
New Buck Corporation

Project # F25-422

Model: 81C

AKA: Carolina 82C

Type: Wood Fired Room Heater

Date: 10/3/2025

Revised Date: 6/19/2026

**ASTM E2780 Standard Test Method for
Determining Particulate Matter Emissions
from Wood Heaters
EPA Test Method 28R for Certification and
Auditing of Wood Heaters**

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Manager



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Revision Summary

Date: 10/3/2025 – Original Issue

Date: 11/3/2025 – Revised the following items as a result of QA review:

- Updated calibration certificates for equipment ID numbers 53, 54, 55, and 203. See Appendix C for certificates.

Date: 6/17/2026 – Made the following revisions at the request of EPA:

- Added note to page 4 specifying that no instructions beyond the Owner's Manual were provided by the manufacturer to the lab.
- Added dry gas meter calibration ranges to table on page 6
- Added note to page 4 specifying that no preliminary testing was conducted
- Specified that firebox measurement was conducted by PFS TECO, see page 12.
- Added note to page 14 addressing missing photograph of appliance installation.
- Replaced owner's manual shown in Appendix B with new version including the following revisions:
 - o Added table of inappropriate fuels – Non-CBI p. 234
 - o Additional low burn setting instructions - Non-CBI p. 263
 - o Revised federal warning language – Non-CBI p. 234
 - o Added catalyst warranty information – Non-CBI p. 234

Date: 6/19/2026 – Made the following revisions at the request of EPA:

- Replaced owner's manual shown in Appendix B with new version including the following revisions:
 - o Added additional content to table of inappropriate fuels – Non-CBI p. 234

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Affidavit

PFS-TECO was contracted by New Buck Corporation to provide testing services for the 81C Wood-Fired Room Heater per EPA Method 28R, *Certification and Auditing of Wood Heaters*. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory beginning on 8/11/2025 and ending on 8/14/2025. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed EPA Method 28R and ASTM E2780, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters*. Particulate sampling was performed per ASTM E2515, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel*.

PFS-TECO is accredited by the U.S. Environmental Protection Agency for the certification and auditing of wood heaters pursuant to subpart AAA of 40 CFR Part 60, New Source Performance Standards for Residential Wood Heaters and subpart QQQQ of 40 CFR Part 60, Standards of Performance for New Hydronic Heaters and Forced Air Furnaces, Methods 28R, 28WHH, 28 WHH-PTS, and all methods listed in Sections 60.534 and 60.5476. PFS-TECO holds EPA Laboratory Accreditation Certificate Number 4. PFS-TECO is accredited by ANAB to ISO 17020:2012 "Criteria for Bodies Performing Inspections", and ISO 17025:2017 "Requirements for Testing Laboratories." PFS-TECO is also accredited by Standards Council of Canada to ISO 17065:2012 "Requirements for Bodies Operating Product Certification Systems."

The following people were associated with the testing, analysis and report writing associated with this project.

A handwritten signature in black ink, appearing to read 'Aaron Kravitz', is written over a solid black horizontal line.

Aaron Kravitz
Laboratory Manager

Introduction

New Buck Corporation contracted with PFS-TECO to perform EPA certification testing on the 81C Wood-Fired Room Heater. All testing was performed at PFS-TECO's Portland Laboratory. All testing was performed by Aaron Kravitz.

Notes

- Prior to start of testing, 50 hours of conditioning was performed by the manufacturer at a medium burn setting in accordance with ASTM E2780.
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- A separate, independent, third filter train was utilized to determine 1st hour emissions for all test runs.
- A total of 4 test runs were completed. One test run in each of the 4 specified burn rate categories was performed. All runs have been found to be appropriate, no anomalies occurred. See the Run Narrative section for further detail on each run.
- No instructions beyond the Owner's Manual were provided to the laboratory. Loading and operation procedures not specified by the Owner's Manual were determined by the lab during testing, and all procedures were in compliance with the applicable test methods.
- No preliminary testing was conducted

Wood Heater Identification and Testing

- Appliance Tested: **81C**
- PFS Tracking Number: **227**
- Manufacturer: ***New Buck Corporation***
- Catalyst: **Yes**
- Heat exchange blower: ***Integral***
- Type: ***Wood Stove***
- Style: ***Free Standing Wood Stove***
- Date Received: ***Monday, July 28, 2025***
- Testing Period – Start: ***Monday, August 11, 2025***
Finish: ***Thursday, August 14, 2025***
- Test Location: ***PFS TECO***
11785 SE Hwy 212
Clackamas, OR 97015
- Elevation: ***~131 Feet above sea level***
- Test Technician(s): ***Aaron Kravitz***
- Observers: ***None***

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Aaron Kravitz. All procedures used are directly from ASTM E2780 and ASTM E2515. See the list below for equipment used. See Appendix C submitted with this report for calibration data.

Equipment List:

Equipment ID#	Equipment Description	DGM Calibration Range
50	Digiweigh DWP12i Platform Scale	
53	APEX XC-60-ED Digital Emissions Sampling Box A	0.10 – 0.25 cfm
54	APEX XC-60-ED Digital Emissions Sampling Box B	0.10 – 0.25 cfm
203	APEX XC-50-DIR Digital Emissions Sampling Box C	0.10 – 0.25 cfm
203B	Dilution Tunnel centroid transducer	
55	Apex Ambient Air Sample Box	0.15 – 0.30 cfm
57	California Analytical ZRE CO ₂ /CO/O ₂ IR ANALYZER	
94	Moisture meter calibration block	
95	Anemometer	
97	10 lb audit weight	
107	Sartorius Analytical Balance	
109A/B	Troemner 100mg/200mg Audit Weights	
111	Microtector	
115	Delmhorst Wood Moisture Meter	
189	Mettler 3'x3' floor scale w/digital weight indicator	
209	Dewalt Tape Measure	
215	Temperature Logger	
DT0042934	Gas Analyzer Calibration Span Gas	
CC341544	Gas Analyzer Calibration Mid Gas	

Barometric Pressure data was taken from a local National Weather Service station, corrected for altitude differences in accordance with ASTM E2515 6.1.2.

Results

A total of 4 test runs were performed on the 81C. The weighted average emissions rate for the 4 run test series was measured to be **1.7 g/hr** with a Higher Heating Value efficiency of **80%**. The average CO emission rate for the 4 tests was **0.25 g/min**. The New Buck Corporation 81C Wood-Fired Room Heater meets the 2020 cribwood PM emission standard of ≤ 2.0 g/hr per CFR 40 part 60, §60.532 (b).

Detailed individual run data can be found in Appendix A submitted with this report.

Summary Table

	Cat. 2 ≤ 1.00 kg/hr	Cat. 2 0.80 - 1.25 kg/hr	Cat. 3 1.25 - 1.90 kg/hr	Cat. 4 Max Burn Rate
Date	8/11/2025	8/12/2025	8/14/2025	8/13/2025
Run Number	1	2	4	3
Emission Rate (g/hr)	1.03	1.97	1.82	2.10
Burn Rate (kg/hr)	0.88	1.19	1.29	1.91
Heat Output (Btu/hr)	13,290	17,489	19,089	27,721
Overall Efficiency (% HHV)	81%	80%	79%	78%
CO Emissions (g/MJ Output)	0.87	1.39	0.49	0.42
CO Emissions (g/kg Dry Fuel)	14.05	21.92	7.67	6.50
CO Emissions (g/min)	0.20	0.43	0.16	0.20
Emissions – 1 st hr (g/hr)	3.71	5.61	3.13	5.55
Weighted particulate emission average of 4 test runs: 1.7 grams per hour.				
Weighted average HHV efficiency of 4 test runs: 80%.				
Average CO Emissions Rate: 0.25 g/min				

Test Run Narrative

Run 1

Run 1 was performed on 8/11/2025 as an attempted category 1 test per EPA Method 28R. The total test time was 437 minutes. The particulate emissions rate for the test was 1.03 g/hr, the burn rate was 0.88 kg/hr with an HHV efficiency of 81.5%. All test results were appropriate and valid. There were no anomalies and all test criteria were met. This test meets the burn rate requirements described in EPA Method 28 Section 8.1.1.3.2 as a category 2 test with a burn rate of 1.00 kg/hr or less for wood stoves that cannot be operated at burn rates less than 0.8 kg/hr. This test was performed with the air control set to its lowest setting, it is not possible to operate the stove at a lower air setting. Therefore, this test will be used in lieu of a category 1 test.

Run 2

Run 2 was performed on 8/12/2025 as a category 2 test, per EPA Method 28R. The total test time was 322 minutes. The particulate emissions rate for the test was 1.97 g/hr, the burn rate was 1.19 kg/hr with an HHV efficiency of 79.8%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 3

Run 3 was performed on 8/13/2025 as a category 4 test, per EPA Method 28R. The total test time was 202 minutes. The particulate emissions rate for the test was 2.10 g/hr, the burn rate was 1.91 kg/hr with an HHV efficiency of 78.0%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 4

Run 4 was performed on 8/14/2025 as a category 3 test, per EPA Method 28R. The total test time was 294 minutes. The particulate emissions rate for the test was 1.82 g/hr, the burn rate was 1.29 kg/hr with an HHV efficiency of 79.4%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of the ASTM 2780 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Run	Ambient (°F)		Relative Humidity (%)		Average Barometric Pressure (In. Hg.)	Preburn Fuel Weight (lbs)	Test Fuel Weight (lbs)	Test Fuel Moisture (%DB)	Test Run Time (Min)
	Pre	Post	Pre	Post					
1	76.1	77.4	34.3	38.0	29.77	16.14	17.00	21.7	437
2	76.6	78.1	41.1	38.7	29.80	13.24	17.04	22.4	322
3	80.5	81.5	37.3	21.3	29.76	16.8	17.20	22.6	202
4	74.9	75.4	35.6	41.3	29.71	12.83	17.04	23.3	294

Appliance Operation and Test Settings

The appliance was operated according to procedures as described in the Operations Manual, found in Appendix B submitted with this report. Detailed run information can be found in Appendix A submitted with this report.

Settings & Run Notes

	Pre-Burn Air Settings	Test Run Air Settings
Run 1	Primary air control fully closed Secondary air control fully closed	Primary air control fully closed Secondary air control fully closed Fan on auto low
Run 2	Primary air control open 1/8" Secondary air control open 0.04"	Primary air control open 1/8" Secondary air control open 0.04" Fan on auto low
Run 3	Primary air control fully open Secondary air control fully open	Primary air control fully open Secondary air control fully open Fan on auto high
Run 4	Primary air control open 5/32" Secondary air control open 7/32"	Primary air control open 5/32" Secondary air control open 7/32" Fan on auto high

Air control note: This unit features two air control slides, with the primary control located on the right side of the ash lip and the secondary air control on the left side. The fully closed setting is achieved by pushing both controls to the left, while the full open setting is both controls pushed to the right.

Appliance Description

Model(s): 81C, Carolina 82C

Appliance Type: Wood-Fired Room Heater

Total Firebox Volume: 2.33 ft³

Usable Firebox Volume: 2.25 ft³

Model Variants: The 81C is available in one additional variant, the Carolina 82C. The 81C and Carolina 82C differ only in exterior cladding and are identical in all respects that affect emissions.

Air Introduction System Air is introduced into three different areas of the fire chamber, all of which are supplied by the two controllable openings at the bottom of the firebox. and is controlled by two sliding control rods. Secondary air is introduced into the fire box through the bottom, it is then channeled up into the secondary air tubes located under the baffle.

Baffles: A ¼" hot rolled steel plate is used to mount the combustor and bypass door. A sliding flue bypass is incorporated into the baffle, when opened it allow products of combustion to bypass the catalyst and flow directly to the flue outlet. When closed products of combustion are directed through the catalyst mounted near the front of the baffle system.

Catalytic Combustor: The appliance features a 6.19" x 7.25" x 2" thick square mesh ceramic substrate catalyst. A bypass mechanism allows for flue gasses to bypass the catalyst during startup.

Combustor Temperature Monitoring System: A combustor monitoring thermometer is located at the front of the firebox, and is inserted into the flue gas stream such that it is located within 1" of the catalyst exit.

Refractory Insulation: The firebox is lined with 1.25" thick high-density firebrick.

Flue Outlet: 6-inch exhaust outlet located on the top of the appliance.

Fan: A room air fan is supplied as factory-installed equipment; it features a variable speed control.

Appliance design drawings can be found in Appendix D submitted with the CBI copy of this report.

Appliance Front



Appliance Left



Appliance Right



Appliance Rear



Note: A photograph of the appliance on the test stand is not available. However, appliance installation conformed to the requirements of ASTM E2515 and matched the diagrams shown on pages 17 & 18.

