TEST REPORT

SCOPE: EMISSIONS

FUEL: PELLET

TEST STANDARD: EPA

MODEL: BIO-45 PELLET STOVE

Certification Test Report

Stove Builder International

Freestanding Pellet Stove
Model: BIO-45MF

Report Number: 338-S-67-3

OMNI-Test Laboratories, Inc.
Product Testing & Certification

Mailing: Post Office Box 743
Street: 5465 SW Western Avenue • Suite G
Beaverton, Oregon 97075 USA

Phone: (503) 643-3788
Fax: (503) 643-3799

Certification Test Report

Stove Builder International

Freestanding Pellet Stove

Model: BIO-45MF

Prepared for:	Stove Builder International 1700 Léon-Harmel Québec City, Québec, Canada G1N 4R9
Prepared by:	OMNI-Test Laboratories, Inc. 5465 SW Western Avenue, Suite G Beaverton, OR 97005 (503) 643-3788
Test Period:	April 10, 2007 through April 11, 2007
Report Date:	May 2007
Report Number:	338-S-67-3

Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

AUTHORIZED SIGNATORIES

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

Alana Smith, Senior Manager
OMNI-Test Laboratories, Inc.

John Voorhees, Technical Services Director
OMNI-Test Laboratories, Inc.

Ken Morgan, Emissions Testing Technician
OMNI-Test Laboratories, Inc.

TABLE OF CONTENTS

Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Section 1

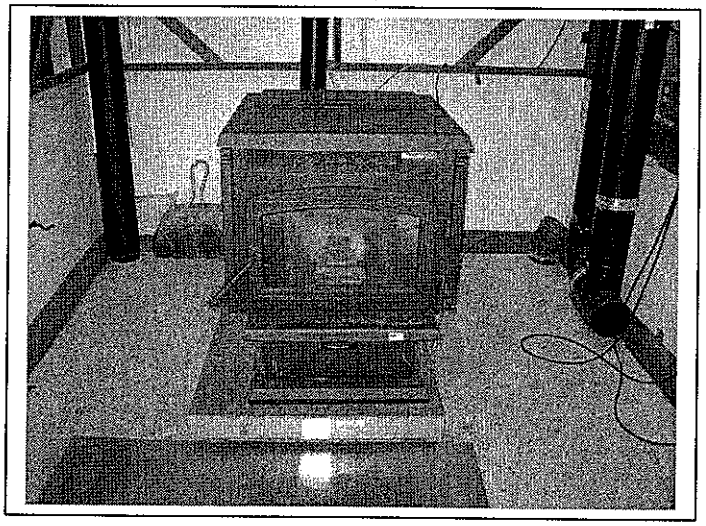
Photographs/Appliance Description/Drawings

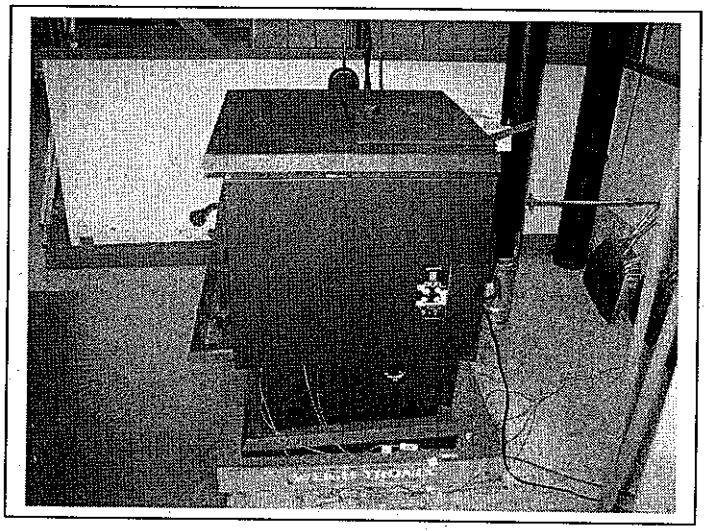
Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Stove Builder International

BIO-45MF

Test Dates: April 10, 2007 through April 11, 2007





Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

APPLIANCE DESCRIPTION

Appliance Manufacturer: Stove Builder International

Pellet Stove Model: BIO-45MF

Type: Freestanding, Air-Circulating Type, Pellet-Fired Room Heater

PELLET HEATER DESCRIPTION

Materials of Construction: The firebox is constructed of mild steel with the exterior being constructed entirely of steel.

Air Introduction System: Air enters the firepot through holes in the firepot. Air is drawn through the pot via a combustion fan.

Combustion Control Mechanisms: Electronically controlled via user selectable control panel.

Combustor: N/A.

Internal Baffles: N/A.

Other Features: Large capacity ash drawer.

Flue Outlet: The 3-inch diameter flue outlet is located in the bottom/rear of the unit.

PELLET HEATER OPERATING INSTRUCTIONS

Specific written instructions: See Section 3 of this report. All markings and instruction materials were reviewed for content prior to printing.

Section 2

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.
- Performing product safety testing by the International Approval Service (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- Performing 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.

Sample Analysis

Analysis Worksheets
Tared Filter and Beaker Data
Solvent Blank Data

OMNI-Test Laboratories, Inc.
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3 Tracking #: 1018
Date: 4-10-07 Test Crew: K. Morgan Run #: 1
Sample Train #: _____ Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	4-11-07	16:40	.5776	.5001	23	75	lk
Lab ID # _____	4-12-07	10:00	.5775	.5001	4.5	74	lk
ID # N333							
Tare wt. .5755							
D/T in desiccator 4-10-07 13:10							
Preliminary wt.: .5784							
Rear Filter	4-11-07	16:40	.5730	.5001	23	75	lk
Lab ID # _____	4-12-07	10:00	.5730	.5001	4.5	74	lk
ID # N332							
Tare wt. .5735							
D/T in desiccator: 4-10-07 13:10							
Preliminary wt.: 5736							
Acetone Rinse	4-12-07	10:00	104.7109	.5001	4.5	74	lk
Lab ID # _____	4-12-07	4:10 pm	104.7110	.5001	5	76	lk
Beaker # 2216							
Tare wt. 104.7074							
Volume 75 ml							
Cleaned by: lk							
Solvent #: SA079							
D/T in desiccator: 4-11-07 09:50							
Preliminary wt.: 104.7130							

Technician signature: lk J. Morgan Date: 4-12-07

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3.8

OMNI-Test Laboratories, Inc.
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3 Tracking #: 1018
Date: 4-10-07 Test Crew: K. Morgan Run #: 2
Sample Train #: _____ Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # _____ ID # N335 Tare wt. .5460 D/T in desiccator 4-10-07 16:30 Preliminary wt.: .5500	4-11-07	16:40	.5498	.5001	23	75	IL
	4-12-07	10:00	.5497	.5001	4.5	74	IL
Rear Filter Lab ID # _____ ID # N334 Tare wt. .5433 D/T in desiccator: 4-10-07 16:30 Preliminary wt.: .5434	4-11-07	16:40	.5431	.5001	23	75	IL
	4-12-07	10:00	.5431	.5001	4.5	74	IL
Acetone Rinse Lab ID # _____ Beaker # 2185 Tare wt. 105.4710 Volume 75 ml Cleaned by: IL Solvent #: SA079 D/T in desiccator: 4-11-07 09:50 Preliminary wt.: 105.4765	4-12-07	10:00	105.4743	.5001	4.5	74	IL
	4-12-07	16:10	105.4743	.5001	5	76	IL

Technician signature: I. L. Morgan Date: 4-12-07

OMNI-Test Laboratories, II
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3 Tracking #: 1018
Date: 4-11-07 Test Crew: K. Morgan Run #: 3
Sample Train #: _____ Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	4-12-07	16:10	.5833	.5001	5	76	IL
Lab ID # _____	4-13-07	08:00	.5833	.5001	5	71	IL
ID # N337							
Tare wt. .5800							
D/T in desiccator 4-11-07 13:00							
Preliminary wt.: .5836							
Rear Filter	4-12-07	16:10	.5738	.5001	5	76	IL
Lab ID # _____	4-13-07	08:00	.5738	.5001	5	71	IL
ID # N336							
Tare wt. .5746							
D/T in desiccator: 4-11-07 13:00							
Preliminary wt.: .5743							
Acetone Rinse	4-13-07	10:00	105.2616	.5001	6	72	IL
Lab ID # _____	4-13-07	14:15	105.2616	.5001	5	74	IL
Beaker # 321							
Tare wt. 105.2587							
Volume 75 ml							
Cleaned by: _____							
Solvent #: SA079							
D/T in desiccator: 4-12-07 10:00							
Preliminary wt.: 105.2640							

Technician signature: K. J. Morgan Date: 4-13-07

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H:1

OMNI-Test Laboratories, II
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3 Tracking #: 1018
Date: 4-11-07 Test Crew: K. Morgan Run #: 4
Sample Train #: Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # N339 Tare wt. .5775 D/T in desiccator 4-11-07 16:00 Preliminary wt.: .5821	4-12-07	16:10	.5816	.5001	5	76	IL
	4-13-07	08:00	.5816	.5001	5	71	IL
Rear Filter Lab ID # ID # N338 Tare wt. .5733 D/T in desiccator: 4-11-07 16:00 Preliminary wt.: .5726	4-12-07	16:10	.5723	.5001	5	76	IL
	4-13-07	08:00	.5723	.5001	5	71	IL
Acetone Rinse Lab ID # Beaker # 2332 Tare wt. 108.6946 Volume 75 ml Cleaned by: IL Solvent #: SA079 D/T in desiccator: 4-12-07 10:00 Preliminary wt.: 108.7000	4-13-07	10:00	108.6971	.5001	6	72	IL
	4-13-07	14:15	108.6972	.5001	5	74	IL

Technician signature: IL Date: 4-13-07 4-13-07

8.0 4.3

AE Glass 102 mm Filter Tares

OMNI-Test Laboratories, Inc

Date Placed in Desiccator	14-Feb-07				Balance ID Number	OMNI-00023						
Time Placed in Desiccator	8:25 PM				Audit Weight ID Number	OMNI-00131						
Technician	Davis				Thermometer/Hygrometer ID Number							
	Date:	2/15/2007	2/16/2007									
	Time:	10:15 PM	4:45 AM									
	RH %:	12	13		0		0					
	T (F):	75	74		0		0					
102 mm Filters	Tech.:	Davis	Davis									
D Number	Audit:	0.5001	0.5001		0		0	Manufacturer	Appliance	Project No.	Run	Train
N332		0.5736	0.5735	X	0		0	SBI	45 Series Pellet	338-S-67-3	1	
N333		0.5756	0.5755	X	0		0	SBI	45 Series Pellet	338-S-67-3	1	
N334		0.5435	0.5433	X	0		0	SBI	45 Series Pellet	338-S-67-3	2	
N335		0.546	0.546	X	0		0	SBI	45 Series Pellet	338-S-67-3	2	
N336		0.5748	0.5746	X	0		0	SBI	45 Series Pellet	338-S-67-3	3	
N337		0.5799	0.58	X	0		0	SBI	45 Series Pellet	338-S-67-3	3	
N338		0.5733	0.5733	X	0		0	SBI	45 Series Pellet	338-S-67-3	4	
N339		0.5779	0.5775	X	0		0	SBI	45 Series Pellet	338-S-67-3	4	

250 ml Beaker Tares

OMNI-Test Laboratories, Inc

Date Placed in Desiccator	29-Mar-07	Balance ID Number	OMNI-00023
Time Placed in Desiccator	2:44 PM	Audit Weight ID Number	OMNI-00131
Technician	Morgan	Thermometer/Hygrometer ID Number	

250 ml Beakers ID Number													
	Date:	3/30/2007	4/2/2007	4/4/2007		4/5/2007		Manufacturer	Appliance	Project No.	Run	Train	
	Time:	2:50 PM	9:00 AM	8:00 AM		8:00 AM							
	RH %:	12	13	13		15							
	T (F):	74	73	74		72							
	Tech.:	Morgan	Morgan	Morgan		Morgan							
	Audit:	0.5001	0.5001	0.5001		0.5001							
2216		104.7079	104.707	104.7074	X	0		SBI	Series 45 Pellet	338-S-67-3	1		
2185		105.472	105.471	105.471	X	0		SBI	Series 45 Pellet	338-S-67-3	2		
2332		108.6963	108.6945	108.6946	X	0		SBI	Series 45 Pellet	338-S-67-3	4		

Date Placed in Desiccator	29-Mar-07	Balance ID Number	OMNI-00023
Time Placed in Desiccator	2:10 PM	Audit Weight ID Number	OMNI-00131
Technician	Morgan	Thermometer/Hygrometer ID Number	

250 ml Beaker Tares

OMNI-Test Laboratories, Inc

Date:	3/30/2007	4/2/2007	4/4/2007	4/5/2007
Time:	2:43 PM	9:00 AM	8:00 AM	8:00 AM
RH %:	12	13	13	15
T (F):	74	73	73	72
Tech.:	Morgan	Morgan	Morgan	Morgan
Audit:	0.5001	0.5001	0.5001	0.5001

250 ml Beakers ID Number							Manufacturer	Appliance	Project No.	Run	Train
321	105.2602	105.2584		105.2587	X	0	SBI	Series 45 Pellet	338-S-67-3	3	

OMNI-Test Laboratories,
Beaverton, OR

Moisture Content Worksheet

Client: SBI
Model: Series 45 Pellet Stove
Project #: 338-S-67-3 Tracking #: 1018
Sample description: Wood Pellets " Granules de Bois"

Weight record:

Prior to Oven-Drying

Balance ID #: OMNI - Audit ID #: 2

Date/Time in: 4-10-07 10:05 Audit weight: 147.5

Container: ID#: 2150 / 2035 Tare weight: 142.9 / 121.3

Total weight: 349.7 / 336.5

Material weight (total weight - container tare weight): 206.8 / 215.2

Post Oven-Drying

Balance ID #: OMNI -

Date/Time out: 4-11-07 10:05 Audit ID #: 2

Total weight: 339.2 / 325.0 Audit weight (if necessary): 147.5

Material weight (total weight - container tare weight): 196.3 / 203.7

Calculations:

Dry basis (%) = $\frac{\text{Initial - Final}}{\text{Final}} \times 100$ $\frac{206.8 - 196.3}{196.3}$ $\frac{215.2 - 203.7}{203.7}$

5.35% 5.65%

Wet basis (%) = $\frac{\text{Initial - Final}}{\text{Initial}} \times 100$

Average = 5.50% DB

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

Technician signature: [signature] Date: 4-11-07

Checked by: [signature] Date: 4-12-07

Approved by: [signature] Date: 10/5/07

GCI Environmental Services, Inc.
OMNI-Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

Acetone Solvent Blank Analysis Worksheet

Date: 3-1-07 By: B Davis Balance ID #: OMNI – 00023

Manuf. Lot #: C181201SP Solvent Bottle #: SA 079 Audit Weight ID #: OMNI – 00131
(Balance audit mfr. std.: 500 ± 0.72 mg)

Mls. Sample	ID No.	Tare Weight	Date & Time in Dessicator	Weighing Record				Initials	Calculations & Remarks
				Date	Time	Weight	Audit Weight		
150	1007	111.5159	3-1-07 & 1550 111.5193	3-2-07 3-7-07	15:55 08:20	111.5188 111.5184	.5041 .5041	BD BD	2.5/150 = .016667
150	245	93.3410	3-1-07 & 1550 93.3444	3-2-07 3-7-07	15:55 08:20	93.3441 93.3437	.5041 .5041	BD BD	2.7/150 .01800 .034667
			&						Bar ~~.051334~~/2 = .0173 mg/m2

Technician Signature: B Davis Date: 3-15-07

Checked by: A Smith Date: 3/19/07 Approved by: JMH Date: 3/19/07

Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Calibrations

Methods 28 and 5G

ID #	Lab Name/Purpose	Log Name	Attachment Type
21	Dry Gas Meter	Control Module – Sierra Misco	Calibration Log
23	Scale/Analytical Balance	Analytical Balance – Mettler Instrument	Calibration Certificate
112	Thermometer	Temperature Controller Meter – Omega	Calibration Log
126	Draft Gauge	Magnehelic, 0-0.25" H_2O – Dwyer	Calibration Log
131	500 mg Weight	Standard Weight, 500 mg – Ohaus	Calibration Certificate
141	Dry Gas Meter	Dry Gas Meter – Singer	Calibration Certificate
156	Incline Manometer	Manometer, 0-10" – Dwyer	Calibration Log
185	Scale	Weight Indicator – Weigh-Tronix	Calibration Log
209	Barometer	Barometer – Princo	Manual Cover
265	Vaneometer	Air Velocity Meter – Dwyer	Calibration Log
274	10 lb Weight	Standard Weight, 10 lb	Calibration Certificate
342	Hygrometer/Thermometer	Digital Hygrometer – Omega	Calibration Certificate
362	Stopwatch	Stopwatch – Sportline	Calibration Log

Thermal Metering System Calibration
Y and dH@

Manufacturer:	American Meter Company
Model:	DTM-200A
Serial Number:	04D893721
OMNI Tracking No.:	CFM 020

Average Orifice Meter dH@	Average Gas Meter y Factor
1.615	0.988

Calibration Date:	04/11/07
Calibrated by:	Ken Morgan
Calibration Frequency:	POST - SERIES
Next Calibration Due:	10/10/07
Instrument Range:	1.000 cfm
Standard Temp.:	68 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	29.6 "Hg
Signature/Date:	4-11-07

Previous Calibration Comparision

Date	11/27/06	Acceptable	
dH@ Value	1.598	Deviation (5%)	Deviation
y Factor	1.001	0.05005	0.013
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.005
Acceptable dH@ Deviation	0.200
Maximum dH@ Deviation	0.005
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	141	
	Calib. Date	19-Jun-06	
	Calib. Value	0.9980	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	1.00	1.00	1.00
dH ("H2O)	0.75	0.75	0.75
Initial Reference Meter	240.78	247.322	253.852
Final Reference Meter	247.322	253.852	258.879
Initial DGM	487.1	494.102	501.055
Final DGM	494.102	501.055	506.384
Temp. Ref. Meter (°F), Tr	74.0	75.0	75.0
Temperature DGM (°F), Td	104.0	105.0	105.0
Time (Minutes)	13.0	13.0	10.0
Net Volume Ref. Meter, Vr	6.542	6.530	5.027
Net Volume DGM, Vd	7.002	6.953	5.329
Gas Meter y Factor =	**0.983**	**0.988**	**0.992**
Gas Meter y Factor Deviation (from avg.)	0.005	0.000	0.005
Orifice dH@	**1.61**	**1.62**	**1.62**
Orifice dH@ Deviation (from avg.)	0.005	0.004	0.001

where:

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

Thermal Metering System Calibration
Y and dH@

Manufacturer:	Sierra - Misco
Model:	7200
Serial Number:	
OMNI Tracking No.:	21

Average Orifice Meter dH@	Average Gas Meter y Factor
1.560	0.998

Calibration Date:	04/25/07
Calibrated by:	Ken Morgan
Calibration Frequency:	Six Month
Next Calibration Due:	10/24/07
Instrument Range:	1.000 cfm
Standard Temp.:	68 oF
Standard Press.:	29.92 "Hg
Barometric Press.:	30.14 "Hg
Signature/Date:	K.J. Morgan 4-25-07

Previous Calibration Comparision

Date	11/27/06	Acceptable	
dH@ Value	1.598	Deviation (5%)	Deviation
y Factor	1.001	0.05005	0.003
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.015
Acceptable dH@ Deviation	0.200
Maximum dH@ Deviation	0.055
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	00141	
	Calib. Date	19-Jun-06	
	Calib. Value	0.9980	y factor (ref)

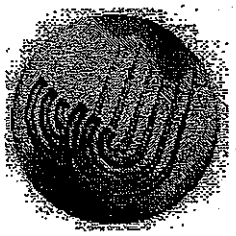
Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.45	0.75	1.50
Initial Reference Meter	260.495	266.576	273.023
Final Reference Meter	265.964	271.59	278.796
Initial DGM	898.692	905.102	911.902
Final DGM	904.455	910.39	917.991
Temp. Ref. Meter (°F), Tr	71.0	71.0	72.0
Temperature DGM (°F), Td	95.0	98.0	112.0
Time (Minutes)	14.0	10.0	8.0
Net Volume Ref. Meter, Vr	5.469	5.014	5.773
Net Volume DGM, Vd	5.763	5.288	6.089
Gas Meter y Factor =	**0.989**	**0.993**	**1.014**
Gas Meter y Factor Deviation (from avg.)	0.010	0.006	0.015
Orifice dH@	**1.58**	**1.59**	**1.51**
Orifice dH@ Deviation (from avg.)	0.022	0.032	0.055

where:

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

Certificate of Calibration 360456



Omni-Test Laboratories
5465 SW Western
Suite G
Beaverton, OR 97005

Cust ID: 56
OnSite
PO: OTL-06-127
Authorized By:

JJ Calibrations, Inc.

