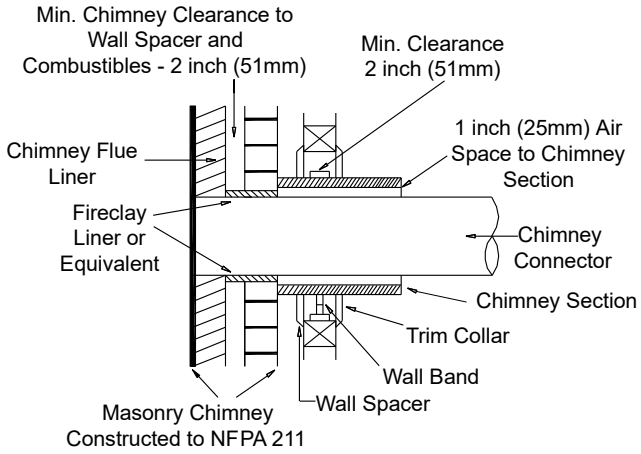


Figure 15.2

G. Installing Chimney Components

Chimney Connector

Single wall connector or appliance pipe.
This must be at least 24 gauge mild steel or 26 gauge blue steel. The sections must be attached to the appliance and to each other with the crimped (male) end pointing toward the appliance. All joints, including the connection at the flue collar, should be secured with 3 sheet metal screws. Make sure to follow the minimum clearances to combustibles. Where passage through the wall, or partition of combustible construction is desired in Canada, the installation shall conform to **CAN/CSA-B365**.

Factory-built listed chimney connector (vented).
A listed connector (vented) must be used when installing this appliance in a mobile home. The listed connectors must conform to each other to ensure a proper fit and seal.

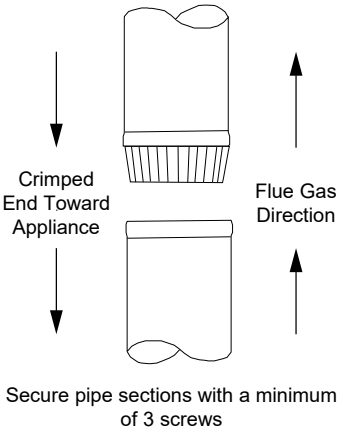


Figure 15.3 - Chimney Connector (Appliance Pipe)

WARNING

Fire Risk.
Follow Chimney Connector Manufacturer's Instructions for Proper Installation.

ONLY use connector:
- Within the room, between appliance and ceiling or wall.

Connector shall NOT pass through:
- Attic or roof space
- Closet or similar concealed space
- Floor or ceiling

Maintain minimum clearances to combustibles

H. Proper Draft

To be sure that your Quadra-Fire appliance burns properly, the chimney draft (static pressure) should be approximately -0.10 inches water column (W.C.) during a high burn and -0.04 inches W.C. during a low burn, measured 6 inches (152mm) above the top of the appliance after one hour of operation at each burn setting.

5 Appliance Set-Up

A. Outside Air Kit Installation

A source of air (oxygen) is necessary in order for combustion to take place. Whatever combustion air is consumed by the fire must be replaced. Air is replaced via air leakage around windows and under doors. In homes that have tightly sealed doors and windows, an outside air source is needed. An optional Outside Air Kit is available.

Items Needed for Installation (not supplied)

- 4 inch flex aluminum pipe, or if using alternate material, then it shall be made from durable, non-combustible, heat resistant material up to 350°F. Cut the pipe to the required length for your installation.
- Phillips head screw driver
- Silicone sealant
- Drills and saws necessary for cutting holes through the wall or flooring in your home.

1. Remove all materials from packing box.
2. Using a #2 Phillips screw driver attach the flex adapter to the appliance using 4 screws (**Figure 16.1).**
3. For floor installations, remove circular" knock-out" in the base of the pedestal.
4. **Floor & Rear Installation:**
   Cut a 4 inch (102mm) hole in outside wall or floor to accommodate outside air piping. Use 4 inch (102mm) aluminum metal flex or rigid piping to directly connect outside air to appliance intake. Use the supplied termination cap with a rodent screen. Seal between the wall (or floor) and the pipe with silicone to prevent moisture penetration.
5. **Floor Installation Alternative:**
   In some instances you may not be able to install the flex pipe as show in **Figure 16.1.** If that is the case, you will need to order SRV7033-041 which includes a cover plate and sealing rope as shown in **Figure 16.2.** The goal is to seal the pedestal so no room air can leak into the pedestal or for cold air infiltration.

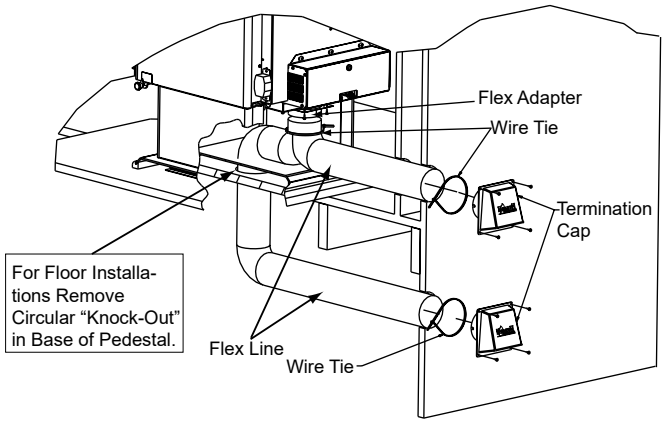


Figure16.1 - Floor & Rear Installation

WARNING

Fire Risk. Asphyxiation Risk.
Do not draw outside combustion air from:
- Wall, floor or ceiling cavity
- Enclosed space such as an attic or garage
- Close proximity to exhaust vents or chimneys

Fumes or odor may result

WARNING

Asphyxiation Risk.
Outside air inlet must be located to prevent blockage from:
- Leaves
- Snow or ice
- Other debris

Block may cause combustion air starvation
Smoke spillage may set off alarms or irritate sensitive individuals.

WARNING

Asphyxiation Risk.
Length of outside air supply duct shall NOT exceed the length of the vertical height of the exhaust flue.
- Fire will not burn properly
- Smoke spillage occurs when door is opened due to air starvation.

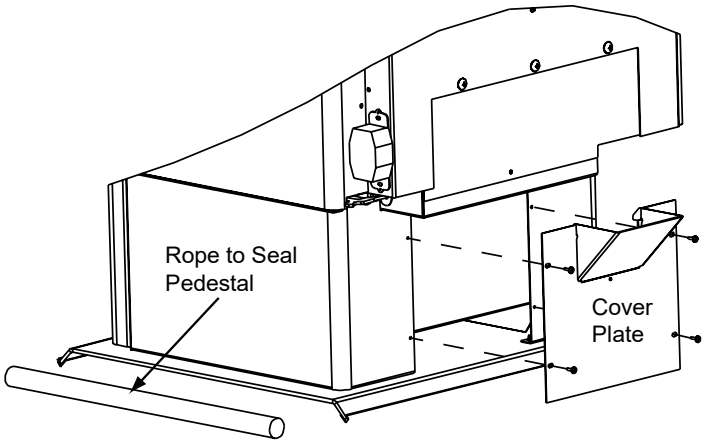


Figure 16.2 - Floor Installation Alternative

B. Door Handle Assembly

Install spring handle using a counter-clockwise motion until the spring handle has a 2 inch clearance from bend of door hand rod **(Figure 17.1).**

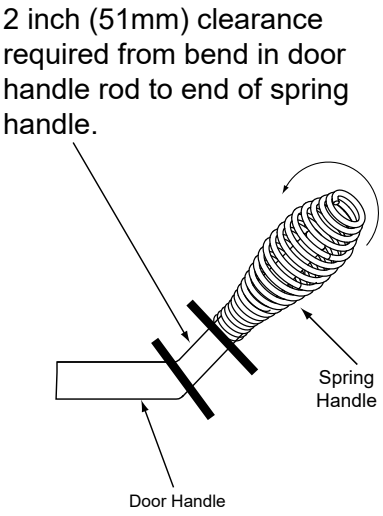


Figure 17.1

C. Blower (Optional)

1. Locate bolts supplied with the blower.
2. Align holes in mounting flange of blower with bolt holes in appliance. Blower should be positioned at bottom of rear outer skin as shown in **Figure 17.2**.
3. Re-insert and tighten bolts, securing blower onto outer wall of appliance.
4. Place the bracket containing the snap disc and magnet under the bottom left rear corner.

See Owner's Manual for detailed operating instructions for the blower and snap disc.

CAUTION

Shock Risk.

- Do NOT remove grounding prong from plug.
- Route cord away from appliance.
- Do NOT route cord under or in front of appliance.
- Plug directly into properly grounded 3 prong receptacle.

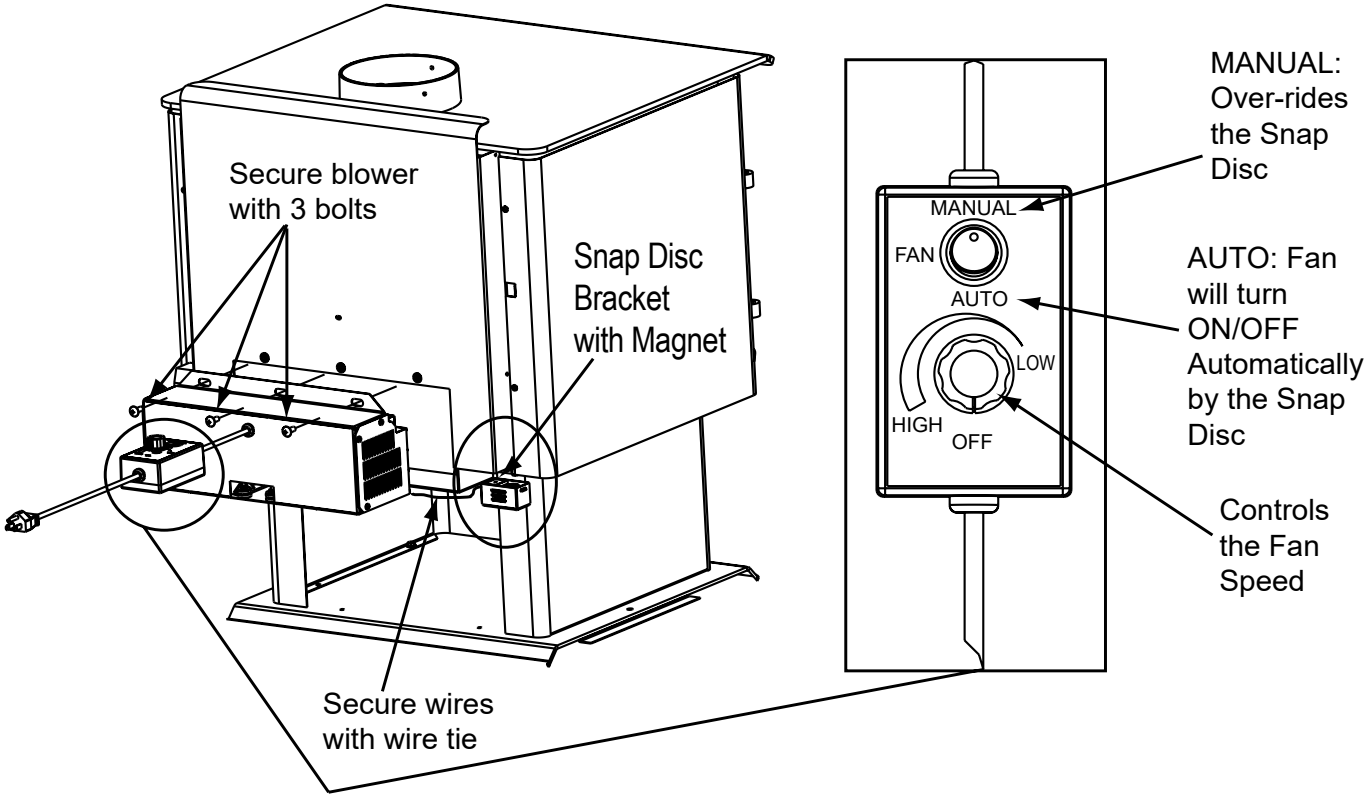


Figure 17.2

6 Mobile Home Installation

You must use a Quadra-Fire Outside Air Kit Part OAK-ACC and (depending on floor installation), Part SRV7033-041 for installation in a mobile home.

1. An outside air inlet must be provided for combustion (see page 16 for installation information).
2. Appliance must be secured to the mobile home structure by bolting the pedestal through hearth pad and into floor.
3. Appliance must be grounded with #8 solid copper grounding wire or equivalent and terminated at each end with N.E.C. approved grounding device.
4. Appliance must be installed with an approved **UL103 HT ventilated chimney connector, UL103 HT chimney, and terminal cap with spark arrestor**. Never use a single wall connector (appliance pipe) in a mobile home installation. Use only double-wall connector pipe, Dura-Vent DVL, Selkirk Metalbestos DS or Security DL double-wall connector or any listed double-wall connector pipe.
5. In Canada, this appliance must be connected to a 6 inch (152mm) factory-built chimney conforming to **CAN/ULC-629M, STANDARD FOR FACTORY BUILT CHIMNEYS**.
6. Follow the chimney and chimney connector manufacturer's instructions when installing the flue system for use in a mobile home.
7. Maintain clearance to combustibles.
8. Floor protection requirements must be followed precisely.
9. Use silicone to create an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure.

NOTE: Offsets from the vertical, not exceeding 45°, are allowed per **Section 905(a) of the Uniform Mechanical Code (UMC)**. Offsets greater than 45° are considered horizontal and are also allowed, providing the horizontal run does not exceed 75% of the vertical height of the vent. Construction, clearance and termination must be in compliance with the **UMC Table 9C**. This installation must also comply with **NFPA 211**.

NOTE: Top sections of chimney must be removable to allow maximum clearance of 13.5 feet (411cm) from ground level for transportation purposes.

10. Burn wood only. Other types of fuels may generate poisonous gases (e.g., carbon monoxide).
11. If appliance burns poorly while an exhaust blower is on in home, (i.e., range hood), increase combustion air.
12. Installation shall be in accordance with the **Manufacturers Home & Safety Standard (HUD) CFR 3280, Part 24**.

CAUTION

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

Do NOT cut through:

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

WARNING

Asphyxiation Risk.
NEVER INSTALL IN A SLEEPING ROOM.
Consumes oxygen in the room.

WARNING

Fire Risk.
Do Not use single wall connector pipe anywhere in a mobile home installation.

7 Reference Materials

A. Service & Maintenance Log

Date of Service	Performed By	Description of Service

Date of Service	Performed By	Description of Service

Date of Service	Performed By	Description of Service

Date of Service	Performed By	Description of Service

B. Accessories

QUADRA-FIRE® **Service Parts** **31M-ACC-C**

Beginning Manufacturing Date: June 2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
	ACCESSORIES			
	Blower Assembly		BK-ACC	
	Blower, Convection - Replacement Blower		812-4900	**Y**
	Blower Control Box w/Switch		SRV7000-194	**Y**
	Component Pack		7033-051	
	Snap Disc Bracket Assembly		SRV7033-036	
	Snap Disc, # 1, Convection Blower		SRV230-0470	**Y**
	Wire Harness, Blower		7033-262	
	Outside Air Kit, Floor & Rear		OAK-ACC	
	Outside Air Collar Assembly		SRV7033-039	
	Outside Air Shield		SRV33271	**Y**
	Outside Air Cover Plate Assembly		SRV7033-041	**Y**
	Upgrade, Door, Nickel		UK-DRNL	
	FASTENERS			
	Avk Rivnut Repair Kit - 1/4-20 & 3/8-16 Rivnut Tools		RIVNUT-REPAIR	**Y**
	Bolt, Hex Head, 1/4-20 x 1	Pkg of 10	25221A/10	**Y**
	Button Head 1/4-20 x .5	Pkg of 20	32328/20	**Y**
	Nut, Keps Lock, 10-32	Pkg of 40	226-0050/40	**Y**
	Nut, Keps Lock, 8-32	Pkg of 40	226-0060/40	**Y**
	Nut, Ser Flange Small 1/4-20	Pkg of 24	226-0130/24	**Y**
	Screw, Sheet Metal #8 x 1/2 S-Grip	Pkg of 40	12460/40	**Y**
	Washer, 1/4 Sae	Pkg of 24	28758/24	**Y**

QUADRA-FIRE®

NOTHING BURNS LIKE A QUAD

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032
Division of HNI INDUSTRIES

**Please contact your Quadra-Fire dealer with any questions or concerns.
For the number of your nearest Quadra-Fire dealer
log onto www.quadrafire.com**

CAUTION

DO NOT DISCARD THIS MANUAL

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

We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed:	
Serial Number:	Location on appliance:
Dealership purchased from:	Dealer Phone: 1( ) -
Notes:	

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.

HEARTH&HOME technologies™

Owner's Manual
Operation & Care

INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.

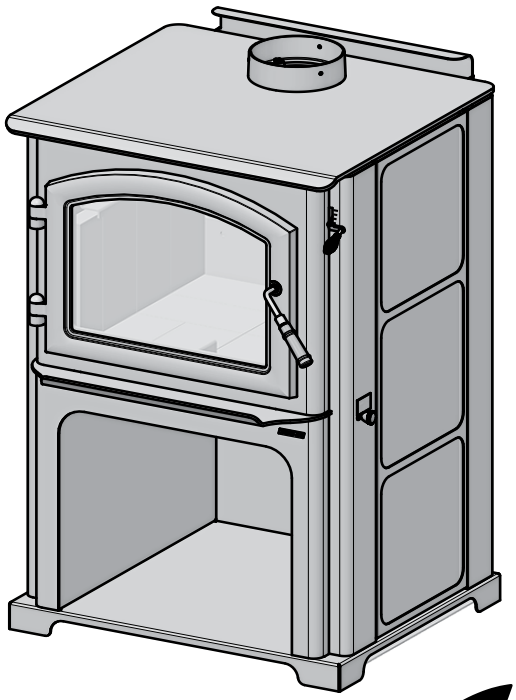
Contact your dealer with questions on installation, operation, or service.

NOTICE: DO NOT DISCARD THIS MANUAL

QUADRA-FIRE®

DISCOVERY II WOOD APPLIANCE AUTOMATIC COMBUSTION CONTROL (ACC)

MODEL NUMBER: DISCOVERY-II-C



EM
C OTL US

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

hearthED FACTORY TRAINING Fuel Your Fire

NFI NATIONAL FIREPLACE INSTITUTE® A CERTIFICATION AGENCY

⚠ WARNING

If the information in these instructions is not followed exactly, a fire could result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over-fire - If appliance or chimney connector glows, you are over-firing. Over-firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified.

Failure to comply may cause house fire.

⚠ WARNING

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

Hot glass and appliance will cause burns.

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

⚠ WARNING

Fire Risk.
For use with solid wood fuel only.
Other fuels may over-fire and generate poisonous gases (i.e. carbon monoxide).

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

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

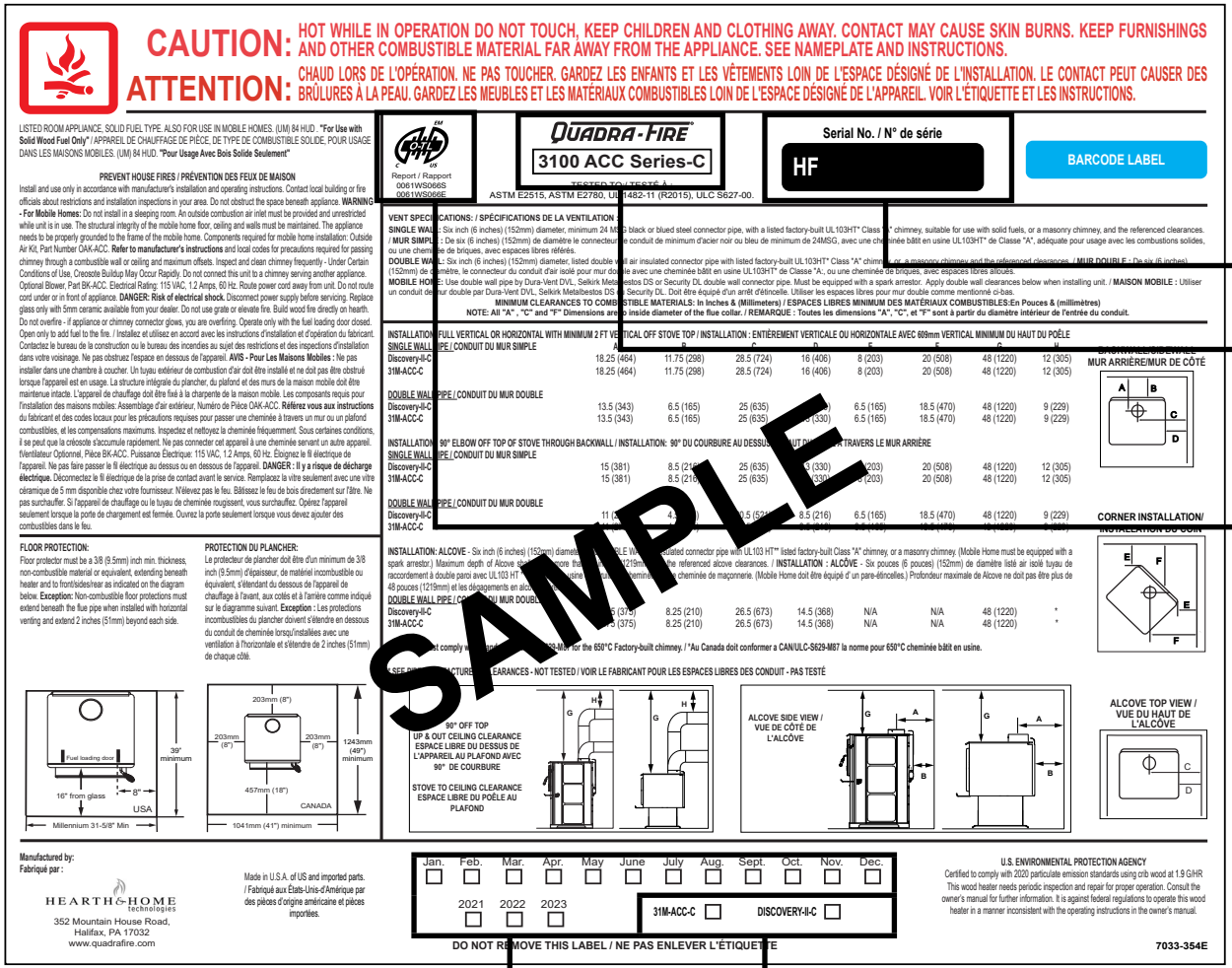
Congratulations

and Welcome to the Quadra-Fire Family!

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

A. Sample of Serial Number / Safety Label

LOCATION: Back of appliance



Safety Alert Key:

- **DANGER!** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- **WARNING!** Indicates a hazardous situation which, if not avoided could result in death or serious injury.
- **CAUTION!** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE:** Indicates practices which may cause damage to the appliance or to property.

TABLE OF CONTENTS

➔ = Contains updated information

B. Warranty Policy

Hearth & Home Technologies LLC

LIMITED LIFETIME WARRANTY

Hearth & Home Technologies LLC ("HHT") extends the following warranty for HHT gas, wood, pellet and electric hearth appliances (each a "Product" and collectively, the "Product(s)") and certain component parts set forth in the table below ("Component Part(s)") that are purchased from a HHT authorized dealer or distributor.

WARRANTY COVERAGE:

HHT warrants that the Products and their Component Parts will be free from defects in materials and workmanship for the applicable period of Warranty coverage set forth in the table below ("Warranty Period"). If a Product or Component Parts are found to be defective in materials or workmanship during the applicable Warranty Period, HHT will, at its option, repair the applicable Component Part(s), replace the applicable Component Part(s), or refund the purchase price of the applicable Product(s). The maximum amount recoverable under this Warranty is limited to the purchase price of the Product. This Warranty is transferable from the original purchaser to subsequent owners, but the Warranty Period will not be extended in duration or expanded in coverage for any such transfer. This Warranty is subject to conditions, exclusions, and limitations as described below.