Test Fuel Properties

Test fuel used was Douglas Fir dimensional lumber, air-dried to the specified moisture content range. A typical fuel load is pictured below:

Typical Fuel Load



Sample Collection

Verified – Yes:☒ No:☐ (if No Explain)

ASTM E2515-11

Four separate, complete particulate sampling trains were used for each run. Filter face velocity at no time exceeded 150mm/sec during any test run. The dry gas meters were calibrated for the flow rates encountered during the test runs.

The 47mm filter holder assemblies consist of an aluminum front housing and polycarbonate rear housing, with the rear housing located 75mm downstream from the front housing. The front filter support frit is stainless steel.

Probe assemblies are constructed from 316 grade stainless steel tubing with an outside diameter of 6.35mm and 310mm length.

A type K thermocouple filter temperature monitor probe is installed behind the front filter housing with its tip directly exposed to the sample gas.

Sample gas drying systems are located prior to each metering system and include temperature sensors.

The metering systems include vacuum gauges, leak-free diaphragm-type pumps, and type K thermocouple temperature sensors. The gas meters have a resolution of 0.001 cubic feet.

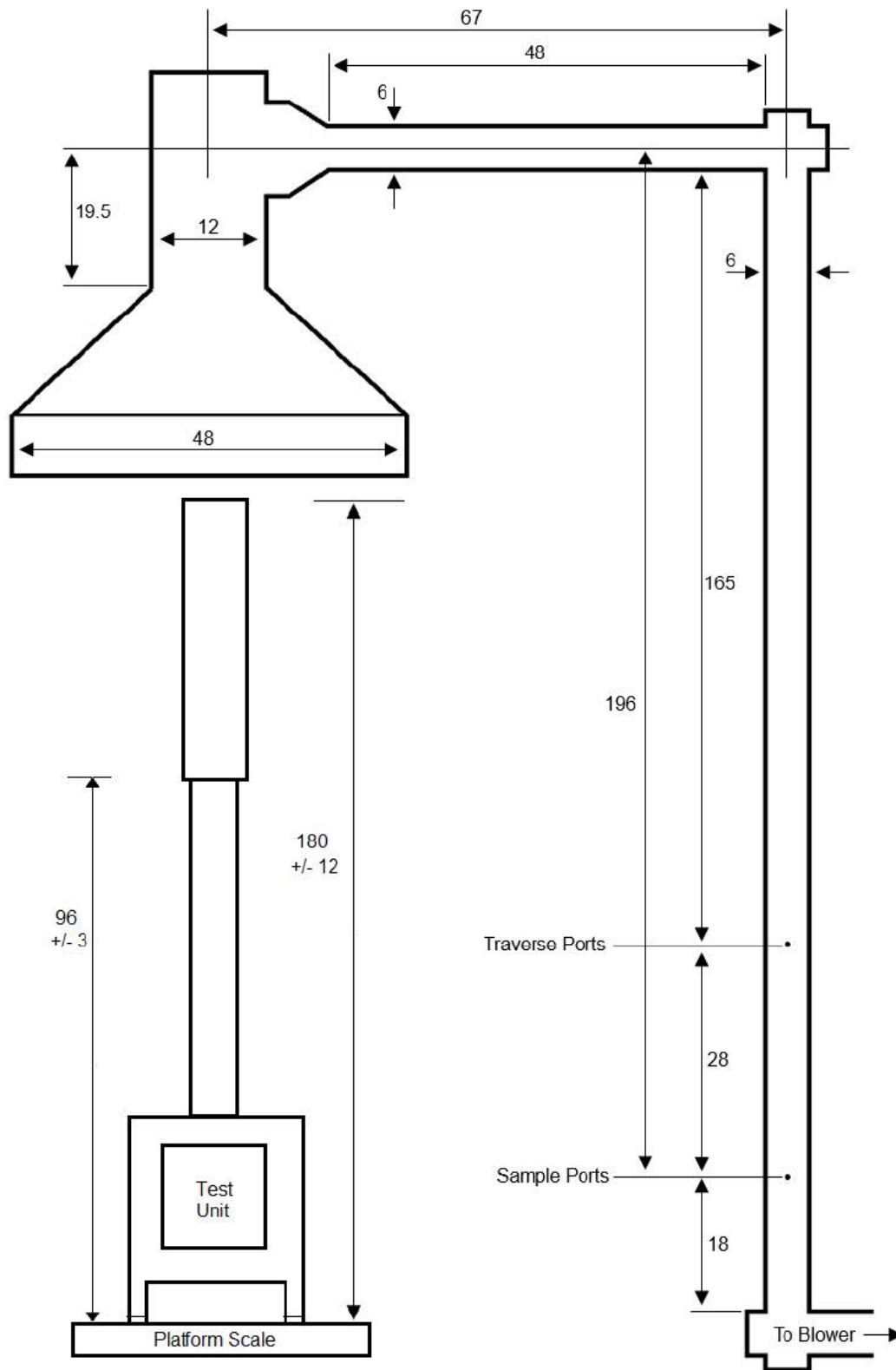
Barometric pressure data was taken from local National Weather Service station KPDX. As PFS and KPDX are at the same altitude, the correction for altitude per ASTM E2515-11 6.1.2 is 1:1.

Dilution tunnel temperature was measured by a type K thermocouple probe.

Dilution tunnel velocity was measured prior to each run by performing a velocity traverse and monitored throughout each run by measuring pitot pressure at the tunnel centroid. Traverses were performed using a Dwyer Model 1430 Microtector in accordance with the instrument owners' manual. This includes leveling and zeroing the instrument prior to each use and performing pre- and post-test leak checks on the pitot tubing.

To monitor and log centroid pitot pressure, the pressure transducer of an Apex Instruments XC-60-DIR sample box was used. Both pieces of equipment offer precision in excess of the +/- 0.001" specified in section 6.1.5 of ASTM E2515-11, and are therefore suitable for use with flows under 800 ft/min. Both pieces of equipment are plumbed to the same pitot tube, which is in accordance with the design shown in Appendix X2 of ASTM E2515-11.

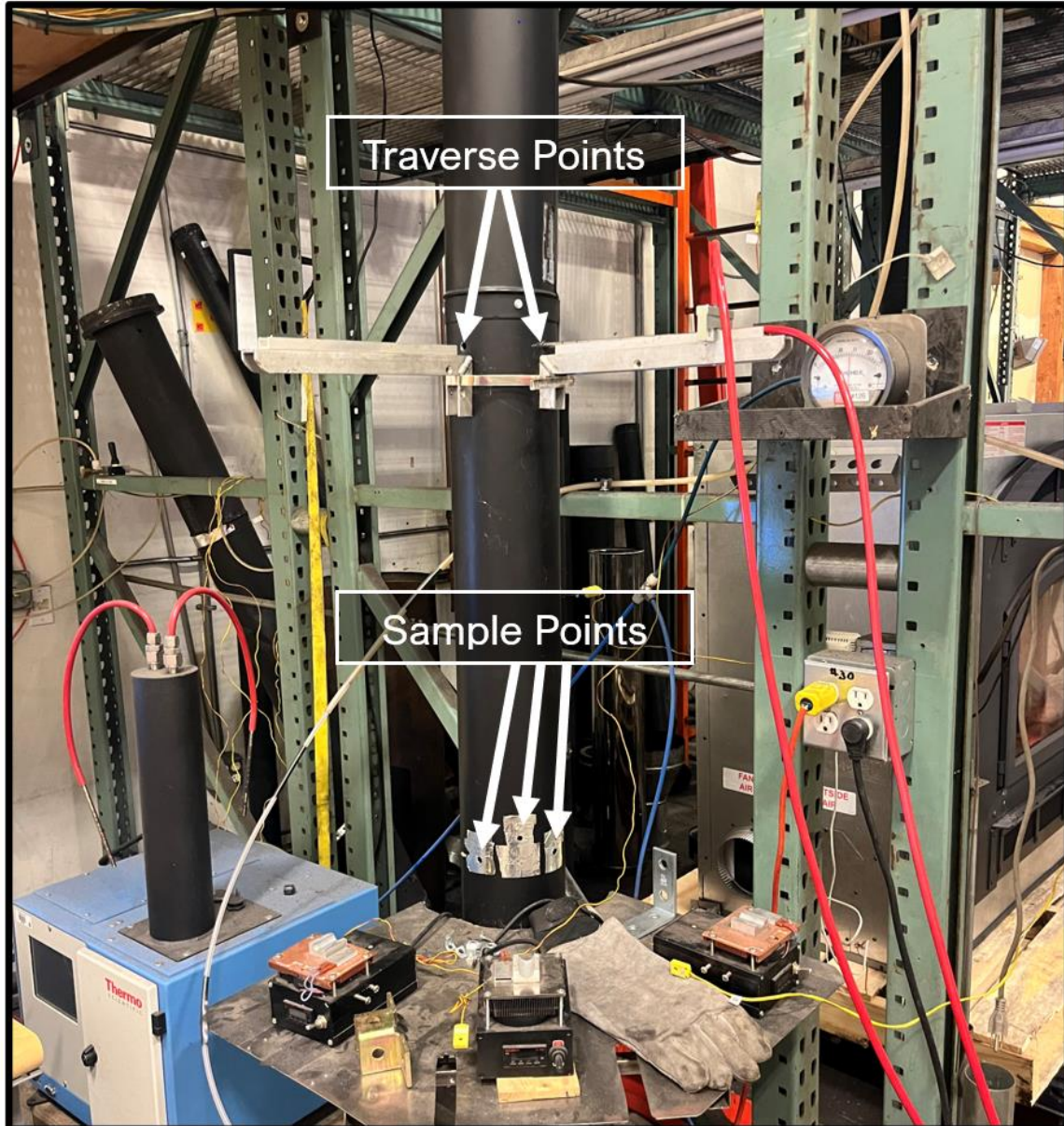
The dilution tunnel is constructed in accordance with the requirements of ASTM E2515-11, as shown below:



Booth #1 Tunnel Schematic

All dimensions are in inches

Sample ports are located 16.3 feet downstream from any disturbances and 1.5 feet upstream from any disturbances. Flow rate traverse data was collected 13.8 feet downstream from any disturbances and 3.8 feet upstream from any disturbances. (See below). Flow is induced and maintained by a centrifugal-type blower.



Test facility temperature is monitored by a type T thermocouple probe, located in a 150mm long, 50mm diameter pipe shield located in the 90-degree arc in front of the test unit, between 1-2m away, and in the horizontal plane of the test unit air intake.

Test facility airflow was measured with an anemometer capable of measuring velocities less than 20 ft/min located within 2 feet of the appliance.

Reagents and Standards

Verified – Yes: ☒ No: ☐ (if No Explain)

Pall Type A/E Glass fiber 47mm filters having at least 99.95% efficiency at 0.3-micron particles were used.

Test samples were conditioned in an airtight desiccator containing calcium sulfate desiccant, with specific humidity of less than 0.005 g/liter prior to and after the testing.

Acetone was used to clean probe assemblies both prior to pretest desiccation and prior to post-test desiccation.

Calibration and Standardization

Verified – Yes: ☒ No: ☐ (if No Explain)

The gas metering system is calibrated every six months traceable to NIST and demonstrating an uncertainty of +/- 0.75% of the measured volume. Calibration flow rate range is from 0.05 to 0.30 scfm.

All thermocouples discussed in this report are calibrated traceable to NIST every six months. Both Type T (ambient) and Type K (all others) TCs are monitored by the same piece of equipment, a National Instruments 9213.

The analytical balance has a resolution of 0.1mg and is calibrated traceable to NIST every six months. Before each test and before each weighing of samples (both for tare and final analysis), the balance is audited with a calibrated 200mg weight.

All other measurement equipment used for this test is calibrated traceable to NIST at an appropriate interval. See Appendix C for all calibration records.

Procedures

Verified – Yes: ☒ No: ☐ (if No Explain)

The following procedures were performed and/or observed prior to testing:

- The dilution tunnel was cleaned with an appropriately sized steel brush.
- Induced draft was evaluated by measuring flue static pressure with the dilution tunnel blower operating and no fire in the appliance. No induced static pressure was observed (all readings $<0.005''$ H₂O) in any appliance door/air damper configuration.
- Smoke capture was evaluated by operating the appliance at a high burn rate and visually monitoring smoke collection by the hood. No less than 100% smoke collection was observed at the minimum tunnel flow rate.

Prior to ignition for each run, a velocity traverse was conducted to determine dilution tunnel velocity. Traverse points were determined in accordance with Figures 5 and 6 of ASTM E2515-11, which for a 6" diameter tunnel are 0.5" and 1.5" from either side of the duct, on two axes located at 90° from each other. Velocity calculated in accordance with section 9.3.2, excluding center readings. The pitot tube was placed in the center of the tunnel for the duration of each test run.