ACCREDITED 0723.01

Make: Mettler
Model: AE200
Noun: SCALE
Serial #: 010644
Property #: OMNI-00023
Department: NO
User:
Procedure: CP 27
Accuracy: ±0.01% OF APPLIED WEIGHT

Order Date: 11/08/2006
Calibrated on: 11/08/2006
*Recommended Due: 05/08/2007
Environment: 17°C 49%RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 92
ID Barcode: CVUH

Remarks
Refer to attachment for measurement results.

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

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
256A	Rice Lake	W0133K	WEIGHT SET	08/11/2008	326425
503A	Rice Lake	1mg-200g TYPE O	O CLASS WEIGHT SET	09/28/2007	353816

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to the National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-1999, 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. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without written approval of JJ Calibrations.

Reviewer

Inspector

4 Issued 11/09/2006 Rev # 12

7007 SE Lake Rd Portland, OR 97267-2105

JJ Calibrations, Inc.

Manufacturer: Mettler
Model: AE200
Nomenclature: 200g Scale
Serial: 010644

Certificate #: 360456
Date: 08Nov2006
Technician: 92
Calibration Interval: 6 Months

Parameter		Reference Standard	UUT Before	UUT After	UUT ± Limit	Uncertainty ±
Mass						
		01 g	1.0000g	1.0000g	0.0001 g	N/A
		10 g	10.0001g	10.0001g	0.001 g	N/A
		50 g	50.0002g	50.0002g	0.005 g	N/A
		100 g	100.0004g	100.0004g	0.010 g	N/A
		200 g	200.0011g	200.0011g	0.020 g	N/A

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

Temperature Calibration
EPA Method 28 and 5G

BOOTH:	TEMPERATURE MONITOR TYPE:	IDENTIFICATION NUMBER:
Emissions	OMEGA 115 KF	112

REFERENCE TEMPERATURE MONITOR TYPE:	IDENTIFICATION NUMBER:
OMEGA Calibrator Model CL300 00117	Serial Number 506

CALIBRATION PERFORMED BY:	DATE:	AMBIENT TEMPERATURE:	BAROMETRIC PRESSURE:
KEN MORGAN	11-27-06	63	29.68

Reference Point Source	Temperature Monitor (°F)					
		Method 5G Dilution Tunnel				
OMEGA Thermocouple Simulator Serial #506	Method 28 Room	Meter (Tm)	Filters (Tf)	Tunnel (Tt)	Dryer (Ts)	DB
0	1	1	1	1	1	1
100	98	98	98	98	98	98
300	301	301	301	301	301	301
500	500	500	500	500	500	506
700	699	699	699	699	699	699

Technician signature: K. J. Morg Date: 11-27-06

OMNI Environmental Service Inc.
OMNI-Test Laboratories, Inc.
Beaverton, OR

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
0-0.25" Magnehelic Gauge

Range: 0-0.25" WC ID Number: 00126

Calibration Instrument: Digital Manometer ID Number: OMNI-00315

Date: 4/9/07 By: John Steinert

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

Range of Calibration Point ("WC)	Digital Manometer (A) ("WC)	Magnehelic Gauge (B) ("WC)	Difference (A - B)	% Error of Full Span*
0.00 - 0.05	.025	.025	0	0
0.05 - 0.10	.074	.07	.004	~~2.4~~ 1.6
0.10 - 0.15	.12	.12	0	0
0.15 - 0.20	.154	.16	.006	2.4
0.20 - 0.25	.245	.245	0	0

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.01" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: John Steinert Date: 4/9/07

Reviewed by: [illegible] Date: 4/9/07

Certificate of Calibration

Certificate # **286629** Page # 1 of 1 Order Date: 13Nov2003

For: OMNI-TEST LABORATORIES 56

Department: NO PO#: PAM BLACKBURN

JJ Calibrations, Inc.

#0723.01

Instrument Identification

Property #: OMNI-00131 Serial #: 27503

Make: OHAUS User:

Model: 500mg

Noun: 500mg WEIGHT

Accuracy: CLASS F

Certification Information

As Found: Within Tolerance Calibration Date: 19Nov2003

As Left: Within Tolerance *Client Specified Due Date: 19Nov2004

Adjustments: None Repairs: None Seals: N/A Environment: 20°C 33% RH

Procedure: CP 16 Technician: 34

Remarks

SEE DATA SHEET FOR MEASUREMENT RESULTS.

*Any number of factors may cause this item to drift out of calibration before the recommended due date has expired.

Standards Used

ID#	Manufacturer	Model#	Nomenclature	Due Date	Trace ID
432	SARTORIUS	C-44	MICROBALANCE 5.1g	19Nov2004	285515

JJ Calibrations, Inc., certifies that this instrument has been compared in accordance with the above referenced procedure using standards with accuracies traceable to the National Institute of Standards and Technology, derived from accepted values of physical constants, derived from ratio measurements, or compared to consensus standards. The results contained herein relate only to the item calibrated. This certificate is in compliance with the applicable requirements of; ISO 17025, ANSI/NCSL Z540-1, MIL-STD-45662A, ISO 10012-1, ISO-9002 and QS-9000. A Test Accuracy Ratio (TAR) of at least 4:1, if achievable, is maintained unless otherwise stated. This uncertainty expression is expanded at approximately the 95% confidence level, coverage factor (k=2).

Technical Reviewer

Quality Assurance

Issued 19Nov2003

Rev # 11

7007 SE Lake Rd. • Portland, OR 97267-2105 • Telephone (503) 786-3005 • Fax (503) 786-2994 • www.jjcalibrations.com

JJ Calibrations, Inc.

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

Certificate #: 286629
Date: 19Nov2003
Technician: 34
Calibration Interval: 12 Months

Parameter	Referance Standard	Nominal	UUT Before	UUT After	UUT ± Limit	Uncertainty ±
Mass	N/A	500.00mg	500.11mg		0.72mg	N/A

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

DICK MUNNS COMPANY

Liquid and Gas - Flowmeter Calibration Service
10572 Calle Lee - 138 • Los Alamitos, California 90720
Telephone (714) 827-1215 • Telefax (714) 827-0823

CERTIFICATE OF CALIBRATION

Client Name:	OMNI-TEST LABS	Calibration Date:	06-19-2006
Reference Number:	PO# OTL-06-057	Calibration Due:	06-19-2007
Instrument Manufacturer:	AMERICAN METER CO.	Procedure:	NAVAIR-17-20MG-02
Instrument Description:	P.D. METER	Calibration Fluid:	Air @14.7PSIA 70F.
Model Number:	DTM-200A	Standard(s) Used:	A4 DUE 2-2007
Serial Number:	95W492393	NIST Traceability Per:	322ENW,737/3096,37720
Rated Uncertainty:	+/- .5% RD	Ambient Conditions:	761 mmHGA, 46% RH
Uncertainty Given:	As rec.Within Specs.	Certificate/File:	423862

	IND. SCFM	ACT. SCFM	C. FACTOR
1	0.250	0.250	1.00001
2	0.501	0.500	0.99801
3	0.751	0.750	0.99868
4	1.002	1.000	0.99801
5	1.503	1.500	0.99801
6	2.004	2.000	0.99801
7	2.507	2.500	0.99722
8	3.009	3.000	0.99702

** ID# 00141 **

All instruments used in the performance of the above calibration have direct traceability to the National Institute of Standards and Technology (NIST). The accuracy ratio between the calibration standards used and the unit under test is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the above listed procedure number, in accordance with ISO 10012-1,17025, ANSI/NCSL-Z-540-1, and/or MIL-STD-45662A. CONDITION AS: RECEIVED(X) AS LEFT( ) WITHIN SPECS.(X)YES ( )NO.

Calibration Performed By:

PABLO ACOSTA

Approved By:

R.L. Munns

2-22-05 2-41

OMNI Environmental Service, Inc.
OMNI-Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
Magnehelic Gauge

Instrument to be calibrated: Liquid INCLINE MANOMETER

Range: 0-10 "w.c. ID Number: 156

Calibration Instrument: Digital Manometer ID Number: 315

Date: 12-07-06 By: K. Morgan

Only two data points for a between calibration check

Digital Manometer (A) (inches of H_20)	Magnehelic Gauge (B) (inches of H_20)	Difference (A - B)	% Error of Full Span*
1.900	1.90	0	0
1.000	1.00	0	0
0.719	~~0.70~~ 0.720	.001	0.1%
0.319	0.320	.001	0.1%

*Acceptable tolerance is 4%.

This calibration is traceable to NIST through the Dwyer Liquid Manometer, NIST Test #MAS 822/254143-94.

Technician signature: K. Morgan Date: 12-07-06

W/ MR. BRUCE DAVIS

Weigh-Tronix, Inc.
7933 SW Nimbus Ave, #28
Beaverton, OR 97005
503-626-3008
1-800-878-3008

WEIGH-TRONIX

SERVICE WORK ORDER

SHIP TO
NAME OMNI ENVIRONMENTAL SERVICES
ADDRESS 5465 SW WESTERN AVE
CITY BEAVERTON STATE OR ZIP 97075
PHONE 503 - 643-3788
FAX
CONTACT Bruce or Richard

JOB No. 111991
CUSTOMER No.
Order Date / /
Start Date / /
Complete Date 1/11/99

BILL TO
NAME
ADDRESS PO BOX 743
CITY STATE ZIP
ATTN:

P.O. No. 99-007

EQUIPMENT

S/N	Location	Type	Cap.	Recommendations and Remarks
5947		WI-127	1K	10,000 DIV
21676		3030	1K	

COMMENTS

Rental 1 Month

Set up calibrated 1000 x 0.1 LB pea. oaden tested. good.

PARTS

2.5

Qty.	Description	Price	Total

ZONE _____ VEHICLE _____
TECHNICIAN LD

SERVICE SUMMARY

Reg.	Agree.	Pref.	Inst.
Hrs. @			
Mileage			
Parts			
Shop Supplies			
Other			
TOTAL			

THIS IS NOT AN INVOICE

I acknowledge all service has been performed satisfactorily, as stated above. All parts installed are warranted for thirty days from this date.

Authorized Signature Bruce Davis

WEIGH-TRONIX
Rental / Sales / Service

Print Name Bruce Davis

DAMAGE TO RENTAL/DEMO EQUIPMENT IS SOLELY THE RESPONSIBILITY OF THE USER WHILE IN THEIR POSSESSION!

DISTRIBUTION: WHITE – OFFICE YELLOW – FILE PINK – CUSTOMER

OMNI 00209

Instruction Booklet

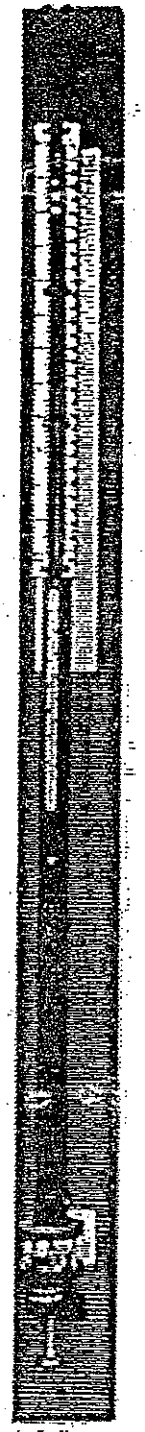
for use with

PRINCO

Fortin type mercurial

Barometers

453
National
Weather
Service
Type



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

CALIBRATION RECORD

Vaneometer Air Velocity Meter – OMNI-00~~032~~ 265 ak

CALIBRATION/SERVICE RECORD			
DATE	**BY**	**RESULTS**	**DATE OF NEXT CALIBRATION**
10-18-02	Jared S	Installed new vane from factory	4-18-03
4-15-03	K	Installed new vane from factory	10-15-03
10-26-03	BQ	Installed new vane from factory	4-26-04
4-26-04	BQ	Installed new vane from factory	10-26-04
11-4-04	BD	Installed new vane from factory	5-4-05
5-3-05	BD	Installed new vane from factory	11-3-05
11-3-05	BR	Installed new vane from factory	5-3-06
6-1-06	JTS	Installed new vane from factory ✓	12-1-06
11-28-06	BD	Installed new vane from factory	5-28-07
		Installed new vane from factory	5.28.07 MD
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	
		Installed new vane from factory	

Certificate of Calibration 365615

Omni-Test Laboratories
5465 SW Western
Suite G
Beaverton, OR 97005

Cust ID: 56

PO: OTL-07-186
Authorized By:

JJ Calibrations, Inc.

ACCREDITED 0723.01

Make: Rice Lake
Model: 10 lb.
Noun: WEIGHT
Serial #: OMNI-00274
Property #: OMNI-00274
Department:
User:
Procedure: CP 16
Accuracy: CLASS F

Order Date: 02/06/2007
Calibrated on: 02/08/2007
*Recommended Due: 02/08/2008
Environment: 19°C 39% RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 34
ID Barcode: GRAI

Remarks
Refer to attachment for measurement results and uncertainties.

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

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
550A	And (A&D) Co.	HP-30K	BALANCE 30 Kg	03/21/2007	344001

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to the National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-1999, 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. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without written approval of JJ Calibrations.

5 yrs.

Carolyn Johansen
Reviewer

Inspector

5 Issued 02/08/2007 Rev # 12

7007 SE Lake Rd Portland, OR 97267-2105 Phone 503.786.3005 FAX 503.786.2994 www.jjcalibrations.com

JJ Calibrations, Inc.

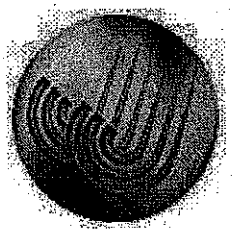
Manufacturer: Rice Lake
Model: 10 Lbs.
Nomenclature: Weight
Serial: OMNI-00274

Certificate #: 365615
Date: 08Feb2007
Technician: 34
Calibration Interval: 12 Months

Parameter		Nominal	UUT Before	UUT After	UUT ± Limit	Uncertainty ±
Mass						
Data in Lbs.		10.0000	10.0000	10.0000	0.0011	0.0008

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

Certificate of Calibration 356168



Omni-Test Laboratories
5465 SW Western
Suite G
Beaverton, OR 97005

Cust ID: 56

PO: otl-06-104
Authorized By:

JJ Calibrations, Inc.

ACCREDITED
0723.01

Make: Omega
Model: RH81
Noun: THERMO HYGOMETER
Serial #: 9480241
Property #: OMNI-00342
Department:
User:
Procedure: CP 1
Accuracy: RH +/-4% TEMP +/-1 DEGREE F

Order Date: 09/11/2006
Calibrated on: 09/15/2006
***Recommended Due:** 09/15/2007
Environment: 25 °C 38 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 40
ID Barcode: GNNM

Remarks
Refer to attachment for measurement results.

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

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
464A	General Eastern	M4-RH/D2	HUMIDITY STANDARD	12/21/2006	337300
497A	Hart Scientific	1502A	TWEENER THERMOMETER	09/23/2006	353815
601A	Burns Engineering	200G05B085	INDUSTRIAL PRT	01/24/2007	339794

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to the National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-1999, 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. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without written approval of JJ Calibrations.

Reviewer

Inspector

Issued 09/18/2006 Rev # 12

7007 SE Lake Rd Portland, OR 97267-2105 Phone 503.786.3005 FAX 503.786.2994 www.jjcalibrations.com

JJ Calibrations, Inc.

Manufacturer: Omega
Model: RH81
Nomenclature: Thermo Hygometer
Serial: 9480241

Certificate #: 356168
Date: 15Sep2006
Technician: 40
Calibration Interval: 12 Months

Parameter	Nominal	Reference Standard	UUT Before	UUT After	UUT ± Limit	Uncertainty ±
Relative Humidity		30.2%	30.5%	30.5%	4%	N/A
		70.1%	69.1%	69.1%	4%	N/A
Temperature	ambient	74.6°F	75.1°F	75.1°F	1°F	N/A

Supplement Data Sheet
Bold Italics indicates Out of Tolerance Value.

OMNI Environmental, Inc.
OMNI-Test Laboratories, Inc.
Beaverton, OR (503) 643-3788

NIST Stopwatch Calibration, Time Proficiency Testing Procedure and Data Sheet

Date: 1/31/07 (User/Technician): Michelle Dolman ☑ Pass ☐ Fail

NIST traceable stop watch OMNI Tracking Number: #292 Last Cal: 2.7.06

Stopwatch to be tested for time proficiency OMNI Tracking Number: omni-00862

1. Start the NIST traceable stopwatch; at a predetermined time (i.e., 1:00 minutes), the technician shall start the watch being tested. When 15.00 seconds have passed (i.e., the NIST traceable stopwatch reads 1 minute, 15 seconds), the technician shall stop the watch being tested. Record the target time interval (i.e., 15.00 seconds). Repeat this step twice and record the data.

2. Repeat step #1 for each of the following target time intervals: 30.00 seconds, 10.00 minutes, and 30 minutes.

3. If the delta between the target time and measured time is less than 5% of the target time interval or 2.00 seconds (whichever is less), then the technician has demonstrated proficiency with the specific instrument utilized in the proficiency test. The proficiency is valid for a period of twelve months.

4. Archive the proficiency test data and information, including the effective date and expiration date of the proficiency, in the equipment record for the instrument involved.

Target time: 15.00 seconds #1 Measured time: MD 00:14.57 #2 Measured time: 14.94 #3 Measured time: 14.94

Target time: 30.00 seconds #1 Measured time: 30.38 #2 Measured time: 30.03 #3 Measured time: 29.80

Target time: 10.00 minutes #1 Measured time: 10:00.26 #2 Measured time: 10:00.06 #3 Measured time: 10:00.13

Target time: 30.00 minutes #1 Measured time: 30:00.00 #2 Measured time: 30:00.29 #3 Measured time: 30.00.03

Technician Signature: zzz. Dolman Date: 1.31.07

Example Calculations

Note: OMNI uses the Lotus 1-2-3 computer program for all Method 5G and 5H calculations. The program automatically carries 14 decimal points in all calculations. The numbers on the printouts have been rounded for display only.

Equations and Sample Calculations - Method 5G

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.