WARRANTY PERIOD:

Warranty coverage begins at the date of installation. In the case of new home constructions, Warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product(s) by an independent, authorized HHT dealer or distributor, whichever occurs earlier. However, the Warranty coverage shall commence no later than 24 months following the date of Product shipment from HHT, regardless of the installation or occupancy date.

The term "Lifetime" in the table below is defined as: 20 years from the beginning date of warranty coverage for gas appliances, and 10 years from the beginning date of warranty coverage for wood and pellet appliances. These time periods reflect the minimum expected useful lives of the designated Component Parts under normal operating conditions.

Warranty Period		**HHT Manufactured Appliances and Venting**					
Component Parts	Labor	Gas	Pellet	Wood	Electric	Venting	Component Parts Covered by this Warranty
1 Year		X	X	X		X	All parts including handles, external enameled components and other material except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 Years					X		All parts except as covered by Warranty Conditions, Warranty Exclusions, and Warranty Limitations listed
2 years			X	X			Igniters, Auger Motors, Electronic Components, and Glass
		X					Electrical components limited to modules, remotes/wall switches, valves, pilots, blowers, junction boxes, wire harnesses, transformers and lights (excluding light bulbs)
		X		X			Molded Refractory Panels, Glass Liners
3 years			X				Firepots, burnpots, mechanical feeders/auger assemblies
5 years	1 year	X					Vent Free Burners, Vent Free Logs
			X	X			Castings, Medallions and Baffles
6 years	3 years			X			Catalysts
7 years	3 years		X	X			Manifold tubes, HHT Chimney and Terminations
10 years	1 year	X					Burners, logs and refractory
Limited Lifetime	3 years	X	X	X			Firebox and heat exchanger, FlexBurn® System (engine, inner cover, access cover and fireback)
1 Year	None	X	X	X	X	X	All purchased replacement parts

WARRANTY CONDITIONS:

- Because HHT cannot control the quality of any Products sold by unauthorized sellers, this Warranty only covers Products that are purchased through an HHT authorized dealer or distributor unless otherwise prohibited by law; a list of HHT authorized dealers is available on the HHT branded websites.
- This Warranty is only valid while the applicable Product remains at the site of original installation.
- This Warranty is only valid in the country in which the HHT authorized dealer or distributor that sold the applicable Product is authorized to sell applicable Product.
- Contact your installing distributor or dealer for Warranty service. If the installing dealer or distributor is unable to provide necessary parts, contact the nearest HHT authorized dealer or supplier. Additional service fees may apply if you are seeking Warranty service from a dealer other than the dealer from whom you originally purchased the applicable Product.
- No HHT consumer should bear cost of warranty service or costs incurred while servicing warranty claims (i.e., travel, gas, or mileage) when the service is performed within the terms of this Warranty. Check with your dealer or distributor in advance for any costs to you when arranging a warranty call. Travel and shipping charges for parts are not covered by this Warranty.

WARRANTY EXCLUSIONS:

This Warranty does not cover the following:

- Changes in surface finishes as a result of normal use. As a heating appliance, some changes in color of interior and exterior surface finishes may occur. This is not a flaw and is not covered under the Warranty.
- Damage to printed, plated, or enameled surfaces caused by fingerprints, accidents, misuse, scratches, melted items or other external sources and residues left on the plated surfaces from the use of abrasive cleaners or polishes.
- Repair or replacement of parts that are subject to normal wear and tear during the Warranty Period are not covered. These parts include: paint, wood and pellet gaskets, firebricks, grates, flame guides, batteries and the discoloration of glass.
- Minor expansion, contraction, or movement of certain parts causing noise. These conditions are normal and complaints related to this noise are not covered by this Warranty.
- Damages resulting from: (1) failure to install, operate, or maintain the applicable Product in accordance with the installation instructions, operating instructions, and listing agent identification label furnished with the applicable Product; (2) failure to install the applicable Product in accordance with local building codes; (3) shipping or improper handling; (4) improper operation, abuse, misuse, continued operation with damaged, corroded or failed components, accident, or improperly/incorrectly performed repairs; (5) environmental conditions, inadequate ventilation, negative pressure, or drafting caused by tightly sealed constructions, insufficient make-up air supply, or handling devices such as exhaust fans or forced air furnaces or other such causes; (6) use of fuels other than those specified in the operation instructions; (7) installation or use of components not supplied with the applicable Product or any other components not expressly authorized and approved by HHT; (8) modification of the appliance not expressly authorized and approved by HHT in writing; and/or (9) interruptions or fluctuations of electrical power supply to the applicable Product.
- Non-HHT venting components, hearth connections or other accessories used in conjunction with the applicable Product.
- Any part of a pre-existing fireplace system in which an insert or a decorative gas applicable Product is installed.
- HHT's obligation under this Warranty does not extend to the Product's capability to heat the desired space. Information is provided to assist the consumer and the dealer in selecting the proper Product for the application. Consideration must be given to the Product location and configuration, environmental conditions, insulation and air tightness of the structure.

This warranty is void if:

- The applicable Product has been over-fired, operated in atmospheres contaminated by chlorine, fluorine, or other damaging chemicals. Over-firing can be identified by, but not limited to, warped plates or tubes, deformation/warping of interior cast iron structure or components, rust colored cast iron, bubbling, cracking and discoloration of steel or enamel finishes.
- The applicable Product is subjected to prolonged periods of dampness or condensation.
- There is any damage to the applicable Product due to water or weather damage which is the result of, but not limited to, improper chimney or venting installation.

LIMITATIONS OF REMEDIES AND LIABILITY:

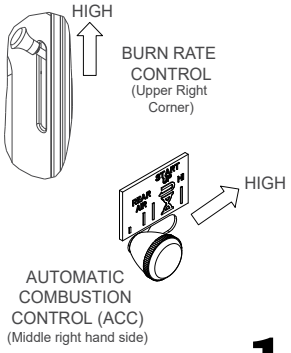
- **EXCEPT TO THE EXTENT PROVIDED BY LAW, HHT MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY SPECIFIED HEREIN. The owner's exclusive remedy and HHT's sole obligation under this Warranty or in contract, tort or otherwise, shall be limited to replacement of the Component Part(s), repair of the Component Part(s), or refund of the original purchase price of the applicable Product(s), as specified above; provided, however, that (i) if HHT is unable to provide replacement of the Component Part(s) and repair of the Component Part(s) is not commercially practicable or cannot be timely made, or (ii) the customer is willing to accept a refund of the purchase price of the applicable Product(s), HHT may discharge all such obligations by refunding the purchase price of the applicable Product. In no event will HHT be liable for any incidental or consequential damages caused by defects in the applicable Product. Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights and you may also have other rights which vary from State to State. THE DURATION OF ANY IMPLIED WARRANTY IS LIMITED TO DURATION OF THE EXPRESSED WARRANTY SPECIFIED ABOVE FOR THE APPLICABLE PRODUCT. Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.**

C. Quick Start Guide

NOTE: These are generic drawings and may not represent your specific model.

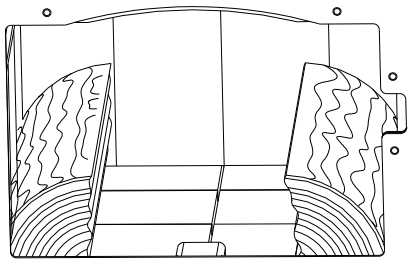
ITEMS NEEDED FOR FIRST FIRE: 10 Pieces of Newspaper, 10-20 Pieces of Dry Kindling and Few Pieces of Dry Split Wood.

OPEN AIR CONTROLS



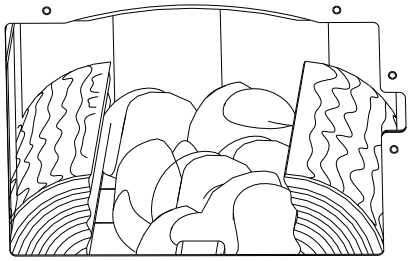
1

LOAD WOOD



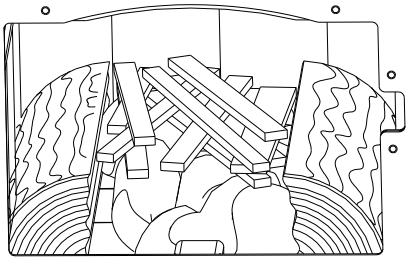
2

ADD NEWSPAPER



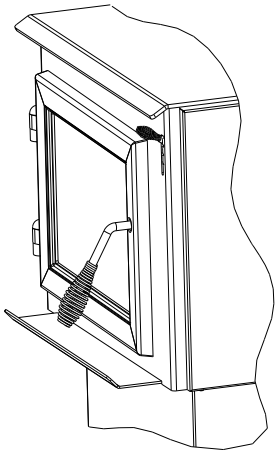
3

ADD KINDLING



LIGHT THE PAPER

4



Warning! Risk of Fire.

Close and securely latch the door after the fire has started, and after refueling, to prevent:

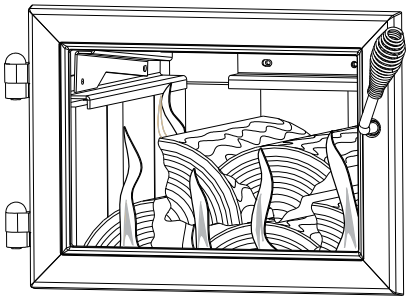
- Spillage of smoke, flame and carbon monoxide
- Spillage of sparks, coals, and logs
- Over firing

DO NOT leave the appliance unattended with the door open.

Starting a fire may not require an open door for draft. The air control should supply adequate draft.

5

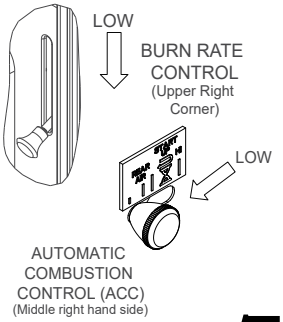
ADD MORE WOOD



6

REDUCE AIR CONTROLS

Set to desired heat output.



7

The appliance is ready for normal operation.

1 Listing and Code Approvals

A. Appliance Safety Certification

Model Number:	DISCOVERY-II-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066S
Type:	Listed Room Appliance, Solid Fuel Type
Standard:	UL 1482-11 (R2015) and ULC S627-00 and (UM) 84-HUD. Mobile Home Approved.

B. Appliance Emissions Certification

Model Number:	DISCOVERY-II-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066E
➔ **Standard:**	ASTM E2515, ASTM E2780
Can be found at: www.quadrafire.com/about-us/epa-certification	

The DISCOVERY-II-C is Certified to comply with 2020 crib wood particulate emission standards.

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

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with **(UM) 84-HUD and NFPA211 in the U.S.A. and CAN/CSA-B365 Installation Codes in Canada**.

C. BTU & Efficiency Specifications

EPA Certification Number:	Number: 86-17
EPA Certified Emissions:	1.9 grams per hour
***LHV Tested Efficiency:**	78.3%
****HHV Tested Efficiency:**	72.5%
*****EPA BTU Output:**	13,900 to 29,100 / hr
******Peak BTU/Hour Output:**	51,000
Vent Size:	6 inches
Firebox Size:	1.89 cubic feet
Recommended Log Length:	16 inches
Fuel	Seasoned Cordwood (20% moisture)

* Weighted average LHV (Low Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. LHV assumes the moisture is already in a vapor state so there is no loss in energy to vaporize.

** Weighted average HHV (High Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. HHV includes the energy required to vaporize the water in the fuel.

*** A range of BTU outputs calculated using HHV Efficiency and the burn rates from the EPA tests, using Douglas Fir dimensional lumber.

**** A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and BTU content of seasoned cordwood (8600) times the efficiency

D. Glass Specifications

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

E. Mobile Home Approved

- This appliance is approved for mobile home installations when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to UL103 HT or a listed UL-1777 full length six inch (152mm) diameter liner must be used.
- Outside Air Kit, part OAK-ACC must be installed in a mobile home installation.

F. Sleeping Room

When installed in a sleeping room it is recommended that a smoke and/or CO alarm be installed in the bedroom. The size of the room must be at least 50ft³ per 1,000 Btu/hr stove input, if the stove exceeds the room size, outside air must be installed.

G. California - Prop65

⚠ WARNING

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

⚠ WARNING

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

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

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

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

2 Operating Instructions

A. Over-Firing Your Appliance

WARNING

Fire Risk. Do not over-fire.
Over-firing may ignite creosote or will damage the appliance and chimney.

To prevent over-firing your appliance,
DO NOT:
- Use flammable liquids
- Overload with wood
- Burn trash or large amounts of scrap lumber
- Permit too much air to the fire

Visit www.quadrafire.com/shopping-tools/videos to view product and use & care videos.

1. Symptoms of Over-Firing

Symptoms of over-firing may include one or more of the following:
- Chimney connector or appliance glowing
- Roaring, rumbling noises
- Loud cracking or banging sounds
- Metal warping
- Chimney fire

2. What To Do if Your Appliance is Over-Firing
- Immediately close the door and air controls to reduce air supply to the fire.
- If you suspect a chimney fire, call the fire department and evacuate your house.
- Contact your local chimney professional and have your appliance and appliance pipe inspected for any damage.
- Do not use your appliance until the chimney professional informs you it is safe to do so.

Hearth & Home Technologies WILL NOT warranty appliances that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:
- Warped air tube
- Deteriorated refractory brick retainers
- Deteriorated baffle and other interior components

B. Wood Selection & Storage

Burn only dry seasoned wood. Store wood under cover, out of the rain and snow. Dry and well-seasoned wood will not only minimize the chance of creosote formation, but will give you the most efficient fire. Even dry wood contains at least 15% moisture by weight, and should be burned hot enough to keep the chimney hot for as long as it takes to dry the wood out - about one hour. It is a waste of energy to burn unseasoned wood of any kind.

Dead wood lying on the forest floor should be considered wet, and requires full seasoning time. Standing dead wood can be considered to be about 2/3 seasoned. To tell if wood is dry enough to burn, check the ends of the logs. If there are cracks radiating in all directions from the center, it is dry. If your wood sizzles in the fire, even though the surface is dry, it may not be fully cured.

Splitting wood before it is stored reduces drying time. Wood should be stacked so that both ends of each piece are exposed to air, since more drying occurs through the cut ends than the sides. This is true even with wood that has been split. Store wood under cover, such as in a shed, or covered with a tarp, plastic, tar paper, sheets of scrap plywood, etc., as uncovered wood can absorb water from rain or snow, delaying the seasoning process.

C. Burning Process

In recent years there has been an increasing concern about air quality. Much of the blame for poor air quality has been placed on the burning of wood for home heating. In order to improve the situation, we at Quadra-Fire have developed cleaner-burning wood appliances that surpass the requirements for emissions established by our governing agencies. These wood appliances, like any other appliances, must be properly operated in order to insure that they perform the way they are designed to perform. Improper operation can turn most any wood appliance into a smoldering environmental hazard.

1. Kindling or First Stage

It helps to know a little about the actual process of burning in order to understand what goes on inside a appliance. The first stage of burning is called the kindling stage. In this stage, the wood is heated to a temperature high enough to evaporate the moisture which is present in all wood. The wood will reach the boiling point of water (212°F) and will not get any hotter until the water is evaporated. This process takes heat from the coals and tends to cool the appliance.

Fire requires three things to burn - fuel, air and heat. So, if heat is robbed from the appliance during the drying stage, the new load of wood has reduced the chances for a good clean burn. For this reason, it is always best to burn dry, seasoned firewood. When the wood isn't dry, you must open the air controls and burn at a high burn setting for a longer time to start it burning. The heat generated from the fire should be warming your home and establishing the flue draft, not evaporating the moisture out of wet, unseasoned wood, resulting in wasted heat.

2. Second Stage

The next stage of burning, the secondary stage, is the period when the wood gives off flammable gases which burn above the fuel with bright flames. During this stage of burning it is very important that the flames be maintained and not allowed to go out. This will ensure the cleanest possible fire. If the flames tend to go out, it is set too low for your burning conditions. The air control located at the upper right hand corner is used to adjust for burn rates. This is called the Burn Rate Air Control **(Figure 10.1)**.

3. Final Stage

The final stage of burning is the charcoal stage. This occurs when the flammable gases have been mostly burned and only charcoal remains. This is a naturally clean portion of the burn. The coals burn with hot blue flames.

It is very important to reload your appliance while enough lively hot coals remain in order to provide the amount of heat needed to dry and rekindle the next load of wood. It is best to open the Burn Rate Air and Start-Up Air Controls before reloading. This livens up the coal bed and reduces excessive emissions (opacity/smoke). Open door slowly so that ash or smoke does not exit appliance through opening. You should also break up any large chunks and distribute the coals so that the new wood is laid on hot coals.

Air quality is important to all of us, and if we choose to use wood to heat our homes we should do so responsibly. To do this we need to learn to burn our appliances in the cleanest way possible. Doing this will allow us to continue using our wood appliances for many years to come.

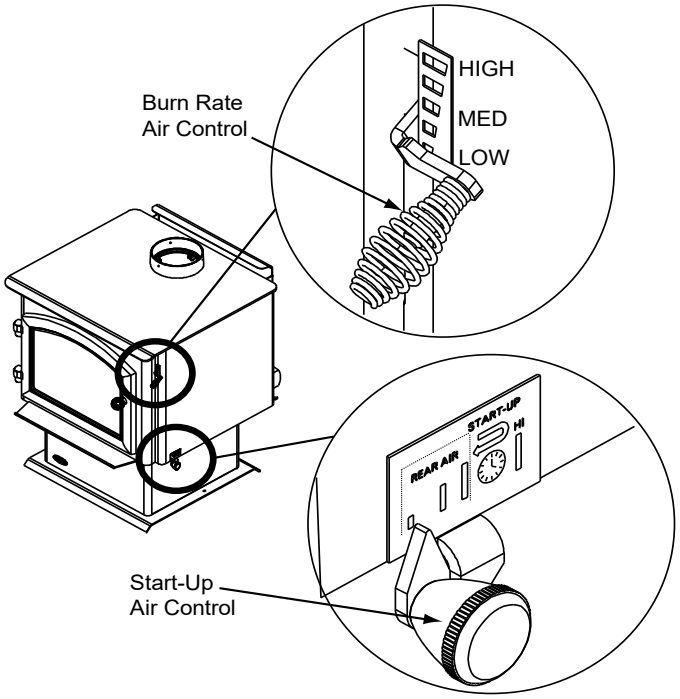


Figure 10.1

D. Air Controls

Users will need to find their preferred setting between high and low based on desired heat output, installation configuration, and fuel type.

1. Burn Rate Air Control

This air supply enters at the upper front of the firebox, near the top of the glass door. This preheated air supplies the necessary fresh oxygen to mix with the unburned gases, helping to create second, third and fourth combustions. This air is regulated by the Burn Rate Air Control. When the control is moved all the way up it is on the High setting and when moved all the way down it is on the Low setting **(Figure 10.1)**.

2. Automatic Combustion Control System (ACC)

To engage the Automatic Combustion Control (ACC) timer system push the lever towards the back of the appliance to the “HI” position, then pull forwards towards the front of the appliance until the knob stops. The timer will slowly close in about 25 minutes. Use this feature when reloading fuel or if you want more air supplied to the fire **(Figure 10.2)**.

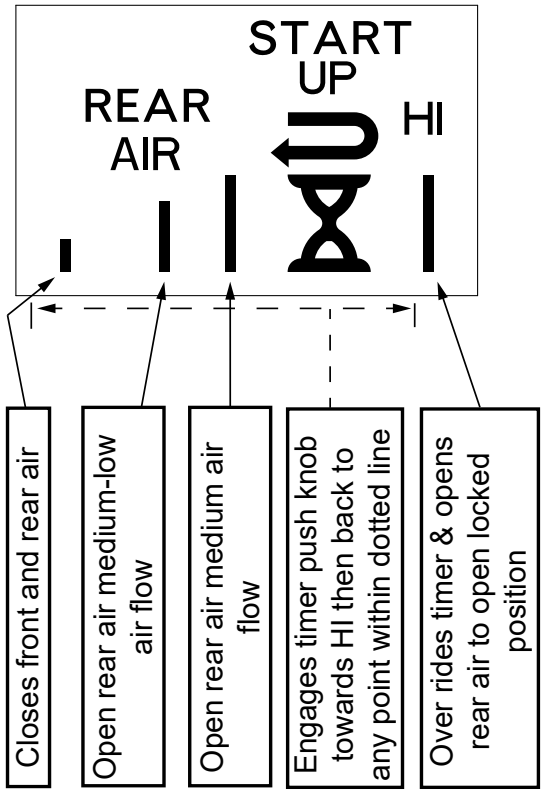


Figure 10.2

E. Using Burn Rate Air Control & ACC System

CAUTION

Injury Risk.
- Gloves recommended

1. Start up and Reloading Fuel

Open both Burn Rate Air Control and ACC systems fully. To do this with the Burn Rate Air Controls push spring handle up to high. For the ACC timer system push knob towards back of appliance until the knob is located under the high position (**Figure 11.1).**

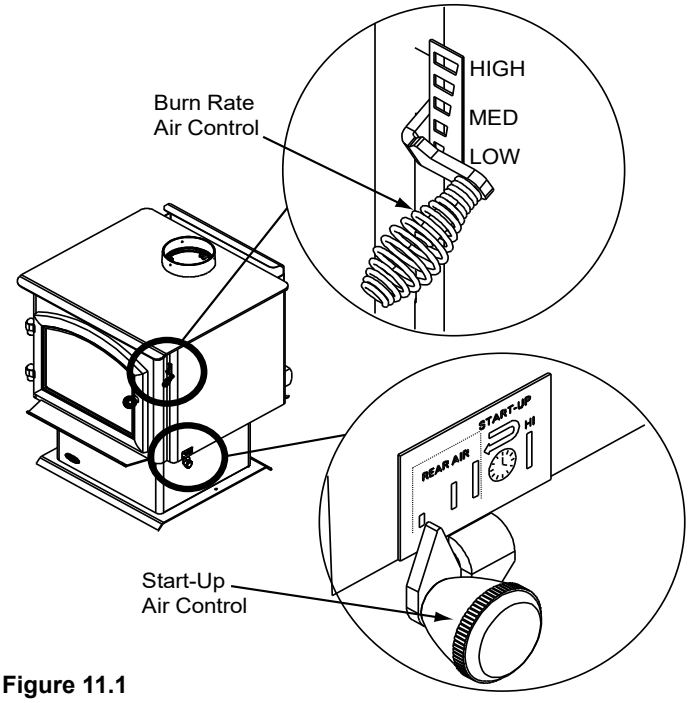


Figure 11.1

2. Maximize Heat with The ACC System

To maximize heat output with the ACC timer System or also known as high burn push the ACC Air Control lever towards the back of the appliance and leave. This combined with having the main burn rate control lever pushed up will deliver the most amount of air needed to achieve the highest amount of heat output (**Figure 11.1).**

3. Manual Timer Over-Ride

If you need to shut the ACC system off before it goes through the cycle of shutting itself off; 25 minutes, reach towards the back of the appliance on the right side and pull the lever towards the front of the appliance (**Figure 11.2).**

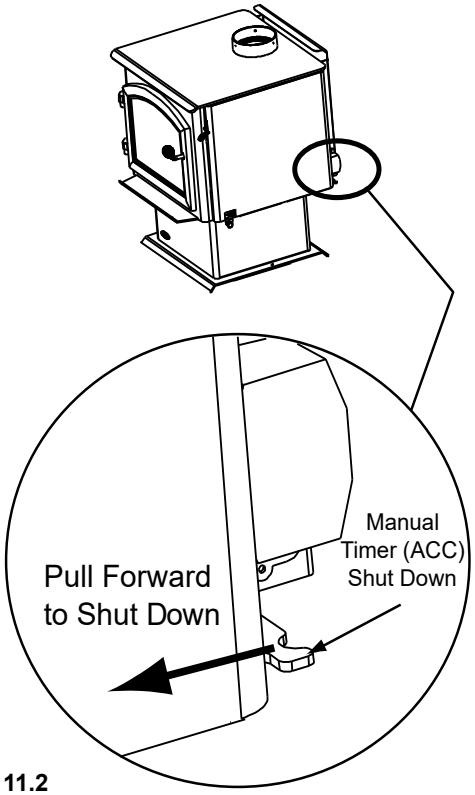


Figure 11.2

F. Burn Rates and Operating Efficiency

For maximum operating efficiency

This wood appliance has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood appliance in a manner inconsistent with operating instructions in this manual.