Prior to tare analysis, probes were cleaned with acetone, O-rings cleaned of any residue, and filters were visually check for pinhole leaks or irregularities. Filters, O-rings, and probes were desiccated at 20+/-5C for at least 24 hours and weighed at intervals of not less than 6 hours until constant weight was attained. Filters and O-rings were both weighed in pairs.

Tared samples were assembled into three dual filter holder assemblies (A, B, and first hour) and the single ambient filter assembly. Blunt tweezers and surgical gloves were used to avoid damage or contamination of the samples. The three dual filter assemblies were inserted to the appropriate depth in the tunnel (within the 2" diameter centroid, no closer than 1" apart). The ambient filter holder was installed within 10' of the centroid of the dilution tunnel inlet hood, in the same plane and the hood inlet.

Leak checks were performed on sampling systems as follows:

- Leak checks were performed on the pitot tube lines before and after each test run by applying a pressure differential of at least 3" H₂O and sealing the pitot tube opening. Pressure remained stable for at least 15 seconds all checks of both the pressure and suction sides, confirming that no leaks were present.
- All four sampling trains were leak-checked before and after each test run. Pre-test leak checks were conducted at the vacuum level corresponding to each sample pump's flow setting, in accordance with Note 5 of ASTM E2515-11. Post-test checks were conducted at the highest vacuum level encountered during the test, or the pre-test vacuum level, whichever was greater. Of the leak rate limits (0.01 cfm or 4% of sample rate), 4% of the sample rate is lower, and at no point was the measured leakage rate greater than this.

- The portion of the sampling trains from the pumps to the dry gas meters (that is, the positive pressure section of the metering system) was leak checked semiannually during calibration. This check was performed by closing the main inlet valve and pressurizing the outlet of the dry gas meter to at least 7" H₂O, and ensuring the pressure remained stable for at least 1 minute.

Sampling began at the start of each test run as defined by the applicable procedure and continued until the defined end of the test run. Readings were collected at 1-minute intervals. During all test runs, the following conditions were maintained:

- Test facility temperature was between 55 and 90 F.
- Air velocities were less than 50ft/min within 2ft of the appliance
- Filter holder temperatures were no greater than 90 F.
- Sample flow rates were maintained within 10% of the initial proportionality ratio.
- Ambient sample flow rate maintained within 20% of the initial flow rate.

Following each test run and its associated leak checks, samples were recovered by disassembling the filter holder components and replacing them in the desiccator. The outside of the probes was cleaned with acetone prior to desiccation.

Sample weights were determined using the same analytical balance and procedures used for tare weights. Filters, O-rings, and probes were desiccated at 20+/-5C for at least 24 hours and weighed at intervals of not less than 6 hours until constant weight was attained. Filters and O-rings were both weighed in pairs. Components were not exposed to laboratory atmosphere for more than 2 minutes per weighing.

Appliance Sealing and Storage

Upon completion of testing, the appliance was secured with metal strapping and the seal below was applied, the appliance was then returned to the manufacturer's location at: 200 Ethan Allen Drive Spruce Pine, NC 28777, for archival.

Sealing Label

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED INACCORDANCE WITH REQUIREMNTS OF 40CFR
PART 60 SUBPART AAA §60.535 (a)(2)(vii)

REPORT # _____

DATE SEALED _____

MANUFACTURER _____

MODEL # _____

Sealed Unit



List of Appendices

The following appendices have been submitted electronically in conjunction with this report:

Appendix A – Test Run Data, Technician Notes, and Sample Analysis

Appendix B – Labels and Manuals

Appendix C –Equipment Calibration Records

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

Appendix A: Test Run Data

EPA Method 28R Weighted Average Emissions

Client: Buck Stove
 Stove Model: 81C
 Test Dates: 8/11/25 - 8/14/25
 Job Number: 25-422

Signature/Date:



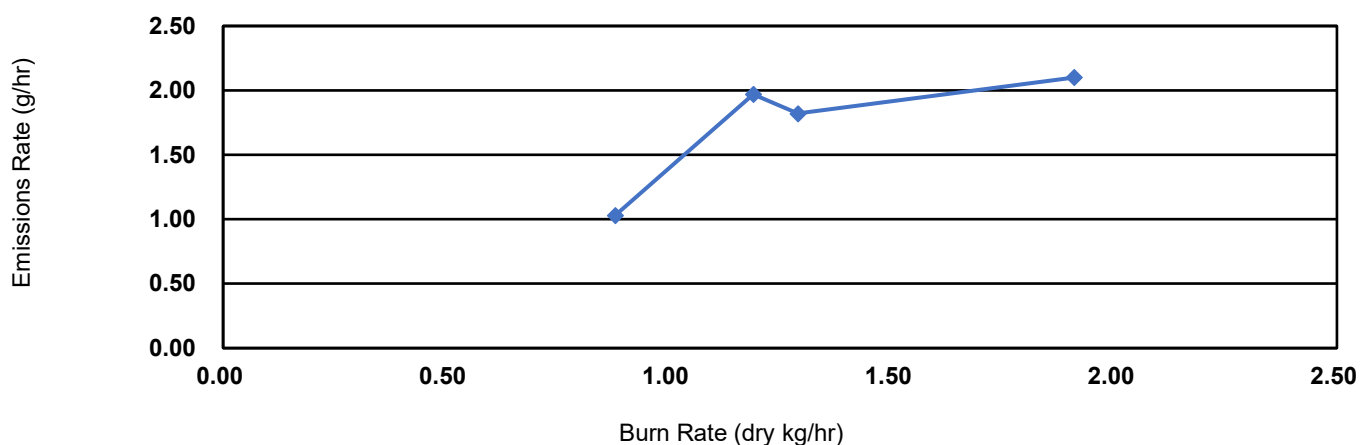
9/4/25

Weighted Average Particulate Emissions (g/hr):	1.7
Weighted Average HHV Efficiency (%):	80%
Weighted Average LHV Efficiency (%):	86%
Average CO Emissions (g/min):	0.25

Individual Run Summaries

Run Number:	1	Run Number:	2
Burn Rate (dry kg/hr):	0.88	Burn Rate (dry kg/hr):	1.19
Emissions Rate (g/hr):	1.03	Emissions Rate (g/hr):	1.97
HHV Efficiency (%):	81.5%	HHV Efficiency (%):	79.8%
LHV Efficiency (%):	88.1%	LHV Efficiency (%):	86.2%
Weighting Percentage (%):	33.30%	Weighting Percentage (%):	20.35%
Run Number:	4	Run Number:	3
Burn Rate (dry kg/hr):	1.29	Burn Rate (dry kg/hr):	1.91
Emissions Rate (g/hr):	1.82	Emissions Rate (g/hr):	2.10
HHV Efficiency (%):	79.4%	HHV Efficiency (%):	78.0%
LHV Efficiency (%):	85.8%	LHV Efficiency (%):	84.3%
Weighting Percentage (%):	22.23%	Weighting Percentage (%):	24.11%

Emission Rate vs Burn Rate Plot



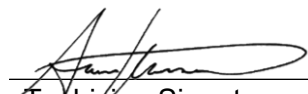
WOOD STOVE TEST DATA PACKET

ASTM E2780/E2515



Run 1 Data Summary

Client:	Buck
Model:	81C
Job #:	25-422
Tracking #:	227
Test Date:	8/11/2025



Technician Signature

9/4/2025

Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 1

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/11/2025

Burn Rate (kg/hr):	0.88
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	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	101.125	71.904	70.810	8.880
Average Gas Velocity in Dilution Tunnel (ft/sec)	17.2			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11298.5			
Average Gas Meter Temperature (°F)	76.7	103.9	104.5	88.4
Total Sample Volume (dscf)	100.141	68.675	66.612	8.730
Average Tunnel Temperature (°F)	94.5			
Total Time of Test (min)	437			
Total Particulate Catch (mg)	0.4	6.5	6.4	2.9
Particulate Concentration, dry-standard (g/dscf)	0.0000040	0.0000946	0.0000961	0.0003322
Total PM Emissions (g)	0.33	7.46	7.58	3.71
Particulate Emission Rate (g/hr)	0.05	1.02	1.04	3.71
Emissions Factor (g/kg)	-	1.17	1.19	-
Difference from Average Total Particulate Emissions (g)	-	0.06	0.06	-
Difference from Average Total Particulate Emissions (%)	-	0.8%	0.8%	
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	7.52
Particulate Emission Rate (g/hr)	1.03
Emissions Factor (g/kg)	1.18
HHV Efficiency (%)	81.5%
LHV Efficiency (%)	88.1%
CO Emissions (g/min)	0.20

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	<90 °F	86.4	OK
Face Velocity	< 30 ft/min	9.1	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	Min:75.2/Max:78.1	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	42.0	OK

B415.1 Efficiency Results

Manufacturer: Buck
Model: 81C
Date: 08/11/25
Run: 1
Control #: 25-422
Test Duration: 437
Output Category: 2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	81.5%	88.1%
Combustion Efficiency	99.4%	99.4%
Heat Transfer Efficiency	82.0%	88.6%

Output Rate (kJ/h)	14,010	13,290	(Btu/h)
Burn Rate (kg/h)	0.87	1.91	(lb/h)
Input (kJ/h)	17,192	16,309	(Btu/h)

Test Load Weight (dry kg)	6.32	13.93	dry lb
MC wet (%)	17.86		
MC dry (%)	21.74		
Particulate (g)	7.52		
CO (g)	89		
Test Duration (h)	7.28		

Emissions	Particulate	CO
g/MJ Output	0.07	0.87
g/kg Dry Fuel	1.19	14.05
g/h	1.03	12.19
g/min	0.02	0.20
lb/MM Btu Output	0.17	2.02

Air/Fuel Ratio (A/F)	14.90
-----------------------------	-------

VERSION:

2.4

4/15/2010

WOODSTOVE FUEL DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Preburn Fuel Information						
Size	Length (in)	Moisture Content (% DB)		Size	Length (in)	Moisture Content (% DB)
2x4	16.00	19.3		2x4	16.00	23.5
2x4	16.00	22.5		2x4	16.00	24.8
2x4	16.00	22.7				
2x4	16.00	19.8				
2x4	16.00	23.8				
2x4	16.00	22.4				
2x4	16.00	21.5				
2x4	16.00	20.0				
Total Fuel Weight (lbs):		16.14	Average Moisture (%DB):		22.0	

Firebox Volume (ft³): 2.25
 Total 2x4 Crib Weight, with spacers (lbs): 7.67
 Total 4x4 Crib Weight, with spacers (lbs): 9.33
 Total Wet Fuel Weight, with spacers (lbs): 17.00

Coal Bed Range (20-25%):

Min (lbs): 3.40
 Max (lbs): 4.25

Test Fuel Information						
Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	17.00	1.90	21.0	20.6	24.8	1.56
2x4	17.00	2.25	22.8	20.8	24.2	1.84
2x4	17.00	2.20	19.2	23.8	22.5	1.81
4x4	17.00	4.32	21.2	22.0	22.3	3.55
4x4	17.00	4.56	19.7	19.0	22.2	3.79
Total Dry Weight, no spacers (lbs):						12.53
Total Dry Weight, with spacers (lbs):						14.08

Spacer Moisture Readings (%DB)							
13.9	12.5						
12.5	15.0						
15.8	14.0						
14.7	15.0						
12.2	15.2						
13.4	15.8						
15.8	15.0						
14.0	14.4						

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft ³ , DB)	31.7	OK
Loading Density	6.3 - 7.7 (lbs/ft ³ , WB)	7.56	OK
2x4 Fuel Mix	35 - 65 % of total weight	45%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client: Buck
 Model: 81C
 Run #: 1
 Test Start Time: 13:42

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Total Sampling Time (min): 437
 Recording Interval (min): 1

Meter Box γ Factor: 1.019 (A)
 Meter Box γ Factor: 1.005 (B)
 Meter Box γ Factor: 1.024 (C)
 Meter Box γ Factor: 1.012 (Ambient)

Induced Draft Check (in. H₂O): 0
 Smoke Capture Check (%): 100%
 Date Flue Pipe Last Cleaned: 8/8/2025
 Test Fuel Scale Audit (lbs): 10.00
 Platform Scale Audit (lbs): 10.0

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.79	29.75	29.77
Relative Humidity (%)	34.3	38.0	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:	101.125		ft ³

Sample Train Leak Checks

	Pre-test	Post-test		
(A)	0.001	0.000	cfm @	-7 in. Hg
(B)	0.000	0.000	cfm @	-7 in. Hg
(C)	0.000	0.001	cfm @	-7 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.048	76
2	0.080	76
3	0.078	76
4	0.056	76
5	0.048	76
6	0.084	76
7	0.086	76
8	0.044	76
Center	0.088	76