BR	Dry burn rate, kg/hr
m_n	Total particulate matter collected, mg
$V_{m(std)}$	Volume of gas sampled corrected to standard conditions, dscf
v_s	Average dilution tunnel gas velocity, ft/sec
C_s	Particulate concentration, g/dscf
Q_{sd}	Average dilution tunnel gas flow rate, dscf/min
E	Particulate emission rate, lbs/hr
PR	Proportional rate variation, %

Dry Burn Rate

Using equation 28-3:

$$BR = \frac{60 \times W_{wd}}{\theta} \times \frac{100 - \%M_w}{100}$$

Where,

BR	=	Dry burn rate, lb/hr
W_{wd}	=	Mass of wood burned (wet basis) during test run, lb
θ	=	Total time of test run, minutes
$\%M_w$	=	Average moisture content of test fuel charge, wet basis percent

Sample Calculation:

Dry basis moisture of fuel = 20.03%

Using the equation 28-2 for converting dry basis moisture to wet basis moisture,

$$\%M_w = \frac{20.03 \times 100}{20.03 + 100}$$

$$\%M_w = 16.69\%$$

The wet weight of the fuel charge was 7.8 pounds. Converting pounds to kilograms yields a weight of 3.538 kg. The run time for this run was 180 minutes. Therefore, the burn rate equation appears thus:

$$BR = \frac{60 \times 3.538 \times (100 - 16.69)}{180 \times 100}$$

$$BR = 0.98\ kg/hr = 2.17\ lb/hr$$

Total Particulate Matter Collected

$$m_n = F_1 + F_2 + R - (V_a \times B_a)$$

Where:

m_n	=	Total particulate matter collected, mg
F_1	=	Particulate matter collected on front filter, mg
F_2	=	Particulate matter collected on rear filter, mg
R	=	Residue from evaporated probe and filter holder acetone rinse, mg
V_a	=	Volume of acetone evaporated probe and filter holder actone rinse, ml
B_a	=	Acetone blank value, mg/ml

Sample Calculation:

$m_n = 12.6 - 0.4 + 4.7 - (180 \times 0.0040)$

$m_n = 16.2$ mg

Volume of Gas Sampled Corrected to Dry Standard Conditions

Using equation 5-1:

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

Where:

K	=	17.64 °R/in. Hg
T_{std}	=	528 °R
P_{std}	=	29.92 in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_b	=	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:

$$V_{m(std)} = 98.434 \times 1.01 \times \left(\frac{528}{29.92}\right) \times \frac{30.03 + \frac{0.7}{13.6}}{532.5}$$

$$V_{m(std)} = 99.116\ ft^3$$

Dilution Tunnel Gas Velocity

Using equations 2-7 and 2-6, calculated at each recorded interval:

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

$$M_s = M_d \times (1 - B_{ws}) + 18.0 \times B_{ws}$$

Where:

v_s	=	Average dilution tunnel gas velocity, ft/sec
k_p	=	Pitot tube constant: $85.49 \frac{ft}{\text{sec}} \left[\frac{(lb/lb\text{-}mole) \times (inches\ Hg)}{(^oR) \times (inches\ H_2O)}\right]^{\frac{1}{2}}$
C_p	=	Pitot tube coefficient (0.99 for standard pitot tube; 0.84 may be used for S-type pitot tubes constructed according to Method 2 procedures), unitless
ΔP	=	ΔP measured during the pre-test flow traverse of the dilution tunnel; the square root of the ΔP values are averaged for this calculation, in. H_2O
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Static Pressure of tunnel, in. Hg
P_s	=	Absolute tunnel pressure, = $P_b + P_g$
M_s	=	Molecular weight of tunnel gas; assume M_d =29 lb/lb-mole (per method 5G)
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
T_s	=	Dilution tunnel temperature, °R; (°R = °F + 460)

Sample calculation:

$$M_s = 29 \times (1 - 0.04) + 18.0 \times 0.04 = 28.56$$

$$v_s = 85.49 \times 0.99 \times \sqrt{0.0351} \times \sqrt{\frac{(548)}{(30.03 + \frac{-0.45}{13.6}) \times (28.56)}}$$

$$v_s = 12.69 \frac{ft}{sec}$$

Particulate Concentration

Using equation 5G-2:

$$C_s = 0.001 \frac{g}{mg} \times \frac{m_n}{V_{m(std)}}$$

Where:

C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf
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:

$$C_s = \frac{0.001 \times 16.2}{99.116}$$

$$C_s = 0.000163 \ g/dscf$$

Average Dilution Tunnel Gas Flow Rate

Using equation 2-8, calculated at each recorded interval:

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

Where:

Q_{sd}	=	Gas flow rate corrected to dry, standard conditions, dscf/hr
3600	=	Conversion from seconds to hours
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
v_s	=	Average dilution tunnel gas velocity, ft/sec
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 538°R
$T_{s(avg)}$	=	Average absolute dilution tunnel temperature, °R, (°R = °F + 460)
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Dilution tunnel static pressure, in. Hg
P_s	=	Absolute dilution tunnel gas pressure, in Hg, (Hg = $P_b + P_g$)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.04) \times 12.69 \times \frac{(\pi \times 3^2)}{144} \times \frac{528}{548} \times \frac{30.03 + \frac{-0.45}{13.6}}{29.92}$$

$$Q_{sd} = 8313.36\ dscf/hr = 138.56\ dscf/min$$

Particulate Emission Rate

Using equation 5G-3 and 5G-4:

$$E = C_s \times Q_{sd}$$

$$E_{adj} = K_3 \times E^{0.83}$$

Where:

E	=	Particulate emission rate, g/hr
E_{adj}	=	Particulate emission rate, adjusted, g/hr
C_s	=	Concentration of particulate matter in the stack, corrected to dry, standard conditions, g/dscf
Q_{sd}	=	Average dilution tunnel gas flow rate, dscf/hr
K_3	=	Constant, 1.82 for metric units, 0.643 for English units

Sample calculation:

$$E = 0.000163 \times 8313.36 \times 60$$

$$E = 1.36\ g/hr$$

$$E_{adj} = 1.82 \times 1.36^{0.83}$$

$$E = 2.35\ g/hr$$

Proportional Rate Variation

Using equation 5H-9, calculated at each recorded interval:

$$PR = \frac{\theta \times (V_{mi} \times V_s \times T_m \times T_{si})}{10 \times (V_m \times V_{si} \times T_s \times T_{mi})} \times 100$$

Where:

PR	=	Percent proportional rate
θ	=	Time of test, min
S_i	=	Measured tracer gas concentration for the "i^{th}" interval, in this case, the inverse of the calculated flow in the stack based on CO_2 concentrations in the stack and in the dilution tunnel
$V_{mi(std)}$	=	Volume of gas sample measured by the dry gas meter during the "i^{th}" 10 minute interval, dscf
V_m	=	Volume of gas sample as measured by dry gas meter, dscf
V_{si}	=	Average gas velocity in the dilution tunnel during each 10 minute interval, i, of the test run, m/sec
V_s	=	Average gas velocity in the dilution tunnel, m/sec
T_{mi}	=	Absolute average dry gas meter temperature during each 10 minute interval, i, of the test run, °R
T_m	=	Absolute average dry gas meter temperature, °R
T_{si}	=	Absolute average gas temperature in the dilution tunnel during each 10 minute interval, i, of the test run, °R
T_s	=	Absolute average gas temperature in the dilution tunnel, °R

Sample calculation (for the reading at 50 minutes into test run 1):

$$PR = \frac{180 \times 5.6 \times 12.69 \times 533 \times 552}{10 \times 98.434 \times 12.63 \times 548 \times 532} \times 100$$

$$PR = 103.8\%$$

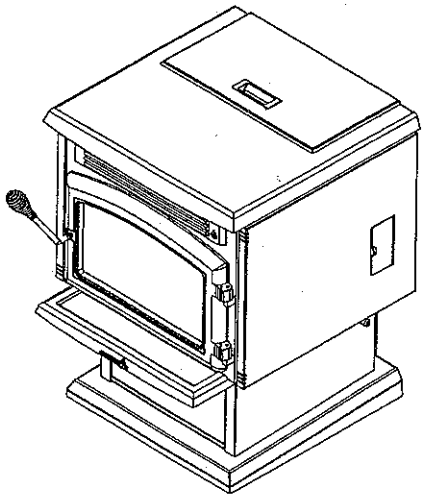
Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Section 3

Owner's Manual

enerzone

MODEL BIO-45 MF



OWNER'S MANUAL

- **Warning: If your appliance is not properly installed a house fire may result. For your safety, follow the installation directions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.**
- **PLEASE read this entire manual before installation and use of this pellet fuel-burning room heater. Failure to follow these instructions could result in property damage, bodily injury, or even death.**
- **Save these instructions.**
- **Some surfaces become hot at higher feeding rates. To prevent potential burns, avoid contact with those areas.**

PROFESSIONAL INSTALLATION IS HIGHLY RECOMMENDED

Manufactured by:
Stove Builder International Inc.
Quebec City (Quebec)
CANADA

INTERTEK
C Warnock Hersey US

45166

2 INTRODUCTION

Thank you for purchasing the BIO-45 MF pellet stove. You are now prepared to burn wood in the most efficient, convenient way possible. To achieve the safest, most efficient and most enjoyable performance from your stove, you must do three things: 1) Install it properly; 2) Operate it correctly; and 3) Maintain it regularly. The purpose of this manual is to help you do all three.

PLEASE read this entire manual before installation and use of this pellet fuel-burning room heater. Failure to follow these instructions could result in property damage, bodily injury or even death.

Keep this manual handy for future reference.

You BIO-45MF has been independently tested to ASTM E1509-95 Standard Specification for Room Heaters, Pellet Fuel Burning Type 1, UL 1482-1998 Standard for Solid Fuel Room Heaters, Oregon Administrative Rules for Mobile Homes (814-23-900 through 814-23-909) and Installation as a Stove Heater.

This pellet stove, when installed, must be electrically grounded in accordance with local codes, or in the absence of local codes, with the *National Electrical Code, ANSI/NFPA 70 and CSA-C22.1.*

This appliance is designed specifically for use only with pelletized wood. It is designed for residential installation according to current national and local building codes as a freestanding room heater. It is also approved as a mobile home heater which is designed for connection to an outside combustion air source.

The stove will not operate using natural draft or without a power source for the blower systems and fuel feed system and must not be burned with any type of coal.

This stove is designed to provide the optimum proportions of fuel and air to the fire in order to burn free of smoke and soot. Any blockage of the air supply to or from the stove will seriously degrade its performance and will be evidenced by a smoking exhaust and a sooting window. For best operation, the ash content of the pellet fuel should be less than 1% and the calorific value approximately 8,200 BTU/LB. Avoid high ash content fuels because this will rapidly fill up the burn pot and eventually cut off the combustion air supply.

Commercial and industrial installations of the BIO-45 MF should not be used since operational control is often not well managed in these settings.

REGISTER YOU WARRANTY ONLINE

To receive full warranty coverage, you will need to show evidence of the date you purchased your stove. Keep your sales invoice. We also recommend that you register your warranty online at **www.enerzone-intl.com/**. Registering your warranty online will help us track rapidly the information we need on your stove.

SAFETY PRECAUTIONS 3

- Do not operate your stove if you smell smoke coming from it. Turn it off, monitor it, and call your dealer.

- Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in this stove. Keep all such liquids well away from the stove while in use.

- Never block free airflow through the open vents of the stove.

- Never try to repair or replace any part of the stove unless instructions are given in this manual. All other work should be done by a trained technician.

- The stove will not operate during a power outage. If an outage does occur, check the stove for smoke spillage and open a window if any smoke spills into the room.

- Disconnect the power cord before performing any maintenance or repairs on the stove.
NOTE: Turning the stove "off" does not disconnect all power from the stove.

- Do not unplug the stove if you suspect a malfunction. Turn the stove off, periodically inspect it, and call your dealer.

- Contact your local building officials to obtain a permit and information on any installation restrictions or inspection requirements in your area. Notify your insurance company of this stove as well.

- This unit must be properly installed to prevent the possibility of a house fire. The instructions must be strictly adhered to. Do not use makeshift methods or compromise in the installation.

- Allow the stove to cool before carrying out any maintenance or cleaning. Ashes must be disposed in a metal container with a tight lid and placed on a non combustible surface well away from the home structure.

- This stove must be connected to a standard 120 V., 60 Hz grounded electrical outlet. Do not use an adapter plug or sever the grounding plug. Do not route the electrical cord underneath, in front of, or over the stove.

- The exhaust system should be checked, at a minimum, at least twice a year for any build up of soot or creosote.

- Keep foreign objects out of the hopper.

- Do not throw this manual away. This manual has important operating and maintenance instructions that you will need at a later time. Always follow the instructions in this manual.

- Do not place clothing or other flammable items on or near the stove.

- The viewing door must be closed and latched during operation.

- Do not operate the stove if the flame becomes dark and sooty or if the burnpot overfills with pellets. Turn the stove off, periodically inspect it, and call your dealer.

- Do not touch the hot surfaces of the heater. Educate all children of the danger of a high temperature stove. Young children should be supervised when they are in the same room as the stove.

- If the stove is installed in a room without air conditioning, or in an area where direct sunlight can shine on the unit, it is possible this can cause the temperature of the stove to rise to operational levels; one of the sensors could then make the stove start on its own. It is recommended that the stove be unplugged when not in use for extended amounts of time (i.e. during the summer months).

- The exhaust system **must** be completely airtight and properly installed. The pellet vent joints must be sealed with RTV 500°F. (260°C.) silicone sealant, and with UL-181-AP foil tape.

- Your stove requires periodic maintenance and cleaning. Failure to maintain your stove may lead to smoke spillage in your home.

- This stove is designed and approved for pelletized wood fuel only. Any other type of fuel burned in this heater will void the warranty and safety listing.

- When installed in a mobile home, the stove must be bolted to the floor, have outside air, and **NOT BE INSTALLED IN A BEDROOM** (Per H.U.D. requirements). Check with local building officials.

- **Stove Builder International Inc. grants no warranty, implied or stated, for the installation or maintenance of your stove, and assumes no responsibility of any consequential damage(s).**

4 TABLE OF CONTENTS

BIO-45 MF FREESTANDING PELLET STOVE

Width: 27"
Height: 30 1/2"
Depth: 24 5"
Weight: 230 lbs.
Flue size: 3" or 4"
Hopper Capacity: Up to 70 lbs.
(This can vary widely depending on pellet size, length, and diameter)
EPA status: exempt
Burn rate: 1 lb. to 5.5 lbs. per hour
BTU range: 8,200 to 45,000
Electrical consumption: 3.5 Amps lighting cycle
2.5 Amps. continuous duty
Control board fuses: Main: 7.5A-250V fastblow
Igniter: 5A-250V fastblow
Electrical requirement: 120VAC 15A
Approved installations: mobile home, conventional

PREPARATION

Factory packaging must be removed, and some minor assembly work is required prior to installation:

- The door overlay must be installed on the door frame;
- The louver kit must be installed in front of the heat exchanger.

NOTE: Normally, your dealer will perform these functions.

CLEARANCES

The BIO-45 MF has been tested and listed for installation in residential and mobile home.(refer figure 1 & 2)

FLOOR PROTECTION: minimum 6" in the front and 6" on each side. The stove must be placed on a continuous (grouted joints) noncombustible material such as ceramic tile, cement board, brick, 3/8" millboard or equivalent, or other approved or listed material suited for floor protection. NOTE: ceramic tile, or any tile, requires a continuous sheet beneath to prevent the possibility of embers falling through to the combustible floor if cracks or separation should occur in the finished surface, this would include floor protection for Built-in raised hearths. Check local codes for approved alternatives.

Clearances are measured from the sides, back and face (door opening) or stove body (refer to fig. 3).

DO NOT USE MAKESHIFT MATERIALS OR COMPROMISES IN THE INSTALLATION OF THIS UNIT.

INSTALL VENT WITH CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

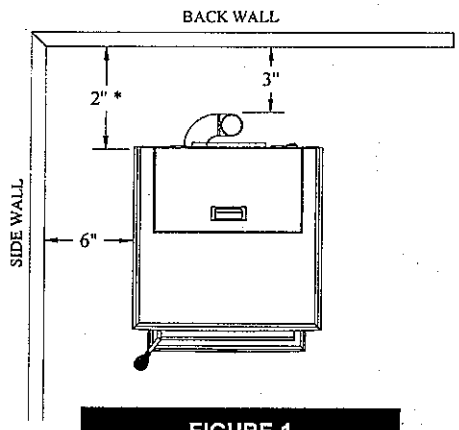


FIGURE 1
Back wall installation

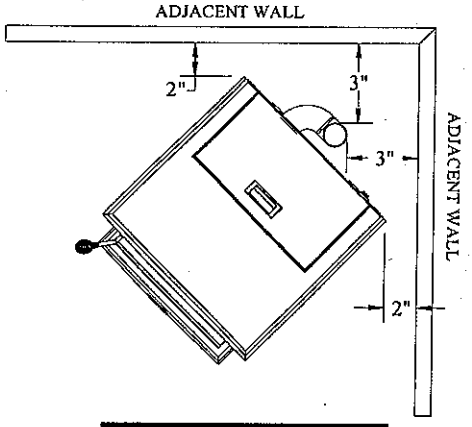


FIGURE 2
Corner installation

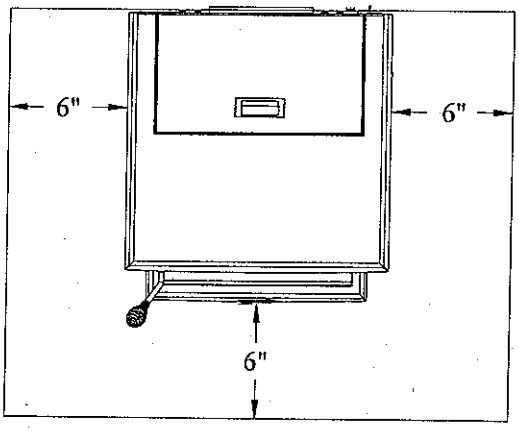


FIGURE 3
Floor protection

6 INSTALLATION

COMBUSTION AIR SUPPLY

For a mobile home installation the stove must be connected to an outside source of combustion air. A 3" inside diameter metallic pipe, either flexible or rigid, may be attached to the inlet at the stove's rear (refer to figures 4, 5 & 6). A rodent guard (minimum ¼" wire mesh) must be used at the terminus (refer to figure 5). All connections must be secured and airtight by either using the appropriately sized hose clamp and/or UL-181-AP foil tape.

For mobile home installations only: No combustion air supply may exceed 10 feet.

Sources of Outside Combustion Air

- A hole in floor near stove rear terminating only in a ventilated crawl space.
- A hole in the wall behind the stove.

WHEN OUTSIDE AIR IS NOT USED

If outside air is not used, it is important that combustion air be easily available to the air inlet. A closeable outside air register can be used in tightly insulated homes.

VENTING

The BIO-45 MF is certified for use with Vent type UL-103 or ULC S629M and Chimney type UL-641 or ULC S609, 3" or 4" diameter in size. This unit can be vented in an existing chimney with the addition of a liner if the chimney is more than 4" in diameter. Class "A" chimney is not required. Refer to the instructions provided by the vent or chimney manufacturer, especially when passing through a wall, ceiling or roof.

This is a pressurized exhaust system. All vent connector joints must be sealed with 500°F (260°C) RTV silicone sealant to ensure consistent performance and avoid smoke spillage. All horizontal connector joints must be sealed with UL-181-AP foil tape. We recommend that all vertical vent connector joints be secured with a minimum of 3 screws.

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

DO NOT INSTALL A FLUE DAMPER IN THE EXHAUST VENTING SYSTEM OF THIS UNIT.

INSTALL VENT AT CLEARANCES SPECIFIED BY THE VENT MANUFACTURER.

WARNING DO NOT INSTALL IN SLEEPING ROOM

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

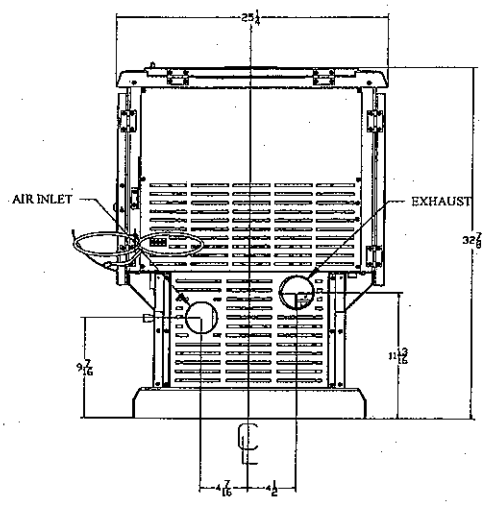


FIGURE 4
Rear view

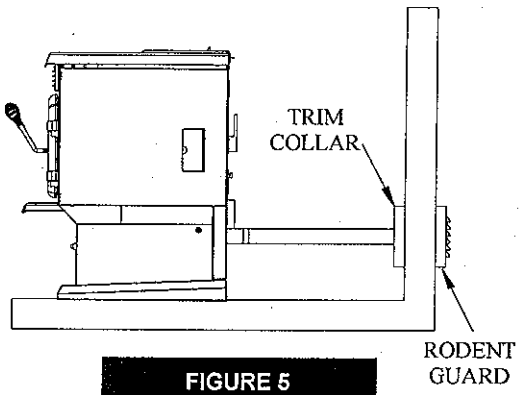


FIGURE 5
Fresh air supply

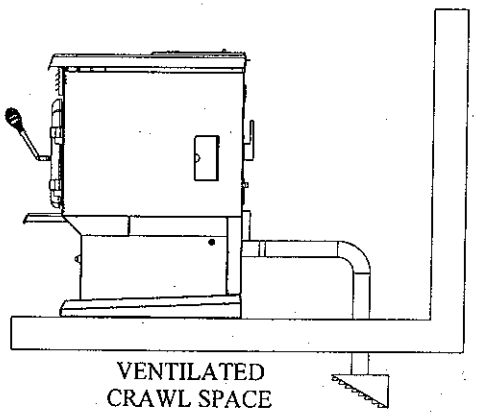


FIGURE 6
Fresh air supply

Equivalent Vent Length (EVL)

The longer the run of pipe in your installation, the more restriction there is in the system. Therefore, larger diameter pipe should be used.