- Burn dry, well-seasoned wood.

Burn Rates

1. **Low burn setting:**
   - Burn Rate Air Control spring handle up to high position for 5 minutes.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops **(Figure 10.1 on page 10)**.
   - At that point close the Burn Rate Air Control by moving the spring handle to the low setting.

2. **Medium low burn setting:**
   - Burn Rate Air Control spring handle up to high position for 5 minutes.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops.
   - At that point move the Burn Rate Air Control spring handle to 1/8”-1/2” from the low setting.

3. **Medium high burn setting:**
   - Burn Rate Air Control spring handle up to high position.
   - Then activate the ACC timer system by pushing the knob all the way back toward the appliance to “HI” then pull forwards towards the front of the appliance until the knob stops.
   - At that point move the Burn Rate Air Control spring handle to 1/2” – high.

4. **High burn setting:**
   - Burn Rate Air Control spring handle up to high position
   - Also activate ACC timer system knob pushed back to the “HI” position.

NOTE: If using the optional blower, for burn rate settings 1-3, the blower shall be off for the first 30 minutes and then be operated in the high position at 30 minutes. For high burn setting, blower may continue to be on full after the loading of the fuel.

NOTE: The above information is provided as a guideline only. Altitude and other circumstances may require control adjustments to achieve the desired burn rates.

NOTE: Operate appliance on High Burn 45 minutes a day to help keep flue/chimney clean.

WARNING

Risk of Fire.
When set on High Burn Rate and over-riding the Automatic Combustion Control system an over fire situation can occur and may result in a chimney fire.
Over firing will void the appliance warranty.

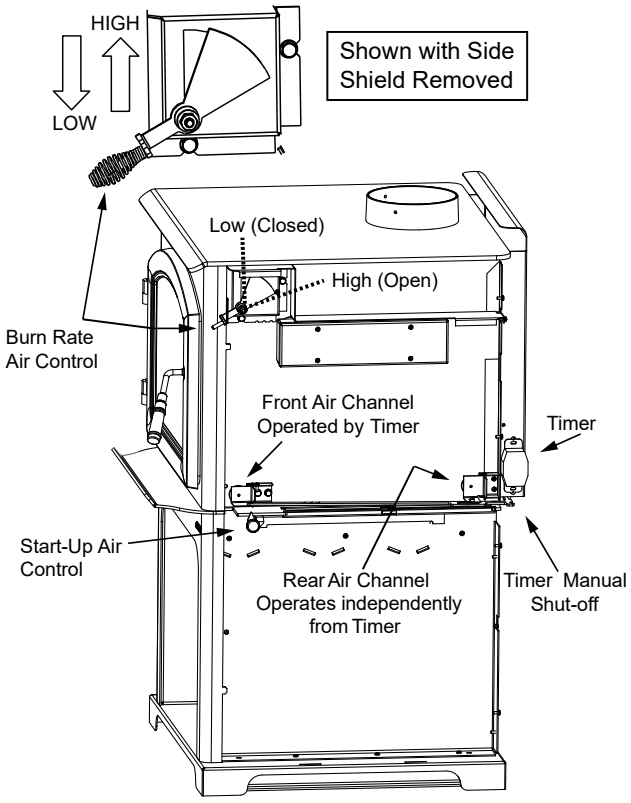


Figure 12.1

After activating the timer (ACC), if the control is placed within the rear air section on the label it will allow rear air to enter the firebox. This will not interfere with the timer gradually closing the front air channel in 25 minutes. If control is set on “HI” it over-rides the timer (ACC).

G. Building A Fire

Before lighting your first fire in the appliance:

NOTE: The special high temperature paint that your appliance is finished with will cure as your appliance heats. You will notice an odor and perhaps see some vapor rise from the appliance surface; this is normal. We recommend that you open a window until the odor dissipates and paint is cured.

1. Confirm the baffle is correctly positioned. It should be even with the front tube and resting on all tubes **(Figure 13.1 and Figure 13.2).**
2. Remove all labels from glass and inside of appliance.

There are many ways to build a fire. The basic principle is to light easily-ignitable tinder or paper, which ignites the fast burning kindling, which in turn ignites the slow-burning firewood. Here is one method that works well:

1. Open the Burn Rate Air and ACC Controls fully (Refer to **Start-Up Guide** on page 6).
2. Place several wads of crushed paper on the firebox floor. Heating the flue with slightly crumpled newspaper before adding kindling keeps smoke to a minimum.
3. Lay small dry sticks of kindling on top of the paper.
4. Make sure that no matches or other combustibles are in the immediate area of the appliance. Be sure the room is adequately ventilated and the flue unobstructed.
5. Light the paper in the appliance. NEVER light or rekindle fire with kerosene, gasoline, or charcoal lighter fluid; the results can be fatal.
6. Once the kindling is burning quickly, add several full-length logs 3 inches (76mm) or 4 inches (102mm) in diameter. Be careful not to smother the fire. Stack the pieces of wood carefully; near enough to keep each other hot, but far enough away from each other to allow adequate air flow between them.
7. Set the Burn Rate Air Control and activate the ACC timer system.
8. When ready to reload, It is best to fully open both the Burn Rate Air and Start-up Air Controls ***before reloading***. This livens up the coal bed and reduces excessive emissions (opacity/smoke). Open door slowly so that ash or smoke does not exit appliance through opening. Large logs burn slowly, holding a fire longer. Small logs burn fast and hot, giving quick heat.
9. As long as there are hot coals, repeating steps 6 through 8 will maintain a continuous fire.

WARNING

Fire Risk.

- Do not leave the fire unattended when the door is unlatched or when using the fire screen.
- Unstable firewood could fall out of the firebox creating a fire hazard to your home.

NOTE:

- Build fire on brick firebox floor.
- Do NOT use grates, andirons or other methods to support fuel. It will adversely affect emissions.

WARNING

Fire Risk.

Do NOT store wood:

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

Do NOT operate appliance:

- With appliance door open.
- With ash removal system door open.

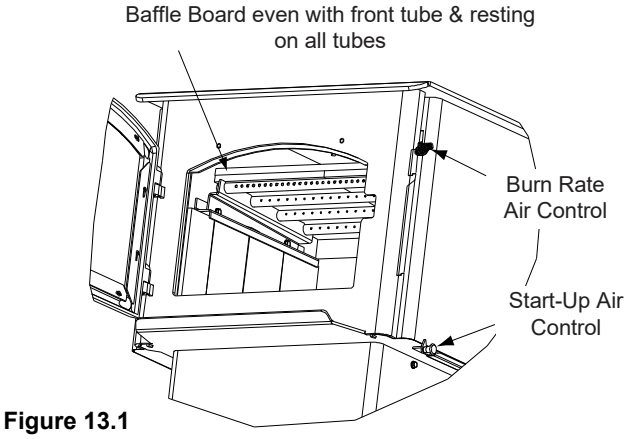


Figure 13.1

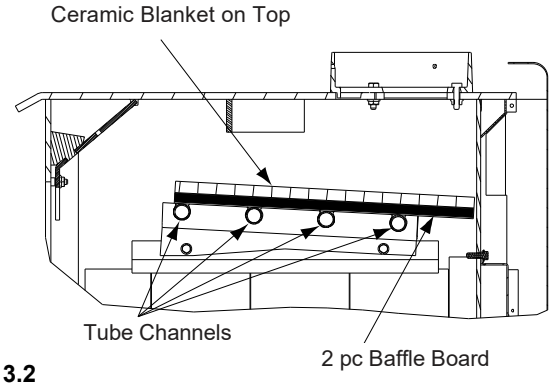


Figure 13.2

WARNING

Fire Risk.

- Do NOT burn wet or green wood.
- Store wood in dry location.
- Stack wood so both ends are exposed to air.

Wet, unseasoned wood can cause accumulation of creosote.

H. Blower Operating Instructions

NOTE: If your Quadra-Fire wood appliance is equipped with an optional blower, you should follow these guidelines:

1. **Initial (cold) start-up and all Burn Settings**
   The blower can be plugged in and turned on right away. The blower fan is turned on and off by a snap disc. When your appliance has reached a certain temperature the blower will turn on and when your appliance has cooled down to a certain temperature it will turn off. Switch on blower control must be set to auto for this feature to work.
2. The blower is equipped with a speed control. Adjust the fan speed by turning the speed control clockwise to “Low” or counterclockwise to “High”.
3. **Snap Disc Location**
   If you find the blower coming on and off at undesirable temperatures, relocate the snap disc to another location in the designated zone on the back of the appliance (**Figure 14.1).** There is a manual over-ride switch to deactivate the snap disc, if necessary **(Figure 14.2)**.

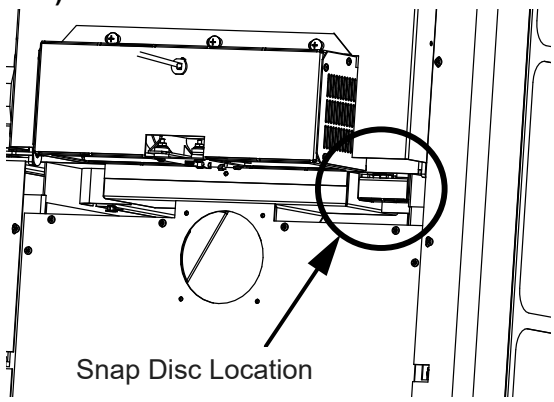


Figure 14.1

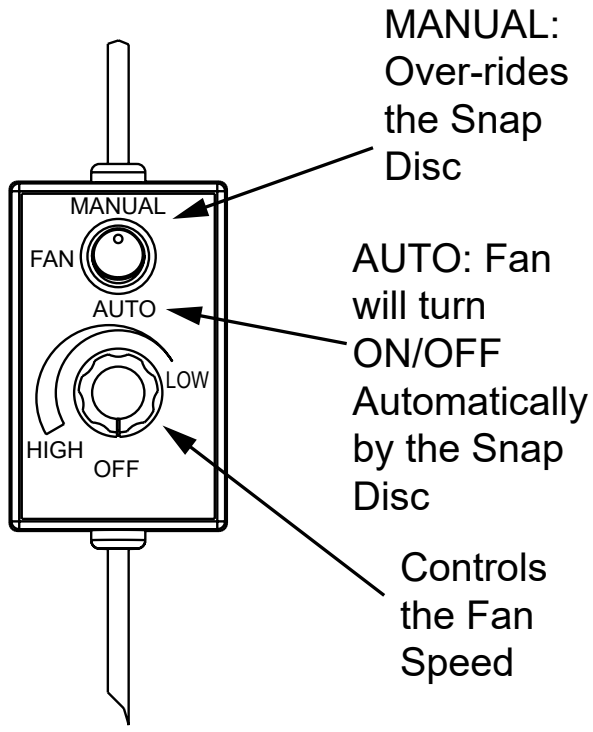


Figure 14.2

I. Opacity (Smoke)

This is the measure of how cleanly your appliance is burning. Opacity is measured in percent; 100% opacity is when an object is totally obscured by the smoke column from a chimney, and 0% opacity means that no smoke column can be seen. As you become familiar with your appliance, you should periodically check the opacity. This will allow you to know how to burn as nearly smoke-free as possible (goal of 0% opacity).

WARNING

Fire Risk.

- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.
- Do NOT burn treated wood or wood with salt (driftwood).
- May generate carbon monoxide if burn material other than wood.

May result in illness or possible death.

WARNING

Fire Risk.

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

- Do NOT store flammable materials in the appliance’s vicinity.
- DO NOT USE GASOLINE, LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR “FRESHEN UP” A FIRE IN THIS APPLIANCE.
- Keep all such liquids well away from the appliance while it is in use.
- Combustible materials may ignite.

CAUTION

When burning your first fire, you will experience smoke and odor from the appliance resulting from the curing of paint and burning off of any oils remaining from manufacturing.

OPEN WINDOWS DURING INITIAL BURN TO DISSIPATE SMOKE AND ODORS!

- Odors may be irritating to sensitive individuals.
- Smoke detectors may activate.

J. Clear Space

NOTE: Do NOT place combustible objects within 4 ft (1.2 m) of the front of appliance **(Figure 15.1)**.

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

WARNING

Do NOT place combustible objects in front of the appliance. High temperatures may ignite clothing, furniture or draperies.

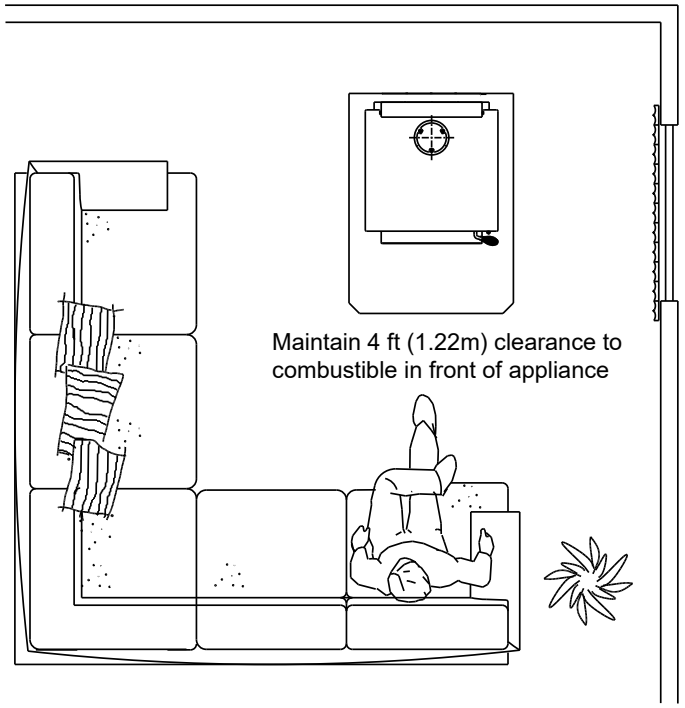


Figure 15.1

K. Negative Pressure

WARNING

Asphyxiation Risk.

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

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

Causes include:

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

To minimize the effects of negative air pressure:

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

L. Frequently Asked Questions

ISSUES	SOLUTIONS
Odor from appliance	When first operated, this appliance may release an odor for the first several hours. This is caused by the curing of the paint and the burning off of any oils remaining from manufacturing.
Metallic noise	Noise is caused by metal expanding and contracting as it heats up and cools down, similar to the sound produced by a furnace or heating duct. This noise does not affect the operation or longevity of the appliance.
Whirring sound	If the optional blower has been installed, the blower produces a whirring sound which increases in volume as the speed is increased.

CONTACT YOUR DEALER for additional information regarding operation and troubleshooting.
Visit www.quadrafire.com to find a dealer.

Table 16.1

WARNING

Fire Risk.

- DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.
- Do NOT burn treated wood or wood with salt (driftwood).
- May generate carbon monoxide if burn material other than wood.

May result in illness or possible death.

WARNING

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

- Do NOT store flammable materials in the appliance's vicinity.
- DO NOT USE GASOLINE, LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS APPLIANCE.
- Keep all such liquids well away from the appliance while it is in use.
- Combustible materials may ignite.

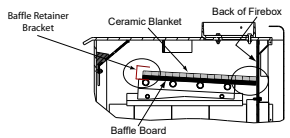
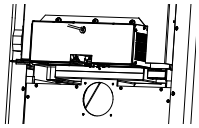
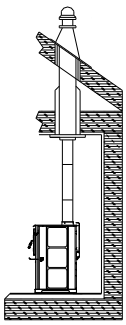
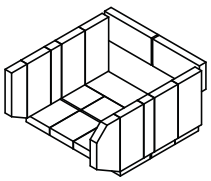
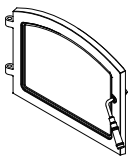
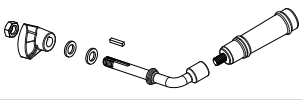
3 Maintenance and Service

A. Quick Reference Maintenance Guide

When properly maintained, your fireplace will give you many years of trouble-free service. Contact your dealer to answer questions regarding proper operation, troubleshooting and service for your appliance. Visit www.quadrafire.com/owner-resources to view basic troubleshooting, FAQs, use & care videos.

CAUTION

Allow the appliance to completely cool down before performing any cleaning or maintenance. Start the first inspection after the first 2 months of use, or if performance changes, and adjust your schedule accordingly. Maintenance is required for safe operation and must be performed to maintain your warranty.

	FREQUENCY	TASK
Baffle & Blanket 	MONTHLY or after every one (1) cord of wood	Baffle and blanket placement is critical to heat output, efficiency and overall life of the appliance. Make sure the baffle is pushed all of the way to the back of the firebox and the blanket is laying flat. Inspect baffle for cracks.
Optional Blower 	YEARLY or after every four (4) cords of wood	Vacuum the blower impellers.
Chimney System 	EVERY TWO MONTHS or after every four (4) cords of wood	The chimney and chimney cap must be inspected for soot and creosote every two months during the burn season or more frequency if chimney exceeds or is under 14-16 ft (4.3m-4.8m) measured from bottom of appliance. This will prevent pipe blockage, poor draft, and chimney fires. Always burn dry wood to help prevent cap blockage and creosote build-up.
Firebrick & Ash Removal 	WEEKLY or after every 25 loads of wood	Ashes must be cool before you can dispose of the ashes in a non-combustible container. Firebrick is designed to protect your firebox. After ashes are removed, inspect the firebrick and replace firebricks that are crumbling, cracked or broken.
Door & Glass Assemblies 	WEEKLY or after every 25 loads of wood	Keep door and glass gasket in good shape to maintain good burn. To test: place a dollar bill between the appliance and door and then shut the door. If you can pull the dollar out, remove one washer from door handle behind latch cam and try again. If you can still pull it out, replace the door gasket. Check the glass frame for loose screws to prevent air leakage. Check glass for cracks.
Door Handles 	WEEKLY or after every 25 loads of wood	Check the door latch for proper adjustment. This is very important especially after the door rope has formed to the appliance face. Check door handle for smooth cam operation.

These are generic drawings and may not represent your model.

Table 17.1

B. General Maintenance

1. Creosote (Chimney) Cleaning

- **Frequency:** Every 2 months during heating season or as recommended by a certified chimney sweep; more frequently if chimney exceeds or is under 14-16 ft. (measured from bottom of appliance)
- **By:** Certified Chimney Sweep

Remove all ash from the firebox and extinguish all hot embers before disposal. Allow the appliance to cool completely. Disconnect flue pipe or remove baffle and ceramic blanket from appliance before cleaning chimney. Otherwise residue can pile up on top of the baffle and ceramic blanket and the appliance will not work properly. (See **Baffle Removal** on page 24). Close the door tightly. The creosote or soot should be removed with a brush specifically designed for the type of chimney in use. Clean out fallen ashes from the firebox.

It is also recommended that before each heating season the entire system be professionally inspected, cleaned and repaired if necessary.

Inspection:

Inspect the system at the appliance connection and at the chimney top. Cooler surfaces tend to build creosote deposits quicker, so it is important to check the chimney from the top as well as from the bottom.

Formation and Need For Removal:

When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote.

The creosote vapors condense in the relatively cool chimney flue of a newly-started or a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote creates an extremely hot fire which may damage the chimney or even destroy the house.

The chimney connector and chimney should be inspected once every 2 months during the heating season to determine if a creosote or soot buildup has occurred. If creosote or soot has accumulated, it should be removed to reduce the risk of a chimney fire.

WARNING

Fire Risk.
Prevent creosote buildup.

- Inspect chimney connector and chimney once every two months during heating season.
- Remove creosote to reduce risk of chimney fire.
- Ignited creosote is extremely HOT.

WARNING

Fire Risk.

- Do not use chimney cleaners or flame colorants in your appliance. Will corrode chimney pipe.

2. Disposal of Ashes

- **Frequency:** When ash is within 1-3/4 in. (44mm) of firebox lip
- **By:** Homeowner

WARNING

Fire Risk.
Ashes could contain hot embers.

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

WARNING

Fire Risk. Disposal of Ashes

- Ashes should be placed in metal container with tight fitting lid.
- Do not place metal container on combustible surface.
- Ashes should be retained in closed container until all cinders have thoroughly cooled.

3. Appliance Inspection

- **Frequency:** Every 2 months at the same time the chimney and chimney connector are inspected.
- **By:** Homeowner

Check for:

- Cracks in glass
- Door handle - smooth cam operation
- Baffle and ceramic blanket correct placement
- Baffle for warp-age
- Firebrick for cracks, broken or crumbly
- Door gasket (Dollar bill test): Place a dollar bill between the stove and the door and then shut the door. If you can pull the dollar bill out, replace the door gasket.
- Glass frame for loose screws

4. Glass Cleaning

- **Frequency:** As desired
- **By:** Homeowner

CAUTION

Handle glass assembly with care. Glass is breakable.

- Avoid striking, scratching or slamming glass
- Avoid abrasive cleaners
- Do not clean glass while it is hot

Clean glass with a non-abrasive glass cleaner. Abrasive cleaners may scratch and cause glass to crack. If the deposits on the glass are not very heavy, normal glass cleaners work well. Heavier deposits may be removed by using a damp cloth dipped in wood ashes or by using a commercially available oven cleaner.

After using an oven cleaner, it is advisable to remove any residue with a glass cleaner or soap and water. Oven cleaner left on during the next firing can permanently stain the glass and damage the finish on metal surfaces.

A portion of the combustion air entering the firebox is deflected down over the inside of the door glass. This air flow “washes” the glass, helping to keep smoke from adhering to its surface.

When operated at a low burn rate, less air will be flowing over the glass and the smokey, relatively cool condition of a low fire will cause the glass to become coated.

Operating the appliance with the Burn Rate Air Control and Start-Up Air Control all the way open for 30-45 minutes should remove the built up coating.

CAUTION

- Do not use polishes with abrasives. It will scratch surfaces.

5. Cleaning Plated Surfaces

- **Frequency:** Prior to first burn and then as desired
- **By:** Homeowner

Clean all the fingerprints and oils from plated surfaces **BEFORE** firing the appliance for the first time. If not cleaned properly before lighting your first fire, the oils can cause permanent markings on the plating.

After the plating is cured, the oils will not affect the finish and little maintenance is required. Wipe clean as needed.

CAUTION

- Do not use polishes with abrasives. It will scratch plated surfaces.

6. Inspect Firebrick

- **Frequency:** After each ash removal
- **By:** Homeowner

Replace the firebrick if they become crumbly and/or if there is a 1/4 inch (6.35mm) gap between the bricks.

The firebox is lined with firebrick, which has exceptional insulating properties. Do not use a grate; simply build a fire on the firebox floor. Do not operate appliance without firebrick.

1. After the coals have completely cooled, remove all old brick and ash from unit and vacuum firebox.
2. Remove new brick set from box and lay out to the diagram shown in the instructions that come with the brick set or refer to the diagram on the service parts list at the end of this manual.
3. Lay bottom bricks in unit.
4. Install rear bricks on the top of the bottom bricks. Slide top of bricks under clip on back of firebox wall and push bottom of bricks back.
5. Install side bricks. Slide top of brick under clips on side of firebox and push the bottom of the brick until it is flush with the side of the unit.

C. Correct Baffle & Blanket Placement

WARNING

Fire Risk.
Firebox damage due to improper baffle placement is not covered by warranty. Operate the wood burning appliance with the baffle in the correct position only.