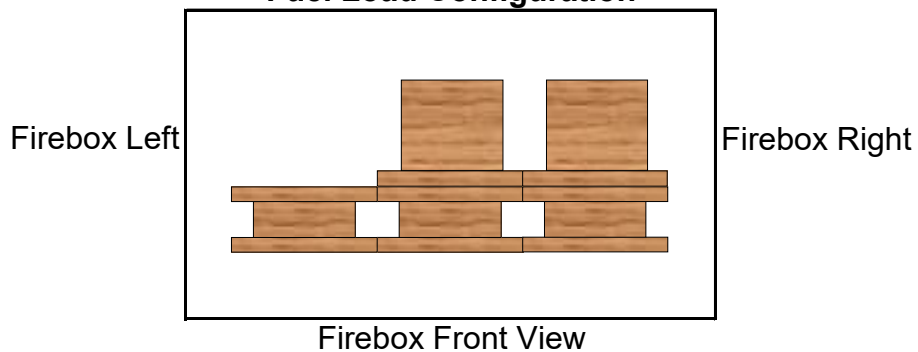
Dilution Tunnel H₂O: 2.00 percent
 Tunnel Diameter: 6 inches
 Pitot Tube Cp: 0.99 [unitless]
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Tunnel Area: 0.1963 ft²

 V_{strav} : 16.98 ft/sec
 V_{scent} : 19.85 ft/sec
 F_p : 0.855 [ratio]
 Initial Tunnel Flow: 192.2 scf/min

Static Pressure: -0.120 in. H₂O

TEST FUEL PROPERTIES

Fuel Load Configuration



Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	21.7

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Recording Interval (min): 1
 Run Time (min): 70

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	4.88	-0.089	324	309	184	496	178	298.2	492	76
1	4.66	-0.088	327	313	185	503	179	301.0	458	76
2	4.54	-0.083	329	311	184	509	180	302.4	432	76
3	4.43	-0.081	330	314	186	500	181	302.3	418	76
4	4.33	-0.080	334	318	181	491	183	301.3	406	76
5	4.27	-0.078	338	319	175	493	184	301.9	396	76
6	4.19	-0.075	341	319	169	474	186	297.8	385	76
7	4.12	-0.077	344	318	164	468	187	296.4	383	76
8	4.05	-0.075	346	316	159	461	188	294.2	375	76
9	3.97	-0.075	347	316	158	450	188	291.8	372	76
10	3.89	-0.075	348	313	154	432	189	287.1	367	76
11	3.84	-0.073	348	311	151	430	188	285.7	362	76
12	3.77	-0.071	348	308	147	426	188	283.5	359	76
13	3.72	-0.073	348	306	146	414	188	280.4	354	75
14	3.68	-0.071	347	304	144	404	188	277.3	350	76
15	3.63	-0.069	346	302	142	398	187	274.9	347	76
16	3.59	-0.071	345	299	141	384	187	271.1	343	76
17	3.55	-0.069	343	295	140	373	187	267.6	339	75
18	3.51	-0.069	341	294	139	371	186	266.2	338	76
19	3.48	-0.068	339	290	137	369	185	264.0	333	76
20	3.45	-0.067	337	289	137	361	184	261.5	331	75
21	3.41	-0.067	335	287	136	352	184	258.6	327	76
22	3.37	-0.066	332	283	135	345	183	255.7	323	75
23	3.36	-0.067	330	281	135	334	182	252.4	319	75
24	3.33	-0.065	328	277	135	332	182	250.7	316	76
25	3.31	-0.065	326	276	134	326	181	248.3	313	76
26	3.28	-0.069	323	273	133	322	180	246.2	310	75
27	3.27	-0.064	321	271	132	314	179	243.3	307	75
28	3.26	-0.063	319	268	131	309	179	241.2	304	75
29	3.24	-0.063	317	265	131	310	178	240.1	300	75
30	3.23	-0.062	315	263	130	304	177	237.8	297	75
31	3.22	-0.060	313	261	129	295	177	234.9	294	75
32	3.21	-0.061	311	258	129	294	176	233.7	291	75
33	3.19	-0.059	309	258	129	284	176	231.0	287	76
34	3.17	-0.057	307	254	128	281	175	228.8	285	76
35	3.17	-0.056	304	252	127	278	174	227.1	282	75
36	4.65	-0.061	303	250	127	268	173	224.2	299	75
37	4.61	-0.063	300	247	128	266	173	222.7	305	76
38	4.58	-0.062	298	245	126	263	172	220.7	302	76
39	4.53	-0.063	296	244	126	264	172	220.1	299	75
40	4.49	-0.060	293	241	125	257	171	217.4	299	75
41	4.47	-0.060	291	239	125	254	170	215.7	297	75
42	4.44	-0.061	289	236	125	252	170	214.5	297	75
43	4.39	-0.061	287	234	123	250	169	212.8	296	75
44	4.35	-0.060	285	233	123	245	169	211.0	295	75
45	4.30	-0.060	284	231	124	243	168	209.8	294	75

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Recording Interval (min): 1
 Run Time (min): 70