- Use 4" pipe if you have more than **15 feet** of Equivalent Vent Length (EVL).
- Horizontal runs shall not exceed 10 feet of EVL.
- To calculate EVL, use the following conversions table:

Qty	Type of pipe	EVL equivalent(ft)
1	90° elbow or "T"	5
1	45° elbow	3
1 ft	Horizontal pipe run	1
1 ft	Vertical pipe run	0.5

NOTE: At altitudes above 3,000 feet, we suggest the use of 4" diameter vent at an EVL of 7 feet or more.

Here is an exemple on how to calculate the EVL of your installation. (See Figure 8)

(3 x 4' of vertical length = 12' x 0.5 = 6 EVL) + (1 x elbow or "T" = 5 EVL) + (2 x 1' of horizontal length = 2 EVL)

Total EVL = (6 + 5 +2) = 13. So 3" diameter vent is allowed

INSTALLATION CONFIGURATIONS

A. HORIZONTALLY THROUGH WALL (refer to Figure 7 & 8)

NOTE: Follow L-Vent chimney manufacturer's instructions.

1. Position stove, adhering to clearances shown in Figures 1 & 2.
2. Locate position of hole in wall; directly behind stove exhaust vent (refer to figure 4).
3. Always maintain 3" clearance from combustible materials.
4. Install L-Vent wall thimble per L-Vent manufacturer's instructions.
5. Attach enough piping to penetrate and extend at least 6" beyond exterior walls. An 8-foot vertical pipe run is suggested where possible to reduce the possibility of smoke spillage in the event of a loss of negative pressure.
6. Attach cap and seal outside wall thimbles with non-hardening waterproof mastic.

Termination should not be located so that hot exhaust gases can ignite trees, shrubs, or grasses or be a hazard to children. Exhaust gases can reach temperatures of 500°F and cause serious burns if touched.

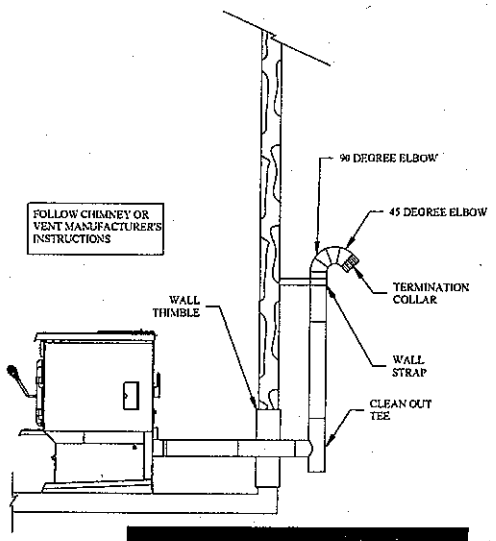


FIGURE 7
Venting through wall

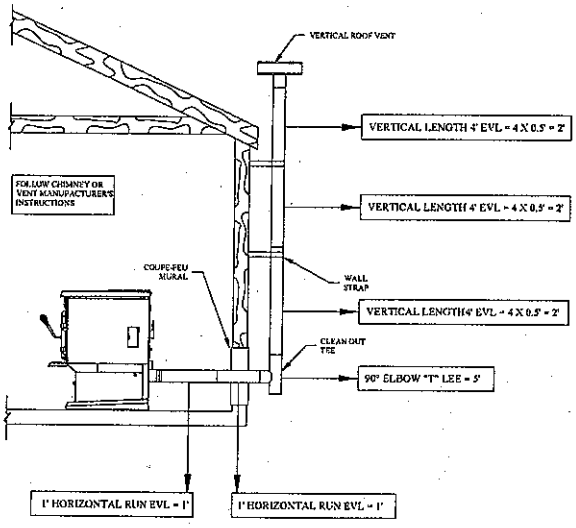


FIGURE 8
Venting through wall

Locate terminations: a) not less than 3 feet above any forced air inlet located within 10 feet; b) not less than 4 feet below or horizontally from, or one foot above, any door, window or gravity air inlet into any building; c) not less than two feet from an adjacent building and not less than 7 feet above grade when located adjacent to a public walkway. Mobile home installations must use a spark arrester.

A. VERTICALLY WITH NEW CHIMNEY SYSTEM (Refer to Figure 9 & 10 for basement installation)

NOTE: Follow L-Vent chimney manufacturer's instructions.

OPTION: To achieve a center vertical installation, a 45° elbow and a clean-out tee can be used to offset the pipe from the exhaust outlet to the rear center of the stove.

OPTION: Install L-Vent elbow in place of clean-out tee. Locate stove. Drop plumb bob to center of tee outlet, mark point on ceiling. Install ceiling support and L-Vent pipe per L-Vent manufacturer's instructions.

1. Always maintain 3" clearance from combustible materials. When passing through additional floors or ceilings, always install firestop spacer.

2. After lining up for hole in roof, cut either around or square hole in roof, always 3" larger all the way around pipe. Install upper edge and sides of flashing under roofing materials, nail to the roof along upper edge. Do not nail lower edge. Seal nail heads with non-hardening waterproof mastic.

3. Apply non-hardening, waterproof mastic where the storm collar will meet the vent. Slide storm collar down until it sits on the flashing. Seal and install cap. Mobile home installations must use a spark arrester.

B. VERTICALLY INTO EXISTING CHIMNEY SYSTEM

As an alternative, 3" or 4" L-Vent can be run inside existing chimney to termination(Figure 11). This is the preferred method.

Follow guidelines for equivalent vent length.

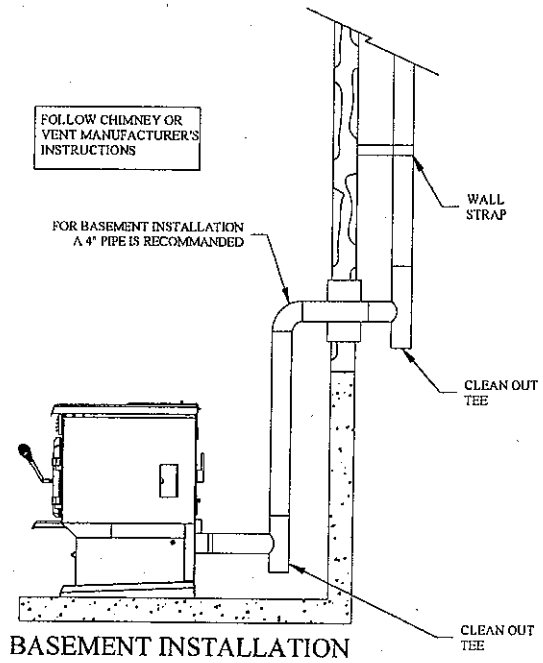


FIGURE 10
Basement installation

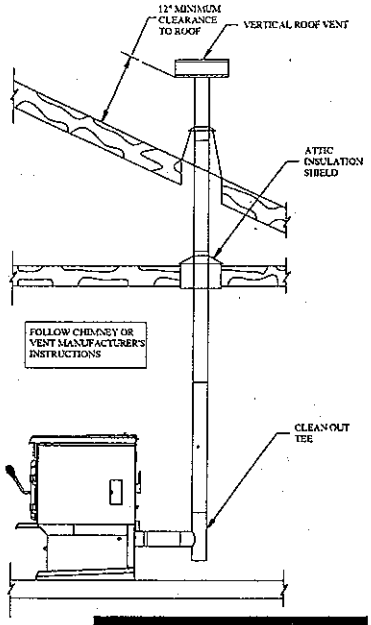


FIGURE 9
Venting through roof

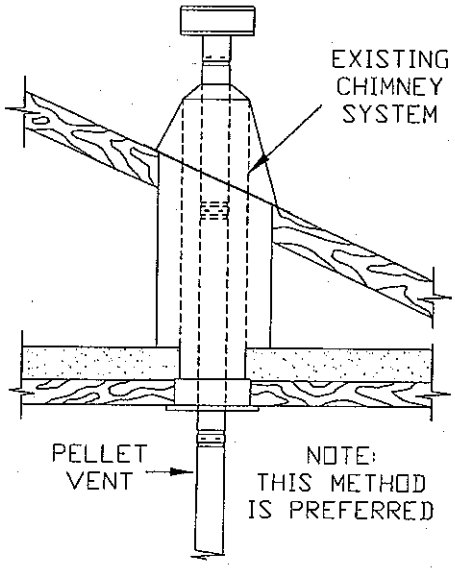


FIGURE 11
Venting through existing chimney

C. VERTICALLY INTO EXISTING MASONRY FIREPLACE

NOTE: Follow L-Vent chimney manufacturer's instructions.

1. Have the masonry chimney inspected by a qualified chimney sweep or installer to determine its structural condition.
2. You will need a pipe length equal to the chimney height from the hearth. If outside combustion air is to be used, you will need a pipe length equal to the chimney height plus 18 inches.
3. Install a blanking plate and the chimney pipe, and if used the outside air pipe, as shown in Figure 12.
4. Attach the DuraVent adapter, a section of pipe and clean out tee, making sure the clean out tee is centered in the chimney flue area. Use RTV, metallic tape, and a minimum of three self-taping screws at all joint connections to ensure a tight seal.
5. Position the stove, adhering to the clearances in Figures 1 & 2.
6. Measure and build chimney top plate. Cut out holes for chimney pipe, and if used the outside air pipe. Install and seal with non-hardening mastic to prevent water leakage. Install vent cap.

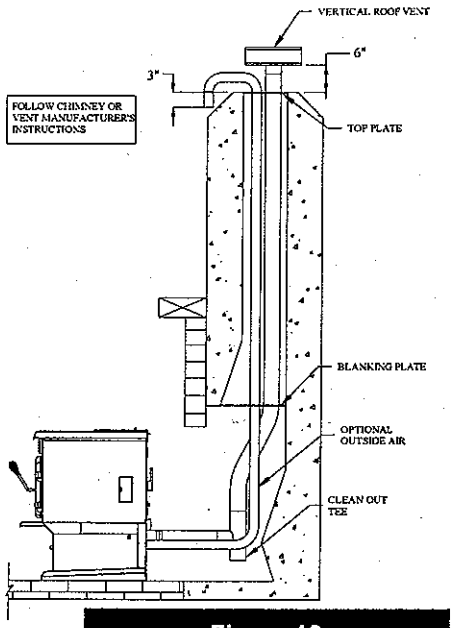


Figure 12
Venting through masonry chimney

D. INSTALLATION THROUGH SIDE OF MASONRY CHIMNEY

NOTE: Follow L-Vent chimney manufacturer's instructions.

1. Position the stove, adhering to the clearances in Figures 1 & 2. Mark the center of the hole where the pipe is to pierce the masonry chimney.
2. It will be necessary to break out the masonry around the location of the pipe center mark. Use a 4-inch diameter hole for 3-inch pipe and 5-inch diameter hole for 4-inch pipe.
3. Measure and build chimney top plate. Cut out holes for chimney pipe, and if used the outside air pipe.
4. Install the tee on the bottom of the vertical pipe system and lower it down the chimney until the center branch of the tee is level with the center of the hole in the masonry, as shown in Figure 13.
5. Install and seal the top plate from step 3 with non-hardening mastic. Slip the storm collar over the pipe, and while holding the pipe at the proper elevation, affix the collar with a minimum of three ¼" stainless steel sheet metal screws. Seal all joints and seams around the collar.
6. Connect the horizontal pipe by pushing it through the hole in the masonry and lining it up with the branch in the tee. Push the pipe into the tee while twisting it to lock it into the tee.
7. If desired, once the horizontal pipe is in place, the space between the pipe and masonry may be filled with high-temperature grout.

Install the trim collar. An adjustable pipe length and adapter may be needed to finish the connection to the stove.

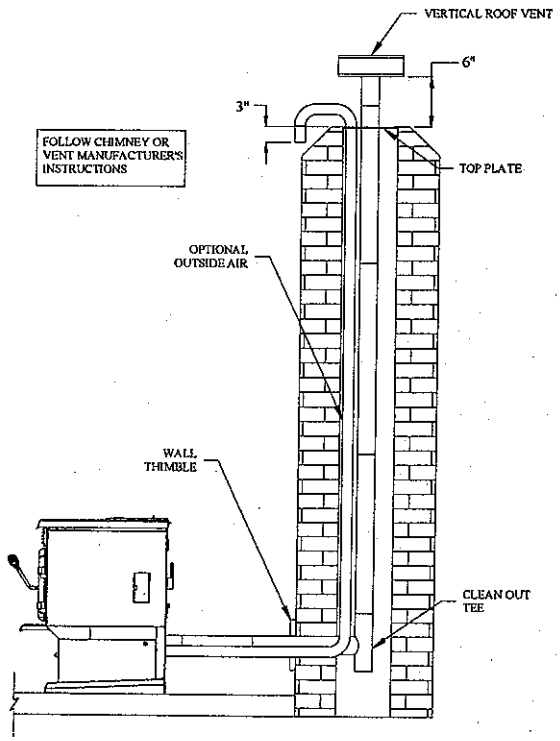


Figure 13
Venting through side of masonry chimney

OPTIONAL LOG SET INSTALLATION

To install the optional log set, you first need to remove the four screws indicated on figure 14a. Keep the screws. Locate the two fixation brackets figure 14b that came with your owner's manual. Fix the two brackets using the same screws you have removed. Lay the log set inside the firebox as shown on figure 14d & 14e

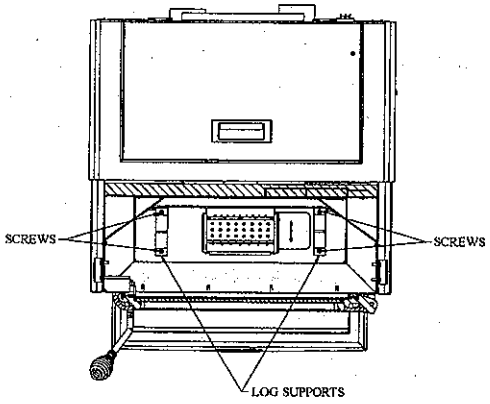


Figure 14a
Fixation of supports

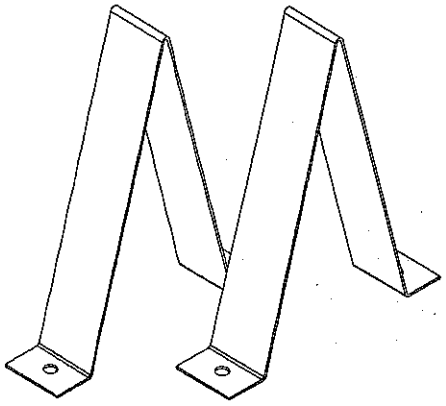


Figure 14b
Log set supports

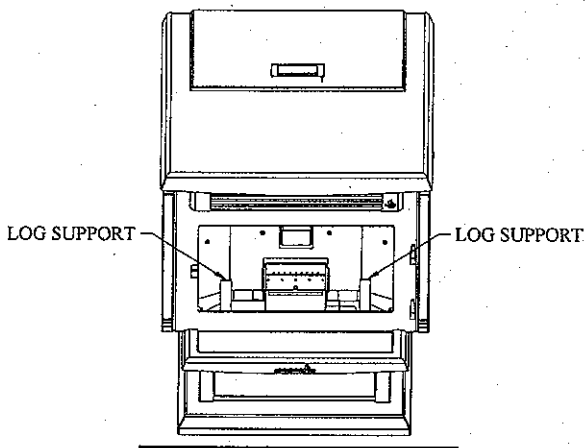


Figure 14c
Location of supports

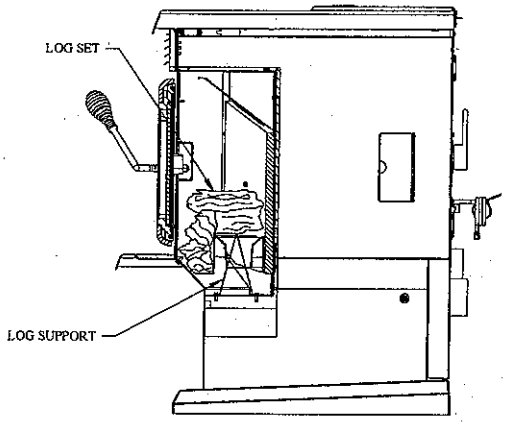


Figure 14d
Log set positionning

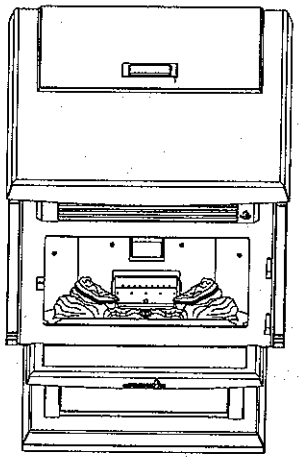


Figure 14e
Log set positionning

PROPER FUEL

THIS STOVE IS APPROVED FOR BURNING PELLETIZED WOOD FUEL ONLY! Factory-approved pellets are those ¼" or 5/16" in diameter and not over 1" long. Longer or thicker pellets sometimes bridge the auger flights, which prevents proper pellet feed. **Burning wood in forms other than pellets is not permitted. It will violate the building codes for which the stove has been approved and will void all warranties.** The design incorporates automatic feed of the pellet fuel into the fire at a carefully prescribed rate. Any additional fuel introduced by hand will not increase heat output but may seriously impair the stoves performance by generating considerable smoke. Do not burn wet pellets. The stove's performance depends heavily on the quality of your pellet fuel.
Avoid pellet brands that display these characteristics:

a. **Excess Fines** – "Fines" is a term describing crushed pellets or loose material that looks like sawdust or sand. Pellets can be screened before being placed in hopper to remove most fines.
b. **Binders** – Some pellets are produced with materials to hold them together, or "bind" them.
c. **High ash content** – Poor quality pellets will often create smoke and dirty glass. They will create a need for more frequent maintenance. You will have to empty the burn pot plus vacuum the entire system more often. Poor quality pellets could damage the auger. Enerzone cannot accept responsibility for damage due to poor quality pellets. Your dealer can recommend a good quality pellet dealer in your area.

PRE-START-UP CHECK

Remove burn pot, making sure it is clean and none of the air holes are plugged. Clean the firebox, and then reinstall burn pot. Clean door glass if necessary (a dry cloth or paper towel is usually sufficient). Never use abrasive cleaners on the glass or door. Check fuel in the hopper, and refill if necessary.

NOTE: The BIO-45 MF Hopper can hold up to 70 lbs. of pellets.

BUILDING A FIRE

Never use a grate or other means of supporting the fuel. Use only the Enerzone approved burn pot.

NOTE: During the first few fires, your stove will emit an odor and a small amount of fumes as the high temperature paint cures or becomes seasoned to the metal. Maintaining smaller fires will minimize this. Avoid placing items on stovetop during this period because paint could be affected. Make sure the room is well-ventilated. Open windows. **Odors and fumes released during this process are unpleasant but they are not toxic.**

LIGHTING PROCEDURE

a. Fill hopper and clean burn pot.

b. Press "MODE" button to select the desired setting "MANUAL" or 'THERMOSTAT"

c. If the flame is too low in burn pot or the unit has difficulty to light, reduce the air supply by turning the air supply control knob toward the minimum setting. The knob is located on the side of the unit. Once the fire is established, adjust the air supply knob to the desired flame height.
d. Adjust feed rate to desired setting by pressing "-" or "+" button.

If fire doesn't start in 30 minutes, refer to troubleshooting section.

UNIT CONTROLS (See Figure 15)

The blowers and automatic fuel supply are controlled from a panel on the right-hand side of the BIO-45 MF. The control panel functions are as follows.