Not doing so could result in:
- Reduced efficiency
- Overheating the chimney
- Overheating the rear of the firebox
- Poor performance

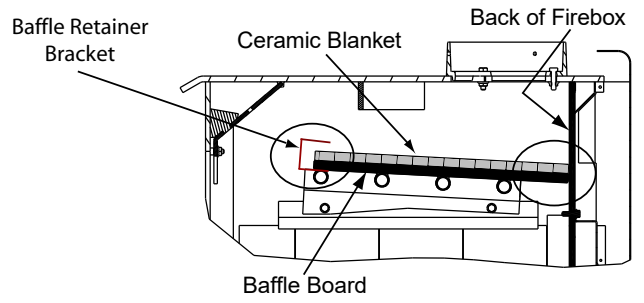
Ensure correct baffle placement and replace baffle components if damaged or missing.

CAUTION

The baffle boards are FRAGILE. Use extreme caution when loading firewood to prevent:
- Cracking, breaking or damaging the baffle boards

DO NOT operate the appliance without baffle boards

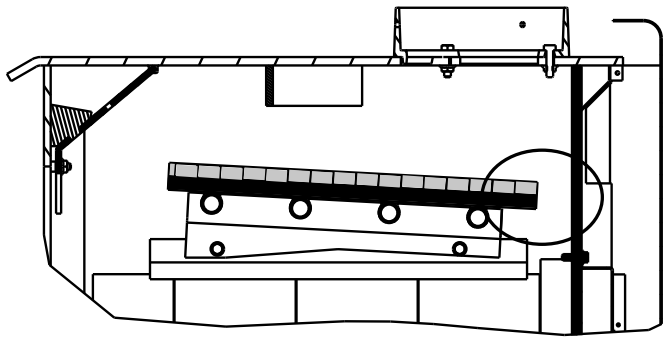
CORRECT POSITION



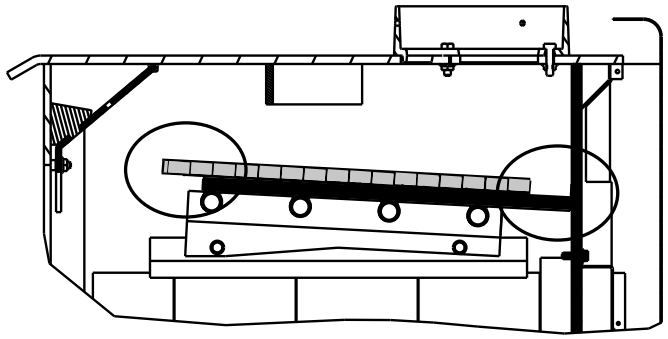
Ceramic Blanket and Baffle Board MUST be in contact with the back of the firebox and even with each other in the front.

Figure 20.1

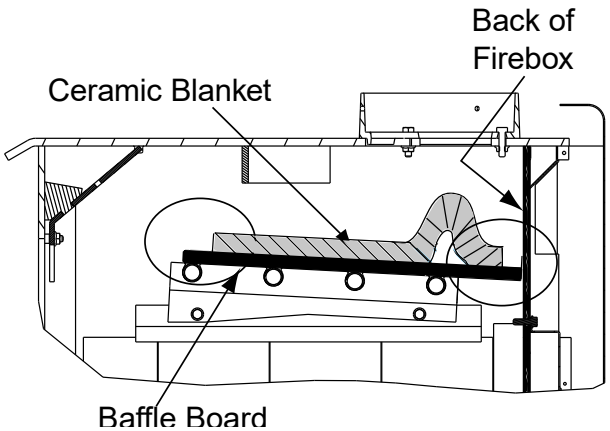
INCORRECT POSITIONS



Ceramic Blanket and Baffle Board are NOT in contact with the back of the firebox.



Ceramic Blanket is NOT in contact with the back of the firebox and NOT even with the Baffle Board in the front.



Ceramic Blanket is bunched up at the back of the firebox and NOT even with the Baffle Board in the front.

Figure 20.2

4 Troubleshooting Guide

With proper installation, operation, and maintenance your wood appliance will provide years of trouble-free service. If you do experience a problem, this troubleshooting guide will assist you or a qualified service person in the diagnosis of a problem and the corrective action to be taken.

Start Fire Problems	Possible Cause	Solution
Can not get fire started Excessive smoke or spillage Burns too slowly Not enough heat output	Not enough kindling/paper or no kindling/paper	Use dry kindling, more paper. Arrange kindling & wood for air movement.
	Not enough air for fire to ignite	Check for restricted termination cap
		Check for blockage of outside air kit (if installed).
		Check for flue blockage.
		Pre-warm flue before starting fire (refer to **Building a Fire** on page 13).
		Check for adequate vent height (refer to **Chimney Height / Rise and Run** on **page 13** of the Installation manual).
		Open window below the appliance towards the wind.
	Wood condition is too wet, too large	Use dry, seasoned wood (refer to **Wood Selection & Storage** on page 9).
	Bed of coals not established before adding wood	Start with paper & kindling to establish bed of coals (refer to **Building a Fire** on page 13).
	Flue blockage such as birds' nests or leaves in termination cap	Have chimney inspected for creosote and cleaned by a certified chimney sweep.
	Down draft or negative pressure Competition with exhaust devices	Do not use exhaust fans during start-up (refer to **Negative Pressure** on page 15).
		Open window below the appliance towards the wind.
Fire burns too fast	Extremely dry or soft wood	Mix in hardwood.
		Mix in less seasoned wood after fire is established (refer to **Wood Selection & Storage** on page 9).
	Over drafting	Check for correct vent height; too much vertical height creates over drafting.
		Check location of vent termination (refer to **Chimney Termination Requirement** on **page 12** of the Installation manual).

Table 21.1

5 Service Part Replacement

A. Glass

NOTE: Replace with 5mm ceramic glass only.

Service Part: 7000-012

1. Ensure that the fire is out and the appliance is cool to the touch.
2. Protect a table or counter top with padding or towels. Protect your hands and wear gloves to prevent injury.
3. Remove the door with the broken glass by lifting the door up and off of the hinges.
4. Lay door face down on a table or counter making sure the handle hangs over the edge so the door lays flat, on a soft surface.
5. Remove the screws from each glass retainer and remove the glass. (If screws are difficult to remove, soak with penetrating oil first).
6. Center the glass with edges evenly overlapping the opening in the door, (i.e. same space top and bottom, left and right sides).
7. Replace the glass retainers. Be careful not to cross thread the screws.
8. Tighten each retainer just a few turns until each is secured. Check again for centering of glass in door frame. Continue to tighten each retainer alternately, a few turns at a time, until the glass is secure.

NOTE: DO NOT OVER TIGHTEN - can cause glass to break.

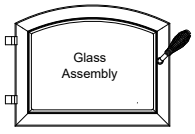
9. Replace the door on the appliance.

Quadra-Fire appliances are equipped with ceramic super heat-resistant glass, which can only be broken by impact or misuse.

WARNING

Injury Risk.
- Use only glass specified in manual.
- DO NOT REPLACE with any other material.

CAUTION!



Handle glass assembly with care.
When cleaning glass:

- Avoid striking, scratching or slamming glass.
- Do NOT clean glass when hot.
- Do NOT use abrasive cleaners.
- Use a hard water deposit glass cleaner on white film.
- Use commercial oven cleaner on heavier deposits.
- Remove all residue of oven cleaner or will permanently stain glass on next firing.

Refer to maintenance instructions.

B. Firebrick

Service Part: SRV7033-006

Replace the firebrick if they become crumbly and/or if there is a 1/4 inch (6.35mm) gap between the bricks.

Inspect the firebrick after each ash removal.

The firebox is lined with high quality firebrick, which has exceptional insulating properties. There is no need to use a grate; simply build a fire on the firebox floor. Do not operate appliance without firebrick.

1. After the coals have completely cooled, remove all old brick and ash from appliance and vacuum firebox.
2. Remove new brick set from box and lay out to diagram shown.
3. Lay bottom bricks in appliance.
4. Install rear bricks on the top of the bottom bricks. Slide top of bricks under clip on back of firebox wall and push bottom of brick back.
5. Install side bricks. Slide top of brick under clips on side of firebox and push the bottom of the brick until it is flush with the side of the appliance.

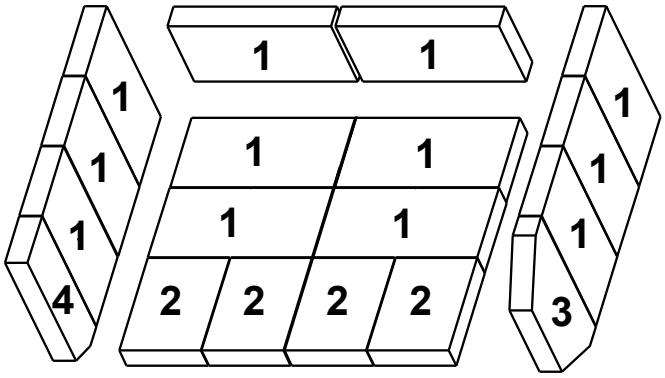


Figure 22.1

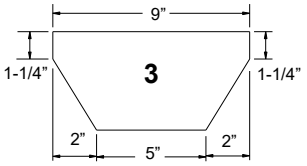


Figure 22.2

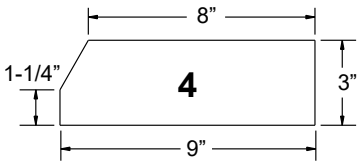


Figure 22.3

Placement	Dimensions	Qty Required
1	9” x 4.5” x 1.25”	12
2	6” x 4.5” x 1.25”	4
3	9” x 4.5” x 1.25” w/Angles	1
4	9” x 3” x 1.25” w/Angle	1

Table 22.1

C. Snap Disc

Service Part: SRV230-0470

1. Locate the snap disc bracket assembly at the bottom left rear corner of the appliance.
2. A magnet holds the bracket to the appliance. Pull the bracket down away from the appliance to expose the snap disc.
3. Pull the snap disc and spade connectors up and out of bracket as shown in **Figure 23.1**
4. Using a Phillips head screw driver, remove the 2 screws from the snap disc and then remove the snap disc from the spade connectors. Replace with new snap disc and re-connect to spade connectors.
5. Push the snap disc and spade connectors back inside bracket and re-attach the bracket to the appliance.

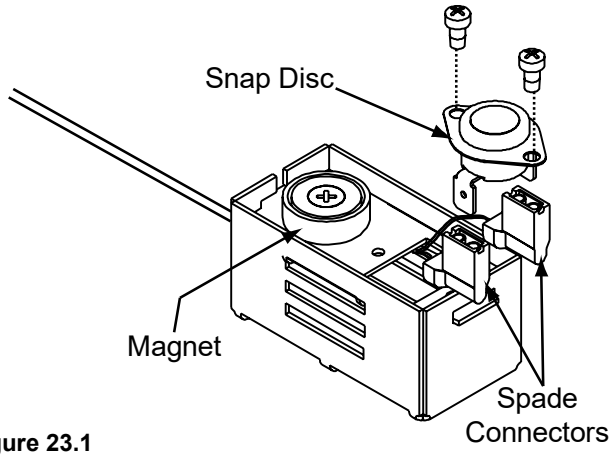


Figure 23.1

D. Door Handle Assembly

Service Part: SRV7033-071

1. Slide door handle through door.
2. Install additional washer(s) as shown in **Figure 23.2**
3. Install key in groove.
4. Align groove in latch cam with key; slide latch cam over shaft
5. Install locknut but do not over tighten, the handle needs to rotate smoothly.
6. Install fiber handle **(Figure 23.2)**.

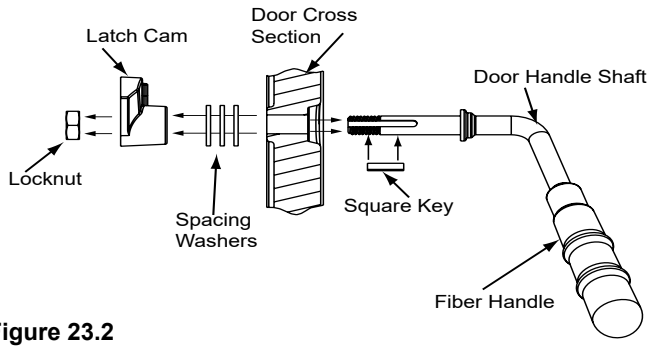


Figure 23.2

CAUTION!

Do not over tighten lock nut. The door handle needs to move smoothly.

E. Baffle

Service Part: SRV7033-209

1. Remove all ash from the firebox, and extinguish all hot embers before disposal into a metal container.
2. The baffle board has 2 pieces. With the ceramic blanket still in place, slide one baffle piece over the top of other one and pull out top piece through the door opening and then remove bottom baffle piece **(Figure 24.1).**
3. Remove the ceramic blanket.
4. Re-install the baffle pieces one piece at a time. Be sure the baffle boards are even with the front manifold tube and is resting on all tubes **(Figure 24.3 and Figure 24.4).**
5. To re-install the ceramic blanket, it is easier to fold it in half first. Place on top of baffle board, open up and flatten and smooth out the blanket. Re-check the baffle board for correct positioning **(Figure 24.3 and Figure 24.4).**

Figure 24.1 - Baffle

Figure 24.2 - Ceramic Blanket

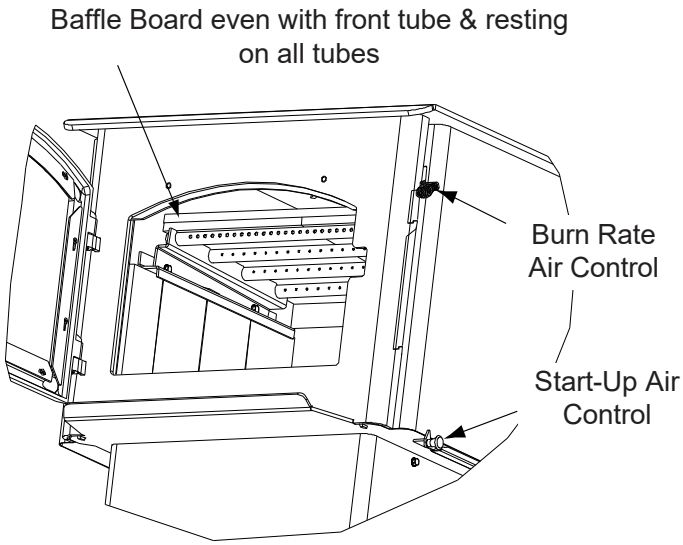


Figure 24.3

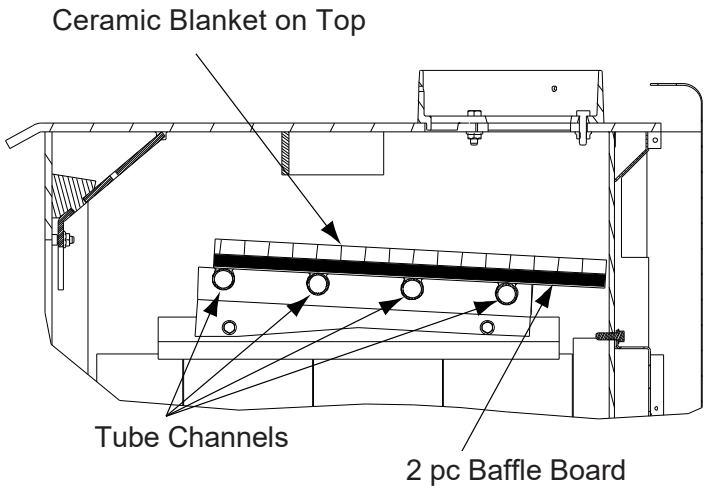


Figure 24.4

F. Decorative Panel Removal & Installation

Left Side Panel Service Part: SRV7033-082
Right Side Panel Service Part: SRV7033-080
Tile Frame Service Part: SRV7033-324
Blank Frame Service Part: SRV7033-346

Your appliance ships with two different side options, one is a solid side panel **(Figure 25.1)** and tile side panel **(Figure 25.2)**. There are two of each and no left or right side, these can be changed at anytime.

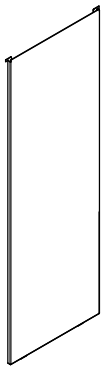


Figure 25.1

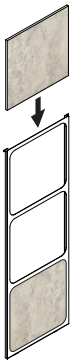


Figure 25.2

The appliances are being shipped with a solid side panel securing clip on both sides. Please remove and discard pins prior to use **(Figures 25.3)**.

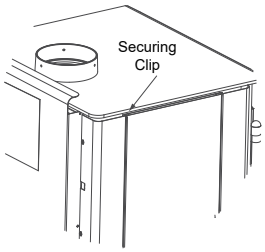


Figure 25.3

Solid Side Panel Removal

1. Remove solid panel from side by lifting up and pulling away from appliance (use a flat tool to pry from bottom if needed) **(Figure 25.4).**

NOTE: 300 degree F high temp paint can be use to repaint the solid side panel only! DO NOT use on the rest of appliance this requires 1200 degree F high temp paint.

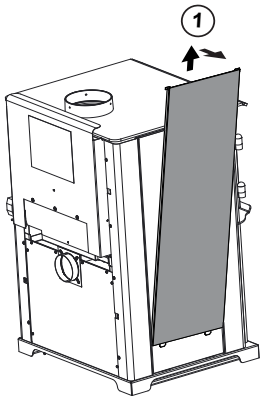


Figure 25.4

Tile Panel Installation

2. Remove tile frame from side by lifting up and pulling away from appliance. **Figure 25.3 reference solid side panel removal.**
3. Stack non-combustible material tiles in tile frame as shown in **Figure 25.2.**
4. Reattach tile frame **(Figure 25.4)**.

WARNING

Fire Risk.
Use only noncombustible materials as a decorative tile.

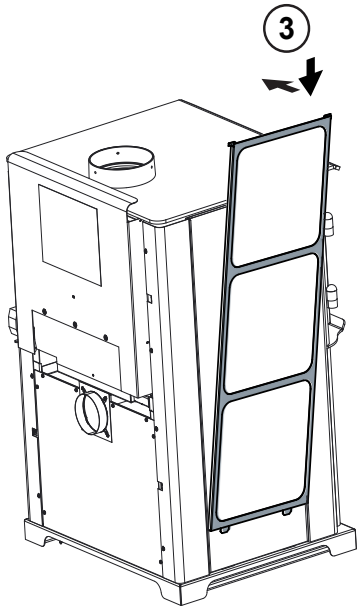


Figure 25.5

Tile Dimensional Requirements:
Max Thickness: 5/16”
Max Length/Width: 11-7/8” square
Min Length/Width: 11-11/16” square

G. Tube Channel Assembly

Service Part: SRV7033-023

Removing Tube Channel Assembly

1. Remove the right side shield by removing 2 screws in the back using a Phillips head screw driver.
2. Remove 4 screws from channel access cover and remove cover.
3. Locate 2 channel nuts inside of chamber and remove using a 7/16 socket wrench. Slide out tube channel assembly.

NOTE: Soak the bolts with penetrating oil for at least 15 minutes before trying to remove them.

Replacing Tube Channel Assembly

1. Slide one gasket onto each tube.
2. Slide the tube channel assembly into side of firebox and insert each tube into the corresponding hole in the tube channel rack starting with the back hole first.
3. Make sure tube channel assembly is flush against the side of the appliance and secure with channel nuts.
4. Re-install channel cover and side shield.

NOTE: Service Space
In order to replace the tube channel assembly a clearance of 19 inches (483mm) is required on the right side of appliance in order to remove the tubes with the appliance in place.

If space is not available, the appliance will have to be disconnected from the chimney to proceed with the tube replacement.