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
46	4.26	-0.060	282	229	124	241	167	208.6	293	75
47	4.23	-0.061	281	226	123	237	167	206.7	292	75
48	4.18	-0.059	279	224	123	236	166	205.5	289	75
49	4.15	-0.060	278	223	122	232	165	204.1	289	75
50	4.10	-0.060	277	221	122	229	165	202.6	288	75
51	4.07	-0.058	275	219	121	227	164	201.3	287	75
52	4.03	-0.058	275	218	122	225	163	200.6	286	75
53	4.00	-0.056	274	216	120	222	163	199.0	285	75
54	3.96	-0.059	273	215	121	221	162	198.4	281	75
55	3.92	-0.057	272	214	121	216	162	196.8	280	75
56	3.89	-0.058	270	213	121	213	161	195.3	280	75
57	3.84	-0.057	267	211	123	214	160	195.2	277	75
58	3.78	-0.058	265	211	123	219	160	195.7	278	76
59	3.76	-0.057	264	210	124	220	160	195.5	275	76
60	3.73	-0.057	264	210	125	227	160	197.2	274	76
61	3.68	-0.058	265	210	125	227	160	197.3	278	76
62	3.65	-0.057	266	208	125	226	161	196.9	279	75
63	3.62	-0.059	266	209	125	223	160	196.7	278	75
64	3.59	-0.057	267	208	124	223	160	196.2	277	75
65	3.55	-0.057	267	207	122	219	160	195.0	277	75
66	3.51	-0.057	268	207	122	216	160	194.4	274	75
67	3.49	-0.058	268	205	123	217	160	194.5	274	75
68	3.46	-0.056	268	204	122	214	159	193.3	274	75
69	3.44	-0.056	268	204	120	212	159	192.4	274	75
70	3.41	-0.055	268	203	121	210	158	191.7	274	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.089	0.02	86	0.1		16.96		105	318	78	76
1	0.153	0.153	0.079	2.19	85	1.0	-	16.94	-0.02	110	339	80	76
2	0.299	0.146	0.079	2.22	85	1.0	-	16.84	-0.10	109	336	80	76
3	0.451	0.152	0.079	2.24	85	1.0	-	16.74	-0.10	108	335	80	76
4	0.599	0.148	0.079	2.27	85	0.9	-	16.65	-0.09	109	339	80	76
5	0.752	0.153	0.077	2.30	85	1.0	-	16.53	-0.12	109	345	81	76
6	0.901	0.149	0.078	2.32	85	1.0	-	16.46	-0.07	106	321	81	76
7	1.055	0.154	0.079	2.34	85	1.0	-	16.40	-0.06	103	301	81	76
8	1.207	0.152	0.078	2.35	85	1.0	-	16.37	-0.03	101	287	81	76
9	1.361	0.154	0.080	2.36	85	1.0	-	16.32	-0.05	100	280	81	76
10	1.515	0.154	0.080	2.38	85	1.0	98	16.29	-0.03	99	275	81	76
11	1.669	0.154	0.079	2.39	85	1.0	-	16.23	-0.06	99	269	81	76
12	1.826	0.157	0.078	2.39	85	1.0	-	16.17	-0.06	99	267	81	76
13	1.977	0.151	0.078	2.39	86	1.0	-	16.12	-0.05	99	266	81	76
14	2.135	0.158	0.080	2.40	86	1.0	-	16.08	-0.04	98	263	81	75
15	2.287	0.152	0.080	2.41	86	1.0	-	16.04	-0.04	98	261	81	75
16	2.446	0.159	0.082	2.43	86	1.0	-	15.97	-0.07	98	260	81	75
17	2.600	0.154	0.081	2.43	86	1.0	-	15.93	-0.04	98	260	81	76
18	2.757	0.157	0.083	2.44	87	1.0	-	15.86	-0.07	98	262	81	75
19	2.913	0.156	0.081	2.45	87	1.0	-	15.80	-0.06	98	259	81	75
20	3.070	0.157	0.083	2.45	87	1.0	101	15.73	-0.07	98	260	81	75
21	3.228	0.158	0.080	2.45	87	1.0	-	15.68	-0.05	97	260	81	75
22	3.381	0.153	0.083	2.46	88	1.0	-	15.60	-0.08	97	260	81	75
23	3.543	0.162	0.084	2.46	88	1.0	-	15.53	-0.07	97	260	81	75
24	3.698	0.155	0.083	2.48	88	1.0	-	15.48	-0.05	97	260	81	75
25	3.856	0.158	0.082	2.48	88	1.0	-	15.41	-0.07	97	260	81	75
26	4.014	0.158	0.082	2.48	89	1.0	-	15.34	-0.07	97	260	81	75
27	4.171	0.157	0.084	2.48	89	1.0	-	15.27	-0.07	97	258	81	75
28	4.331	0.160	0.084	2.49	89	1.0	-	15.22	-0.05	97	256	81	75
29	4.487	0.156	0.084	2.49	89	1.0	-	15.16	-0.06	97	254	81	76
30	4.649	0.162	0.084	2.51	90	1.0	101	15.09	-0.07	97	254	81	76
31	4.805	0.156	0.082	2.51	90	1.0	-	15.05	-0.04	96	255	81	75
32	4.964	0.159	0.084	2.51	90	1.0	-	14.98	-0.07	96	254	81	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.126	0.162	0.085	2.51	91	1.0	-	14.92	-0.06	96	254	81	75
34	5.281	0.155	0.085	2.52	91	1.0	-	14.85	-0.07	96	252	81	75
35	5.444	0.163	0.084	2.53	91	1.0	-	14.80	-0.05	96	252	81	75
36	5.600	0.156	0.083	2.52	91	1.0	-	14.74	-0.06	96	250	81	75
37	5.762	0.162	0.086	2.52	92	1.0	-	14.70	-0.04	96	249	81	75
38	5.924	0.162	0.085	2.54	92	1.0	-	14.64	-0.06	96	248	81	75
39	6.080	0.156	0.083	2.53	92	1.0	-	14.59	-0.05	95	247	81	75
40	6.244	0.164	0.085	2.55	92	1.0	101	14.53	-0.06	95	245	81	75
41	6.401	0.157	0.085	2.54	93	1.0	-	14.46	-0.07	95	246	81	76
42	6.563	0.162	0.084	2.54	93	1.0	-	14.40	-0.06	95	245	81	76
43	6.725	0.162	0.085	2.54	93	1.0	-	14.35	-0.05	95	245	81	75
44	6.882	0.157	0.085	2.55	93	1.0	-	14.30	-0.05	95	244	81	75
45	7.047	0.165	0.086	2.56	94	1.0	-	14.25	-0.05	95	244	81	75
46	7.205	0.158	0.086	2.55	94	1.0	-	14.17	-0.08	95	243	81	75
47	7.367	0.162	0.085	2.56	94	1.0	-	14.11	-0.06	95	243	81	76
48	7.530	0.163	0.086	2.55	94	1.0	-	14.07	-0.04	95	242	81	76
49	7.689	0.159	0.084	2.56	95	1.0	-	14.02	-0.05	95	242	81	75
50	7.851	0.162	0.085	2.56	95	1.0	101	13.94	-0.08	95	241	81	75
51	8.013	0.162	0.084	2.57	95	1.0	-	13.89	-0.05	95	241	81	76
52	8.172	0.159	0.085	2.57	95	1.0	-	13.83	-0.06	95	241	81	76
53	8.337	0.165	0.084	2.56	96	1.0	-	13.77	-0.06	95	242	81	76
54	8.496	0.159	0.086	2.57	96	1.0	-	13.72	-0.05	95	240	81	76
55	8.659	0.163	0.085	2.58	96	1.0	-	13.65	-0.07	94	240	81	76
56	8.823	0.164	0.086	2.57	96	1.0	-	13.59	-0.06	94	240	81	76
57	8.981	0.158	0.086	2.57	96	1.0	-	13.54	-0.05	94	239	81	76
58	9.147	0.166	0.086	2.58	97	1.0	-	13.48	-0.06	94	238	81	76
59	9.306	0.159	0.087	2.58	97	1.0	-	13.43	-0.05	94	239	81	76
60	9.469	0.163	0.088	2.58	97	1.0	100	13.39	-0.04	94	238	81	76
61	9.633	0.164	0.087	2.58	97	1.0	-	13.35	-0.04	94	237	81	76
62	9.794	0.161	0.087	2.59	97	1.0	-	13.30	-0.05	94	237	81	76
63	9.956	0.162	0.084	2.59	98	1.0	-	13.24	-0.06	94	237	81	76
64	10.121	0.165	0.086	2.58	98	1.0	-	13.19	-0.05	94	235	81	76
65	10.279	0.158	0.087	2.57	98	1.0	-	13.14	-0.05	94	237	81	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	10.446	0.167	0.087	2.59	98	1.0	-	13.10	-0.04	94	238	81	76
67	10.607	0.161	0.086	2.59	98	1.0	-	13.04	-0.06	94	237	81	76
68	10.769	0.162	0.087	2.59	98	1.0	-	12.99	-0.05	94	237	81	76
69	10.934	0.165	0.087	2.59	99	1.0	-	12.95	-0.04	94	237	81	76
70	11.095	0.161	0.086	2.60	99	1.0	100	12.88	-0.07	94	237	81	76
71	11.259	0.164	0.087	2.59	99	1.0	-	12.83	-0.05	94	237	81	76
72	11.423	0.164	0.087	2.60	99	1.0	-	12.77	-0.06	94	238	81	76
73	11.583	0.160	0.086	2.59	99	1.0	-	12.73	-0.04	94	237	81	76
74	11.748	0.165	0.088	2.60	99	1.0	-	12.68	-0.05	94	235	81	76
75	11.912	0.164	0.087	2.59	100	1.0	-	12.63	-0.05	94	236	81	76
76	12.072	0.160	0.085	2.61	100	1.0	-	12.59	-0.04	94	238	81	76
77	12.239	0.167	0.087	2.60	100	1.0	-	12.54	-0.05	94	237	81	76
78	12.400	0.161	0.087	2.61	100	1.0	-	12.50	-0.04	94	237	81	76
79	12.564	0.164	0.083	2.60	100	1.0	-	12.45	-0.05	94	237	81	76
80	12.729	0.165	0.086	2.61	100	1.0	101	12.41	-0.04	94	237	81	76
81	12.891	0.162	0.087	2.61	100	1.0	-	12.36	-0.05	94	236	81	76
82	13.054	0.163	0.088	2.60	100	1.0	-	12.31	-0.05	94	236	81	76
83	13.220	0.166	0.085	2.60	101	1.0	-	12.26	-0.05	94	236	81	76
84	13.381	0.161	0.088	2.61	101	1.0	-	12.22	-0.04	94	235	81	76
85	13.546	0.165	0.089	2.61	101	1.0	-	12.18	-0.04	93	235	81	76
86	13.711	0.165	0.086	2.61	101	1.0	-	12.14	-0.04	93	236	81	76
87	13.871	0.160	0.086	2.62	101	1.0	-	12.09	-0.05	93	236	81	76
88	14.039	0.168	0.087	2.60	101	1.0	-	12.04	-0.05	93	237	81	76
89	14.200	0.161	0.086	2.62	101	1.0	-	12.01	-0.03	93	236	81	76
90	14.365	0.165	0.086	2.62	101	1.0	101	11.97	-0.04	94	236	81	76
91	14.530	0.165	0.085	2.61	101	1.0	-	11.91	-0.06	93	237	81	76
92	14.692	0.162	0.086	2.62	102	1.0	-	11.88	-0.03	93	237	82	76
93	14.857	0.165	0.087	2.61	102	1.0	-	11.83	-0.05	93	237	81	76
94	15.022	0.165	0.087	2.61	102	1.0	-	11.78	-0.05	94	237	82	76
95	15.184	0.162	0.087	2.61	102	1.0	-	11.74	-0.04	93	237	82	76
96	15.349	0.165	0.087	2.61	102	1.0	-	11.71	-0.03	93	236	82	76
97	15.515	0.166	0.087	2.62	102	1.0	-	11.66	-0.05	93	236	82	76
98	15.675	0.160	0.085	2.61	102	1.0	-	11.60	-0.06	93	237	82	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	15.843	0.168	0.083	2.62	102	1.0	-	11.58	-0.02	94	234	82	76
100	16.007	0.164	0.085	2.61	102	1.0	101	11.53	-0.05	93	234	82	76
101	16.168	0.161	0.087	2.62	102	1.0	-	11.49	-0.04	93	233	82	76
102	16.337	0.169	0.086	2.63	102	1.0	-	11.45	-0.04	93	233	82	76
103	16.498	0.161	0.087	2.63	103	1.0	-	11.43	-0.02	93	233	82	76
104	16.664	0.166	0.083	2.62	103	1.0	-	11.38	-0.05	93	233	82	76
105	16.829	0.165	0.086	2.62	103	1.0	-	11.35	-0.03	93	233	82	76
106	16.992	0.163	0.087	2.62	103	1.0	-	11.33	-0.02	93	231	82	76
107	17.157	0.165	0.085	2.63	103	1.0	-	11.29	-0.04	93	231	82	76
108	17.323	0.166	0.087	2.63	103	1.0	-	11.24	-0.05	93	231	82	76
109	17.485	0.162	0.087	2.62	103	1.0	-	11.20	-0.04	93	231	82	76
110	17.650	0.165	0.088	2.62	103	1.0	100	11.17	-0.03	93	230	82	76
111	17.817	0.167	0.086	2.62	103	1.0	-	11.14	-0.03	93	229	82	76
112	17.979	0.162	0.088	2.63	103	1.0	-	11.10	-0.04	93	228	82	76
113	18.145	0.166	0.085	2.63	103	1.0	-	11.06	-0.04	93	228	82	76
114	18.311	0.166	0.084	2.61	103	1.0	-	11.02	-0.04	93	227	82	76
115	18.472	0.161	0.085	2.61	103	1.0	-	10.99	-0.03	93	226	82	76
116	18.641	0.169	0.084	2.63	103	1.0	-	10.96	-0.03	93	226	82	76
117	18.804	0.163	0.085	2.62	104	1.0	-	10.93	-0.03	93	226	82	76
118	18.966	0.162	0.087	2.64	104	1.0	-	10.88	-0.05	93	225	82	76
119	19.135	0.169	0.086	2.63	104	1.0	-	10.85	-0.03	93	225	82	76
120	19.297	0.162	0.087	2.63	104	1.0	100	10.82	-0.03	93	224	82	76
121	19.463	0.166	0.087	2.63	104	1.0	-	10.79	-0.03	93	224	82	76
122	19.629	0.166	0.086	2.63	104	1.0	-	10.75	-0.04	93	223	82	76
123	19.790	0.161	0.087	2.62	104	1.0	-	10.72	-0.03	93	223	82	76
124	19.957	0.167	0.086	2.63	104	1.0	-	10.69	-0.03	93	222	82	76
125	20.123	0.166	0.089	2.62	104	1.0	-	10.65	-0.04	93	221	82	76
126	20.287	0.164	0.087	2.61	104	1.0	-	10.60	-0.05	93	221	82	76
127	20.452	0.165	0.085	2.61	104	1.0	-	10.57	-0.03	93	221	82	76
128	20.617	0.165	0.087	2.63	104	1.0	-	10.55	-0.02	93	221	82	76
129	20.781	0.164	0.089	2.62	104	1.0	-	10.52	-0.03	93	221	82	76
130	20.946	0.165	0.087	2.62	104	1.0	100	10.47	-0.05	93	220	82	76
131	21.114	0.168	0.086	2.63	104	1.0	-	10.43	-0.04	93	219	82	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	21.275	0.161	0.088	2.62	104	1.0	-	10.41	-0.02	93	219	82	76
133	21.441	0.166	0.088	2.62	104	1.0	-	10.38	-0.03	93	219	82	76
134	21.608	0.167	0.086	2.63	104	1.0	-	10.34	-0.04	93	219	82	76
135	21.769	0.161	0.086	2.64	104	1.0	-	10.30	-0.04	93	219	82	76
136	21.938	0.169	0.085	2.63	104	1.0	-	10.26	-0.04	93	218	82	76
137	22.102	0.164	0.085	2.63	104	1.0	-	10.24	-0.02	93	218	82	76
138	22.265	0.163	0.086	2.62	105	1.0	-	10.20	-0.04	93	218	82	76
139	22.434	0.169	0.086	2.61	105	1.0	-	10.18	-0.02	93	219	82	76
140	22.596	0.162	0.088	2.60	105	1.0	100	10.14	-0.04	93	218	82	76
141	22.761	0.165	0.086	2.62	105	1.0	-	10.11	-0.03	93	219	82	76
142	22.929	0.168	0.086	2.61	105	1.0	-	10.07	-0.04	93	218	82	76
143	23.091	0.162	0.085	2.62	105	1.0	-	10.05	-0.02	92	218	82	76
144	23.257	0.166	0.084	2.62	105	1.0	-	10.00	-0.05	93	216	82	76
145	23.424	0.167	0.086	2.62	105	1.0	-	9.98	-0.02	92	216	82	76
146	23.587	0.163	0.085	2.61	105	1.0	-	9.94	-0.04	93	216	82	76
147	23.753	0.166	0.086	2.61	105	1.0	-	9.92	-0.02	92	217	82	76
148	23.920	0.167	0.089	2.60	105	1.0	-	9.88	-0.04	92	217	82	76
149	24.083	0.163	0.087	2.60	105	1.0	-	9.86	-0.02	92	217	82	76
150	24.249	0.166	0.087	2.60	105	1.0	100	9.84	-0.02	92	216	82	76
151	24.415	0.166	0.087	2.60	105	1.0	-	9.80	-0.04	92	214	82	76
152	24.578	0.163	0.087	2.60	105	1.0	-	9.76	-0.04	92	215	82	76
153	24.744	0.166	0.088	2.61	105	1.0	-	9.74	-0.02	92	214	82	76
154	24.912	0.168	0.087	2.61	105	1.0	-	9.72	-0.02	92	214	82	76
155	25.073	0.161	0.087	2.62	105	1.0	-	9.67	-0.05	92	214	82	76
156	25.240	0.167	0.087	2.62	105	1.0	-	9.65	-0.02	92	214	82	76
157	25.407	0.167	0.086	2.62	105	1.0	-	9.61	-0.04	92	215	82	76
158	25.568	0.161	0.088	2.62	105	1.0	-	9.58	-0.03	92	215	82	76
159	25.737	0.169	0.087	2.63	105	1.0	-	9.56	-0.02	92	215	82	76
160	25.903	0.166	0.085	2.63	105	1.0	101	9.53	-0.03	92	214	82	76
161	26.065	0.162	0.087	2.64	105	1.0	-	9.49	-0.04	92	213	82	76
162	26.234	0.169	0.088	2.64	105	1.0	-	9.47	-0.02	92	214	82	76
163	26.398	0.164	0.086	2.62	105	1.0	-	9.43	-0.04	92	215	82	76
164	26.561	0.163	0.086	2.62	105	1.0	-	9.41	-0.02	92	213	82	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	26.730	0.169	0.088	2.61	105	1.0	-	9.37	-0.04	92	215	82	76
166	26.892	0.162	0.085	2.61	105	1.0	-	9.32	-0.05	92	215	82	76
167	27.058	0.166	0.084	2.61	105	1.0	-	9.31	-0.01	92	215	82	76
168	27.226	0.168	0.086	2.61	105	1.0	-	9.28	-0.03	92	216	82	76
169	27.389	0.163	0.086	2.62	106	1.0	-	9.24	-0.04	92	216	82	76
170	27.555	0.166	0.087	2.61	106	1.0	101	9.21	-0.03	92	215	82	76
171	27.721	0.166	0.086	2.63	106	1.0	-	9.17	-0.04	92	215	82	76
172	27.884	0.163	0.086	2.62	106	1.0	-	9.14	-0.03	92	215	82	76
173	28.051	0.167	0.086	2.62	106	1.0	-	9.10	-0.04	92	216	82	76
174	28.218	0.167	0.087	2.62	106	1.0	-	9.07	-0.03	92	217	82	76
175	28.382	0.164	0.089	2.62	106	1.0	-	9.03	-0.04	92	216	82	76
176	28.547	0.165	0.088	2.63	106	1.0	-	9.01	-0.02	92	217	82	76
177	28.714	0.167	0.087	2.63	106	1.0	-	8.96	-0.05	93	217	82	76
178	28.878	0.164	0.084	2.62	106	1.0	-	8.94	-0.02	93	219	82	76
179	29.043	0.165	0.086	2.63	106	1.0	-	8.89	-0.05	93	220	82	76
180	29.210	0.167	0.088	2.63	106	1.0	100	8.86	-0.03	93	222	82	76
181	29.374	0.164	0.084	2.62	106	1.0	-	8.82	-0.04	93	222	82	76
182	29.540	0.166	0.085	2.63	106	1.0	-	8.79	-0.03	93	223	82	76
183	29.708	0.168	0.088	2.62	106	1.0	-	8.74	-0.05	93	225	82	76
184	29.870	0.162	0.084	2.61	106	1.0	-	8.70	-0.04	93	225	82	76
185	30.037	0.167	0.088	2.63	106	1.0	-	8.65	-0.05	93	226	82	76
186	30.204	0.167	0.088	2.61	106	1.0	-	8.62	-0.03	93	225	82	76
187	30.365	0.161	0.084	2.62	106	1.0	-	8.58	-0.04	93	225	82	76
188	30.534	0.169	0.086	2.63	106	1.0	-	8.54	-0.04	93	226	82	76
189	30.700	0.166	0.086	2.62	106	1.0	-	8.50	-0.04	93	227	82	76
190	30.862	0.162	0.088	2.62	106	1.0	100	8.46	-0.04	93	228	82	76
191	31.032	0.170	0.086	2.61	106	1.0	-	8.42	-0.04	93	230	82	76
192	31.195	0.163	0.087	2.61	106	1.0	-	8.37	-0.05	93	229	82	77
193	31.358	0.163	0.086	2.61	106	1.0	-	8.34	-0.03	94	231	82	76
194	31.528	0.170	0.085	2.59	106	1.0	-	8.29	-0.05	94	231	82	77
195	31.691	0.163	0.083	2.58	106	1.0	-	8.23	-0.06	94	231	82	77
196	31.856	0.165	0.085	2.59	106	1.0	-	8.19	-0.04	94	231	82	77
197	32.025	0.169	0.086	2.59	106	1.0	-	8.15	-0.04	94	231	82	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	32.187	0.162	0.089	2.59	106	1.0	-	8.10	-0.05	94	233	82	77
199	32.354	0.167	0.085	2.59	106	1.0	-	8.06	-0.04	94	232	82	77
200	32.522	0.168	0.086	2.59	106	1.0	101	8.02	-0.04	94	233	82	77
201	32.685	0.163	0.086	2.60	106	1.0	-	7.98	-0.04	94	233	82	76
202	32.851	0.166	0.086	2.60	106	1.0	-	7.95	-0.03	94	234	82	77
203	33.018	0.167	0.087	2.60	106	1.0	-	7.90	-0.05	94	235	82	77
204	33.181	0.163	0.087	2.59	106	1.0	-	7.85	-0.05	94	235	82	77
205	33.349	0.168	0.085	2.60	106	1.0	-	7.83	-0.02	94	236	82	77
206	33.515	0.166	0.084	2.63	106	1.0	-	7.79	-0.04	94	235	82	77
207	33.679	0.164	0.086	2.63	106	1.0	-	7.75	-0.04	94	235	82	77
208	33.846	0.167	0.087	2.61	106	1.0	-	7.71	-0.04	94	234	82	77
209	34.013	0.167	0.090	2.63	106	1.0	-	7.66	-0.05	94	235	82	77
210	34.177	0.164	0.085	2.63	106	1.0	101	7.63	-0.03	94	235	82	77
211	34.343	0.166	0.091	2.61	106	1.0	-	7.61	-0.02	94	235	82	77
212	34.510	0.167	0.090	2.64	106	1.0	-	7.55	-0.06	94	234	82	77
213	34.674	0.164	0.086	2.63	106	1.0	-	7.53	-0.02	94	235	82	77
214	34.840	0.166	0.090	2.65	106	1.0	-	7.49	-0.04	94	236	82	77
215	35.007	0.167	0.088	2.62	106	1.0	-	7.45	-0.04	94	234	82	77
216	35.171	0.164	0.092	2.62	106	1.0	-	7.41	-0.04	94	235	82	77
217	35.337	0.166	0.091	2.63	106	1.0	-	7.38	-0.03	94	234	83	77
218	35.505	0.168	0.092	2.64	106	1.0	-	7.33	-0.05	94	235	83	77
219	35.668	0.163	0.090	2.64	106	1.0	-	7.29	-0.04	94	234	83	77
220	35.835	0.167	0.089	2.63	107	1.0	101	7.27	-0.02	94	235	83	77
221	36.003	0.168	0.088	2.62	106	1.0	-	7.23	-0.04	94	233	83	77
222	36.165	0.162	0.089	2.59	107	1.0	-	7.19	-0.04	94	233	83	77
223	36.332	0.167	0.089	2.61	107	1.0	-	7.17	-0.02	94	233	83	77
224	36.500	0.168	0.090	2.61	107	1.0	-	7.11	-0.06	94	233	83	77
225	36.662	0.162	0.090	2.61	107	1.0	-	7.07	-0.04	94	233	83	77
226	36.830	0.168	0.089	2.61	107	1.0	-	7.03	-0.04	94	234	83	77
227	36.997	0.167	0.089	2.61	107	1.0	-	7.01	-0.02	94	233	83	77
228	37.159	0.162	0.089	2.62	107	1.0	-	6.95	-0.06	94	234	83	77
229	37.328	0.169	0.091	2.62	107	1.0	-	6.92	-0.03	94	232	83	77
230	37.494	0.166	0.090	2.62	107	1.0	99	6.89	-0.03	94	232	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	37.657	0.163	0.089	2.62	107	1.0	-	6.87	-0.02	94	232	83	77
232	37.827	0.170	0.090	2.60	107	1.0	-	6.82	-0.05	94	233	83	77
233	37.992	0.165	0.091	2.60	107	1.0	-	6.79	-0.03	94	233	83	77
234	38.156	0.164	0.089	2.61	107	1.0	-	6.74	-0.05	94	231	83	77
235	38.325	0.169	0.089	2.59	107	1.0	-	6.71	-0.03	94	231	83	77
236	38.489	0.164	0.088	2.59	107	1.0	-	6.68	-0.03	94	231	83	77
237	38.653	0.164	0.089	2.60	107	1.0	-	6.63	-0.05	94	232	83	77
238	38.823	0.170	0.089	2.59	107	1.0	-	6.59	-0.04	94	232	83	77
239	38.986	0.163	0.090	2.59	107	1.0	-	6.57	-0.02	94	232	83	77
240	39.151	0.165	0.092	2.60	107	1.0	98	6.51	-0.06	94	231	83	77
241	39.321	0.170	0.090	2.61	107	1.0	-	6.48	-0.03	94	231	83	77
242	39.484	0.163	0.091	2.61	107	1.0	-	6.44	-0.04	94	232	83	77
243	39.650	0.166	0.093	2.63	107	1.0	-	6.42	-0.02	94	232	83	77
244	39.820	0.170	0.090	2.64	107	1.0	-	6.36	-0.06	94	234	83	77
245	39.982	0.162	0.092	2.64	107	1.0	-	6.33	-0.03	94	233	83	77
246	40.149	0.167	0.089	2.64	107	1.0	-	6.28	-0.05	94	233	83	77
247	40.318	0.169	0.089	2.63	107	1.0	-	6.25	-0.03	94	234	83	77
248	40.481	0.163	0.091	2.65	107	1.0	-	6.19	-0.06	94	235	83	77
249	40.648	0.167	0.087	2.65	107	1.0	-	6.15	-0.04	95	237	83	77
250	40.815	0.167	0.090	2.64	107	1.0	99	6.11	-0.04	95	238	83	77
251	40.979	0.164	0.090	2.64	107	1.0	-	6.06	-0.05	95	238	83	77
252	41.146	0.167	0.091	2.62	107	1.0	-	6.02	-0.04	95	237	83	77
253	41.314	0.168	0.090	2.64	107	1.0	-	5.97	-0.05	95	237	83	77
254	41.476	0.162	0.089	2.64	107	1.0	-	5.92	-0.05	95	238	83	77
255	41.644	0.168	0.091	2.64	107	1.0	-	5.89	-0.03	95	238	83	77
256	41.812	0.168	0.089	2.64	108	1.0	-	5.84	-0.05	95	239	83	77
257	41.975	0.163	0.089	2.65	108	1.0	-	5.78	-0.06	95	240	83	77
258	42.143	0.168	0.089	2.63	108	1.0	-	5.73	-0.05	95	241	83	77
259	42.310	0.167	0.087	2.63	108	1.0	-	5.67	-0.06	95	242	83	77
260	42.474	0.164	0.090	2.63	108	1.0	99	5.64	-0.03	95	242	83	77
261	42.642	0.168	0.089	2.64	108	1.0	-	5.59	-0.05	95	243	83	77
262	42.809	0.167	0.092	2.64	108	1.0	-	5.54	-0.05	95	246	83	77
263	42.973	0.164	0.088	2.63	108	1.0	-	5.49	-0.05	95	247	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	43.140	0.167	0.092	2.65	108	1.0	-	5.44	-0.05	95	248	83	77
265	43.307	0.167	0.088	2.65	108	1.0	-	5.37	-0.07	95	249	83	77
266	43.472	0.165	0.088	2.65	108	1.0	-	5.34	-0.03	95	249	83	77
267	43.639	0.167	0.087	2.65	108	1.0	-	5.28	-0.06	96	249	83	77
268	43.806	0.167	0.090	2.65	108	1.0	-	5.22	-0.06	96	249	83	77
269	43.971	0.165	0.089	2.65	108	1.0	-	5.16	-0.06	96	251	83	77
270	44.137	0.166	0.091	2.64	108	1.0	99	5.10	-0.06	96	252	83	77
271	44.305	0.168	0.088	2.66	108	1.0	-	5.06	-0.04	96	254	83	77
272	44.470	0.165	0.090	2.66	108	1.0	-	5.00	-0.06	96	253	83	77
273	44.636	0.166	0.091	2.65	108	1.0	-	4.94	-0.06	96	253	83	77
274	44.804	0.168	0.087	2.65	108	1.0	-	4.87	-0.07	96	255	83	77
275	44.968	0.164	0.088	2.66	108	1.0	-	4.83	-0.04	96	256	83	77
276	45.135	0.167	0.088	2.64	108	1.0	-	4.77	-0.06	96	257	83	77
277	45.302	0.167	0.089	2.65	108	1.0	-	4.72	-0.05	96	257	83	77
278	45.467	0.165	0.087	2.64	108	1.0	-	4.65	-0.07	96	259	83	77
279	45.633	0.166	0.087	2.64	108	1.0	-	4.59	-0.06	96	258	83	77
280	45.800	0.167	0.089	2.64	108	1.0	99	4.52	-0.07	96	262	83	77
281	45.965	0.165	0.089	2.64	108	1.0	-	4.46	-0.06	96	263	83	77
282	46.132	0.167	0.089	2.64	108	1.0	-	4.38	-0.08	96	264	83	77
283	46.299	0.167	0.090	2.63	108	1.0	-	4.32	-0.06	96	267	83	77
284	46.464	0.165	0.089	2.64	108	1.0	-	4.26	-0.06	97	270	83	77
285	46.631	0.167	0.086	2.63	108	1.0	-	4.18	-0.08	97	270	83	77
286	46.798	0.167	0.087	2.64	108	1.0	-	4.10	-0.08	97	273	83	77
287	46.963	0.165	0.087	2.63	108	1.0	-	4.03	-0.07	97	273	83	77
288	47.129	0.166	0.089	2.64	108	1.0	-	3.96	-0.07	97	275	83	77
289	47.297	0.168	0.091	2.64	108	1.0	-	3.88	-0.08	97	274	83	77
290	47.461	0.164	0.090	2.62	108	1.0	99	3.80	-0.08	97	274	83	77
291	47.628	0.167	0.087	2.62	108	1.0	-	3.73	-0.07	98	275	83	77
292	47.796	0.168	0.090	2.61	108	1.0	-	3.66	-0.07	97	277	83	77
293	47.960	0.164	0.090	2.62	108	1.0	-	3.59	-0.07	98	278	83	77
294	48.127	0.167	0.087	2.61	108	1.0	-	3.54	-0.05	98	277	84	77
295	48.295	0.168	0.087	2.62	108	1.0	-	3.47	-0.07	98	277	84	78
296	48.459	0.164	0.089	2.62	108	1.0	-	3.41	-0.06	98	277	84	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	48.626	0.167	0.090	2.63	108	1.0	-	3.35	-0.06	98	278	84	77
298	48.795	0.169	0.089	2.62	108	1.0	-	3.29	-0.06	98	278	84	78
299	48.958	0.163	0.088	2.64	108	1.0	-	3.23	-0.06	98	279	84	78
300	49.126	0.168	0.089	2.65	108	1.0	100	3.16	-0.07	98	278	84	78
301	49.294	0.168	0.090	2.64	108	1.0	-	3.09	-0.07	98	278	84	77
302	49.456	0.162	0.090	2.64	108	1.0	-	3.03	-0.06	98	279	84	78
303	49.625	0.169	0.087	2.66	108	1.0	-	2.96	-0.07	98	278	84	78
304	49.792	0.167	0.088	2.66	108	1.0	-	2.90	-0.06	98	280	84	78
305	49.955	0.163	0.088	2.63	108	1.0	-	2.85	-0.05	98	280	84	78
306	50.123	0.168	0.087	2.66	108	1.0	-	2.80	-0.05	98	281	84	78
307	50.291	0.168	0.089	2.63	108	1.0	-	2.74	-0.06	98	281	84	78
308	50.453	0.162	0.089	2.62	108	1.0	-	2.68	-0.06	98	280	84	78
309	50.621	0.168	0.088	2.62	108	1.0	-	2.60	-0.08	99	282	84	78
310	50.789	0.168	0.088	2.61	108	1.0	100	2.52	-0.08	99	282	84	78
311	50.952	0.163	0.088	2.61	108	1.0	-	2.45	-0.07	99	281	84	78
312	51.120	0.168	0.088	2.63	108	1.0	-	2.39	-0.06	99	280	84	77
313	51.288	0.168	0.088	2.63	108	1.0	-	2.34	-0.05	98	279	84	78
314	51.450	0.162	0.088	2.63	108	1.0	-	2.30	-0.04	98	275	84	78
315	51.620	0.170	0.089	2.63	108	1.0	-	2.27	-0.03	98	273	84	78
316	51.787	0.167	0.090	2.64	108	1.0	-	2.22	-0.05	98	271	84	78
317	51.949	0.162	0.091	2.63	108	1.0	-	2.20	-0.02	98	268	84	78
318	52.119	0.170	0.091	2.64	108	1.0	-	2.17	-0.03	97	266	84	78
319	52.285	0.166	0.089	2.64	108	1.0	-	2.16	-0.01	97	266	84	78
320	52.448	0.163	0.087	2.64	108	1.0	100	2.13	-0.03	97	262	84	78
321	52.618	0.170	0.090	2.64	108	1.0	-	2.11	-0.02	97	258	84	78
322	52.784	0.166	0.089	2.64	108	1.0	-	2.08	-0.03	97	256	84	78
323	52.947	0.163	0.089	2.65	108	1.0	-	2.07	-0.01	97	254	84	78
324	53.117	0.170	0.087	2.63	108	1.0	-	2.03	-0.04	97	253	84	78
325	53.282	0.165	0.090	2.63	108	1.0	-	2.02	-0.01	97	250	84	78
326	53.446	0.164	0.087	2.64	108	1.0	-	1.98	-0.04	97	249	84	78
327	53.616	0.170	0.088	2.63	108	1.0	-	1.97	-0.01	97	248	84	78
328	53.780	0.164	0.087	2.63	108	1.0	-	1.96	-0.01	96	249	84	78
329	53.944	0.164	0.087	2.64	108	1.0	-	1.92	-0.04	97	246	84	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	54.114	0.170	0.089	2.62	108	1.0	100	1.90	-0.02	96	244	84	78
331	54.279	0.165	0.089	2.63	108	1.0	-	1.89	-0.01	96	243	84	78
332	54.442	0.163	0.090	2.64	108	1.0	-	1.87	-0.02	96	242	84	78
333	54.612	0.170	0.089	2.63	108	1.0	-	1.85	-0.02	96	240	84	78
334	54.776	0.164	0.090	2.62	108	1.0	-	1.83	-0.02	96	240	84	78
335	54.941	0.165	0.090	2.62	108	1.0	-	1.82	-0.01	96	239	84	78
336	55.111	0.170	0.092	2.62	108	1.0	-	1.79	-0.03	96	237	84	78
337	55.274	0.163	0.088	2.61	108	1.0	-	1.78	-0.01	96	235	84	78
338	55.440	0.166	0.091	2.62	108	1.0	-	1.75	-0.03	96	235	84	78
339	55.610	0.170	0.090	2.62	108	1.0	-	1.73	-0.02	96	233	84	78
340	55.773	0.163	0.091	2.62	108	1.0	99	1.72	-0.01	95	232	84	78
341	55.939	0.166	0.090	2.62	108	1.1	-	1.70	-0.02	95	232	84	78
342	56.108	0.169	0.089	2.62	108	1.0	-	1.67	-0.03	95	230	84	77
343	56.271	0.163	0.088	2.62	108	1.0	-	1.66	-0.01	95	230	84	78
344	56.438	0.167	0.089	2.62	108	1.0	-	1.65	-0.01	95	228	83	78
345	56.607	0.169	0.089	2.62	108	1.0	-	1.64	-0.01	95	227	84	78
346	56.770	0.163	0.090	2.62	108	1.0	-	1.62	-0.02	95	227	83	78
347	56.937	0.167	0.088	2.62	108	1.0	-	1.59	-0.03	95	227	83	78
348	57.105	0.168	0.090	2.61	108	1.0	-	1.57	-0.02	95	226	83	78
349	57.269	0.164	0.089	2.63	108	1.0	-	1.57	0.00	95	225	83	78
350	57.436	0.167	0.090	2.63	108	1.0	99	1.55	-0.02	94	225	83	78
351	57.604	0.168	0.092	2.62	108	1.0	-	1.53	-0.02	94	224	83	78
352	57.768	0.164	0.092	2.64	108	1.0	-	1.52	-0.01	94	224	83	78
353	57.935	0.167	0.089	2.62	108	1.0	-	1.51	-0.01	94	223	83	78
354	58.103	0.168	0.090	2.62	108	1.0	-	1.49	-0.02	94	223	83	78
355	58.266	0.163	0.088	2.63	108	1.0	-	1.47	-0.02	94	221	83	78
356	58.434	0.168	0.090	2.63	108	1.0	-	1.46	-0.01	94	219	83	78
357	58.602	0.168	0.088	2.62	108	1.1	-	1.44	-0.02	94	220	83	78
358	58.764	0.162	0.089	2.64	108	1.0	-	1.43	-0.01	94	219	83	78
359	58.932	0.168	0.089	2.63	108	1.0	-	1.41	-0.02	94	219	83	78
360	59.100	0.168	0.089	2.64	108	1.0	99	1.40	-0.01	94	218	83	78
361	59.263	0.163	0.090	2.65	108	1.0	-	1.38	-0.02	94	216	83	78
362	59.432	0.169	0.090	2.63	108	1.1	-	1.37	-0.01	94	215	83	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
363	59.599	0.167	0.089	2.64	108	1.0	-	1.34	-0.03	94	215	83	78
364	59.763	0.164	0.090	2.64	108	1.0	-	1.33	-0.01	94	215	83	78
365	59.931	0.168	0.091	2.62	108	1.0	-	1.31	-0.02	94	215	83	78
366	60.098	0.167	0.089	2.64	108	1.1	-	1.31	0.00	94	214	83	78
367	60.262	0.164	0.092	2.63	108	1.0	-	1.29	-0.02	93	213	83	78
368	60.430	0.168	0.088	2.64	108	1.0	-	1.27	-0.02	93	213	83	78
369	60.597	0.167	0.090	2.63	108	1.0	-	1.26	-0.01	93	212	83	78
370	60.761	0.164	0.090	2.64	108	1.0	99	1.23	-0.03	93	213	83	78
371	60.929	0.168	0.090	2.64	108	1.0	-	1.20	-0.03	93	212	83	78
372	61.096	0.167	0.091	2.63	108	1.0	-	1.20	0.00	93	213	83	78
373	61.260	0.164	0.090	2.63	108	1.0	-	1.18	-0.02	93	213	83	78
374	61.428	0.168	0.089	2.64	108	1.0	-	1.15	-0.03	93	213	83	78
375	61.595	0.167	0.089	2.63	108	1.1	-	1.13	-0.02	93	213	83	78
376	61.760	0.165	0.090	2.64	108	1.0	-	1.12	-0.01	93	213	83	78
377	61.927	0.167	0.090	2.63	108	1.0	-	1.10	-0.02	93	213	83	78
378	62.094	0.167	0.091	2.63	108	1.0	-	1.07	-0.03	93	213	83	78
379	62.259	0.165	0.090	2.64	108	1.0	-	1.05	-0.02	93	213	83	78
380	62.426	0.167	0.091	2.63	108	1.0	99	1.04	-0.01	93	213	83	78
381	62.593	0.167	0.089	2.63	108	1.0	-	1.01	-0.03	93	214	83	78
382	62.758	0.165	0.089	2.62	108	1.0	-	0.99	-0.02	93	214	83	78
383	62.925	0.167	0.090	2.62	108	1.0	-	0.96	-0.03	93	214	83	78
384	63.092	0.167	0.087	2.64	108	1.0	-	0.95	-0.01	93	213	83	78
385	63.257	0.165	0.090	2.62	108	1.0	-	0.93	-0.02	93	214	83	78
386	63.423	0.166	0.088	2.63	108	1.0	-	0.92	-0.01	93	215	83	78
387	63.591	0.168	0.087	2.64	108	1.0	-	0.89	-0.03	93	215	83	78
388	63.756	0.165	0.090	2.63	108	1.0	-	0.88	-0.01	93	214	83	78
389	63.922	0.166	0.089	2.62	108	1.0	-	0.84	-0.04	93	214	83	78
390	64.090	0.168	0.091	2.64	108	1.0	98	0.84	0.00	93	213	83	78
391	64.254	0.164	0.088	2.63	108	1.0	-	0.80	-0.04	93	213	83	78
392	64.421	0.167	0.088	2.62	108	1.0	-	0.79	-0.01	93	214	83	78
393	64.588	0.167	0.089	2.63	108	1.0	-	0.78	-0.01	93	213	83	78
394	64.753	0.165	0.089	2.62	108	1.0	-	0.74	-0.04	93	213	83	78
395	64.919	0.166	0.091	2.63	108	1.0	-	0.73	-0.01	93	213	83	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
396	65.086	0.167	0.092	2.63	108	1.0	-	0.70	-0.03	93	213	83	78
397	65.251	0.165	0.092	2.62	108	1.0	-	0.70	0.00	93	213	83	78
398	65.418	0.167	0.092	2.63	108	1.0	-	0.67	-0.03	93	212	83	78
399	65.585	0.167	0.091	2.63	108	1.0	-	0.65	-0.02	93	211	83	78
400	65.750	0.165	0.087	2.63	108	1.0	99	0.64	-0.01	93	211	83	77
401	65.917	0.167	0.091	2.63	108	1.0	-	0.62	-0.02	93	211	83	77
402	66.085	0.168	0.088	2.63	108	1.0	-	0.60	-0.02	93	211	83	78
403	66.250	0.165	0.092	2.63	108	1.1	-	0.57	-0.03	93	211	83	77
404	66.416	0.166	0.089	2.62	108	1.0	-	0.56	-0.01	93	210	83	77
405	66.584	0.168	0.090	2.63	108	1.0	-	0.54	-0.02	93	211	83	78
406	66.749	0.165	0.089	2.64	108	1.0	-	0.53	-0.01	92	211	83	78
407	66.915	0.166	0.089	2.64	108	1.0	-	0.50	-0.03	92	209	83	77
408	67.083	0.168	0.089	2.63	108	1.0	-	0.48	-0.02	93	210	83	77
409	67.247	0.164	0.092	2.63	108	1.0	-	0.45	-0.03	92	209	83	78
410	67.414	0.167	0.088	2.63	108	1.0	100	0.46	0.01	92	211	83	78
411	67.582	0.168	0.089	2.63	108	1.0	-	0.43	-0.03	92	210	83	77
412	67.746	0.164	0.087	2.64	108	1.0	-	0.42	-0.01	92	211	83	77
413	67.913	0.167	0.089	2.63	108	1.0	-	0.39	-0.03	92	211	83	77
414	68.082	0.169	0.089	2.63	108	1.0	-	0.39	0.00	92	211	83	77
415	68.245	0.163	0.089	2.63	108	1.0	-	0.36	-0.03	92	211	83	77
416	68.412	0.167	0.089	2.64	108	1.0	-	0.34	-0.02	92	211	83	77
417	68.581	0.169	0.089	2.64	108	1.0	-	0.33	-0.01	92	210	83	77
418	68.744	0.163	0.094	2.63	108	1.0	-	0.31	-0.02	92	209	83	77
419	68.912	0.168	0.094	2.63	108	1.0	-	0.30	-0.01	92	210	83	77
420	69.080	0.168	0.089	2.64	108	1.0	100	0.26	-0.04	92	209	83	77
421	69.242	0.162	0.091	2.63	108	1.0	-	0.25	-0.01	92	210	83	78
422	69.411	0.169	0.089	2.64	108	1.0	-	0.24	-0.01	92	211	83	77
423	69.578	0.167	0.091	2.63	108	1.0	-	0.23	-0.01	92	210	83	77
424	69.741	0.163	0.090	2.63	108	1.0	-	0.21	-0.02	92	211	83	77
425	69.909	0.168	0.090	2.63	108	1.0	-	0.18	-0.03	92	211	83	77
426	70.077	0.168	0.089	2.61	108	1.0	-	0.17	-0.01	92	210	83	78
427	70.239	0.162	0.090	2.62	108	1.0	-	0.17	0.00	92	212	83	77
428	70.407	0.168	0.091	2.62	108	1.0	-	0.14	-0.03	92	211	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
429	70.575	0.168	0.089	2.61	108	1.0	-	0.11	-0.03	92	211	83	77
430	70.738	0.163	0.089	2.63	108	1.0	99	0.10	-0.01	92	210	83	77
431	70.906	0.168	0.088	2.63	108	1.0	-	0.09	-0.01	92	210	83	77
432	71.074	0.168	0.088	2.64	108	1.0	-	0.06	-0.03	92	209	83	77
433	71.236	0.162	0.089	2.63	108	1.0	-	0.05	-0.01	92	209	83	77
434	71.405	0.169	0.088	2.63	108	1.0	-	0.03	-0.02	92	210	83	77
435	71.572	0.167	0.091	2.64	108	1.0	-	0.02	-0.01	92	210	83	77
436	71.735	0.163	0.091	2.64	108	1.0	-	0.01	-0.01	92	211	83	77
437	71.904	0.169	0.088	2.63	108	1.0	99	0.00	-0.01	92	210	83	77
Avg/Tot	71.904	0.165	0.087	2.60	103.9	1.0	100			94.5	236.2	82.3	76.7