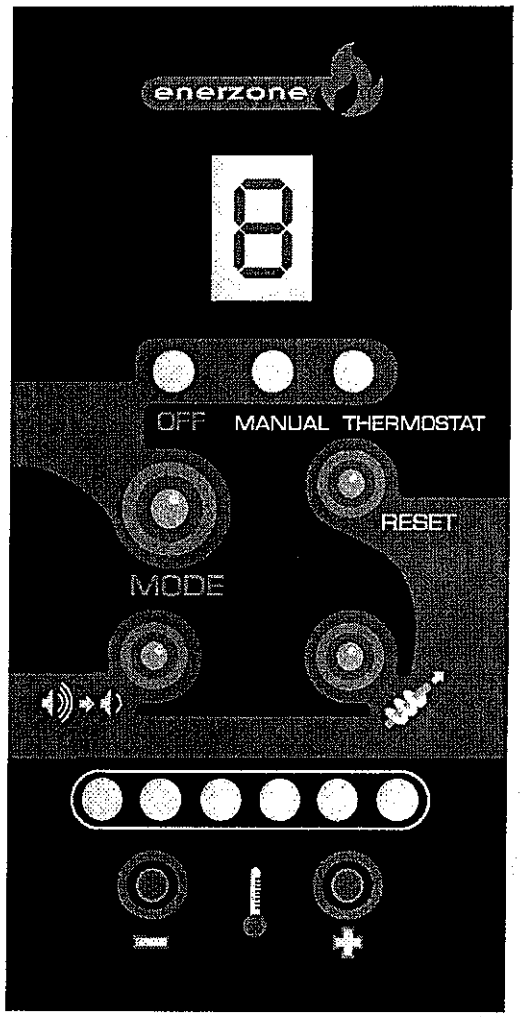


FIGURE 15
PC board

12 OPERATION

a. **MODE SWITCH** 

- When the mode switch is pressed, the stove will automatically ignite. If the manual mode is selected, the heat level must be selected manually to adjust the stove's heat output to the desired level. If the thermostat mode is selected, the stove will automatically modulate between the lowest heat level and the heat level selected to keep the room temperature at the thermostat's setting. If the set room temperature is achieved while the stove has been running at the lowest heat level for more than 45 minutes, the unit will automatically shut off and will start another ignition cycle only when the thermostat calls for heat again. No fire starter is necessary to ignite the unit. The auger will feed fuel for 4 minutes and the electronic igniter will stay on for 10 minutes. If the unit doesn't ignite within 15 minutes, the stove will wait for 5 minutes and will start a second ignition cycle. If ignition fails a second time, an error message will appear on control panel.

- The Heat Level may be selected during the ignition cycle. However, the unit will only feed fuel at the desired heat level setting when the heat sensor located into the stove will receive a signal indicating that the unit has been fully ignited. This may take anywhere between 10 and 15 minutes.

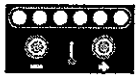
b. **FUEL FEED SWITCH** 

- When the "Fuel Feed" button is pushed and held down the stove will feed pellets continuously into the burn pot.

CAUTION: THIS FUNCTION CAN ONLY BE OPERATED WHEN THE STOVE IS IN "OFF" POSITION. THE FUEL FEED SWITCH IS USED TO PRIME THE AUGER WHEN AUGER IS EMPTY.

c. **NOISE REDUCER** 

- The convection blower speed varies directly with the fuel feed rate.
- When the "NOISE REDUCER" button is pushed, the convection blower will switch to its lowest speed. The convection blower will remain at its lowest speed unless the stove reaches a certain temperature. If this occurs, the convection blower will go back to its highest setting to cool down the stove. The low noise button will have to be pressed again for the convection blower to go back to its lowest speed.

d. **HEAT LEVEL** 

- By pressing "+" or "-", you can set the pellet feed rate and hence the heat output of your stove. The levels of heat output will incrementally change and each LED indicate the level from 1 to 6.

e. **RESET** 

Reset button has to be used to clear any error on the control and restart your stove.

OPENING DOOR

The door should be open only for maintenance purposes.

CONVECTION BLOWER (ROOM AIR FAN)

Upon starting your stove, the convection blower will not come on until the stove's heat exchanger warms up. This usually takes about 10 to 15 minutes from start-up. Speed will vary with the selected feed rate, except if the noise reducer mode has been activated.

COMBEX[tm]

Your stove uses a unique patented technology called COMBEX. As opposed to most other pellet stoves, which use only an exhaust blower, your BIO-45MF uses a motor on which are mounted two housings with impeller blades. One housing serves for combustion, and the other for exhaust. This is why we refer to the combustion/exhaust blower throughout this manual. The COMBEX system balances combustion air and uptake to provide clean, worry-free combustion which is less dependent on the leak-tightness of the device and the quality of the combustible.

IF THE STOVE RUNS OUT OF PELLETS

The fire goes out and the auger motor and blowers will run until the stove cools down. This will take a few minutes.

After the stove's components stop running, an error message will appear E.

To restart, press the "RESET" button, refill the hopper , and press the "FUEL FEED" button  until pellets begin to fall into the burn pot. Press the "MODE" button to start the unit on Manual or Thermostatic mode.

DAMPER CONTROL

The damper control rod on the stove's lower right side adjusts the combustion air. This control is necessary due to the varied burn characteristics of individual installations and different pellet brands. It allows you to improve the efficiency of your stove. Providing correct combustion air will reduce the frequency of cleaning your glass door and prevent the rapid buildup of creosote inside your stove and chimney.

You should adjust the damper based on the fire's appearance. A low, reddish, dirty fire can be improved by by increasing the air supply using the control knob located on the side of the unit. A "blow torch" fire can be improved by reducing the air supply.

Through trial and error, you will find the best setting. Consult your dealer if you need help.

REFUELING

We recommend that you not let the hopper drop below ¼ full. If the reload lid stays for open more than 3 minutes, an error d will appear. To restart, press the "RESET" button, and then press the "MODE" button to start the unit on Manual or Thermostatic mode.

KEEP HOPPER LID CLOSED AT ALL TIMES EXCEPT WHEN REFILLING. THE HOPPER MAY BE FILLED WHILE THE STOVE IS OPERATING. DO NOT OVERFILL HOPPER.

SHUTDOWN PROCEDURE

Turning your Enerzone stove off is a matter of pressing the "MODE" control panel switch, until the "OFF" led goes on. The blowers will continue to operate until internal firebox temperatures have fallen to a preset level.

SAFETY FEATURES

a. Your stove is equipped with a re-settable high temperature switch (also called heat sensor or heat switch). The switch has a reset button on its backside. Like a circuit breaker, once tripped, the reset button will have to be pushed before you can restart the stove. The high temperature switch is there to protect the stove from overheating in case of an evacuation problem, a control board problem, a blower problem, or any other problem causing the unit to overheat. The manufacturer recommends that you call your dealer if this occurs as it may indicate a more serious problem. A service call may be required.

   NOTE: If an overheating situation occurs, the high temperature switch (called the L-250 manual reset) will automatically shut down the auger (fuel feed system) and an error code 0 will appear.

b. If the combustion blower fails, an air pressure switch will automatically shut down the auger and an error message P will appear. This safety feature is to prevent the unit from burning fuel when the combustion/exhaust blower has failed, therefore preventing combustion fumes from spilling into the room.

c. If the temperature in the auger rises beyond a certain acceptable level, a second high temperature switch located on the auger housing will stop the fuel feed system and an error H will appear.

14 THERMOSTAT INSTALLATION

OPERATING THE STOVE USING A THERMOSTAT

A thermostat may help you maintain a constant house temperature automatically. A millivolt thermostat or 24 Volt thermostat is required. A fixed wall mount or hand held model can be used. The control panel can be set up two ways to operate your stove in thermostatic mode.

THERMOSTAT INSTALLATION

- Unplug the stove from the power outlet.
- Connect two thermostat wires to the terminal block located on the lower right side of the back of the stove. To do so, loosen the two screws and insert the wires in the terminals. Tighten the two screws. (See figure 16)
- If you are using a wireless wall thermostat or a hand held thermostatic remote control, you can locate the receiver behind the stove's back panel, on the right end side, just below the terminal block. Most receivers are already equipped with quick-connect terminals. Simply unplug the PC board wires connected to the back of the terminal block and connect them directly with the receiver's terminals. Location of the thermostat is very important to obtain the best comfort and efficiency from you BIO-45 MF. The thermostat should be mounted 50 inch from the floor on a wall located 15 to 20 feet from the stove. You should avoid an installation directly in front of the stove to avoid cycling.(See figure 17)

MODES

THERMOSTATIC MODE

- To use this mode, the "MODE" button must be pushed to "Thermostat" upon starting the stove. The heat setting is then selected using the "Heat Level" selector "+ or –". When set in thermostatic mode, the stove will automatically run a the heat level selected until the set room temperature is reached. When that occurs, the stove will switch to heat setting #1 (lowest) until the thermostat calls for heat again. The convection blower will also slow to its lowest speed. When the thermostat calls for heat again, the stove will increase its feed rate to match the heat setting selected.

- **N.B.:** If the room temperature remains stable and the thermostat does not call for heat during at least 45 minutes, the stove will shut down. When the thermostat calls for heat again, the stove will start an ignition cycle. Once the ignition cycle is completed, the stove will increase its feed rate to match the heat setting selected.

NOTE: When in thermostatic mode:

- <u>You should not operate the manual control or play with the temperature setting.</u>

- <u>YOUR THERMOSTAT SHOULD BE INSTALLED BY AN AUTHORIZED DEALER OR SERVICE PERSON.</u>

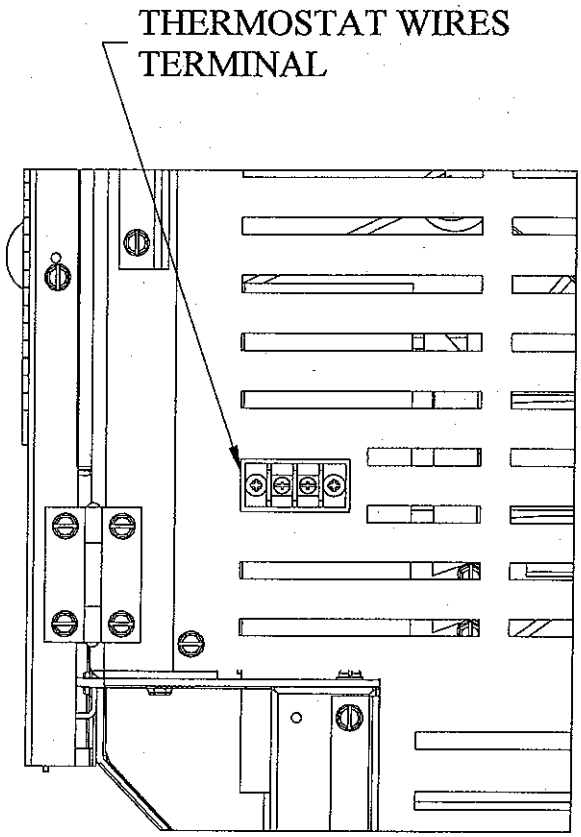
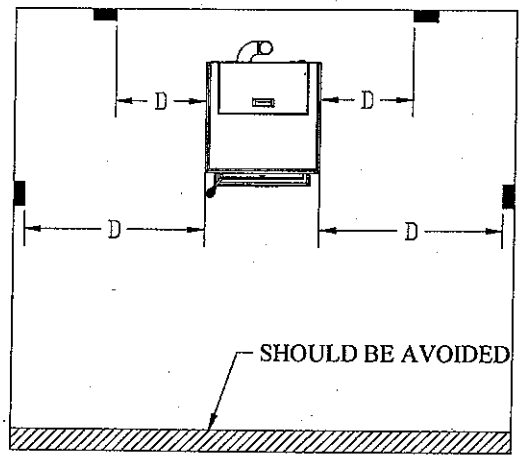


FIGURE 16
Rear view



D = MINIMUM DISTANCE 15 FEET

FIGURE 17
Thermostat location

OPERATING SAFETY PRECAUTIONS

PLEASE READ THIS!

a. **If you notice a smoldering fire** (burnpot full but no visible flame) **AND a heavy smoke buildup in firebox, immediately TURN OFF the stove, but DO NOT unplug it. Do not open the door, change the damper setting or tamper with any controls on the stove.** Wait until smoke inside the firebox clears and blowers shut down. Do as instructed in "**PRE-START-UP CHECK**" and "**LIGHTHING PROCEDURE**", then attempt to restart the fire. If the problem persists, contact your dealer. Please note that smoke build-up during ignition may occur. Smoke can accumulate in the firebox for a few seconds just before the igniter is hot enough to fire-up the pellets in the burn pot. This is normal. As soon there is fire in the burn pot, smoke will disappear.

b. **DO NOT STORE OR USE FLAMMABLE LIQUIDS, ESPECIALLY GASOLINE, IN THE VICINITY OF YOUR ENERZONE STOVE. NEVER USE A GAS OR PROPANE TORCH, GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR FLUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER.**

c. **WARNING: DO NOT OVERFIRE THIS STOVE.** This may cause serious damage to your stove and void your warranty. It also may create a fire hazard in your home. **IF ANY EXTERNAL PART OF THE UNIT BEGINS TO GLOW, YOU ARE OVERFIRING.** Immediately press the "MODE" switch on the control panel, until reaching the 'OFF' position. **DO NOT UNPLUG YOUR STOVE.** If you leave your house and your stove is not connected to a thermostat or a fresh air supply, do not leave it at the maximum setting. **If the ambient air in a confined room becomes to hot, the stove may overheat and the thermal protection on the combustion/exhaust motor may be activated, causing the motor to stop.**

d. **KEEP ALL LOOSE OR MOVEABLE HOUSEHOLD COMBUSTIBLES, SUCH AS FURNITURE, DRAPES, TOYS, ETC. AT LEAST THREE FEET FROM THE OPERATING STOVE.**

e. Maintain proper ventilation. It is important that adequate oxygen be supplied to the fire for the combustion process. Modern houses are often so well insulated that it may become necessary to open a window slightly or install an outside air vent to provide sufficient combustion air.

f. Since heating with solid fuel is potentially hazardous, even with a well made and thoroughly tested stove, it would be wise to install strategically placed smoke detectors and have a fire extinguisher in a convenient location, near an exit.

g. Do not open the stove door when operating unless necessary. This will create a dirty, inefficient burn and could allow smoke spillage or sparks to escape.

h. Do not permit operation by young children or those unfamiliar with stove's operation.

i. **Do not service or clean this appliance without disconnecting the power cord.**

j. Do not abuse the door glass by striking, slamming or similar trauma. Do not operate the stove with the glass removed, cracked or broken.

k. If the stove is installed in a room without air conditioning, or in an area where direct sunlight can shine on the unit, it is possible this can cause the temperature of the stove to rise to operational levels; one of the sensors could then make the blowers start on their own. It is recommended that the stove be unplugged when not in use for extended periods of time (i.e. during the summer months).

16 MAINTENANCE

FAILURE TO CLEAN AND MAINTAIN THIS UNIT AS INDICATED CAN RESULT IN POOR PERFORMANCE AND SAFETY HAZARDS. NEVER CLEAN WHEN HOT.

NOTE: Inspect burn pot periodically to see that holes have not become plugged. If so, clean thoroughly.

ASH REMOVAL

Ashes should be placed in a metal container with a tight-fitting lid. The closed container or ashes should be placed on a noncombustible surface or on the ground, well away from all combustible materials pending final disposal. If ashes are disposed of by soil burial or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

ASH DISPOSAL

The BIO-45 MF has an ash bin located below the firebox. To remove ashes:

a. Make sure fire is out and the firebox is cool.

b. Open the door and remove the baffle from the firebox. Close the door.

c. With the door closed, clean heat exchanger tubes by activating the cleaning rod back and forth from front to back.
(see Cleaning section and Figure 18 & 19) .

d. Open the door and remove the burn pot by grasping it and pulling straight out. Scrape the burn pot with a scraper if necessary. Make sure that the burn pot holes are not plugged. Empty ashes from the burn pot into the pedestal ash bin through the opening at the bottom of the firebox. Put the burn pot back in place. Make sure it is level and pushed all the way in.

e. Scrape the ashes in the firebox into the pedestal ash bin through the opening or the bottom of the firebox or vacuum to remove ashes.

WARNING: Make sure ashes are cool to the touch before using a vacuum. See "**VACUUM USE**".

f. Periodically remove and empty the ash bin (see Figure 20) by opening the front lid of the pedestal below the ash lip. Dispose of ashes properly.
(See "**ASH REMOVAL**" above)

g. Put the ash bin back into place, making sure that you tighten the knob and maintain a good seal. Inspect gasket at the same time to make sure it is in good condition.

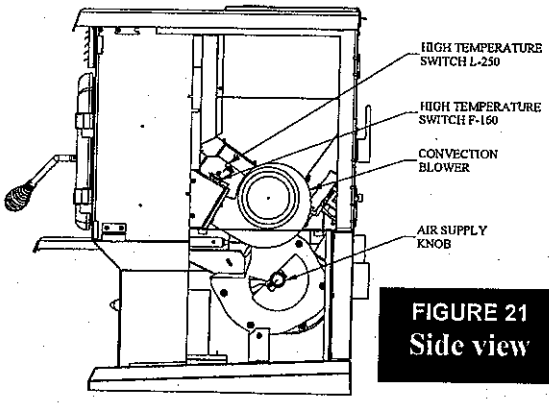


FIGURE 21
Side view

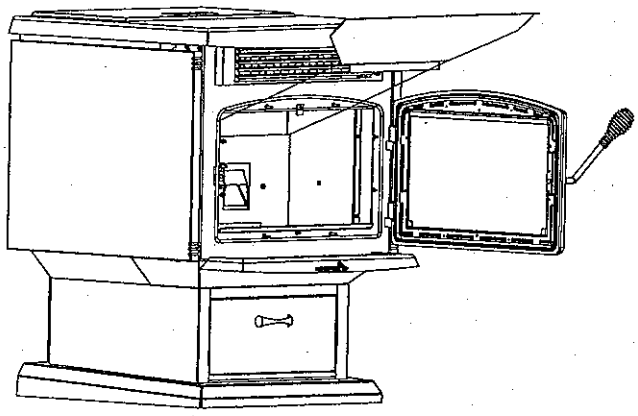


FIGURE 18
Baffle removal

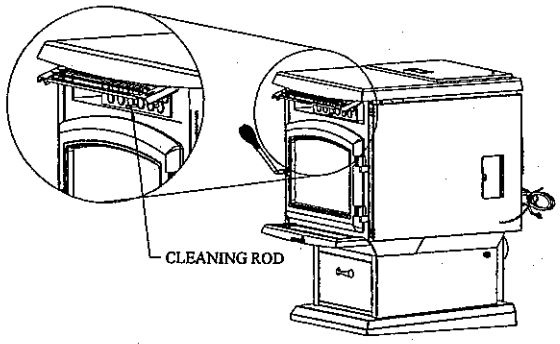


FIGURE 19
Cleaning rod

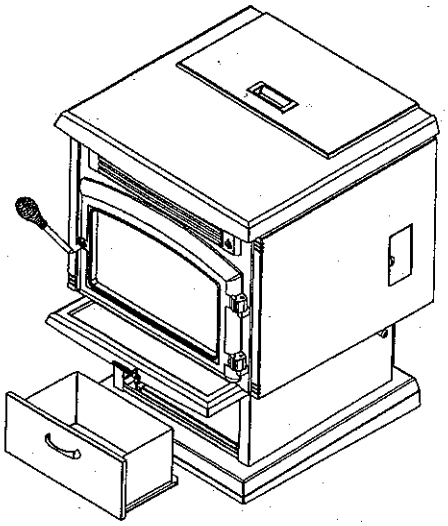


FIGURE 20
Ash drawer

VACCUM USE

If a vacuum is used to clean your stove, we suggest using a vacuum designed for ashes.

Some regular vacuums and shop vacs leak ash into the room. Your vacuum or shop vac may have a special filter or bag available to eliminate this leakage.