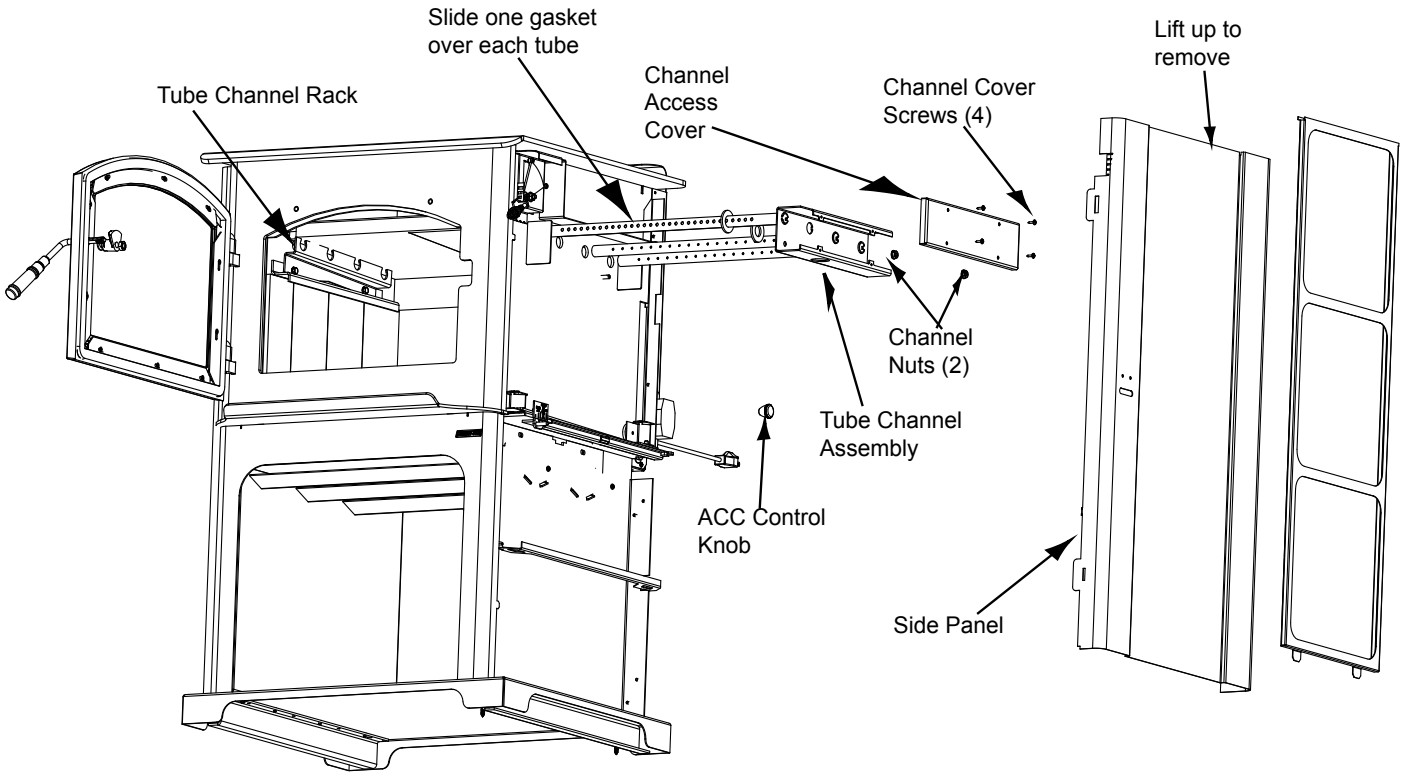


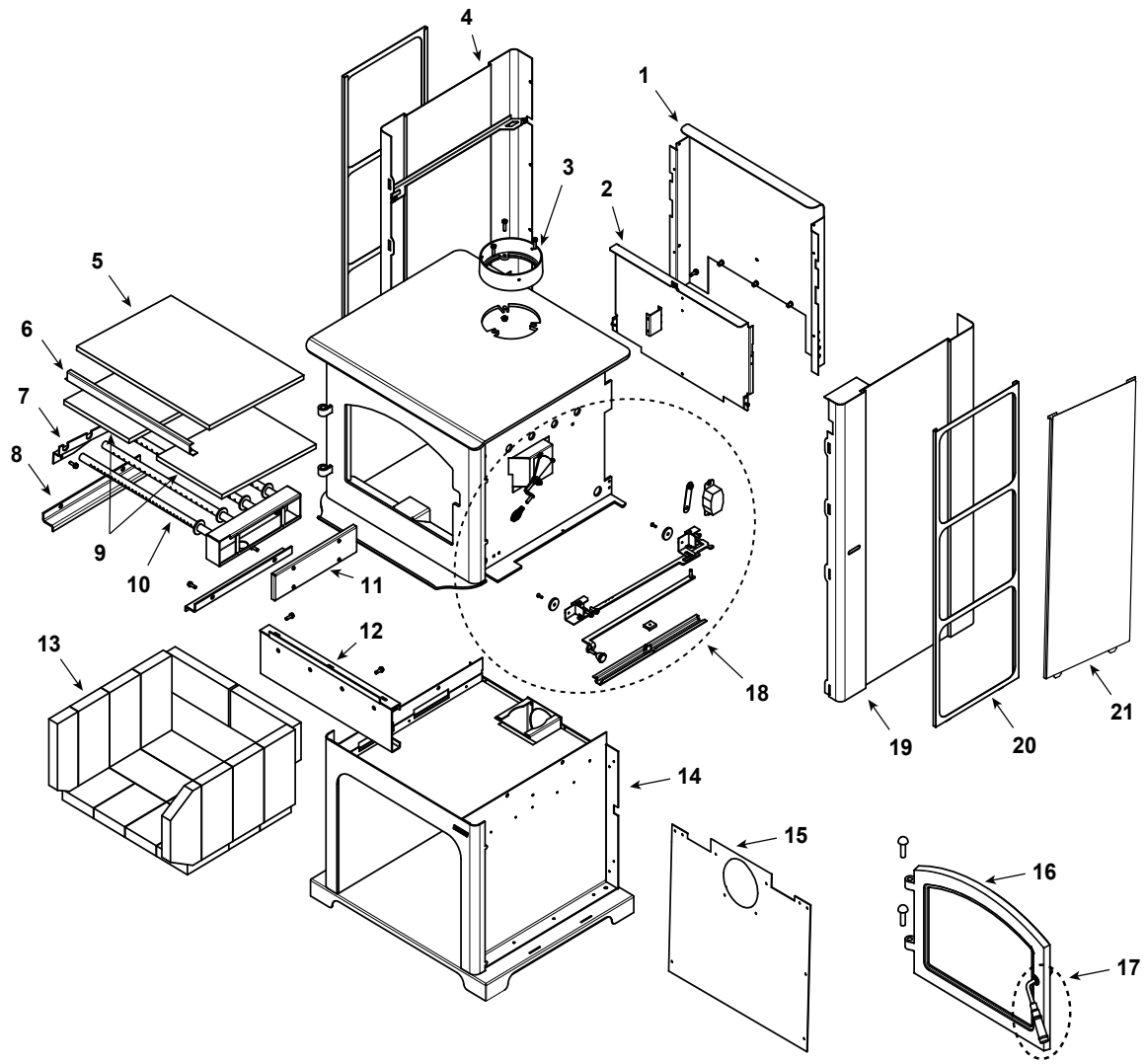
Figure 26.1

6 Reference Materials

A. Service and Maintenance Log

Date of Service	Performed By	Description of Service

Date of Service	Performed By	Description of Service



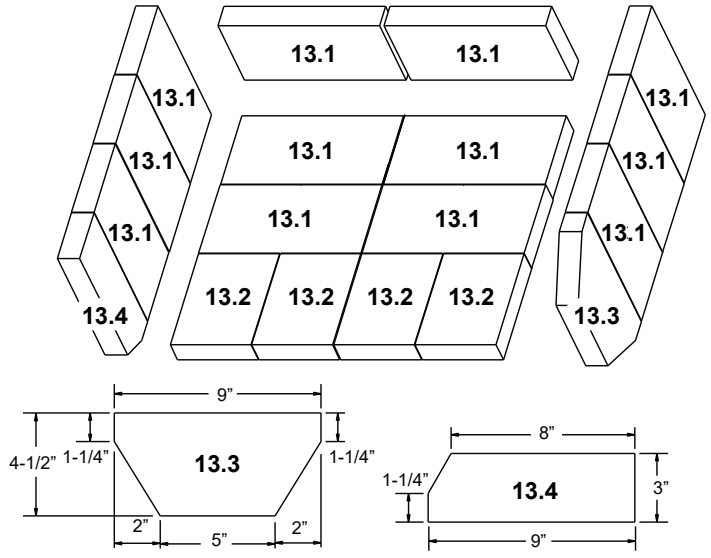
Part number list on following page.

07/21

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
1	Air Channel, Convection w/Bracket (Retain Original SN Label)		SRV7033-144	
2	Air Supply Back		SRV7033-134	
3	Flue Collar		SRV7000-302	
4	Panel Assembly, Side, Left		SRV7033-082	**Y**
5	Ceramic Fiber Blanket, 1/2” Thick		832-3390	
6	Baffle Protection Channel		SRV7033-298	
7	Tube Support Rack		SRV7033-148	
8	Brick Retainer		SRV7033-149	
9	Baffle Board	Pkg of 2	SRV7033-209	
10	Tube, Channel Assembly		SRV7033-023	
11	Tube Channel Top		SRV7033-237	**Y**
12	Rear Channel Assembly		7033-002	**Y**

#13 Brick Set Assembly



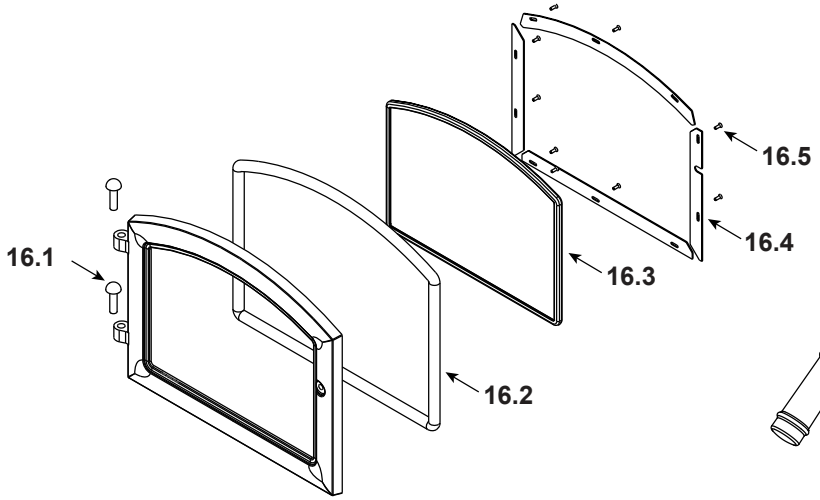
13	Firebrick Set, Complete Set		SRV7033-006	
13.1	Brick, Uncut, 9 x 4-1/2 x 1-1/4” (Qty. 12 Req.)	Pkg of 1	832-0550	
		Pkg of 6	832-3040	
13.2	Brick, 6 x 4-1/2 x 1-1/4”	Qty. 4 Req.	SRV7128-002	
13.3	Brick, 9 x 4-1/2 x 1-1/4” w/angles	Qty. 1 Req.	SRV7128-805	
13.4	Brick, 9 x 3 x 1-1/4” w/angles	Qty. 1 Req.	SRV7128-617	

Additional service part numbers appear on following page.

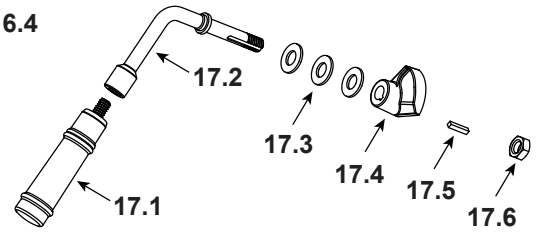
IMPORTANT: THIS IS DATED INFORMATION. Parts must be ordered from a dealer or distributor. **Hearth and Home Technologies does not sell directly to consumers**. Provide model number and serial number when requesting service parts from your dealer or distributor.

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
14	Pedestal Assembly		SRV7033-072	
	Logo, Quadra-Fire	Pkg of 10	7000-649/10	
15	Rear Cover, Pedestal		SRV7033-327	

#16 Door Assembly



#17 Handle Assembly

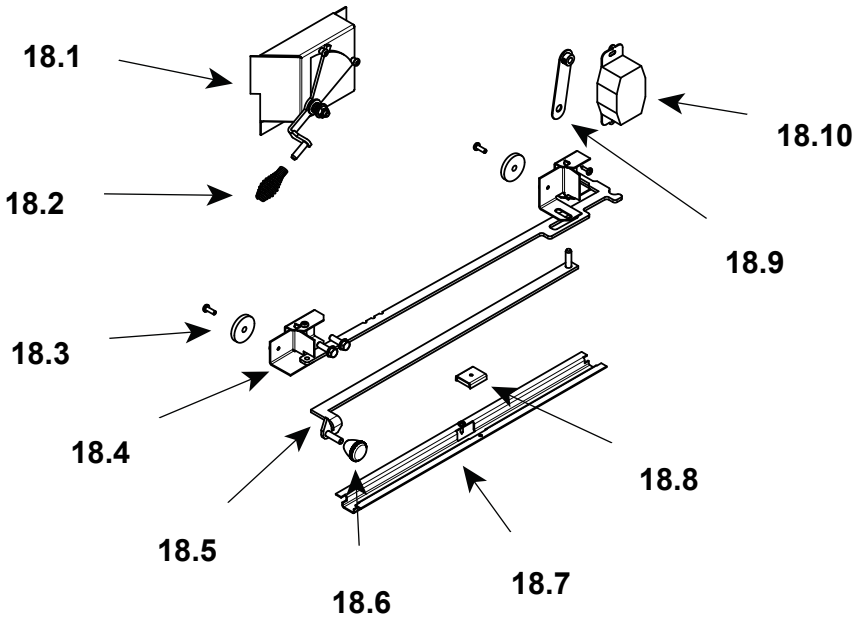


16	Door Assembly	Black	DR-31/43BK-FH	
		Nickel	DR-34/43NL-FH	
16.1	Hinge Pin, 1/2”	Black	7000-606/2	
		Nickel	SRV430-5320	
16.2	Rope, Door, 3/4” x 84”	7 Ft.	832-1680	**Y**
16.3	Door Glass Assembly		SRV7000-012	**Y**
	Gasket, Glass Tape, 3/4” x 1/8”	5 Ft.	832-0460	**Y**
16.4	Glass Frame Set	4 pcs.	832-0350	
16.5	Screw Flat Head Phillips 8-32 x 1/2	Pkg of 12	220-0490/12	**Y**
17	Door Handle Assembly		SRV7033-071	
17.1	Fiber Handle		SRV7060-212	
17.2	Door Handle		SRV7044-188	**Y**
17.3	Washer, Sae, 3/8 (3 Ea)	Pkg of 3	832-0990	
17.4	Cam Latch		SRV430-1141	
17.5	Key, Cam Latch		SRV430-1151	
17.6	Nut, 2-Wy Side-Lock Jam 3	Pkg of 24	226-0100/24	**Y**

Additional service part numbers appear on following page.

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

#18 Burn Rate Control & Associated Parts



ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
18.1	Burn Rate Control Assembly		SRV7033-033	Y
18.2	Spring Handle,1/4", Nickel		250-8340	Y
18.3	Door Gasket		7033-282	Y
18.4	Timer Air Control Assembly		SRV7033-052	Y
	Rear Air Door Assembly		SRV7033-024	
18.5	Control Arm Assembly, Rear Air		SRV7033-079	
18.6	Knob		SRV7000-343	
18.7	Air Control Rod Guide		SRV7033-210	
18.8	Latch, Magnet		SRV229-0631	
18.9	Timer Arm Assembly		SRV7033-034	Y
18.10	Timer (Only) Replacement Assembly		SRV480-1940	Y
19	Panel Assembly, Side Right		SRV7033-080	
20	Tile Frame		SRV7033-324	
21	Blank Frame		SRV7033-346	
	Component Pack Assembly		SRV7033-097	
	Paint, Touch-Up		3-42-19905	

Additional service part numbers appear on following page.

D. Accessories

QUADRA-FIRE® **Service Parts** **DISCOVERY-II-C**

Beginning Manufacturing Date: June2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
	ACCESSORIES			
	Blower Assembly		BK-ACC	
	Blower Convection		812-4900	
	Blower Control Box w/Switch		SRV7000-194	**Y**
	Component Pack		7033-051	
	Snap Disc Bracket Assembly		SRV7033-036	
	Snap Disc, # 1, Convection Blower		SRV230-0470	**Y**
	Wire Harness, Blower		7033-262	
	Outside Air Kit, Floor & Rear		OAK-ACC	
	Outside Air Collar Assembly		SRV7033-039	
	Outside Air Shield		SRV33271	**Y**
	Outside Air Cover Plate Assembly		SRV7033-041	**Y**
	FASTENERS			
	Avk Rivnut Repair Kit - 1/4-20 & 3/8-16 Rivnut Tools		RIVNUT-REPAIR	**Y**
	Bolt, Hex Head, 1/4-20 X 1	Pkg of 10	25221A/10	**Y**
	Button Head 1/4-20 X .5	Pkg of 20	32328/20	**Y**
	Nut, 2-Wy Side-Lock Jam 3	Pkg of 24	226-0100/24	**Y**
	Nut, Keps Lock, 10-32	Pkg of 40	226-0050/40	**Y**
	Nut, Ser Flange Small 1/4-20	Pkg of 24	226-0130/24	**Y**
	Screw PH PHL TC 8-32X1/2	Pkg of 25	220-0030/25	**Y**
	Screw, Pan Head Philips Tc 8-32X1/2	Pkg of 12	220-0490/12	**Y**
	Screw, Bh, 1/4-20 X 1.25	Pkg of 24	225-0630/24	**Y**
	Screw, Pan Head Philips 8-32 X 3/4	Pkg of 24	229-1100/24	**Y**
	Screw, Pan Head Philips 8-32 X 3/8	Pkg of 40	225-0500/40	**Y**
	Screw, Sheet Metal #8 X 1/2 S-Grip	Pkg of 40	12460/40	**Y**

QUADRA-FIRE®

NOTHING BURNS LIKE A QUAD

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032
Division of HNI INDUSTRIES

**Please contact your Quadra-Fire dealer with any questions or concerns.
For the number of your nearest Quadra-Fire dealer
log onto www.quadrafire.com**

CAUTION

DO NOT DISCARD THIS MANUAL

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

We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed:	
Serial Number:	Location on appliance:
Dealership purchased from:	Dealer Phone: 1( ) -
Notes:	

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.

HEARTH&HOME technologies™

Installation Manual

Installation & Appliance Set-Up

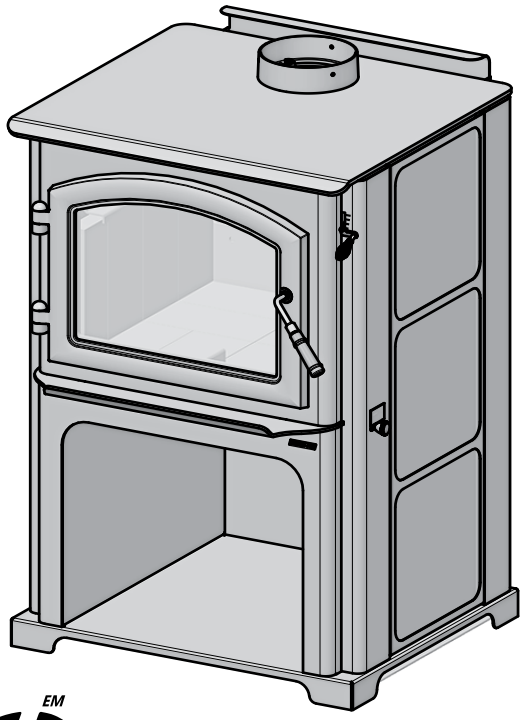
INSTALLER: Leave this manual with party responsible for use and operation.
OWNER: Retain this manual for future reference.

NOTICE: DO NOT DISCARD THIS MANUAL

QUADRA-FIRE®

DISCOVERY II WOOD APPLIANCE
AUTOMATIC COMBUSTION CONTROL (ACC)

MODEL NUMBER:
DISCOVERY-II-C



EM
OTL
C US

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

hearthED FACTORY TRAINING Fuel Your Fire

NFI NATIONAL FIREPLACE INSTITUTE® A CERTIFICATION AGENCY

⚠ WARNING

If the information in these instructions is not followed exactly, a fire could result causing property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Do not over-fire - If appliance or chimney connector glows, you are over-firing. Over-firing will void your warranty.
- Comply with all minimum clearances to combustibles as specified.

Failure to comply may cause house fire.

⚠ WARNING

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

Hot glass and appliance will cause burns.

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

⚠ WARNING

Fire Risk.
For use with solid wood fuel only.
Other fuels may over-fire and generate poisonous gases (i.e. carbon monoxide).

NOTE: To obtain a French translation of this manual, please contact your dealer or visit www.quadrafire.com
REMARQUE : Pour obtenir une traduction française de ce manuel, s'il vous plaît contacter votre revendeur ou visitez www.quadrafire.com

Safety Alert Key:

- ***DANGER!*** Indicates a hazardous situation which, if not avoided will result in death or serious injury.
- ***WARNING!*** Indicates a hazardous situation which, if not avoided may result in death or serious injury.
- ***CAUTION!*** Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
- ***NOTICE:*** Indicates practices which may cause damage to the appliance or to property.

TABLE OF CONTENTS

➔ = Contains updated information

1 Important Safety Information

A. Appliance Safety Certification

Model Number:	DISCOVERY-II-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066S
Type:	Listed Room Appliance, Solid Fuel Type
Standard:	UL 1482-11 (R2015) and ULC S627-00 and (UM) 84-HUD, Mobile Home Approved.

B. Appliance Emission Certification

Model Number:	DISCOVERY-II-C
Laboratory:	OMNI Test Laboratories, Inc.
Report Number:	0061WS066E
Standard:	ASTM E2515, ASTM E2780
Can be found at: www.quadrafire.com/about-us/epa-certification	

The DISCOVERY-II-C is Certified to comply with 2020 crib wood particulate emission standards.

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

NOTE: This installation must conform with local codes. In the absence of local codes you must comply with **(UM) 84-HUD and NFPA211 in the U.S.A. and CAN/CSA-B365 Installation Codes in Canada**.

C. BTU & Efficiency Specifications

EPA Certification Number:	Number: 86-17
EPA Certified Emissions:	1.9 grams per hour
***LHV Tested Efficiency:**	78.3%
****HHV Tested Efficiency:**	72.5%
*****EPA BTU Output:**	13,900 to 29,100 / hr
******Peak BTU/Hour Output:**	51,000
Vent Size:	6 inches
Firebox Size:	1.89 cubic feet
Recommended Log Length:	16 inches
Fuel	Seasoned Cord Wood (20% moisture)
* Weighted average LHV (Low Heating Value) efficiency sing Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. LHV assumes the moisture is already in a vapor state so there is no loss in energy to vaporize.	
** Weighted average HHV (High Heating Value) efficiency using Douglas Fir dimensional lumber and data collected during EPA emission tests in accordance with the requirements of CSA B415.1. HHV includes the energy required to vaporize the water in the fuel.	
*** A range of BTU outputs calculated using HHV Efficiency and the burn rates from the EPA tests, using Douglas Fir dimensional lumber.	
**** A peak BTU out of the appliance calculated using the maximum first hour burn rate from the High EPA Test and BTU content of seasoned cordwood (8600) times the efficiency.	

D. Mobile Home Approved

- This appliance is approved for mobile home installations; when not installed in a sleeping room and when an outside combustion air inlet is provided.
- The structural integrity of the mobile home floor, ceiling, and walls must be maintained.
- The appliance must be properly grounded to the frame of the mobile home with #8 copper ground wire, and chimney must be listed to **UL103 HT or a listed UL-1777** full length six inch (152mm) diameter liner must be used.
- Outside Air Kit, part OAK-ACC must be installed in a mobile home installation.

E. Glass Specifications

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

F. Non-Combustible Materials

Material which will not ignite and burn, composed of any combination of the following:

- Steel
- Plaster
- Brick
- Iron
- Concrete
- Tile
- Glass
- Slate

Materials reported as passing ASTM E 136, Standard Test Method for Behavior of Metals, in a Vertical Tube Furnace of 750° C.

G. Combustible Materials

Material made of/or surfaced with any of the following materials:

- Wood
- Compressed Paper
- Plant Fibers
- Plastic
- Plywood/OSB
- Sheet Rock (drywall)

Any material that can ignite and burn: flame proofed or not, plastered or non-plastered.

H. Sleeping Room

When installed in a sleeping room it is recommended that a smoke and/or CO alarm be installed in the bedroom. The size of the room must be at least 50ft³ per 1,000 Btu/hr stove input, if the stove exceeds the room size, out air must be installed.

I. California - Prop65

⚠ WARNING

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

⚠ WARNING

Fire Risk

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

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

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

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

Hearth & Home Technologies WILL NOT warranty appliances that exhibit evidence of over-firing. Evidence of over-firing includes, but is not limited to:

- Warped air tube
- Deteriorated refractory brick retainers
- Deteriorated baffle and other interior components

2 Getting Started

A. Design and Installation Considerations

Consideration must be given to:

- Safety
- Convenience
- Traffic flow
- Chimney and chimney connector required

It is a good idea to plan your installation on paper, using exact measurements for clearances and floor protection, before actually beginning the installation. If you are not using an existing chimney, place the appliance where there will be a clear passage for a factory-built listed chimney through the ceiling and roof.

We recommend that a qualified building inspector and your insurance company representative review your plans before and after installation.

If this appliance is in an area where children may be near it is recommended that you purchase a decorative barrier to go in front of the appliance. Remember to always keep children away while it is operating and do not let anyone operate this appliance unless they are familiar with these operating instructions.

CAUTION

Check building codes prior to installation.

- Installation MUST comply with local, regional, state and national codes and regulations.
- Consult insurance carrier, local building, fire officials or authorities having jurisdiction about restrictions, installation inspection, and permits.

WARNING

Asphyxiation Risk.

- Do NOT connect this appliance to a chimney flue servicing another appliance.
- Do NOT connect to any air distribution duct or system.

May allow flue gases to enter the house.

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

- Inadequate draft due to environmental conditions
- Down drafts
- Tight sealing construction of the structure
- Mechanical exhausting devices
- Over drafting caused by excessive chimney heights
- Ideal performance is with height of chimney between 14-16 feet (4.26-4.88m) measured from the base of the appliance.

B. Fire Safety

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

1. Install at least one smoke detector on each floor of your home to ensure your safety. They should be located away from the heating appliance and close to the sleeping areas. Follow the smoke detector manufacturer's placement and installation instructions, and be sure to maintain regularly.
2. A conveniently located Class A fire extinguisher to contend with small fires resulting from burning embers.
3. A CO detector should be installed in the room with the appliance.
4. A practiced evacuation plan, consisting of at least two escape routes.
5. A plan to deal with a chimney fire as follows:
   - In the event of a chimney fire:
     - Evacuate the house immediately
     - Notify fire department.

C. Negative Pressure

WARNING

Asphyxiation Risk.

- Negative pressure can cause spillage of combustion fumes, soot and carbon monoxide.
- Appliance needs to draft properly for safety.

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

Causes include:

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

To minimize the effects of negative air pressure:

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

WARNING

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

- Installation and use of any damaged appliance.
- Modification of the appliance.
- Installation other than as instructed by Hearth & Home Technologies.
- Installation and/or use of any component part not approved by Hearth & Home Technologies.
- Operating appliance without fully assembling all components.
- Operating appliance without legs attached (if supplied with appliance).
- Do NOT Over fire - If appliance or chimney connector glows, you are over firing.

Any such action that may cause a fire hazard.

D. Tools And Supplies Needed

Before beginning the installation be sure the following tools and building supplies are available:

- Reciprocating saw
- Framing material
- Pliers
- High temp caulking material
- Hammer
- Gloves
- Phillips screwdriver
- Framing square
- Flat blade screwdriver
- Electric drill and bits
- Plumb line
- Safety glasses
- Level
- Tape measure
- Misc. screws and nails
- 7/16 socket or wrench

1/2-3/4 in. length, #6 or #8 self-drilling screws

E. Inspection of Appliance and Components

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

F. Removal of Appliance from Shipping Materials

1. Remove box and 2x4 structural boards being careful not to damage product.
2. Using a 7/16 socket or open end wrench, remove and discard the four lag bolts from mounting brackets (two on each side) attaching the appliance to the pallet.
3. Carefully pull appliance off of pallet and put in desired location following Hearth Pad information on page 9 and Clearance to Combustibles on page 10.