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.000		0.01	91	0.8		81	-0.065	5.92	0.044
1	0.149	0.149	2.56	91	1.8	-	82	-0.069	5.94	0.038
2	0.309	0.160	2.54	91	2.2	-	83	-0.069	6.02	0.042
3	0.467	0.158	2.53	91	1.8	-	83	-0.070	6.74	0.036
4	0.628	0.161	2.53	90	1.7	-	83	-0.071	7.29	0.037
5	0.786	0.158	2.52	90	2.0	-	84	-0.073	8.47	0.040
6	0.946	0.160	2.52	90	2.0	-	84	-0.063	9.30	0.035
7	1.106	0.160	2.52	90	2.2	-	84	-0.063	6.03	0.020
8	1.263	0.157	2.52	90	2.1	-	84	-0.061	5.49	0.019
9	1.425	0.162	2.52	90	1.6	-	84	-0.059	5.49	0.020
10	1.582	0.157	2.52	91	2.0	102	84	-0.061	5.71	0.019
11	1.742	0.160	2.52	91	2.2	-	84	-0.059	5.99	0.016
12	1.903	0.161	2.52	91	1.9	-	84	-0.059	6.27	0.019
13	2.059	0.156	2.51	91	1.8	-	84	-0.058	6.51	0.017
14	2.221	0.162	2.52	91	1.7	-	84	-0.058	6.75	0.018
15	2.378	0.157	2.52	91	1.7	-	84	-0.058	6.72	0.017
16	2.539	0.161	2.51	91	2.0	-	84	-0.057	6.78	0.017
17	2.699	0.160	2.53	91	1.8	-	84	-0.058	6.96	0.020
18	2.855	0.156	2.52	91	2.2	-	84	-0.057	7.22	0.015
19	3.018	0.163	2.52	92	1.7	-	84	-0.057	7.45	0.015
20	3.174	0.156	2.52	92	1.9	105	84	-0.056	8.11	0.021
21	3.335	0.161	2.52	92	1.8	-	84	-0.058	8.24	0.018
22	3.495	0.160	2.52	92	1.7	-	84	-0.056	8.09	0.023
23	3.653	0.158	2.52	92	2.2	-	84	-0.057	8.19	0.019
24	3.814	0.161	2.52	92	1.7	-	84	-0.057	8.33	0.020
25	3.972	0.158	2.52	93	1.7	-	84	-0.058	8.31	0.018
26	4.133	0.161	2.52	93	1.7	-	84	-0.057	8.07	0.025
27	4.292	0.159	2.51	93	2.0	-	84	-0.055	8.17	0.023
28	4.451	0.159	2.51	93	2.1	-	84	-0.056	8.05	0.023
29	4.612	0.161	2.52	93	1.9	-	84	-0.057	8.03	0.019
30	4.772	0.160	2.52	93	1.8	103	84	-0.055	7.91	0.020
31	4.930	0.158	2.51	94	1.9	-	84	-0.056	7.86	0.025
32	5.092	0.162	2.52	94	1.8	-	84	-0.055	7.76	0.021