CLEANING

a. **Heat Exchange Tubes** – Your BIO-45 MF stove is designed with a built-in heat exchanger tube cleaner. This should be used weekly to remove accumulated ash on the tubes. To clean the heat exchanger, open the door and grab the cleaning rod located behind the louvers (just above the stove's door) and push it forward. Close the door. Slide the cleaning rod back and forth two or three times from front to back (refer to figure 19). When finished, push the cleaning rod back in, behind the louvers.

b. **Baffle:** Remove the baffle and scrape off ashes. Use a vaccum is necessary. In some cases, you will need to remove creosote on the baffle, which can accumulate rapidly under certain conditions. A small wire brush can be used. It is important to remove this creosote because it is highly combustible and could cause premature corrosion.

c. **Chamber walls:** Periodically, you must vacuum the ashes that may have accumulated on the main walls of the combustion chamber. START BY REMOVING THE DECORATIVE MASONRY-LIKE PANELS, WHICH ARE SIMPLY HELD BY SCREWS. Scrape off ashes. Use a vacuum is necessary. There is also a cleaning outlet located behind the left side panel of the combustion chamber. Remove this panel using a screw driver. You will notice a small rectangular cleaning outlet. Inspect behind this outlet (see figure 22) Insert the vacuum tip through the cleaning outlet and clean thoroughly. REPEAT THIS OPERATION AT LEAST ONCE PER TON OF PELLETS BURNED UNTIL YOU ARE FAMILIAR WITH HOW ASHES ACCUMULATE WITH YOUR OPERATING PRACTICES.

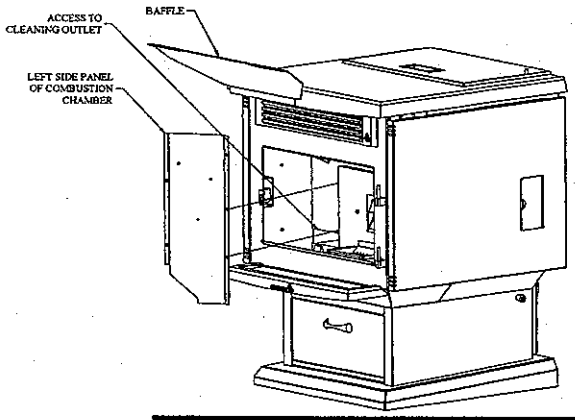


FIGURE 22
Access to cleaning outlet #1

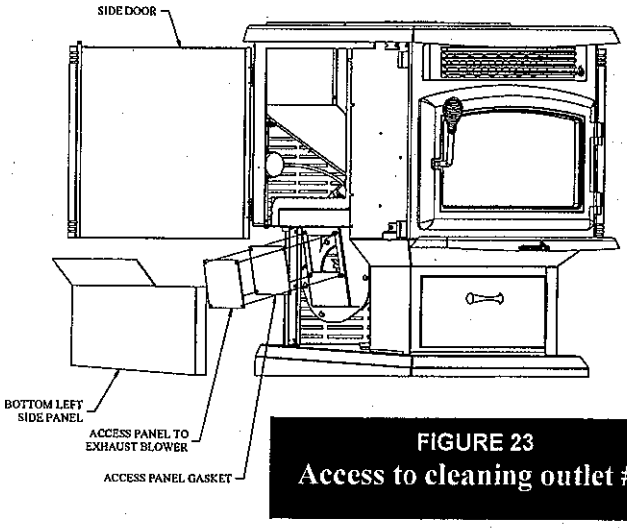


FIGURE 23
Access to cleaning outlet #2

BLOWERS

DANGER: RISK OF ELECTRIC SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT.

- **Cleaning** – Over a period of time, ashes or dust may collect on the blades of both the combustion/exhaust blower and convection blower. Periodically, the blowers should be cleaned as the ash and dust can impede performance. The combustion/exhaust blower can be accessed by opening the left, right, and back panels located on the pedestal. To clean the blades in the combustion housing, insert the vacuum tip through the air inlet damper opening located on the side of the combustion housing. Clean thoroughly. To clean the blades in the exhaust housing, use a screw driver to remove the cleaning access panel located on the side of the metal box covering the housing. Insert the vacuum tip through the cleaning outlet and clean the blades thoroughly.

  NOTE: When cleaning, be careful not to bend fan blades. Some stove owners lightly spray an anti-creosote chemical on the fire to help reduce creosote formation within the stove.

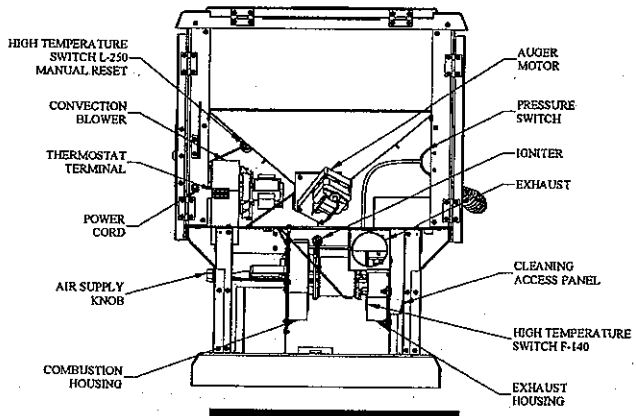


FIGURE 24
Rear view

Oiling – both the convection and combustion/exhaust blowers have sleeve bearings that are permanently sealed. No oiling is required.

CHIMNEY CLEANING

a. **Creosote Formation** – When any 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 or a newly started fire or from a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire, which may damage the chimney or even destroy the house. Despite their high efficiency, pellet stoves can accumulate creosote under certain conditions.

b. **Fly Ash** – This accumulates in the horizontal portion of an exhaust run. Though noncombustible, it may impede the normal exhaust flow. It should therefore be periodically removed.

c. **Inspection and Removal** – The chimney connector and chimney should be inspected annually or per ton to determine if a creosote or fly ash build-up has occurred. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire. Inspect the system at the stove 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.

The creosote should be removed with a brush specifically designed for the type of chimney in use. A qualified chimney sweep can perform this service. It is also recommended that before each heating season the entire system be professionally inspected, cleaned and, if necessary, repaired.

To clean the chimney, detach the vent at the combustion blower transition where it is attached to the blower.

RECOMMENDED MAINTENANCE SCHEDULE

Use this as a guide under average-use conditions.

	Daily	Weekly/as needed	Bi-Annually	Annually or per Ton
Burn Pot	Stirred	Emptied/brushed		
Glass	Wiped	Cleaned		
Combustion Chamber		Vacuumed	Brushed	
Ashes		Emptied		
Interior Chambers		Vacuumed		
Heat Exchange Tubes		Cleaned (with rod)		
Combustion/Exhaust Blower Blades			Vacuumed/Brushed	
Convection Blower Blades				Vacuumed
Vent System				Cleaned/brushed
Gaskets			Inspected	
Hopper (end of season)				Emptied and vacuumed

Gasket around door and door glass should be inspected and repaired or replaced when necessary (see "**REPLACEMENT PARTS**").

REMOVAL AND REPLACEMENT OF BROKEN DOOR GLASS

While wearing leather gloves (or any other gloves suitable for handling broken glass), carefully remove any loose pieces of glass from the doorframe. Dispose of all broken glass properly. Return the damaged door to your Enerzone Dealer for repair or replacement. Neither the appliance owner nor any other unauthorized person(s) should replace the door glass. An authorized Enerzone dealer must perform all repairs involving door glass.

TROUBLESHOOTING GUIDE 19

When your stove acts out of the ordinary, the first reaction is to call for help. This guide may save time and money by enabling you to solve simple problems yourself. Problems can be caused by to only five factors: 1) poor fuel; 2) poor operation or maintenance; 3) poor installation; 4) component failure; 5) factory defect. You can usually solve those problems related to 1 and 2. Your dealer can solve problems relating to 3, 4 and 5. Refer to figures 26 - 29 to help locate indicated parts.

STOVE SHUTS OFF AND P APPEARS ON CONTROL BOARD	
Possible Causes:	**Possible Remedies:** (Unplug stove first when possible)
1. Airflow pressure switch hose or pressure tab for hose are blocked.	Unhook air hose from the airflow switch and blow through it. If air flows freely, the hose and tube are fine. If air will not flow throw the hose, use a thin wire to clear the blockage.
2. The air inlet, burn pot, interior combustion air chambers, combustion blower, or exhaust pipe are blocked with ash or foreign material.	Follow all cleaning procedures in the maintenance section of the owner's manual.
3. Vent pipe is incorrectly installed.	Check to make sure vent pipe installation meets criteria in owner's manual and pipe manufacturer.
4. The airflow pressure switch wire connections are faulty.	Check the connectors that attach to the airflow pressure switch.
5. The airflow pressure switch wires are pulled loose at the connector on the wiring harness.	Check to see if the wires are loose at the connector.
6. Combustion/exhaust blower failure.	With the stove on, check to see if the combustion/exhaust blower is running. If it is not, you will need to check for power going to the combustion/exhaust blower. Current reading may vary. If there is power, the blower is bad. If there is not, see #7.
7. Control board not sending power to combustion/exhaust blower.	If there is no current going to the combustion blower, check all wire connections. If all wires are properly connected, you have a bad control board.
8. Control board not sending power to airflow pressure switch.	There should be a 120-volt current going to the air switch after the stove has been on. You will need a technician to perform this test.
9. Airflow pressure switch has failed (very rare).	To test the airflow pressure switch, you will need to disconnect the air hose from the body of the stove. With the other end still attached to the switch, very gently suck on the loose end of the hose (you may want to remove the hose entirely off the stove and the switch first and make sure it is clear). If you hear a click, the switch is working. BE CAREFUL TOO MUCH VACUUM CAN DAMAGE THE SWITCH.

20 TROUBLESHOOTING GUIDE

STOVE SHUTS OFF AND E APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:** (Unplug stove first when possible)
1. The hopper is out of pellets.	Refill the hopper.
2. The air damper is too far open for a low feed setting.	If burning on the low setting, you may need to close the damper all the way turn the air supply knob toward the minimum setting.
3. The burn pot holes are blocked.	Remove the burn pot and clean it thoroughly.
4. The air inlet, the interior chambers, or exhaust system has a partial blockage.	Follow all cleaning procedures in the maintenance section of the owner's manual.
5. The auger motor has failed.	Remove the auger motor from the auger shaft and try to run the motor separately by pressing the fuel feed button on the control board. If the motor turns, the shaft is jammed on something. If the motor does not turn, the motor is bad or a connection with the control board is faulty. To remove the auger motor, take off the top and bottom panels at the back of the stove's body. Loosen the two screws holding the motor to the auger shaft. Then, remove the plate located on the stove body, at the bottom of the gear motor, to allow the motor to slide out of the stove body.
6. The auger shaft is jammed.	Remove that auger shaft from the auger housing. Start by emptying the hopper. Take off the top and bottom panels at the back of the stove's body. Then, remove the auger motor by removing the screws holding the motor to the auger shaft. Remove the plate located on the stove body, at the bottom of the gear motor, to allow the motor to slide out of the stove body. Once, the motor is out, remove the four screws on the steel plate holding the auger shaft to the auger housing. Then, rotate the bottom end of the auger shaft down towards you until you can pull the shaft down out of the stove. After you have removed the shaft, inspect it for bent flights, burrs, or broken welds. Remove any foreign material that might have caused the jam. Also, check the auger housing for signs of damage such as burrs, rough spots, or grooves cut into the metal that could have caused a jam. Clean the auger housing thoroughly to remove all pellet dust.
7. A fuse on the control board has blown.	Remove the control board. Check if the F2 fuse on the back of it appears to be bad. Replace it with a 7.5 Amp 250 Volt fuse. Plug the stove back in and try to run the unit.

STOVE FEEDS PELLETS, BUT WILL NOT IGNITE AND L APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:**
1. Air damper open too far for ignition.	Turn the air supply knob toward the minimum setting for startup. In some situations, it may be necessary to have the damper completely closed for ignition to take place. After there is a flame, the damper can then be adjusted for the desired feed setting.
2. Blockage in igniter tube or inlet for igniter tube.	Remove the burn pot and clean it thoroughly. Make sure that all openings are clear. Find the igniter tube coming out of the burn pot housing. It is a small tube located on the back of the burn pot housing. Make sure it is clear. Make sure there is not any debris around the igniter element or inside the igniter tube.
3. Bad igniter element.	Put power directly to the igniter element. Watch the tip of the igniter from the front of the stove. After about 2 minutes, the tip should glow. If it does not, the element is bad. You may need a technician to perform this test.
4. The F-140 heat sensor has malfunctioned.	The F-140 is a heat sensor is located on the exhaust housing. Its function is to tell the control board that the unit has ignited properly by measuring the heat in the exhaust. The pellet stove will not start feeding pellets at the desired heat setting until it has received a signal from the F-140 heat sensor. If the F-140 heat sensor is bad, the unit will stop after the ignition cycle. If this situation occurs, call your dealer or technician.
5. The control board is not sending power to the igniter.	Check the voltage going to the igniter during startup. It should be a full current. If the voltage is lower than full current, check the wiring. If the wiring checks out good, the board is bad. You will need a technician to perform this test.

STOVE FEEDS PELLETS, BUT WILL NOT IGNITE AND 1 APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:**
1. The igniter fuse on the control board has blown.	Remove the control board and check at the back to see if the F3 fuse appears to be bad. Replace it with a 5 Amp 250V fuse. Plug the stove back and try to run the unit.

STOVE STOPS FEEDING PELLETS AND 0 APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:**
1. The L-250 manual reset high temperature switch has tripped.	Using the owner's manual, locate the L-250 high temperature switch. There is a red button located on the back of it. Press the red button. If you hear a click, the high limit had tripped. Reset the stove. The stove should now function normally. YOU NEED TO INSPECT YOUR UNIT AT THIS POINT. The F-250 high temperature switch will trip if the unit overheats. There might be a problem with another component or the installation, causing the stove to overheat. Make sure that the convection blower works. If the convection blower has failed, this can cause the unit to overheat. Clean any dust off of the windings and blades of the convection blower. Call your dealer or a technician if you get this code again.

22 TROUBLESHOOTING GUIDE

STOVE STOPS FEEDING PELLETS AND H APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:**
1. The L-250 automatic high temperature switch has tripped.	The L-250 automatic high temperature switch is located on the auger housing and will send a signal to the control board if the auger housing overheats. Wait until the stove cools down. YOU NEED TO INSPECT YOUR UNIT AT THIS POINT. There might be a problem with another component or the installation, causing the stove to overheat. Reset the stove and start it. Call a technician if you get this code again.

STOVE STOPS FEEDING PELLETS AND d APPEARS ON THE CONTROL BOARD	
Possible Causes:	**Possible Remedies:**
1. The hopper lid has stayed open for more than 3 minutes	As a security measure, the auger will stop turning and feeding pellets as soon as the hopper lid opens. It will resume normal operation as soon as the hopper lid is closed. However, if the hopper lid stays open for more than 3 minutes, the unit will stop and a code "d" will appear on the control board. Close the hopper lid. Reset the unit and start it again.

SMOKE SMELL COMING BACK INTO THE HOME	
Possible Causes:	**Possible Remedies:**
1. There is a leak in the vent pipe system.	Inspect all vent pipe connections. Make sure they are sealed with RTV silicone that has a temperature rating on 500°F or higher. Also, seal joints with UL-181-AP foil tape.
2. The gasket on the combustion/exhaust blower housing has gone bad.	Inspect the gasket on the combustion/exhaust blower housing to make sure it is in good shape.

AUGER MOTOR STOP FEEDING PELLETS AND COMES BACK ON	
Possible Causes:	**Possible Remedies:**
1. The auger motor is overheating and tripping the internal temperature shutoff (thermal protector).	Start by emptying the hopper. Then, remove the auger motor by removing the screws holding the motor to the auger shaft. Remove the plate located on the stove body, at the bottom of the gear motor, to allow the motor to slide out of the stove body. Once, the motor is out, remove the four screws on the steel plate holding the auger shaft to the auger housing. Then, rotate the bottom end of the auger shaft down towards you until you can pull the shaft down out of the stove. After you have removed the shaft, inspect it for bent flights, burrs, or broken welds. Remove any foreign material that might have caused the jam. Also, check the auger housing for signs of damage such as burrs, rough spots, or grooves cut into the metal that could have caused a jam. Clean the auger housing thoroughly to remove all pellet dust.

- **GLASS "SOOT'S" UP AT A VERY FAST RATE**
- **FLAME IS LAZY, DARK, AND HAS BLACK TIPS**
- **AFTER STOVE HAS BEEN ON FOR A WHILE, THE BURNPOT OVERFILLS**

Possible Causes:	Possible Remedies:
1. Stove or vent pipe is dirty, which restricts airflow through the burn pot.	Follow all cleaning procedure in the maintenance section of the owner's manual.
2. Vent pipe installed improperly.	Check to make sure the vent pipe has been installed according to the criteria in the owner's manual.
3. The air damper is too far closed for a higher setting.	Turn the air supply knob toward the maximum setting and try to burn the unit again.
4. Burn pot holes are blocked.	Remove the burn pot and clean it thoroughly.
5. Blockage in air intake pipe.	Visually inspect the air intake pipe that leads into the burn pot for foreign material.
6. Combustion/exhaust blower is not spinning fast enough.	Test the RPM on the blower (separately – bypassing the control board) after the blades have been cleaned. The RPM should be approximately 3000 RPM. You will need a technician to perform this test.
7. Bad pellets (Applies to "GLASS SOOTS UP AT A VERY FAST RATE" Only)	The brand of pellets or the batch of pellets that are being used may be of poor quality. If possible, try a different brand of pellets. You might also want to try a brand that is made from a different type of wood (softwood vs. hardwood). Different woods have different characteristics when being burned. Your pellets may also be too humid. Make sure your store your fuel properly, in a dry ventilated area.

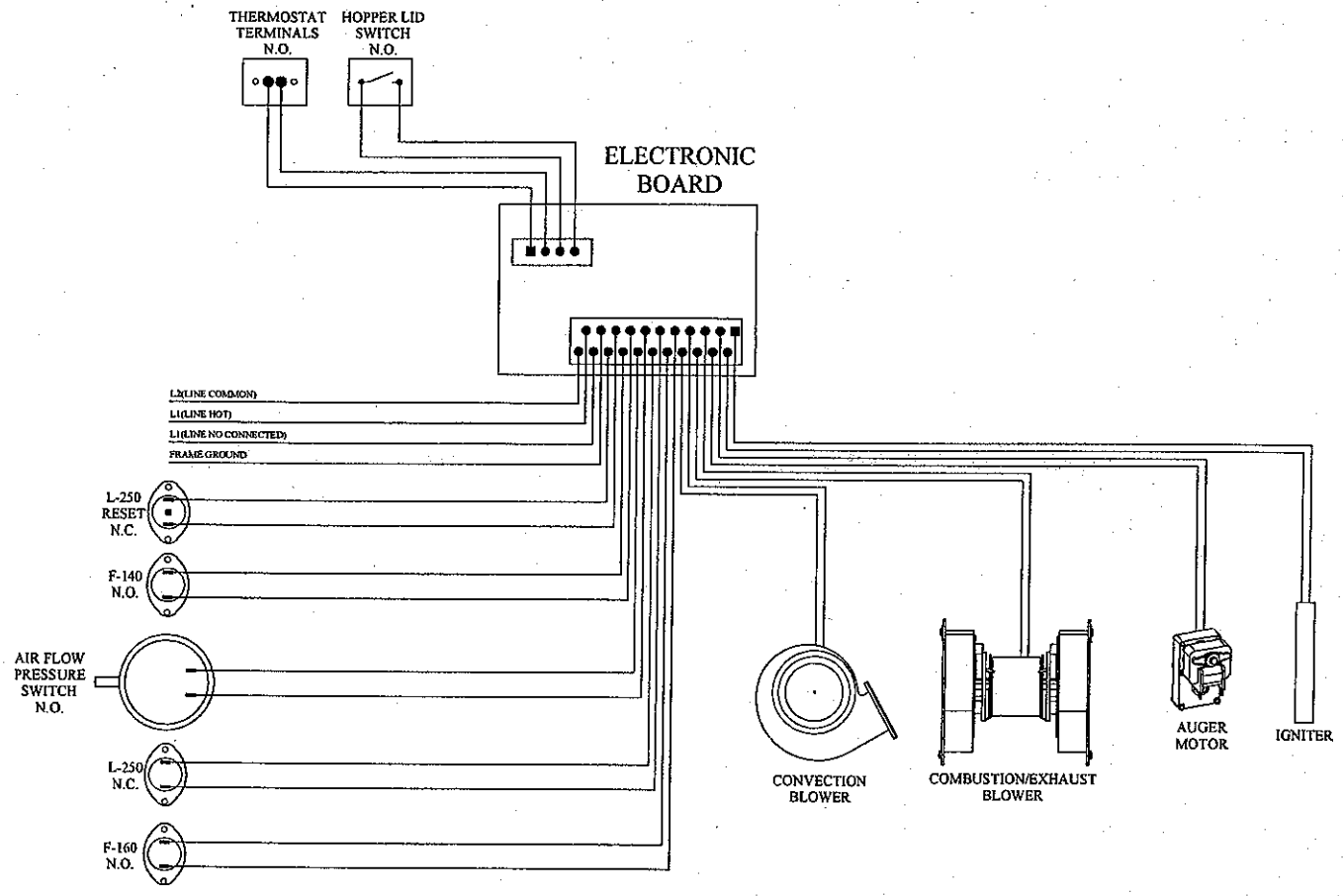
24 TROUBLESHOOTING GUIDE

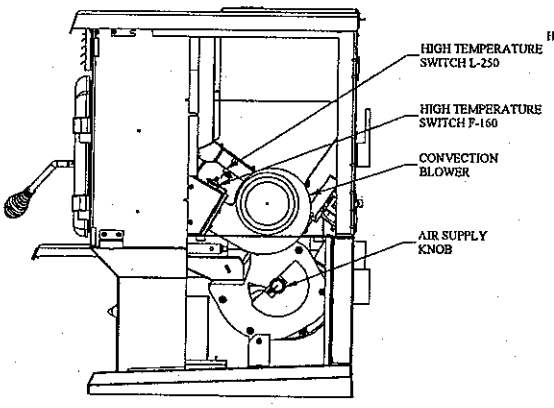
ALARM CODES CHART	
MESSAGE	CORRESPONDING ERROR
P	Pressure switch error.
H	L-250 automatic high temperature switch, located under the auger.
O	L-250 manual reset high temperature switch, located beside convection blower.
E	Hopper is empty
L	Lighting error.
d	Hopper lid stay open more than 3 minutes.
n	Inverted polarity in power outlet.
C	Power outage
1	Igniter fuse blew up

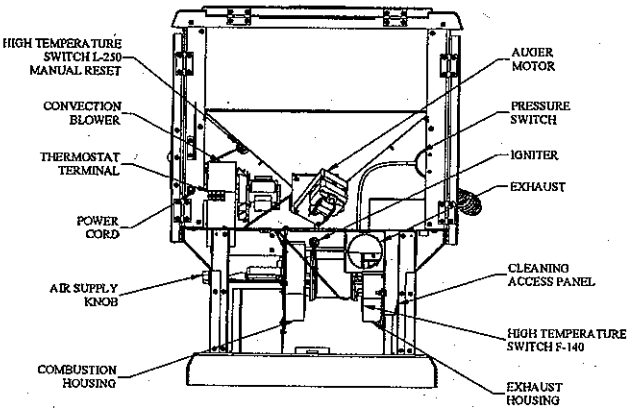
SMOKE SMELL OR SOOT BUILD-UP

Because it is a wood-burning device, your BIO-45 MF may emit a faint wood-burning odor. If this increases beyond normal, or if you notice an unusual soot build-up on walls or furniture, check your exhaust system carefully for leaks. All joints should be properly sealed. Also clean your stove, following instructions in "**MAINTENANCE**". If problem persists, contact your dealer.