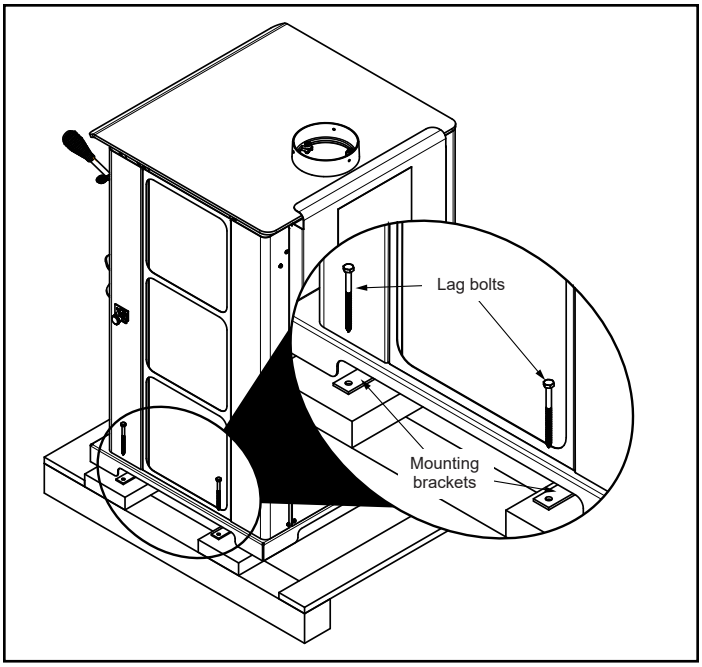


Figure 6.1

WARNING

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

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

Report damaged parts to dealer.

G. Install Checklist

ATTENTION INSTALLER:
Follow this Standard Work Checklist

This standard work checklist is to be used by the installer in conjuction with, not instead of, the instructions contained in this installation manual.

Customer: _____
Date Installed: _____
Lot / Address: _____
Location of Appliance: _____
Installer: _____
Dealer / Distributor Phone #: _____
Serial #: _____
Model: _____

WARNING! Risk of Fire or Explosion! Failure to install appliance according to these instructions can lead to a fire or explosion.

Appliance Install	**YES**	**IF NO, WHY?**
Verified clearances to combustibles.	☐	_____
Appliance is leveled and connector is secured to appliance.	☐	_____
Hearth extension size/height decided.	☐	_____
Outside air kit installed.	☐	_____
Floor protection requirements have been met.	☐	_____
If appliance is connected to a masonry chimney, it should be cleaned and inspected by a professional. If installed to a factory built metal chimney, the chimney must be installed according to the manufacturer's instructions and clearances.	☐	_____

Chimney		
Chimney configuration complies with diagrams.	☐	_____
Chimney installed, locked and secured in place with proper clearance.	☐	_____
Chimney meets recommended height requirements (14-16 feet).	☐	_____
Roof flashing installed and sealed.	☐	_____
Terminations installed and sealed.	☐	_____

Clearances		
Combustible materials not installed in non-combustible areas.	☐	_____
Verified all clearances meet installation manual requirements.	☐	_____
Mantels and wall projections comply with installation manual requirements.	☐	_____
Protective hearth strips and hearth extension installed per manual requirements.	☐	_____

Appliance Setup		
All packaging and protective materials removed.	☐	_____
Firebrick, baffle and ceramic blanket installed correctly.	☐	_____
All labels have been removed from the door.	☐	_____
All packaging materials are removed from inside/under the appliance.	☐	_____
Manual bag and all of its contents are removed from inside/under the appliance and given to the party responsible for use and operation.	☐	_____

Hearth & Home Technologies recommends the following:
- Photographing the installation and copying this checklist for your file.
- That this checklist remain visible at all times on the appliance until the installation is complete.

Comments: Further description of the issues, who is responsible (Installer/Builder/Other Trades, etc.) and corrective action needed:
Comments communicated to party responsible _____ by _____ on _____
(Builder / Gen. Contractor) (Installer) (Date)

3 Dimensions and Clearances

A. Appliance Dimensions

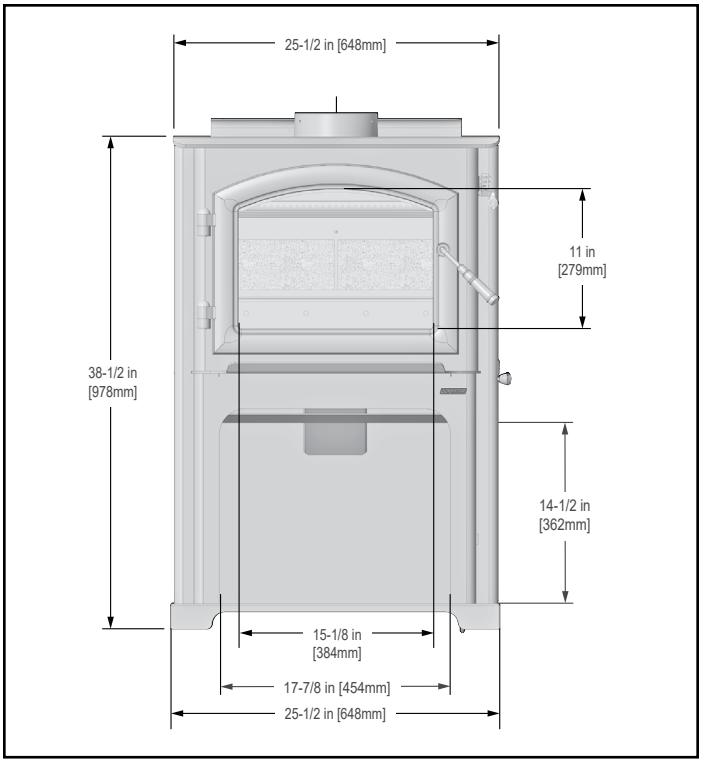


Figure 8.1 - Front View

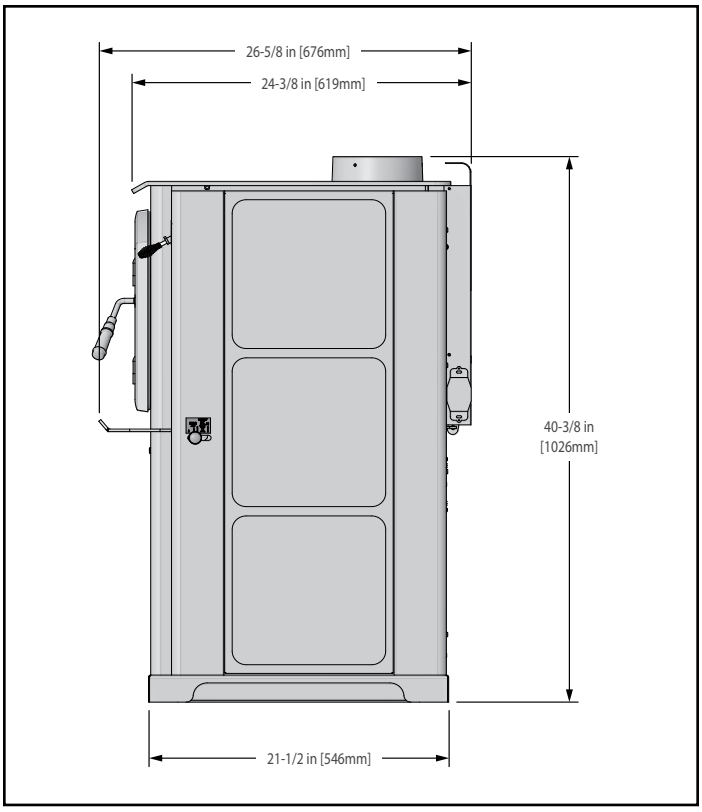


Figure 8.3 - Side View

NOTE: Flue Collar size is 6 inch (152mm) diameter (ID)

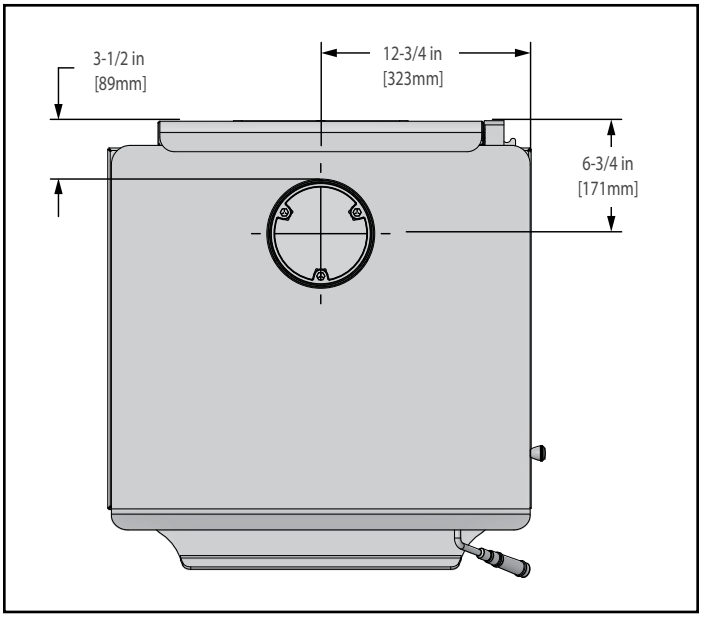


Figure 8.2 - Top View

B. Hearth Protection Requirements

EMBER PROTECTION: Ember protection shall be either a Type 1 floor protector or made of non-combustible material to the requirements below.

Floor protector must be non-combustible material, extending beneath appliance with a minimum of 16 inches (406mm) in front of glass and 8 inches (203mm) to both sides of the fuel loading door. Open the door and measure 8 inches (203mm) from the side edge of the opening in the face of the appliance. ***See exception.**

USA, minimum flat wall hearth pad dimensions

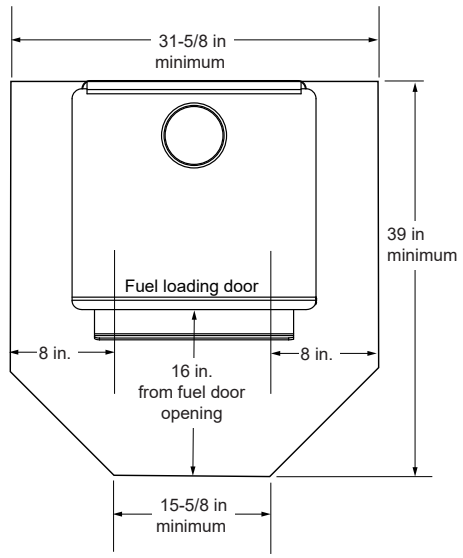


Figure 9.1

****Canada, flat wall hearth pad dimensions with double wall horizontal venting**

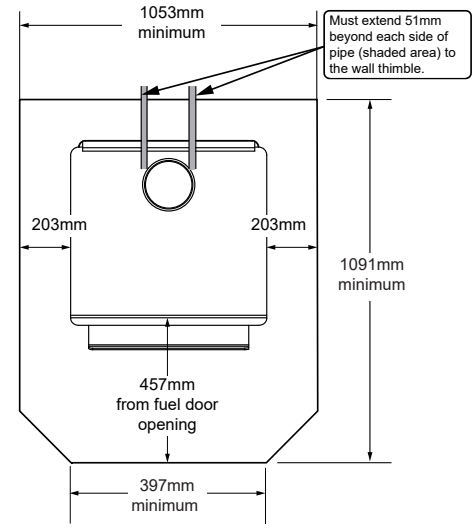


Figure 9.2 - **This dimension will vary depending installation.

In Canada, similar floor protection must be provided 18 inches (457mm) in front and 8 inches (203mm) from the sides and rear of the appliance unless the hearth pad is placed against the wall **(Figure 9.2)**. Then the clearance may be reduced using double wall pipe and the **Clearance to Combustibles** table listed on page 10**.**

***Exception:** Non-combustible floor protector must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side; **See Figure 9.2**

WARNING

Fire Risk.
Hearth pads must be installed exactly as specified. High temperatures or hot embers may ignite concealed combustibles.

Corner hearth pad dimensions with single wall pipe

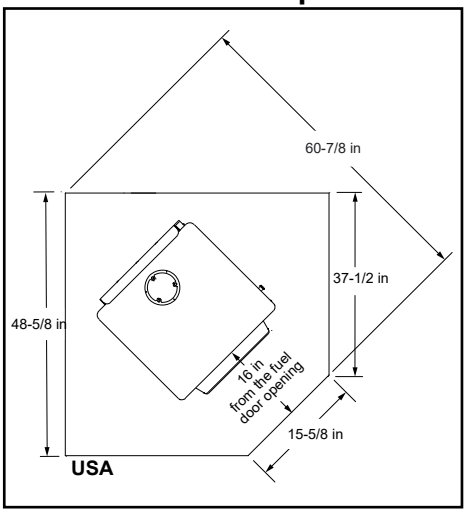


Figure 9.3

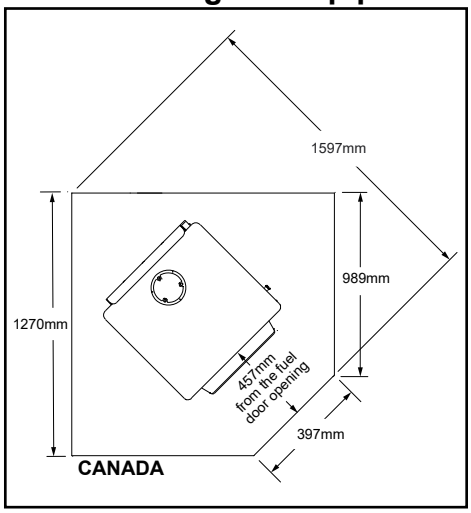


Figure 9.5

Corner hearth pad dimensions with double wall pipe

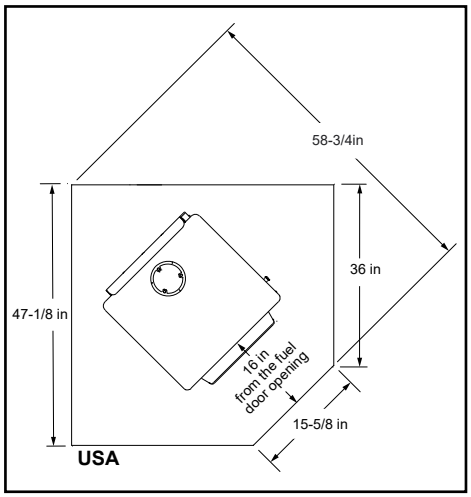


Figure 9.4

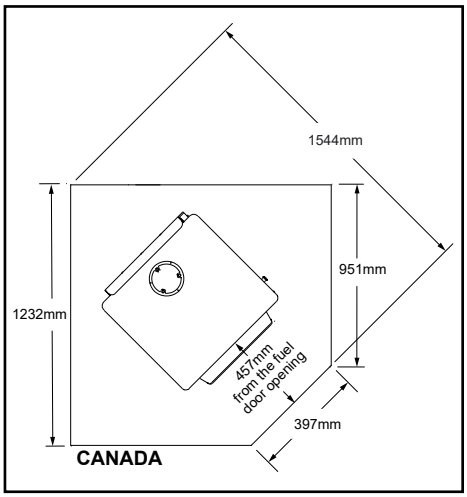


Figure 9.6

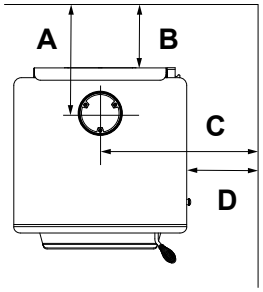
C. Clearances to Combustibles

Note: If mantle clearance specifications are not listed or to reduce mantle clearances you can follow NFPA211 regulations to assure safe installation of this product. Please consult with your local building inspector before attempting any clearance reductions.

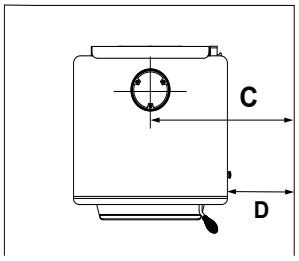
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS IN INCHES (MILLIMETERS) **NOTE:** A, C, AND F DIMENSIONS ARE TO THE CENTER OF THE FLUE COLLAR **DISCOVERY-II-C WOOD APPLIANCE**								
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
INSTALLATION: FULL VERTICAL								
SINGLE WALL PIPE								
DISCOVERY-II-C	18-1/4 (464)	11-3/4 (298)	28-1/2 (724)	16 (406)	8 (203)	20 (208)	48 (1220)	12 (305)
DOUBLE WALL PIPE								
DISCOVERY-II-C	13-1/2 (343)	6-1/2 (165)	25 (635)	13 (330)	6-1/2 (165)	18-1/2 (470)	48 (1220)	9 (229)
INSTALLATION: 90 DEGREE ELBOW OFF TOP OF APPLIANCE THROUGH BACKWALL								
SINGLE WALL PIPE								
DISCOVERY-II-C	15 (381)	8-1/2 (216)	25 (635)	13 (330)	8 (203)	20 (508)	48 (1220)	12 (305)
DOUBLE WALL PIPE								
DISCOVERY-II-C	11 (279)	4-1/2 (114)	20-1/2 (521)	8-1/2 (216)	6-1/2 (165)	18-1/2 (470)	48 (1220)	9 (229)
INSTALLATION: ALCOVE								
DOUBLE WALL PIPE								
DISCOVERY-II-C	14-3/4 (375)	8-1/4 (210)	26-1/2 (673)	14-1/2 (368)	N/A	N/A	48 (1220)	N/A
For alcove only: Six inch diameter listed Double wall air insulated connector pipe with **UL103 HT** listed factory built Class A chimney or masonry chimney. Maximum depth of Alcove shall be no more than 48 inches (1219mm) and the referenced alcove clearances. Canada must comply with **CAN/ULC-S269 M87** for the 650° factory built chimney. *** FOLLOW PIPE MANUFACTURES CLEARANCES AS REQUIRED**								

Table 10.1

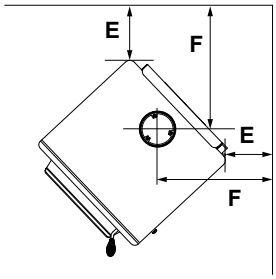
BACKWALL / SIDEWALL



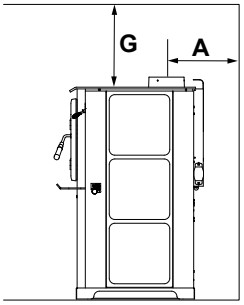
ALCOVE TOP VIEW

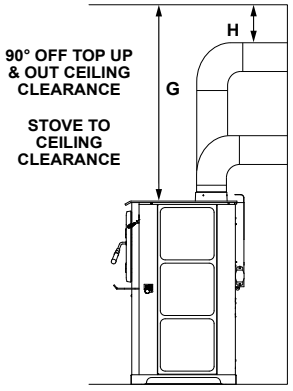


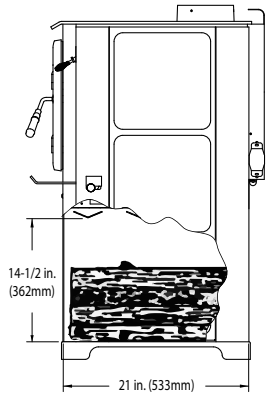
CORNER INSTALLATION



ALCOVE SIDE VIEW







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

WARNING

Fire Risk.

- Comply with all minimum clearances to combustibles as specified.
- Failure to comply may cause house fire.

NOTE: Service Space

In order to replace the tube channel assembly a clearance of 19 inches (483mm) is required on the right side of appliance in order to remove the tubes with the appliance in place. If space is not available, the appliance will have to be disconnected from the chimney to proceed with the tube replacement.

4 Chimney Systems

A. Locating Your Appliance & Chimney

Location of the appliance and chimney will affect performance. As shown in **Figure 11.1** the chimney should:

- Install through the warm space enclosed by the building envelope. This helps to produce more draft, especially during lighting and die down of the fire.
- Penetrate the highest part of the roof. This minimizes the affects of wind turbulence and down drafts.
- Consider the appliance location in order to avoid floor and ceiling attic joists and rafters.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.

Your local dealer is the expert in your geographic area and can usually make suggestions or discover solutions that will easily correct your flue problem.

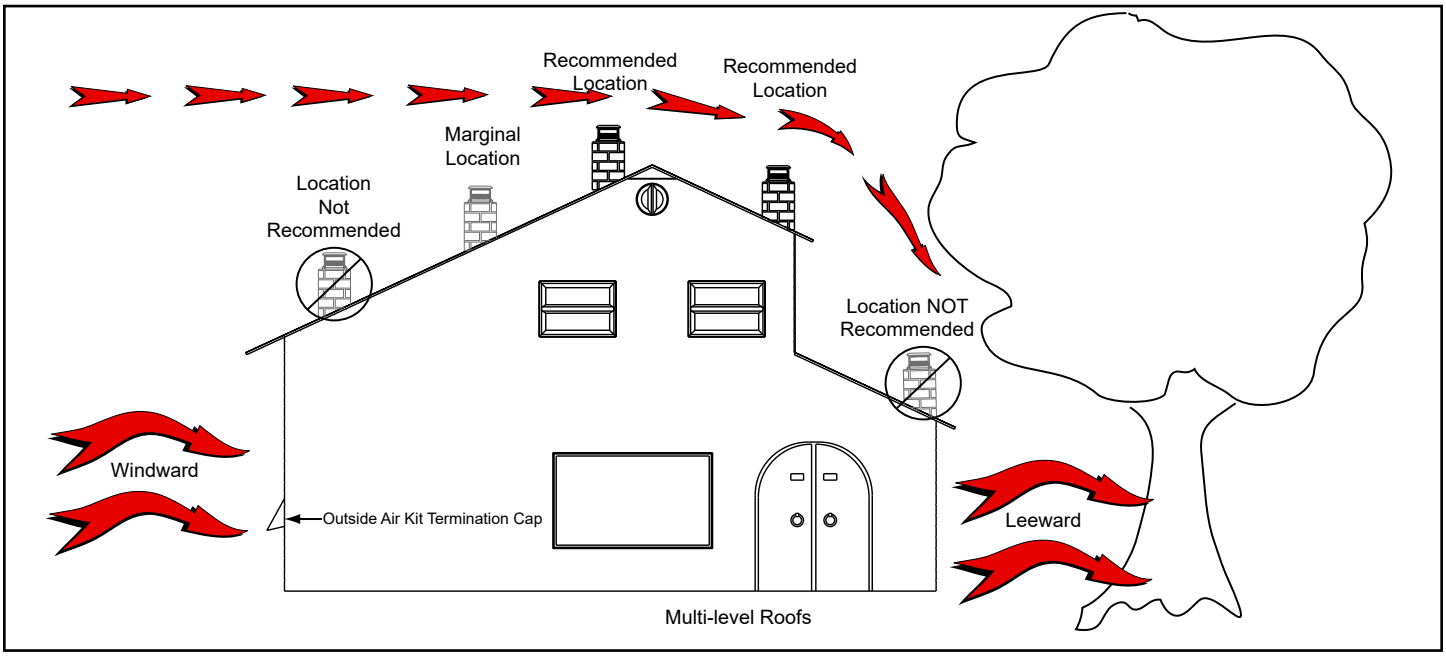


Figure 11.1

B. Chimney Termination Requirements

Follow manufacturer's instructions for clearance, securing flashing and terminating the chimney **(Figure 12.1 and Figure 12.2)**.