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
33	5.250	0.158	2.53	94	2.1	-	84	-0.055	7.76	0.023
34	5.410	0.160	2.52	94	1.9	-	84	-0.055	7.69	0.024
35	5.572	0.162	2.52	94	2.2	-	84	-0.055	7.66	0.018
36	5.729	0.157	2.52	94	1.9	-	84	-0.054	7.61	0.023
37	5.892	0.163	2.53	95	1.8	-	84	-0.055	7.63	0.027
38	6.049	0.157	2.52	95	1.8	-	84	-0.054	7.69	0.023
39	6.211	0.162	2.52	95	1.7	-	84	-0.054	7.68	0.024
40	6.372	0.161	2.52	95	2.2	102	84	-0.055	7.73	0.023
41	6.531	0.159	2.53	96	1.8	-	84	-0.052	7.76	0.019
42	6.692	0.161	2.53	96	2.1	-	84	-0.052	7.92	0.022
43	6.853	0.161	2.53	96	2.1	-	84	-0.051	7.94	0.023
44	7.012	0.159	2.53	96	1.8	-	84	-0.053	7.96	0.023
45	7.174	0.162	2.53	96	2.2	-	84	-0.054	8.09	0.019
46	7.332	0.158	2.53	96	2.1	-	84	-0.053	8.21	0.019
47	7.494	0.162	2.53	97	2.1	-	84	-0.051	8.32	0.019
48	7.656	0.162	2.53	97	2.1	-	84	-0.053	8.51	0.016
49	7.814	0.158	2.53	97	1.8	-	84	-0.053	8.74	0.017
50	7.977	0.163	2.53	97	1.8	102	84	-0.052	8.91	0.017
51	8.135	0.158	2.53	97	2.1	-	84	-0.053	8.77	0.017
52	8.297	0.162	2.52	97	1.9	-	84	-0.053	8.56	0.018
53	8.458	0.161	2.52	98	2.2	-	84	-0.053	8.67	0.018
54	8.618	0.160	2.54	98	2.0	-	84	-0.052	8.74	0.017
55	8.779	0.161	2.53	98	2.1	-	84	-0.052	8.71	0.019
56	8.942	0.163	2.53	98	1.8	-	84	-0.052	8.60	0.014
57	9.099	0.157	2.52	98	2.0	-	84	-0.051	8.56	0.017
58	9.264	0.165	2.53	98	1.8	-	84	-0.051	8.30	0.020
59	9.422	0.158	2.52	98	2.1	-	85	-0.053	8.13	0.017
60	9.584	0.162	2.53	99	2.0	101	85	-0.051	7.88	0.017
61	9.745	0.161	2.53	99	2.2	-	84	-0.051	7.89	0.017
62	9.905	0.160	2.53	99	1.9	-	86	-0.050	7.93	0.014
63	10.067	0.162	2.53	99	2.0	-	84	-0.052	8.07	0.017
64	10.229	0.162	2.53	99	1.9	-	84	-0.050	8.28	0.018
65	10.388	0.159	2.53	99	2.2	-	84	-0.049	8.36	0.019