ELECTRICAL DIAGRAM 25







26 REPLACEMENT PARTS

Contact an Authorized Enerzone Dealer to obtain any of these parts. Never use substitute materials. Use of non-approved parts can result in poor performance and safety hazards.

ITEM	PART #
Airflow Pressure Switch	44029
Air Switch Hose	49004
Auger Motor	44038
Burn Pot	PL52545
Control Board	44032
Combustion/Exhaust Blower Assembly	44039
Convection Blower	44040
Door Gasket	AC06000
Door Glass – Center	SE52707
Log support	PL52691
Exhaust Adapter 3"	SE52572
Hot Rod Igniter	44030
F-140 Heat Sensor	44057
F-160 Convection blower heat sensor	44058
L-250 Automatic High Temp. Switch	44059
L-250 Manual Reset High Temp. Switch	44041
Window Gasket (7')	AC06400
Convection blower gasket	21107
Combustion/Exhaust blower gasket	21109
Auger	24017
Loading lid switch	44098
Loading lid handle	30527
Ash drawer	SE52617
Ash drawer access panel handle	28062
Baffle	PL52628

1700, rue Léon-Harmel, Québec (Québec) G1N 4R9
tel. : (418) 527-3060 fax : (418) 527-4311
e-mail : tech@sbi-international.com web site : www.enerzone-intl.com/

LIMITED LIFETIME WARRANTY

The Enerzone warranty extends only to the original consumer purchaser and is not transferable. This warranty covers brand new products only, which have not been altered, modified nor repaired since shipment from factory. Proof of purchase (dated bill of sale), model name and serial number must be supplied when making any warranty claim to your Enerzone dealer

This warranty applies to normal use only. Damages caused by misuse, abuse, improper installation, lack of maintenance, over firing, negligence or accident during transportation are not covered by this warranty.

This warranty does not cover any scratch or discoloration caused by over firing, abrasives or chemical cleaners. Any defect or damage caused by the use of unauthorized parts or others than original parts void this warranty.

An authorized qualified technician must perform the installation in accordance with the Instructions supplied with this product and all local and national building codes. Any service call related to an improper installation is not covered by this warranty.

Returned products are to be shipped prepaid to Enerzone for investigation. If a product is found to be defective, Enerzone will repair or replace such defect and reasonable transportation fees will be refunded. Repair work covered by the warranty, executed at the purchaser domicile by an authorized qualified technician requires the prior approval of Enerzone. Labour cost and repair work to the account of Enerzone are based on predetermined rate schedule and must not exceed the wholesale price of the replacement part.

Enerzone at its discretion may decide to repair or replace any part or unit after inspection and investigation of the defect. Enerzone may, at its discretion, fully discharge all obligations with respect to this warranty by refunding the wholesale price of any warranted but defective parts

Enerzone shall in no event be responsible for any special, indirect, consequential damages of any nature, which are in excess of the original purchase price of the product.

DESCRIPTION	WARRANTY APPLICATION	
	PARTS	LABOUR
Combustion chamber (welds only)	Lifetime	5 years
Removable stainless steel parts	5 years	1 year
Removable carbon steel parts	2 years	1 year
Cast iron parts	5 years	1 year
Combustion/exhaust blower	2 years	2 years
Convection	2 years	1 year
Auger motor	2 years	2 years
Igniter	1 year	1 year
Control board	2 years	1 year
Ceramic glass (thermal breakage only)	1 year	n/a
Paint, gaskets, blower, heat sensors, switches, and rheostat	1 year	n/a
Plated surfaces	1 year	n/a

Shall your unit or a components be defective, contact immediately your Enerzone dealer. Prior to your call make sure you have the following information necessary to your warranty claim treatment: **your name, address, telephone number, bill of sale, dealer's name, serial number of unit, nature of defect and relevant information.**

Before shipping your unit or defective component to our plant, you must obtain from your Enerzone dealer an Authorization Number. Any merchandise shipped to our plant without authorization will be refused automatically and returned to sender.

Section 4

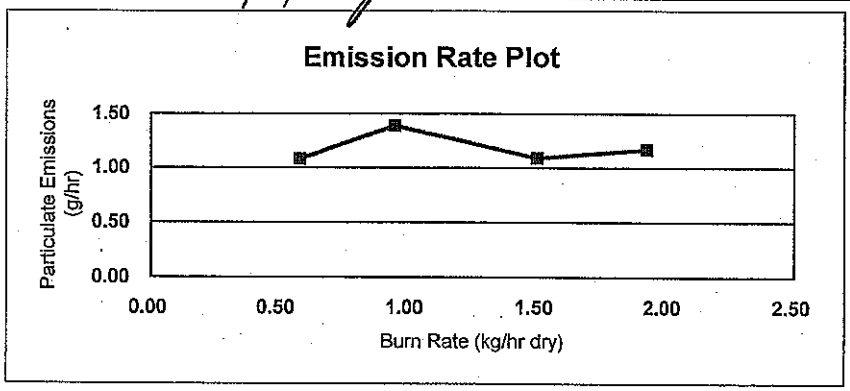
Test Data by Run

EPA Weighted Average Emissions
EPA Method 28

Client: SBI
Stove Model: Series 45 Pellet
Test Dates: 4/10/07 - 4/11/07
Project Number: 338-S-67-3
Tracking Number: 1018
Signature/Date: 4-13-07

Status: FINAL
Stove Type: Pellet Stove

Weighted Average (g/hr)
1.2



Run #	1	
Burn Rate (dry kg/hr)	0.58	
Catagory	1	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.08	
Cap (g/hr)	15	
Weighting Factor	0.328	18.15%
Heat Output (BTU/hr)	8677	

Run #	2	
Burn Rate (dry kg/hr)	0.95	
Catagory	2	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.39	
Cap (g/hr)	15	
Weighting Factor	0.656	36.28%
Heat Output (BTU/hr)	14213	

Run #	3	
Burn Rate (dry kg/hr)	1.50	
Catagory	3	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.09	
Cap (g/hr)	15	
Weighting Factor	0.574	31.74%
Heat Output (BTU/hr)	22441	

Run #	4	
Burn Rate (dry kg/hr)	1.93	
Catagory	4	
Overall Efficiency (%)	78%	
Emissions (g/hr)	1.17	
Cap (g/hr)	18	
Weighting Factor	0.250	13.83%
Heat Output (BTU/hr)	28874	

Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Run 1

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI
Model: Seiries 45 Pellet
Project No.: 1018
Tracking No.: 338-S-67-3
Run: 1
Test Date: 04/10/07

Burn Rate	0.58 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00006 grams/dscf 0.53 grams/hour 1.08 grams/hour
Average Tunnel Temperature	94 degrees Fahrenheit
Average Delta p	0.037 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	63.23 cubic feet 100 degrees Fahrenheit 13.03 feet/second 8467.10 dscf/hour 60.19 dscf
Total Particulates - mn Average Delta H Total Time of Test	3.8 mg 0.69 inches H20 120 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Te

Run:	1
Manufacturer:	SBI
Model:	Seiries 45 Pellet
Tracking No.:	1018
Project No.:	338-S-67-3
Test Date:	10-Apr-07
Beginning Clock Time:	10:52
Recording Interval:	10 min.
Total Sampling Time:	120 min.

Velocity Traverse Data							
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7
Initial dP	0.042	0.040	0.034	0.028	0.038	0.038	0.038
Initial Temp.	93	93	93	93	93	93	93

OMNI Equipment Numbers: _____

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb			
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebo Botto
0	228.300		0.00	71	0	93	0.037		33.1		217	140
10	233.500	0.52	0.75	81	1	94	0.037	103	32.9	-0.2	223	140
20	238.705	0.52	0.75	91	1	93	0.037	101	32.7	-0.2	213	140
30	243.950	0.52	0.75	97	1	93	0.037	101	32.5	-0.2	230	142
40	249.245	0.53	0.75	101	1	93	0.037	101	32.2	-0.3	223	143
50	254.470	0.52	0.75	103	1	92	0.037	99	32.0	-0.2	220	143
60	259.750	0.53	0.75	105	1	92	0.037	100	31.8	-0.2	214	142
70	265.030	0.53	0.75	106	1	92	0.037	100	31.6	-0.2	218	142
80	270.300	0.53	0.75	107	1	93	0.037	99	31.4	-0.2	224	142
90	275.550	0.53	0.75	108	1	96	0.037	99	31.1	-0.3	226	141
100	280.890	0.53	0.75	109	1	97	0.037	101	30.9	-0.2	230	143
110	286.200	0.53	0.75	110	1	98	0.037	100	30.7	-0.2	223	143
120	291.533	0.53	0.75	111	1	100	0.037	101	30.4	-0.3	222	142
Avg/Total	63.233	0.53	0.69	100.00		94.31	0.037	100.36				

OMNI-Test Laboratories, Inc.

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Stove Builders International
Model: Series 45 Pellet
Project No.: 338-S-67-3
Tracking No.: 1018

Equipment Numbers:

Run #: 1
Date: 04/10/07

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	N333	577.5	575.5		2.0
B. Rear filter catch	Filter	N332	573.0	573.5		-0.5
C. Rinse of probe and filter assembly	Acetone	75	104711.0	104707.4	0.0173	2.3

Total Particulate, mg :	3.8

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: [signature] Date: 4-13-07

OMNI Laboratories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G R & D

Client/Model: Stove Builder International Project #: 338-S-67-3 Tracking #: 1018

Date: 4-10-07 Test Crew: K. MORGAN Run #: 1

OMNI Equipment ID #:

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: N/A Actual: Coal Bed: N/A

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst (Not Used)	% GASES O2	CO2	CO
0	34.3		-.033	69	264	141	161	309	218	251		20.35	1.41	0.06
10	34.1	0.2	-.036	67	221	144	153	270	201	225		19.94	1.20	0.02
20	33.9	0.2	-.030	67	221	145	152	264	197	223		20.00	1.10	0.03
30	33.7	0.2	-.030	67	227	144	156	267	200	226		18.97	2.07	0.01
40	33.5	0.2	-.028	66	225	143	152	265	197	221		19.34	1.77	0.01
50	33.3	0.2	-.028	68	224	142	150	262	193	222		19.07	2.14	0.01
60	33.1	0.2	-.028	68	217	140	148	258	190	220		19.44	1.63	0.02
70														
80														
90														
00														
10														
20								Preliminary: 0.58 @ 1.36						
30														
40														
50														
60														
70														
80														
90														
AVG														

Technician signature: K. J. Morgan Date: 4-10-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Run Notes

Client/Model: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3
Tracking Number: 1018
Run #: 1 Date: 4-10-07
Test Crew: K. MORGAN
OMNI Equipment ID Numbers: _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

Setting 1 of 6
Air shutter: Fully Closed

SECONDARY: NONE

TERTIARY: NONE

FAN: Auto

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	test setting					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES
BYPASS: N/A
FUEL LOADING N/A
DOOR: N/A
PRIMARY AIR: N/A
OTHER: NONE

DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

SAME AS ABOVE

SECONDARY: NONE

TERTIARY: NONE

FAN: Auto

Technician signature: K. J. Morgan Date: 4-10-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: Stove Builder International

Model: Series 45 Pellet Stove

Project No.: 338-S-67-3 Tracking No.: 1018

Date: 4-10-07 Run No.: 1 Booth: 1

Test Crew: K. Morgan Start Time: 10:52 Stop Time: 12:52

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: _____ Initial: _____

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2							
CO_2			N/A				
CO							
CO_2 (DT)							

Stack Diameter (inches): 3.0

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

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: 0 @ 3.1 "w.c. Post: 0 @ 3.1 "w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 4-3-07 Initials: K

	Initial	Middle	Ending
Pb (in. Hg)	30.14	30.12	30.11
Room Temp (°F)	67	68	70

Technician signature: K. Morgan Date: 4-10-07

Run 2

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI
Model: Seiries 45 Pellet
Project No.: 1018
Tracking No.: 338-S-67-3
Run: 2
Test Date: 04/10/07

Burn Rate	0.95 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00009 grams/dscf 0.73 grams/hour 1.39 grams/hour
Average Tunnel Temperature	112 degrees Fahrenheit
Average Delta p	0.033 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	63.88 cubic feet 106 degrees Fahrenheit 12.59 feet/second 7927.45 dscf/hour 60.10 dscf
Total Particulates - mn Average Delta H Total Time of Test	5.5 mg 0.69 inches H20 120 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run:	**2**
Manufacturer:	SBI
Model:	Seiries 45 Pellet
Tracking No.:	1018
Project No.:	338-S-67-3
Test Date:	10-Apr-07
Beginning Clock Time:	14:15
Recording Interval:	10 min.
Total Sampling Time:	120 min.

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.030	0.036	0.034	0.032	0.038	0.038	0.030	0.028	"H2O
Initial Temp.	112	112	112	112	112	112	112	112	oF

OMNI Equipment Numbers: _____

PM Control Module:	21			
Dilution Tunnel MW(dry):	29.00	lb/lb-mole		
Dilution Tunnel MW(wet):	28.56	lb/lb-mole		
Dilution Tunnel H2O:	4.00	percent		
Dilution Tunnel Static:	-0.550	"H2O		
Pitot Tube Cp:	0.99			
Meter Box Y Factor:	1.001			
Barometric Pressure:	Begin	Middle	End	Average
	30.11	30.11	30.1	30.11 "Hg

Signature/Date: K J. Moyer 10-05-07

Tunnel Velocity:	12.59	ft/sec.
Intial Tunnel Flow:	131.9	scfm
Average Tunnel Flow:	132.1	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check:	.014 @ 7.5	cfm@"Hg
Fuel Moisture (dry basis):	5.5	%
Total Particulate:	5.5	mg
Filter Holder No.:		

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack		
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O	Oxygen	Carbon Monoxide
0	292.000		0.00	76	0	112	0.033		27.5		321	172	196	366	263		263.6	302	72	58	73	-0.038	17.94	0.02
10	297.230	0.52	0.75	92	1	112	0.033	102	27.1	-0.4	329	175	199	378	270		270.2	307	75	52	74	-0.038	18.78	0.04
20	302.475	0.52	0.75	99	1	111	0.033	100	26.8	-0.3	324	173	195	370	268		266.0	304	76	51	74	-0.038	16.72	0.01
30	307.760	0.53	0.75	104	1	111	0.033	100	26.4	-0.4	316	175	194	366	262		262.6	299	76	50	73	-0.038	19.4	0.06
40	313.040	0.53	0.75	107	1	110	0.033	100	26.0	-0.4	322	173	196	368	264		264.6	296	75	49	72	-0.038	18.9	0.04
50	318.330	0.53	0.75	109	1	111	0.033	100	25.6	-0.4	320	174	195	371	266		265.2	304	75	50	73	-0.038	17.78	0.02
60	323.650	0.53	0.75	111	1	111	0.033	100	25.3	-0.3	318	172	192	367	268		263.4	300	76	50	73	-0.038	18.49	0.03
70	329.050	0.54	0.75	111	1	112	0.033	101	24.9	-0.4	322	172	195	370	270		265.8	304	75	50	73	-0.038	18.17	0.02
80	334.350	0.53	0.75	113	1	112	0.033	99	24.5	-0.4	321	172	195	374	269		266.2	309	76	51	74	-0.038	18.81	0.03
90	339.665	0.53	0.75	113	1	113	0.033	100	24.1	-0.4	331	174	203	381	280		273.8	310	77	51	74	-0.038	17.58	0.02
100	345.045	0.54	0.75	115	1	113	0.033	100	23.8	-0.3	318	175	198	367	271		265.8	299	77	52	74	-0.038	18.83	0.04
110	350.480	0.54	0.75	115	1	113	0.033	101	23.4	-0.4	315	173	196	366	267		263.4	300	77	53	75	-0.038	17.87	0.02
120	355.878	0.54	0.75	116	1	113	0.033	101	23.1	-0.3	324	173	198	375	268		267.6	307	77	53	75	-0.038	18.17	0.02
Avg/Total	63.878	0.53	0.69	106.23		111.85	0.033	100.32									4		75.69	51.54		-0.038	18.265	0.028

OMNI-Test Laboratories, Inc.