- Must have an approved and Listed cap
- Must not be located where it will become plugged by snow or other material
- Must terminate at least 3 feet (91cm) above the roof **and** at least 2 feet (61cm) above any portion of the roof within 10 feet (305cm).
- Must be located away from trees or other structures

NOTICE:
- Chimney performance may vary.
- Trees, buildings, roof lines and wind conditions affect performance.
- Chimney height may need adjustment if smoking or overdraft occurs.

NOTICE: Locating the appliance in a basement or in a location of considerable air movement can cause intermittent smoke spillage from appliance. Do not locate appliance near
- Frequently open doors
- Central heat outlets or returns

C. 2-10-3 Rule

These are safety requirements and are not meant to assure proper flue draft.

This appliance is made with a 6 inch (152mm) diameter chimney connector as the flue collar on the appliance.

- Changing the diameter of the chimney can affect draft and cause poor performance.
- It is not recommended to use offsets and elbows at altitudes above 4000 feet above sea level and or when there are other factors that affect flue draft.

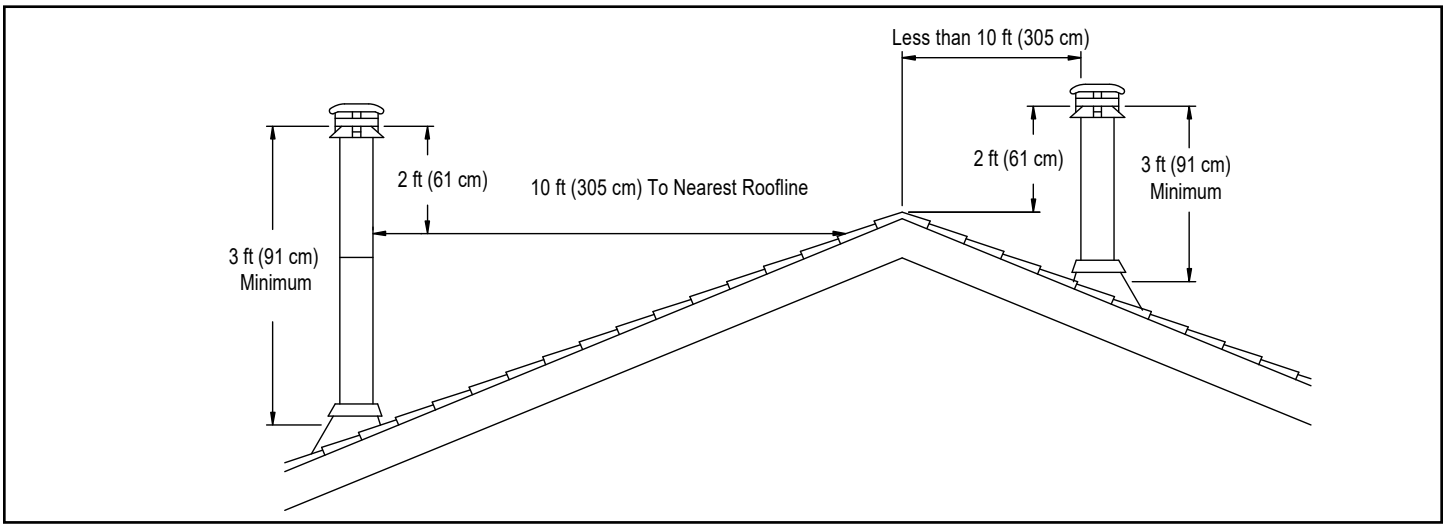


Figure 12.1

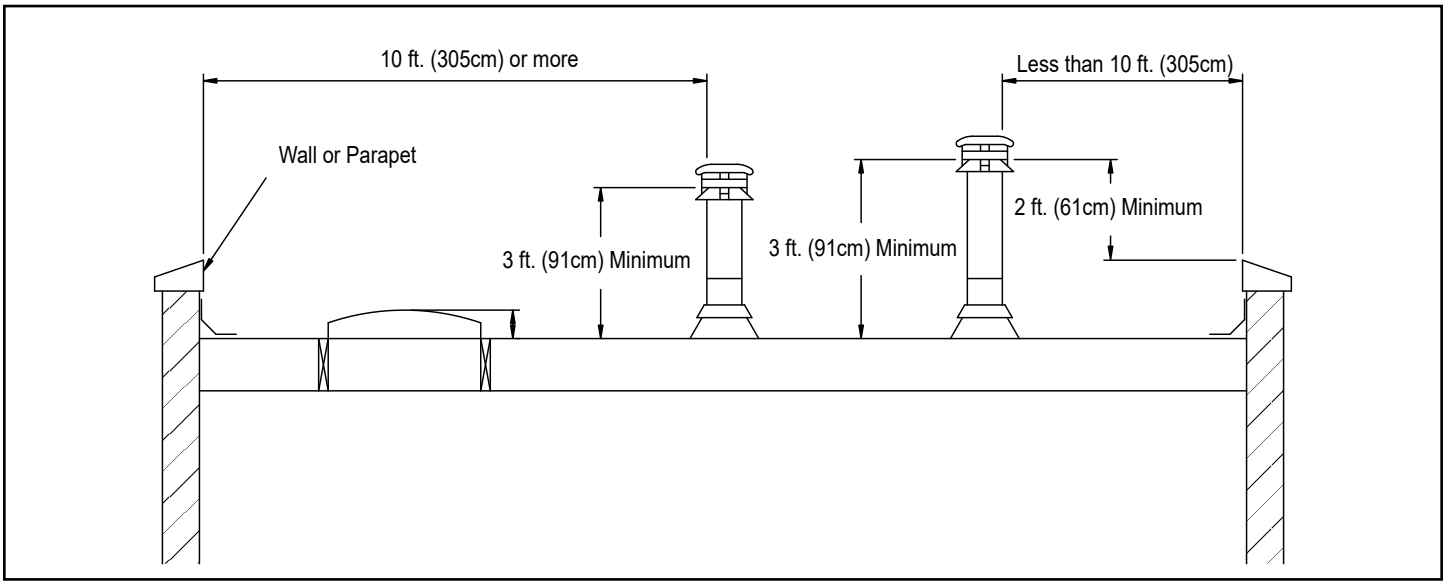


Figure 12.2

D. Chimney Height / Rise and Run

This product was designed for and tested on a 6 inch (152mm) chimney, 14 to 16 feet (420-480cm) high, (includes appliance height) measured from the base of the appliance. The further your stack height or diameter varies from this configuration, the greater the likelihood it may affect performance.

Chimney height may need to be increased by 2 - 3% per each 1000 feet above sea level. It is not recommended to use offsets or elbows at altitudes above 4000 feet above sea level or when there are other factors that affect flue draft.

WARNING

Fire Risk.
Inspection of Chimney:
- Chimney must be in good condition.
- Meets minimum standard of **NFPA 211**
- Factory-built chimney must be 6 inch (152mm) **UL103 HT**.

WARNING

Asphyxiation Risk.
- DO NOT CONNECT THIS APPLIANCE TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.
- DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the owner's information manual provided with this appliance. For assistance or additional information consult a qualified installer, service agency or your dealer.

E. Venting Components

Chimney Connector:

It is also known as flue pipe or appliance pipe. The chimney connector joins the appliance to the chimney. It must be a 6 inch (152mm) minimum diameter 24 gauge mild steel black or 26 gauge blued steel, or an approved air-insulated double wall venting pipe.

Thimble:

A manufactured or site-constructed device installed in combustible walls through which the chimney connector passes to the chimney. It is intended to keep the walls from igniting. Site constructed thimbles must meet **NFPA 211 Standards**. Prefabricated must be suitable for use with selected chimney and meet **UL103 Type HT Standards**. Follow instructions provided by the manufacturer for manufactured thimbles for masonry chimney and prefabricated chimneys.

Chimney:

The chimney can be new or existing, masonry or prefabricated and must meet the following minimum requirements and as specified in Section 4F.

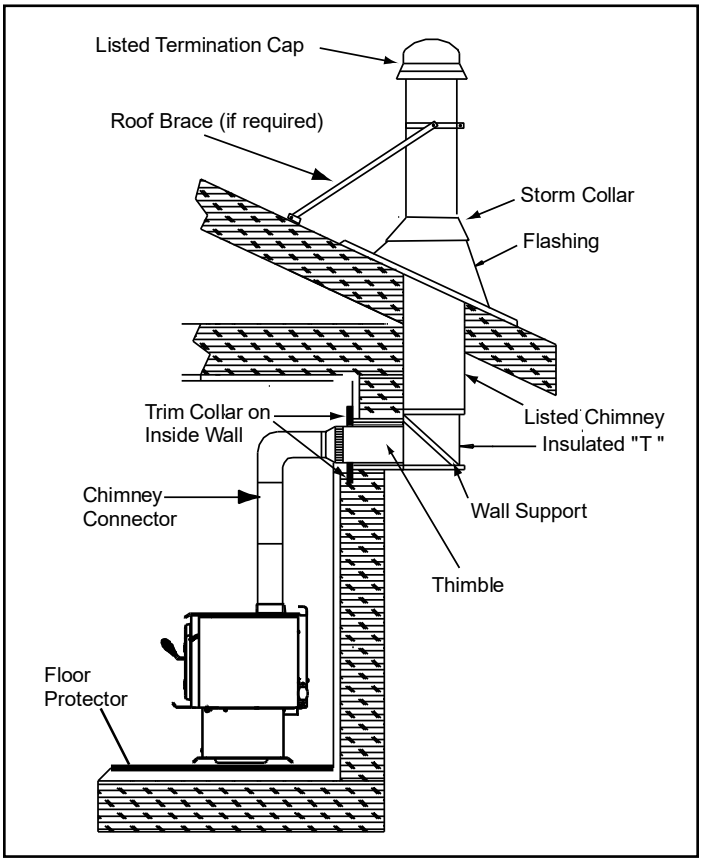


Figure 13.1 - Prefabricated Exterior Chimney

F. Chimney Systems

Prefabricated Metal Chimney

- Must be minimum 6 inch (152mm) diameter (ID) high temperature chimney listed to **UL 103 HT (2100^{O}F) or ULC S629M**.
- Must use components required by the manufacturer for installation.
- Must maintain clearances required by the manufacturer for installation.
- Refer to manufacturers instructions for installation.

NOTE: In Canada when using a factory-built chimney it must be safety listed, **Type UL103 HT (2100^{O}F) CLASS "A"** or conforming to **CAN/ULC-S629M, STANDARD FOR 650^{O}C FACTORY-BUILT CHIMNEYS.**

Thimble

Site constructed for masonry chimney installation:

Components

A minimum length of 12 inches [305mm] (longer for thicker walls) of solid insulated factory-built chimney length constructed to UL 103 Type HT 6 inch (152mm) inside diameter. Chimney needs to extend a minimum of 2 inches (51mm) from the interior wall and a minimum of 1 inch (25mm) from the exterior wall.

Wall spacer, trim collar and wall band to fit solid pack chimney selected.

Minimum 8 inch (203mm) diameter clay liner section (if not already present in chimney) and refractory mortar.

When jurisdiction requires install approved chimney liner in masonry chimney.

Air Clearances

- Masonry chimney clearance must meet NFPA 211 minimum requirement of 2 inches (51mm) to sheet metal supports and combustibles.
- Minimum of 1 inch (25mm) clearance around the chimney connector.
- Top of wall opening is a minimum of 13-1/2 inches (343mm) from ceiling or 4-1/2 inches (114mm) below minimum clearance specified by chimney connector manufacturer. NFPA 211 minimum vertical clearance of 18 inches (457mm) from chimney connector and ceiling or minimum recommended by chimney connector manufacturer (**Figure 14.2).**

Instructions:

1. Open inside wall at proper height for the chimney connector to entry the masonry chimney (**Figure 14.2).**
2. Entry hole to masonry chimney must be lined with an 8 inch (203mm) minimum diameter clay liner, or equivalent, secured with refractory mortar.
3. Construct a 17 inch x 17 inch (432mm x 432mm) outside dimension frame from 2 x 2 framing lumber to fit into wall opening. Inside opening of frame should be no less than 14 inch x 14 inch (356mm x 356mm) (**Figure 14.2).**
4. Attach the wall spacer to the chimney side of the frame.
5. Nail the frame into the wall opening. The spacer should be on the chimney side.
6. Insert the section of the solid insulated chimney into the outer wall of the masonry chimney.
7. Tightly secure the length of the solid insulated chimney with the wall band to the masonry chimney.
8. Insert a section of chimney connector into the chimney. Make sure it does not protrude past the edge of the clay chimney liner inside the chimney.
9. Seal the end of the chimney connector to the clay liner with refractory mortar.
10. Install trim collar around the sold pack chimney section.

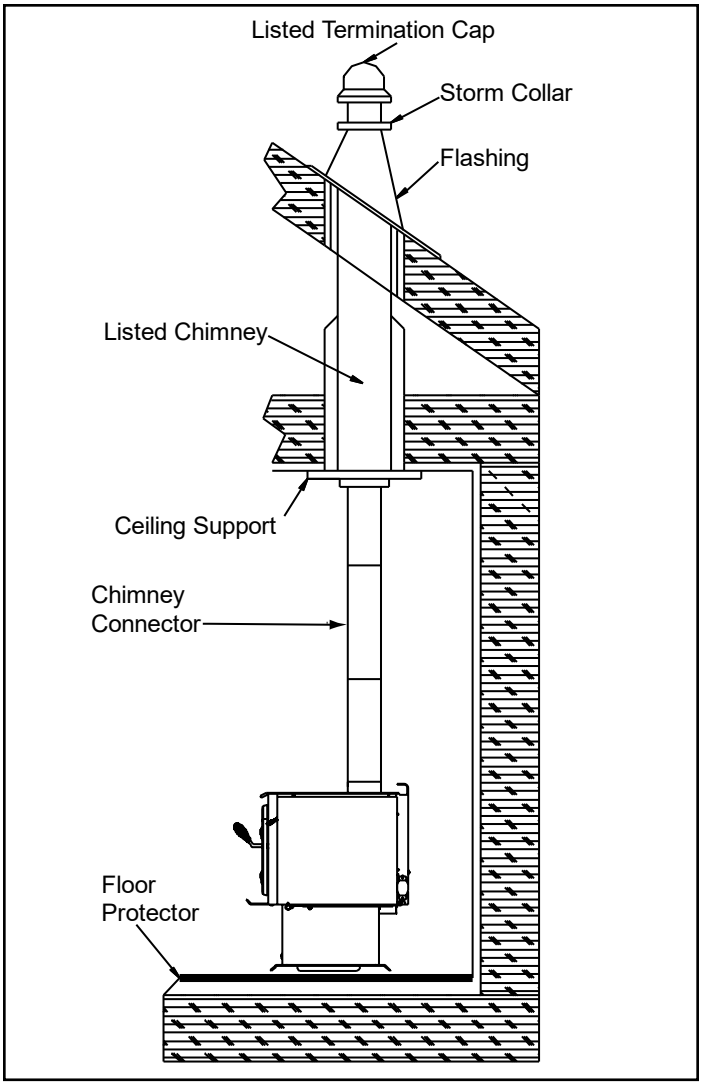


Figure 14.1 - Prefabricated Interior Chimney

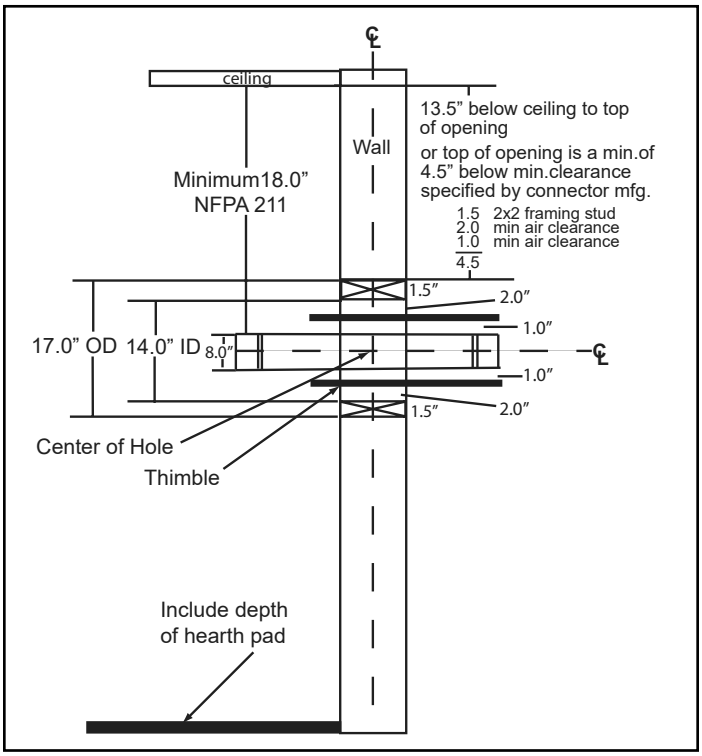


Figure 14.2

Solid Pack Chimney with Metal Supports as a Thimble

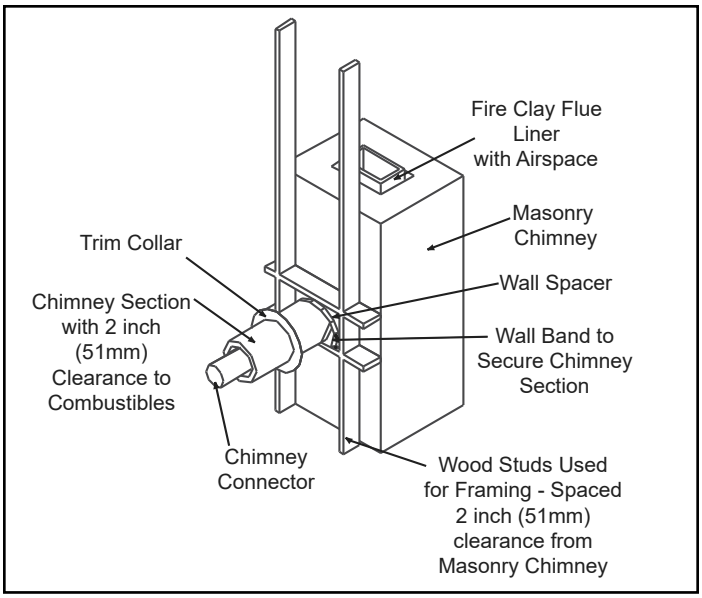


Figure 15.1

WARNING

Fire Risk.

Do NOT pack insulation or other combustibles between spacers.

- ALWAYS maintain specified clearances around venting and spacers.
- Install spacers as specified.

Failure to keep insulation or other material away from vent pipe may cause fire.

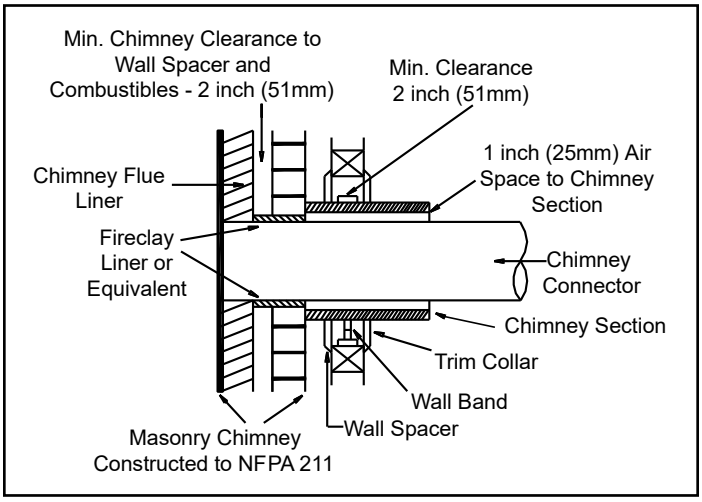


Figure 15.2

G. Installing Chimney Components

Chimney Connector

Single wall connector or appliance pipe.

This must be at least 24 gauge mild steel or 26 gauge blue steel. The sections must be attached to the appliance and to each other with the crimped (male) end pointing toward the appliance. All joints, including the connection at the flue collar, should be secured with 3 sheet metal screws. Make sure to follow the minimum clearances to combustibles. Where passage through the wall, or partition of combustible construction is desired in Canada, the installation shall conform to **CAN/CSA-B365**.

Factory-built listed chimney connector (vented).

A listed connector (vented) must be used when installing this appliance in a mobile home. The listed connectors must conform to each other to ensure a proper fit and seal.

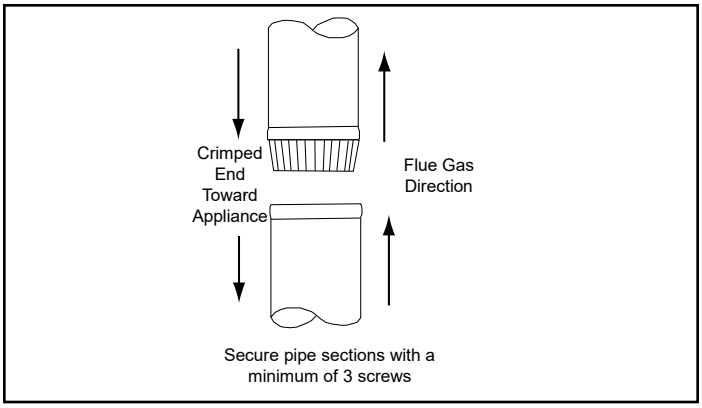


Figure 15.3 - Chimney Connector (Appliance Pipe)

WARNING

Fire Risk.

Follow Chimney Connector Manufacturer's Instructions for Proper Installation.

ONLY use connector:

- Within the room, between appliance and ceiling or wall.

Connector shall NOT pass through:

- Attic or roof space
- Closet or similar concealed space
- Floor or ceiling

Maintain minimum clearances to combustibles

H. Proper Draft

To be sure that your Quadra-Fire appliance burns properly, the chimney draft (static pressure) should be approximately -0.10 inches water column (W.C.) during a high burn and -0.04 inches W.C. during a low burn, measured 6 inches (152mm) above the top of the appliance after one hour of operation at each burn setting.

5 Appliance Set-Up

A. Outside Air Kit Installation

A source of air (oxygen) is necessary in order for combustion to take place. Whatever combustion air is consumed by the fire must be replaced. Air is replaced via air leakage around windows and under doors. In homes that have tightly sealed doors and windows, an outside air source is needed. An optional Outside Air Kit is available.

Items Needed for Installation (not supplied)

- 4 inch flex aluminum pipe, or if using alternate material, then it shall be made from durable, non-combustible, heat resistant material up to 350°F. Cut the pipe to the required length for your installation.
- Phillips head screw driver
- Silicone sealant
- Drills and saws necessary for cutting holes through the wall or flooring in your home.

Installation Instructions

1. Remove all materials from packing box.
2. **Floor & Rear Installation:**

   Cut a 4 inch (102mm) hole in outside wall or floor to accommodate outside air piping. Use 4 inch (102mm) aluminum metal flex or rigid piping to directly connect outside air to appliance intake. Use the supplied termination cap with a rodent screen. Seal between the wall (or floor) and the pipe with silicone to prevent moisture penetration.

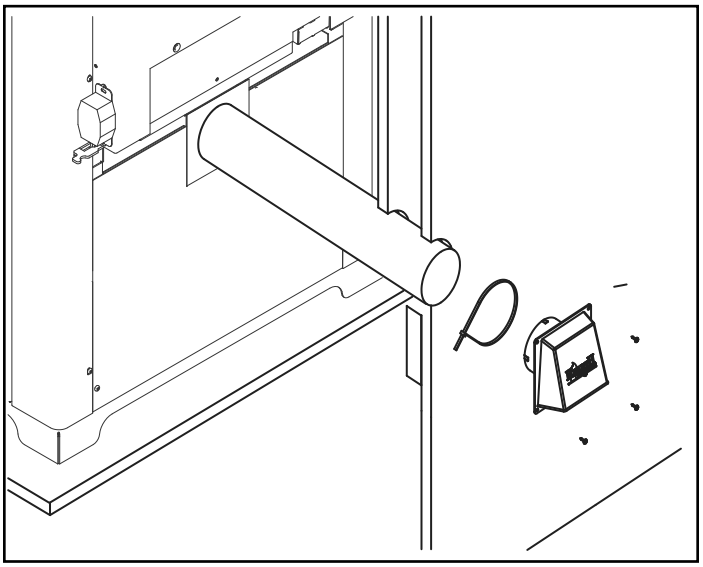


Figure 16.1 - Rear Installation

WARNING

Fire Risk. Asphyxiation Risk.

Do not draw outside combustion air from:

- Wall, floor or ceiling cavity
- Enclosed space such as an attic or garage
- Close proximity to exhaust vents or chimneys

Fumes or odor may result

WARNING

Asphyxiation Risk.

Outside air inlet must be located to prevent blockage from:

- Leaves
- Snow or ice
- Other debris

Block may cause combustion air starvation

Smoke spillage may set off alarms or irritate sensitive individuals.

WARNING

Asphyxiation Risk.

Length of outside air supply duct shall NOT exceed the length of the vertical height of the exhaust flue.

- Fire will not burn properly
- Smoke spillage occurs when door is opened due to air starvation.

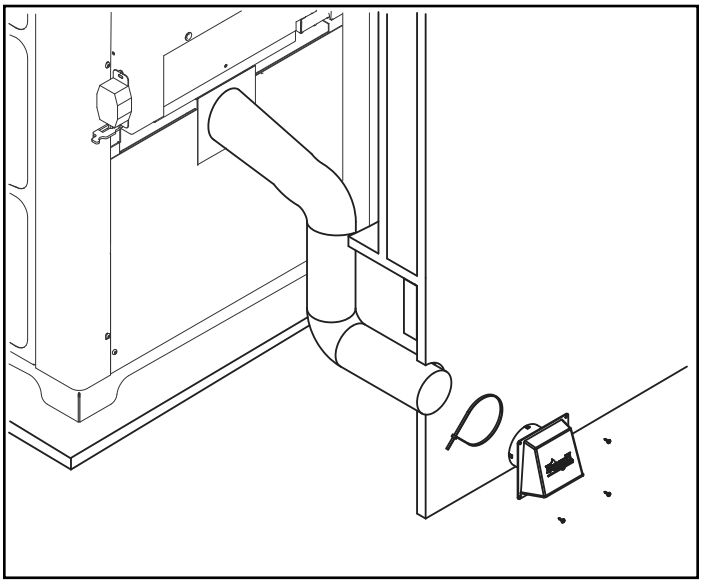


Figure 16.2 - Floor Installation

USA

B. Decorative Panel Removal & Installation

Your appliance ships with two different side options, one is a solid side panel **(Figure 17.1)** and tile side panel **(Figure 17.2)**. There are two of each and no left or right side, these can be changed at anytime.

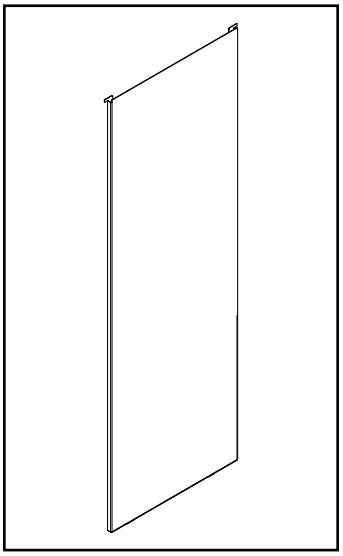


Figure 17.1

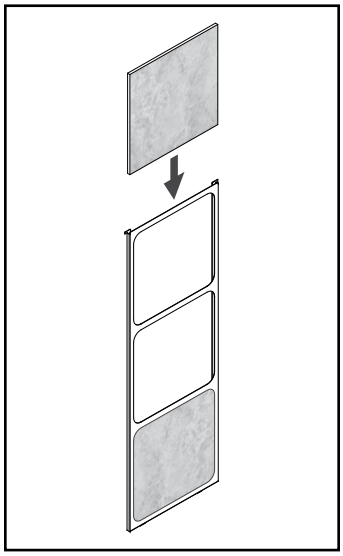


Figure 17.2

The appliances are being shipped with a solid side panel securing clip on both sides. Please remove and discard pins prior to use **(Figures 17.3)**.

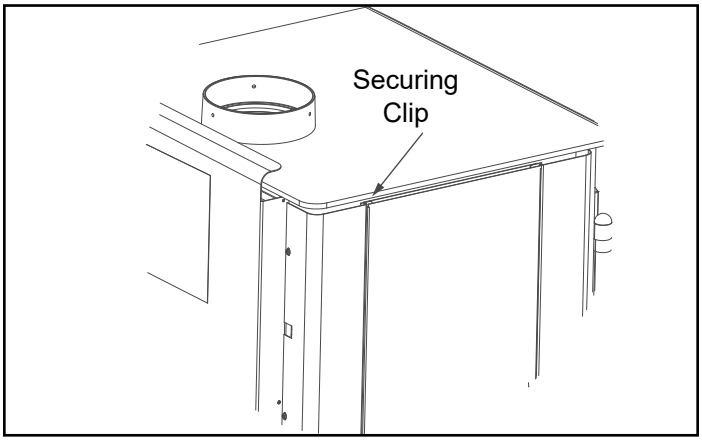


Figure 17.3

Solid Side Panel Removal

- Remove solid panel from side by lifting up and pulling away from appliance (use a flat tool to pry from bottom if needed) **(Figure 17.4).**

NOTE: 300°F high temp paint can be use to repaint the solid side panel only! **DO NOT** use on the rest of appliance this requires 1200°F high temp paint.

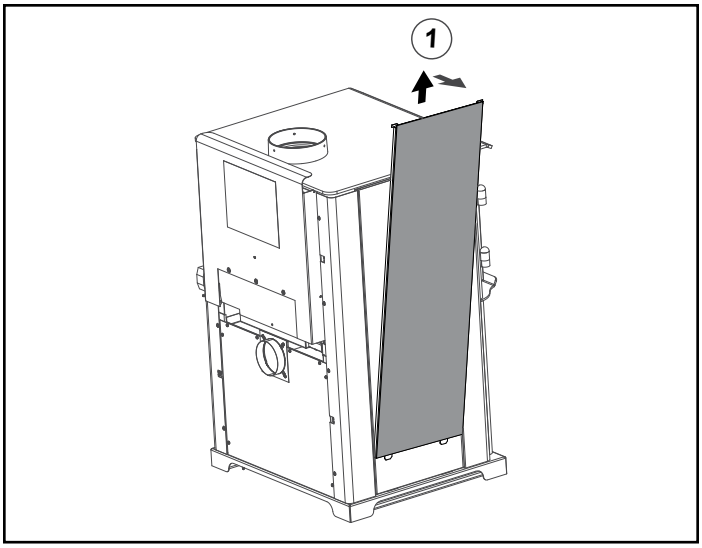


Figure 17.4

Tile Panel Installation

1. Remove tile frame from side by lifting up and pulling away from appliance **(Figure 17.4 reference solid side panel removal)**.
2. Stack non-combustible material tiles in tile frame as shown in **Figure 17.2**.

WARNING

Fire Risk.

Use only noncombustible materials as a decorative tile.

3. Reattach tile frame **(Figure 17.5)**.

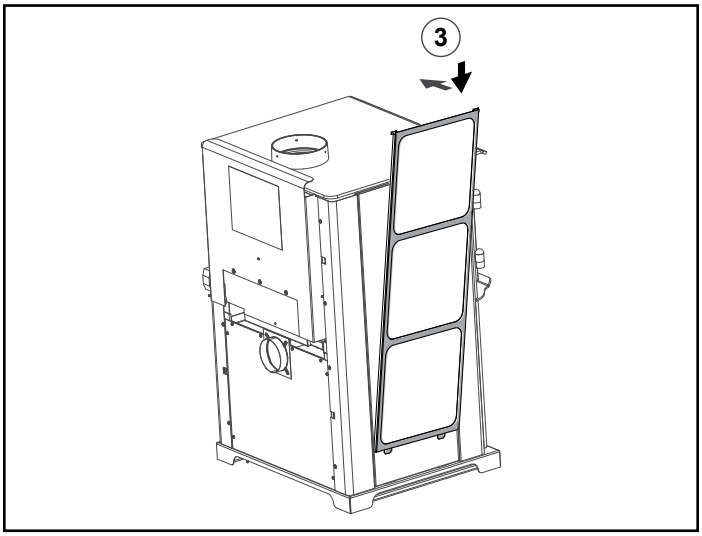


Figure 17.5

Tile Dimensional Requirements:
Max Thickness: 5/16”
Max Length/Width: 11-7/8” square
Min Length/Width: 11-11/16” square

C. Door Handle Assembly

1. Install fiber handle to door handle rod.

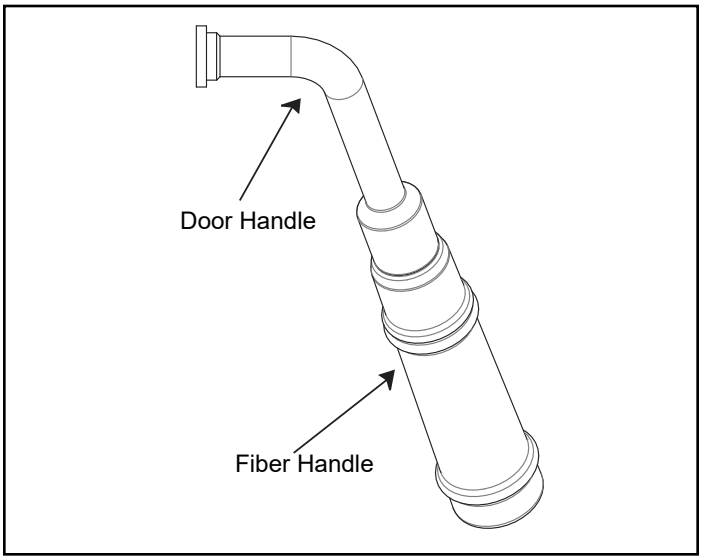


Figure 18.1

D. Blower (Optional)

1. Locate bolts supplied with the blower.
2. Align holes in mounting flange of blower with bolt holes in appliance. Blower should be positioned at bottom of rear outer skin as shown in **Figure 18.2**
3. Re-insert and tighten bolts, securing blower onto outer wall of appliance.
4. Place the bracket containing the snap disc and magnet under the bottom left rear corner.

See **Owner's Manual** for detailed operating instructions for the blower and snap disc.

CAUTION

Shock Risk.

- Do NOT remove grounding prong from plug.
- Route cord away from appliance.
- Do NOT route cord under or in front of appliance.
- Plug directly into properly grounded 3 prong receptacle.

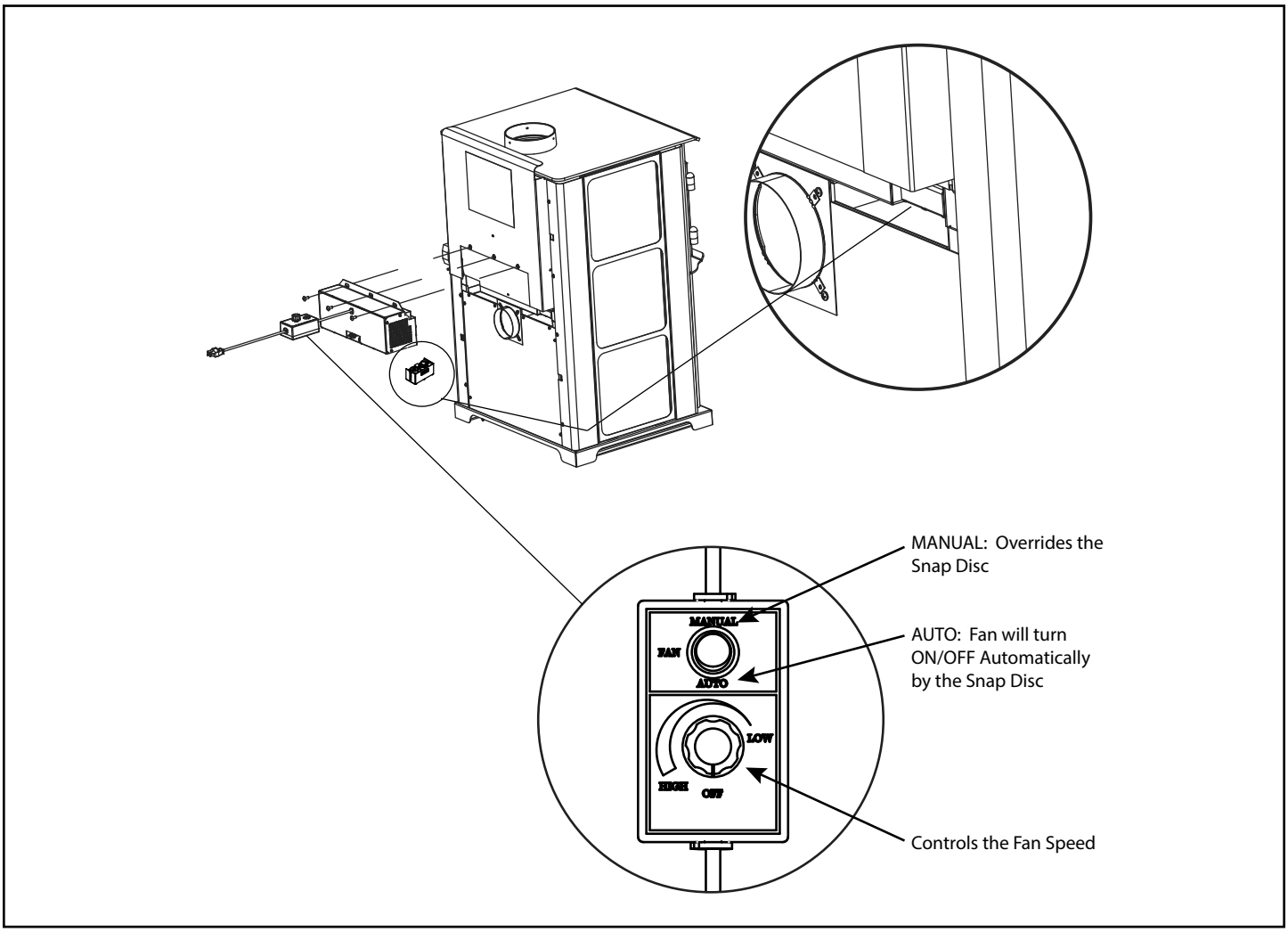


Figure 18.2

6 Mobile Home Installation

You must use a Quadra-Fire Outside Air Kit Part OAK-ACC; which is available from you dealer, for installation in a mobile home.

1. An outside air inlet must be provided for combustion (See page 16 for installation instructions).
2. Appliance must be secured to the mobile home structure by bolting the legs to the floor.
3. Appliance must be grounded with #8 solid copper grounding wire or equivalent and terminated at each end with N.E.C. approved grounding device.
4. Appliance must be installed with an approved **UL103 HT** ventilated chimney connector, **UL103 HT** chimney, and terminal cap with spark arrestor. Never use a single wall connector (appliance pipe) in a mobile home installation. Use only double-wall connector pipe, Dura-Vent DVL, Selkirk Metalbestos DS or Security DL double-wall connector or any listed double-wall connector pipe.
5. In Canada, this appliance must be connected to a 6 inch (152mm) factory-built chimney conforming to **CAN/ULC-629M, STANDARD FOR FACTORY BUILT CHIMNEYS**.
6. Follow the chimney and chimney connector manufacturer's instructions when installing the flue system for use in a mobile home.
7. Maintain clearance to combustibles.
8. Floor protection requirements must be followed precisely.
9. Use silicone to create an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure.

NOTE: Offsets from the vertical, not exceeding 45°, are allowed per **Section 905(a) of the Uniform Mechanical Code (UMC)**. Offsets greater than 45° are considered horizontal and are also allowed, providing the horizontal run does not exceed 75% of the vertical height of the vent. Construction, clearance and termination must be in compliance with the **UMC Table 9C.** This installation must also comply with **NFPA 211.**

NOTE: Top sections of chimney must be removable to allow maximum clearance of 13.5 feet (411cm) from ground level for transportation purposes.

10. Burn seasoned cord wood only. Other types of fuels may generate poisonous gases (e.g., carbon monoxide).
11. If appliance burns poorly while an exhaust blower is on in home, (i.e., range hood), increase combustion air.
12. Installation shall be in accordance with the **Manufacturers Home & Safety Standard (HUD) CFR 3280, Part 24.**

CAUTION

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

Do NOT cut through:

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

WARNING

Asphyxiation Risk.
NEVER INSTALL IN A SLEEPING ROOM.
Consumes oxygen in the room.

WARNING

Fire Risk.
Do Not use single wall connector pipe anywhere in a mobile home installation.

7 Reference Materials

A. Service & Maintenance Log

Date of Service	Performed By	Description of Service

B. Accessories

QUADRA-FIRE® **Service Parts** **DISCOVERY-II-C**

Beginning Manufacturing Date: June2017
Ending Manufacturing Date: Active

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

ITEM	DESCRIPTION	COMMENTS	PART NUMBER	Stocked at Depot
	ACCESSORIES			
	Blower Assembly		BK-ACC	
	Blower Convection		812-4900	
	Blower Control Box w/Switch		SRV7000-194	**Y**
	Component Pack		7033-051	
	Snap Disc Bracket Assembly		SRV7033-036	
	Snap Disc, # 1, Convection Blower		SRV230-0470	**Y**
	Wire Harness, Blower		7033-262	
	Outside Air Kit, Floor & Rear		OAK-ACC	
	Outside Air Collar Assembly		SRV7033-039	
	Outside Air Shield		SRV33271	**Y**
	Outside Air Cover Plate Assembly		SRV7033-041	**Y**

QUADRA-FIRE®

NOTHING BURNS LIKE A QUAD

CONTACT INFORMATION

Hearth & Home Technologies
352 Mountain House Road
Halifax, PA 17032
Division of HNI INDUSTRIES

**Please contact your Quadra-Fire dealer with any questions or concerns.
For the number of your nearest Quadra-Fire dealer
log onto www.quadrafire.com**

CAUTION

DO NOT DISCARD THIS MANUAL

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

We recommend that you record the following pertinent information for your heating appliance.

Date purchased/installed:	
Serial Number:	Location on appliance:
Dealership purchased from:	Dealer Phone: 1( ) -
Notes:	

This product may be covered by one or more of the following patents: (United States) 5341794, 5263471, 6688302, 7216645, 7047962 or other U.S. and foreign patents pending.

HEARTH & HOME technologies™

Appendix A
Firebox Volume

PROTOTYPE

ITEM	PART NUMBER	PART NAME	QTY

H W D

V_1: 0.88 × 1.37 × 0.95 = 1.14532

V_2: 0.93 × 1.37 × 0.59 = 0.751719

V_3: $\frac{0.05 \times 1.37 \times 0.95}{2}$ = 0.0325375

1.9296 ft³

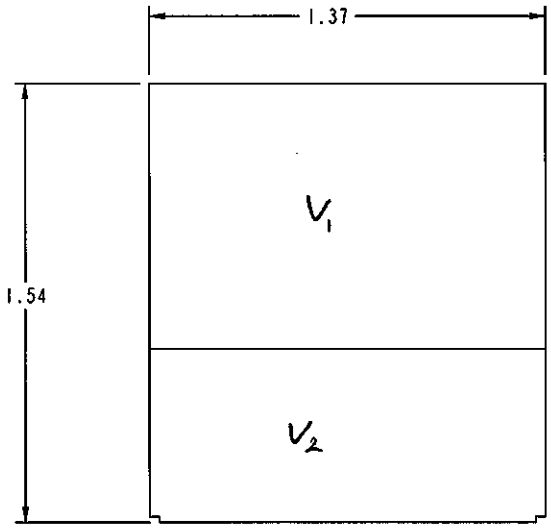
V_4: $\frac{0.15 \times 1.37 \times 0.28}{2}$ = 0.02877

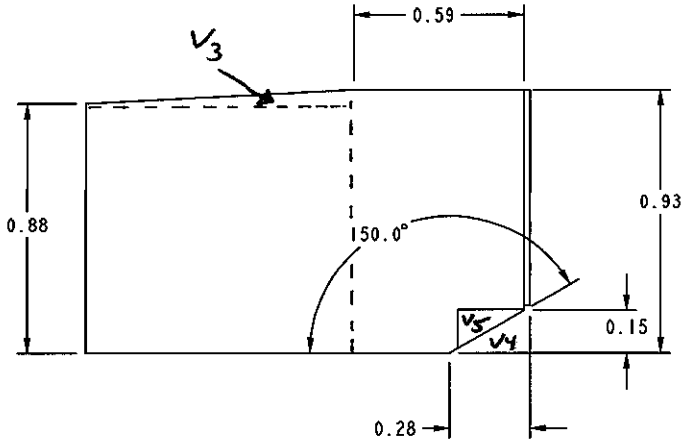
V_5: 0.15 × 0.25 × 0.28 = 0.0105

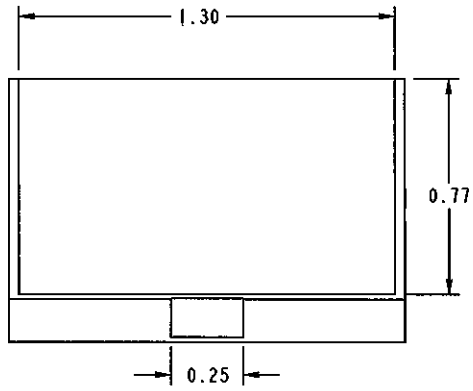
0.03927 ft³

1.9296
- 0.0393
1.890 ft³

BLW 2/13/17







REV	REVISIONS	ECO #	DATE	BY
	PROTOTYPE			

UNLESS OTHERWISE SPECIFIED: TOLERANCE - (2) PLACE DEC: ±0.03 (3) PLACE DEC: ±0.085 ANGLE: ±2° FRACTION: ±1/16
OUTSIDE MATERIAL. NORMAL DIM & INSIDE MATERIAL. OUTSIDE APEX. INSIDE APEX - DIMS ENCLOSED BY AN OVAL ARE CRITICAL DIMENSIONS

HEARTH&HOME technologies

PART NAME: FIREBOX VOLUME 1.90 cu. ft.

DRAWN BY:	SCALE:	MATERIAL:
BLW	0.125	NA

THIS PRINT IS CHECKED AND CONTROLLED BY THE ENGINEERING DEPARTMENTS OF HEARTH & HOME TECHNOLOGIES INC.

SHEET:	PART NUMBER:	REV:
1 of 1	7033-VOLUME	04

Appendix B
Revision History

Date	Project No.	Tech. & Evaluator	Report Sect.	Summary of Changes
3/21/17	0061WS066E.REV002	Bruce Davis	All	Original report was generated.
8/17/21	0061WS066E.REV002 Edition 001	Bruce Davis	Preface	Cover, signatories, and table of content updated for new edition.
			1	Sampling Procedure updated by adding B415 example calculation information. Individual run summary updated by adding the word appropriate to all runs and adding negative filter information for run 5. Table 3 updated by changing CO emissions from grams per hour to grams per minute and adding average CO emissions.
			3	Updated conditioning data on page 24 by adding fuel weight information. Sample train precision data added to pages 27, 39,51, 63, and 75.
			5	Updated manual and label replaced 2017 version.
10/27/21	0061WS066E.REV002 Edition 002	Bruce Davis	3	Updated conditioning data with fuel moisture on page 24.
			5	Updated manual on page 142 with corrected firebox volume.
2/09/22	0061WS066E.REV002 Edition 003	Bruce Davis	Appendix A	Firebox volume was added.
11/13/2024	0061WS066E.REV002 Edition 004	R Tiegs K Morgan	1	Corrected/Uncorrected values added to each test run (pg8)
			3	Dilution Tunnel Schematic added to test report (pg23)
				Run 5 Corrected Data added (pg 77)
			4	Added statement for microtector confirming it was properly zeroed and leveled prior to use. (pg 96)
			3	For clarification, “good” indicated on the pitot leak checks of the hand-written notes for each test run means “zero leakage”. (pg35,47,59,71,84)