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Stove Builders International
Model: Series 45 Pellet
Project No.: 338-S-67-3
Tracking No.: 1018

Equipment Numbers:

Run #: 2
Date: 04/10/07

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	N335	549.7	546.0		3.7
B. Rear filter catch	Filter	N334	543.1	543.3		-0.2
C. Rinse of probe and filter assembly	Acetone	75	105474.3	105471.0	0.0173	2.0

Total Particulate, mg :	5.5

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: K. J. Morgan Date: 4-13-07

OMNI Laboratories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G R & D

Client/Model: Stove Builder International Project #: 338-S-67-3 Tracking #: 1018

Date: 4-10-07 Test Crew: K. Morgan Run #: 2

OMNI Equipment ID #:

Preburn [X]
Test [ ]

Coal Bed: Data: 0 = Range: N/A

Actual: Coal Bed: N/A

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	~~Catalyst~~ Not Used	% GASES O2	CO2	CO
0	29.7		-.038	71	312	170	198	360	263	296		18.19	3.15	0.03
10	29.3	0.4	-.038	72	310	171	186	357	257	294		18.94	2.31	0.06
20	29.0	0.3	-.038	72	311	170	192	359	261	296		18.24	2.99	0.03
30	28.6	0.4	-.038	72	313	172	193	360	263	296		18.63	2.69	0.03
40	28.2	0.4	-.038	72	316	171	192	360	263	297		17.96	3.18	0.03
50	27.9	0.3	-.038	73	315	170	189	361	259	299		18.42	2.99	0.03
60	27.5	0.4	-.038	73	321	172	196	366	263	302		17.94	3.31	0.02
70														
80														
90														
00														
10														
20														
30								Preliminary: 0.95 @ 1.50						
40														
50														
60														
70														
80														
90														
AVG														

Technician signature: K. Morgan Date: 4-10-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Run Notes

Client/Model: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3
Tracking Number: 1018
Run #: 2 Date: 4-10-07
Test Crew: K. Morgan
OMNI Equipment ID Numbers:

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

SETTING 2 of 6
AIR Shutter: 1/2 open

SECONDARY: NONE

TERTIARY: NONE

FAN: Auto

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	test setting					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES
BYPASS: N/A
FUEL LOADING N/A
DOOR: N/A
PRIMARY AIR: N/A

OTHER: NONE

DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

SAME AS ABOVE

SECONDARY: N/A

TERTIARY: N/A

FAN: Auto

Technician signature: K. Morgan Date: 4-10-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: Stove Builder International

Model: Series 45 Pellet Stove

Project No.: 338-S-67-3 Tracking No.: 1018

Date: 4-10-07 Run No.: 2 Booth: 1

Test Crew: K. Morgan Start Time: 14:15 Stop Time: 16:15

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: _____ Initial: _____

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2							
CO_2				N/A			
CO							
CO_2 (DT)							

Stack Diameter (inches): 3.0

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

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.2" W.C. Post: Ø @ 3.1 "W.C

Flue Pipe Cleaned Prior to First Test in Series: Date: 4-3-07 Initials: JL

	Initial	Middle	Ending
Pb (in. Hg)	30.11	30.11	30.10
Room Temp (°F)	73	73	75

Technician signature: K. J. Morgan Date: 4-10-07

Model: BIO-45MF
Stove Builder International
1700 Léon-Harmel
Québec City, Québec, Canada
G1N 4R9

Run 3

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI
Model: Seiries 45 Pellet
Project No.: 1018
Tracking No.: 338-S-67-3
Run: 3
Test Date: 04/11/07

Burn Rate	1.50 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00007 grams/dscf 0.54 grams/hour 1.09 grams/hour
Average Tunnel Temperature	109 degrees Fahrenheit
Average Delta p	0.034 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	63.65 cubic feet 98 degrees Fahrenheit 12.71 feet/second 7917.30 dscf/hour 59.90 dscf
Total Particulates - mn Average Delta H Total Time of Test	4.1 mg 0.69 inches H20 120 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Te

Run:	3
Manufacturer:	SBI
Model:	Seiries 45 Pellet
Tracking No.:	1018
Project No.:	338-S-67-3
Test Date:	11-Apr-07
Beginning Clock Time:	10:05
Recording Interval:	10 min.
Total Sampling Time:	120 min.

Velocity Traverse Data							
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7
Initial dP	0.030	0.034	0.034	0.036	0.040	0.040	0.030
Initial Temp.	107	107	107	107	107	107	107

OMNI Equipment Numbers: _____

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb			
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebo Botto
0	356.300		0.00	67	0	107	0.034		58.8		446	235
10	361.520	0.52	0.75	77	1	107	0.034	103	58.2	-0.6	445	235
20	366.755	0.52	0.75	87	1	108	0.034	101	57.6	-0.6	454	236
30	372.045	0.53	0.75	94	1	108	0.034	101	57.0	-0.6	448	237
40	377.300	0.53	0.75	98	1	109	0.034	100	56.4	-0.6	444	238
50	382.600	0.53	0.75	101	1	109	0.034	100	55.9	-0.5	457	239
60	387.930	0.53	0.75	104	1	110	0.034	100	55.3	-0.6	461	243
70	393.270	0.53	0.75	105	1	109	0.034	100	54.7	-0.6	459	242
80	398.620	0.54	0.75	106	1	109	0.034	100	54.1	-0.6	450	241
90	403.980	0.54	0.75	107	1	110	0.034	100	53.6	-0.5	458	239
100	409.315	0.53	0.75	107	1	110	0.034	100	53.0	-0.6	449	239
110	414.675	0.54	0.75	108	1	110	0.034	100	52.4	-0.6	449	234
120	419.945	0.53	0.75	108	1	111	0.034	98	51.8	-0.6	458	238
Avg/Total	63.645	0.53	0.69	97.62		109.00	0.034	100.34				

OMNI-Test Laboratories, Inc.

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Stove Builders International
Model: Series 45 Pellet
Project No.: 338-S-67-3
Tracking No.: 1018

Equipment Numbers:

Run #: 3
Date: 04/11/07

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	N337	583.3	580.0		3.3
B. Rear filter catch	Filter	N336	573.8	574.6		-0.8
C. Rinse of probe and filter assembly	Acetone	75	105261.6	105258.7	0.0173	1.6

Total Particulate, mg :	4.1

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: [signature] Date: 4-13-07

OMNI Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G R & D

Client/Model: Stove Builder International Project #: 338-S-67-3 Tracking #: 1018

Date: 4-11-07 Test Crew: K. Morgan Run #: 3

OMNI Equipment ID #:

Preburn [X] Coal Bed: Actual:
Test [ ] Data: 0 = Range: N/A Coal Bed: N/A

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	~~Catalyst~~ Not Used	% GASES O2	CO2	CO
0	62.4		-.040	64	392	153	224	436	316	346		17.78	3.50	0.02
10	61.8	0.6	-.040	64	413	182	239	458	341	361		17.72	4.09	0.01
20	61.3	0.5	-.043	65	415	201	248	468	354	368		17.62	4.26	0.02
30	60.7	0.6	-.043	65	431	219	261	483	363	376		17.01	4.82	0.02
40	60.1	0.6	-.045	66	441	227	264	487	376	382		17.72	3.98	0.02
50	59.4	0.7	-.043	65	441	232	264	486	376	381		18.17	4.19	0.01
60	58.8	0.6	-.045	65	446	235	268	497	384	387		17.35	4.57	0.03
70														
80														
90														
00														
10														
20								Preliminary: 1.50 @ 1.29						
30														
40														
50														
60														
70														
80														
90														
AVG														

Technician signature: K. J. Morgan Date: 4-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Run Notes

Client/Model: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3
Tracking Number: 1018
Run #: 3 Date: 4-11-07
Test Crew: K. Morgan
OMNI Equipment ID Numbers:

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

Setting 4 of 6
Air shutter 1/2 open

SECONDARY: ~~Fix~~ 1L NONE

TERTIARY: NONE

FAN: Auto

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	TEST setting					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES
BYPASS: N/A
FUEL LOADING N/A
DOOR: N/A
PRIMARY AIR: N/A

OTHER: NONE

DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

SAME AS ABOVE

SECONDARY: NONE

TERTIARY: NONE

FAN: Auto

Technician signature: K. J. Morgan Date: 4-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: Stove Builder International

Model: Series 45 Pellet Stove

Project No.: 338-S-67-3 Tracking No.: 1018

Date: 4-11-07 Run No.: 3 Booth: 1

Test Crew: K. Morgan Start Time: 10:05 Stop Time: 12:05

OMNI Equipment #'s:

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: Initial:

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2							
CO_2			N/A				
CO							
CO_2 (DT)							

Stack Diameter (inches): 3.0

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

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ✓ @ 3.1 "w.c. Post: ✓ @ 3.2 "w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 4-3-07 Initials: JL

	Initial	Middle	Ending
Pb (in. Hg)	29.66	29.66	29.66
Room Temp (°F)	65	65	67

Technician signature: K. J. Morgan Date: 4-11-07

Run 4

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI
Model: Seiries 45 Pellet
Project No.: 1018
Tracking No.: 338-S-67-3
Run: 4
Test Date: 04/10/07

Burn Rate	1.93 kg/hr dry
Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00007 grams/dscf 0.59 grams/hour 1.17 grams/hour
Average Tunnel Temperature	117 degrees Fahrenheit
Average Delta p	0.035 inches H20
Total Sample Volume - Vm Average Gas Meter Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd Total Sample Volume (Standard Conditions) - Vms	64.58 cubic feet 102 degrees Fahrenheit 13.13 feet/second 8062.75 dscf/hour 60.28 dscf
Total Particulates - mn Average Delta H Total Time of Test	4.4 mg 0.69 inches H20 120 minutes

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run:	4
Manufacturer:	SBI
Model:	Seiries 45 Pellet
Tracking No.:	1018
Project No.:	338-S-67-3
Test Date:	10-Apr-07
Beginning Clock Time:	13:44
Recording Interval:	10 min.
Total Sampling Time:	120 min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.040	0.042	0.032	0.026	0.034	0.034	0.036	0.038	"H2O
Initial Temp.	115	115	115	115	115	115	115	115	oF

OMNI Equipment Numbers:

PM Control Module:	21			
Dilution Tunnel MW(dry):	29.00	lb/lb-mole		
Dilution Tunnel MW(wet):	28.56	lb/lb-mole		
Dilution Tunnel H2O:	4.00	percent		
Dilution Tunnel Static:	-0.600	"H2O		
Pitot Tube Cp:	0.99			
Meter Box Y Factor:	1.001			
Barometric Pressure:	Begin	Middle	End	Average
	29.66	29.64	29.6	29.63 "Hg

Signature/Date: K.J. Morgan 10-05-07

Tunnel Velocity:	13.13	ft/sec.
Intial Tunnel Flow:	134.3	scfm
Average Tunnel Flow:	134.4	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check:	.008 @ 8	cfm@"Hg
Fuel Moisture (dry basis):	5.5	%
Total Particulate:	4.4	mg
Filter Holder No.:		

Elapsed Time	Particulate Sampling Data								Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack		
	Gas Meter Cubic Feet	Sample Rate, cfm	Orifice dH	Meter oF	Meter Vac. In. Hg.	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Firebox Interior	Average Surface	Stack	Filter	Impinger exit	Ambient	Draft In. H2O	Oxygen	Carbon Monoxide
0	420.600		0.00	71	0	115	0.035		44.4		548	270	348	594	490		450.0	437	72	66	66	-0.053	14.63	0.01
10	425.880	0.53	0.75	83	1	114	0.035	102	43.6	-0.8	552	269	348	593	492		450.8	436	74	51	67	-0.053	14.17	0.01
20	431.180	0.53	0.75	95	1	114	0.035	100	42.9	-0.7	553	265	349	596	491		450.8	439	76	52	70	-0.053	14.75	0.02
30	436.495	0.53	0.75	98	1	115	0.035	100	42.2	-0.7	548	262	346	595	492		448.6	437	76	54	70	-0.053	12.69	0.02
40	441.820	0.53	0.75	102	1	115	0.035	100	41.4	-0.8	555	262	355	602	500		454.8	442	77	54	68	-0.053	13.51	0.01
50	447.170	0.54	0.75	105	1	115	0.035	99	40.7	-0.7	549	261	353	597	495		451.0	438	77	56	67	-0.053	14.97	0.02
60	452.570	0.54	0.75	106	1	116	0.035	100	39.9	-0.8	550	260	352	596	492		450.0	439	77	56	68	-0.053	13.12	0.01
70	457.970	0.54	0.75	109	1	117	0.035	100	39.2	-0.7	548	258	358	600	494		451.6	441	78	58	69	-0.053	14.9	0.02
80	463.375	0.54	0.75	109	1	118	0.035	100	38.4	-0.8	555	258	358	604	497		454.4	442	78	60	70	-0.053	13.21	0.01
90	468.820	0.54	0.75	110	1	119	0.035	101	37.7	-0.7	552	256	360	603	497		453.6	442	79	61	69	-0.053	12.81	0.02
100	474.255	0.54	0.75	111	1	119	0.035	100	36.9	-0.8	564	256	365	609	502		459.2	445	79	62	70	-0.053	14.33	0.02
110	479.710	0.55	0.75	112	1	120	0.035	101	36.2	-0.7	562	257	367	608	501		459.0	444	79	62	70	-0.053	15.11	0.01
120	485.175	0.55	0.75	112	1	121	0.035	101	35.4	-0.8	568	257	366	613	504		461.6	445	79	63	71	-0.053	14.6	0.01
Avg/Total	64.575	0.54	0.69	101.77		116.77	0.035	100.33									12		77.00	58.08		-0.053	14.062	0.015

OMNI-Test Laboratories, Inc.

Final Laboratory Report - Method 5G
Dilution Tunnel Particulate Calculations

Client Name: Stove Builders International
Model: Series 45 Pellet
Project No.: 338-S-67-3
Tracking No.: 1018

Equipment Numbers:

Run #: 4
Date: 04/11/07

Sample Component	Reagent	Filter # or Volume, ml	Weights			
			Final, mg	Tare, mg	Blank, mg/ml	Particulate, mg
A. Front filter catch	Filter	N339	581.6	577.5		4.1
B. Rear filter catch	Filter	N338	572.3	573.3		-1.0
C. Rinse of probe and filter assembly	Acetone	75	108697.2	108694.6	0.0173	1.3

Total Particulate, mg :	4.4

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Rinse of probe and filter assembly	(Final, mg - Tare, mg) - (Blank, mg/ml x Volume, ml) = Particulate, mg

Analyst: K. J. Morgan Date: 4-13-07

OMNI Test Laboratories, Inc.
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G R & D

Client/Model: Stove Builder International_____ Project #: 338-S-67-3_____ Tracking #: _1018_____

Date: 4-11-07 Test Crew: K. Morgan Run #: 4

OMNI Equipment ID #: _____

Preburn [X] Coal Bed: Actual:
Test [ ] Data: 0 = Range: N/A Coal Bed: N/A

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst	% GASES O2	CO2	CO
0	49.0		-.053	71	555	279	347	602	494	442	Not used	14.17	7.45	0.01
10	48.2	0.8	-.053	71	570	279	357	610	501	444		13.82	7.54	0.01
20	47.4	0.8	-.053	68	550	280	353	600	493	441		14.34	7.23	0.02
30	46.6	0.8	-.053	68	553	275	349	598	490	441		13.56	7.87	0.01
40	45.8	0.8	-.053	66	565	274	361	602	503	443		14.75	6.96	0.01
50	45.1	0.7	-.053	65	542	271	345	591	492	439		13.53	7.92	0.01
60	44.4	0.7	-.053	66	548	270	348	594	490	437		14.63	7.00	0.01
70			-.053	68	553	265	349	596	491	439	LC	14.75	6.63	0.02 LC
80														
90														
00														
10														
20														
30							Preliminary:	1.93 @	1.64					
40														
50														
60														
70														
80														
90														
AVG														

Technician signature: L. J. Morgan Date: 4-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Run Notes

Client/Model: Stove Builder International
Model: Series 45 Pellet Stove
Project #: 338-S-67-3
Tracking Number: 1018
Run #: 4 Date: 4-11-07
Test Crew: K. Morgan
OMNI Equipment ID Numbers:

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

Setting 6 of 6
Air shutter: Fully open

SECONDARY: N/A

TERTIARY: N/A

FAN: Auto

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	TEST setting					

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

N/A

START UP PROCEDURES
BYPASS: N/A
FUEL LOADING N/A
DOOR: N/A
PRIMARY AIR: N/A

OTHER: NONE

DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

Same As Above

SECONDARY: NONE

TERTIARY: NONE

FAN: Auto

Technician signature: K. J. Morgan Date: 4-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: Stove Builder International

Model: Series 45 Pellet Stove

Project No.: 338-S-67-3 Tracking No.: 1018

Date: 4-11-07 Run No.: 4 Booth: 1

Test Crew: K. Morgan Start Time: 13:44 Stop Time: 15:44

OMNI Equipment #'s: _____

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: _____ Initial: _____

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A CO_2(DT): N/A

	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span	N_2 Span
Time							
O_2							
CO_2			N/A				
CO							
CO_2 (DT)							

Stack Diameter (inches): 3.0

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

Scale Audit (lbs.): Pretest: 10.0 Post Test: 10.00

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: 0 @ 3.0" W.C. Post: 0 @ 3.2" W.C.

Flue Pipe Cleaned Prior to First Test in Series: Date: 4-3-07 Initials: JL

	Initial	Middle	Ending
Pb (in. Hg)	29.66	29.64	29.60
Room Temp (°F)	66	68	71

Technician signature: K. J. Morgan Date: 4-11-07

Section 5

Sampling Procedures and Test Results

INTRODUCTION

Stove Builder International retained OMNI-Test Laboratories, Inc. (*OMNI*) to perform U.S. Environmental Protection Agency (EPA) certification testing on the BIO-45MF pellet stove. The BIO-45MF pellet stove is a freestanding, pellet-fired room heater.

The testing was performed at *OMNI*'s testing facility in Beaverton, Oregon. The altitude of the laboratory is 204 feet above sea level. The unit was received in good condition and logged in at the *OMNI*'s testing facility on April 7, 2007. It was assigned and labeled with *OMNI* ID #1018. *OMNI* representative Ken Morgan conducted the certification testing and completed all testing by April 11, 2007. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Claude Paré of Stove Builder International and is on file at *OMNI*.

The BIO-45MF was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the four test runs indicate a particulate emission level of 1.2 g/hr. Test runs were conducted in each of four burn rate categories (<0.80 kg/hr; 0.80-1.25 kg/hr; 1.25-1.90 kg/hr; and maximum). Emissions for each of the individual test runs did not exceed the cap. The BIO-45MF pellet stove results are within the emission limit of 7.5 g/hr for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

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

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.58	1.08
2	0.95	1.39
3	1.50	1.09
4	1.93	1.17
Weighted particulate emission average of four test runs: 1.2 g/hr		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	67	70	30.14	30.11	<50	<50
2	73	75	30.11	30.10	<50	<50
3	65	67	29.66	29.66	<50	<50
4	66	71	29.66	29.60	<50	<50

Table 1.3.1 – Fuel Measurement Summary – PRETEST

Run	Beginning Fuel Weight (lbs)	Ending Fuel Weight (lbs)
1	34.3	33.1
2	29.7	27.5
3	62.4	58.8
4	49.0	44.4

Table 1.3.2 – Fuel Measurement Summary – TEST

Run	Beginning Fuel Weight (lbs)	Fuel Moisture Content (Dry basis - %)	Ending Fuel Weight (lbs)
1	33.1	5.5	30.4
2	27.5	5.5	23.1
3	58.8	5.5	51.8
4	44.4	5.5	35.4

Table 1.4 – 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	120	13.03	141.1	94.3
2	120	12.59	132.1	111.9
3	120	12.71	132.0	109.0
4	120	13.13	134.4	116.8

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average[a]	Ending Surface Temp Average[a]	Surface Delta T[b]
1	190.6	194.6	4
2	263.6	267.6	4
3	366.0	375.0	9
4	450.0	461.6	12

a. All temperatures are in °F.

b. Represents the difference between beginning and ending average surface temperature.

Table 1.6 – Pretest Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Setting 1 of 6, Air Shutter Closed	N/A	N/A	60
2	Setting 2 of 6, Air Shutter ½ Open	N/A	N/A	60
3	Setting 4 of 6, Air Shutter ½ Open	N/A	N/A	60
4	Setting 6 of 6, Air Shutter Open	N/A	N/A	60

Table 1.7 – Test Configuration

Run	Stove Temperature Control	Feed Adjuster	Temperature Control	Time (min)
1	Setting 1 of 6, Air Shutter Closed	N/A	N/A	120
2	Setting 2 of 6, Air Shutter ½ Open	N/A	N/A	120
3	Setting 4 of 6, Air Shutter ½ Open	N/A	N/A	120
4	Setting 6 of 6, Air Shutter Open	N/A	N/A	120

Table 1.8 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (in H_2O)	Average Draft (in H_2O)	Run Time (min)
1	0.58	0	-0.030	120
2	0.95	0	-0.038	120
3	1.50	0	-0.045	120
4	1.93	0	-0.053	120

TEST RESULTS AND DISCUSSION

A total of four test runs were conducted in the following categories: one in the <0.80 kg/hr dry category; one in the 0.80 to 1.25 kg/hr dry category; one in the 1.25 to 1.90 kg/hr dry category; and one at maximum.

The weighted particulate emission level was measured to be 1.2 g/hr.

The proportionality results for all four test runs were acceptable. Quality check results for each test run are presented Section 2 of this report.