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
66	10.552	0.164	2.54	99	1.8	-	84	-0.050	8.58	0.020
67	10.710	0.158	2.53	100	2.2	-	84	-0.049	8.64	0.026
68	10.873	0.163	2.53	100	2.2	-	84	-0.052	8.58	0.020
69	11.034	0.161	2.53	100	1.7	-	84	-0.052	8.76	0.017
70	11.195	0.161	2.54	100	2.2	101	84	-0.048	8.81	0.027
71	11.356	0.161	2.52	100	2.1	-	84	-0.052	8.61	0.020
72	11.519	0.163	2.53	100	2.1	-	84	-0.051	8.32	0.031
73	11.677	0.158	2.53	100	1.8	-	84	-0.050	8.21	0.025
74	11.842	0.165	2.54	101	2.2	-	84	-0.050	8.26	0.021
75	12.000	0.158	2.53	101	1.8	-	84	-0.050	8.32	0.023
76	12.163	0.163	2.54	101	2.2	-	84	-0.049	8.29	0.029
77	12.325	0.162	2.53	101	1.8	-	84	-0.048	8.34	0.029
78	12.485	0.160	2.53	101	2.2	-	84	-0.050	8.29	0.033
79	12.647	0.162	2.54	101	1.9	-	84	-0.049	8.34	0.035
80	12.810	0.163	2.54	101	2.0	101	84	-0.048	8.35	0.029
81	12.969	0.159	2.53	101	1.9	-	84	-0.050	8.30	0.029
82	13.133	0.164	2.54	101	2.2	-	84	-0.048	8.37	0.024
83	13.293	0.160	2.53	101	2.2	-	84	-0.050	8.35	0.031
84	13.454	0.161	2.54	102	1.7	-	84	-0.051	8.32	0.028
85	13.618	0.164	2.54	102	2.2	-	84	-0.049	8.29	0.028
86	13.777	0.159	2.54	102	1.9	-	84	-0.051	8.25	0.024
87	13.940	0.163	2.54	102	2.2	-	84	-0.052	8.37	0.033
88	14.102	0.162	2.54	102	1.7	-	84	-0.052	8.34	0.029
89	14.263	0.161	2.54	102	1.9	-	84	-0.049	8.46	0.028
90	14.426	0.163	2.54	102	2.2	101	84	-0.050	8.42	0.029
91	14.587	0.161	2.54	102	2.1	-	84	-0.049	8.46	0.034
92	14.748	0.161	2.54	102	2.1	-	84	-0.050	8.35	0.031
93	14.912	0.164	2.54	102	2.2	-	84	-0.050	8.38	0.030
94	15.071	0.159	2.54	103	2.2	-	84	-0.049	8.31	0.025
95	15.234	0.163	2.54	103	1.8	-	84	-0.047	8.33	0.033
96	15.396	0.162	2.53	103	1.7	-	84	-0.048	8.25	0.030
97	15.557	0.161	2.54	103	2.0	-	84	-0.048	8.29	0.030
98	15.719	0.162	2.53	103	2.1	-	84	-0.049	7.90	0.031

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
99	15.883	0.164	2.54	103	1.7	-	84	-0.052	8.05	0.031
100	16.042	0.159	2.54	103	2.2	101	84	-0.049	7.92	0.029
101	16.206	0.164	2.54	103	2.1	-	84	-0.051	7.85	0.041
102	16.367	0.161	2.54	103	1.9	-	84	-0.049	7.62	0.027
103	16.528	0.161	2.54	103	2.1	-	84	-0.050	7.64	0.031
104	16.693	0.165	2.54	103	2.2	-	84	-0.050	7.63	0.034
105	16.852	0.159	2.54	103	1.7	-	84	-0.049	7.60	0.024
106	17.015	0.163	2.54	103	2.2	-	84	-0.050	7.55	0.032
107	17.178	0.163	2.54	103	2.2	-	84	-0.049	7.56	0.032
108	17.338	0.160	2.53	104	1.7	-	84	-0.049	7.53	0.030
109	17.501	0.163	2.54	104	1.9	-	84	-0.049	7.49	0.022
110	17.664	0.163	2.54	104	2.2	101	84	-0.047	7.46	0.023
111	17.823	0.159	2.53	104	2.2	-	84	-0.048	7.37	0.026
112	17.989	0.166	2.54	104	1.8	-	85	-0.045	7.52	0.026
113	18.148	0.159	2.54	104	1.9	-	84	-0.047	7.39	0.027
114	18.311	0.163	2.54	104	1.7	-	84	-0.048	7.31	0.016
115	18.475	0.164	2.54	104	2.0	-	84	-0.045	7.29	0.021
116	18.634	0.159	2.54	104	2.2	-	84	-0.046	7.16	0.020
117	18.798	0.164	2.54	104	2.2	-	84	-0.047	7.10	0.019
118	18.961	0.163	2.54	104	1.8	-	84	-0.047	6.94	0.016
119	19.121	0.160	2.54	104	2.2	-	84	-0.049	6.94	0.021
120	19.285	0.164	2.54	104	2.0	100	84	-0.048	6.98	0.024
121	19.447	0.162	2.54	104	2.1	-	84	-0.047	7.25	0.024
122	19.607	0.160	2.54	104	1.7	-	84	-0.047	7.28	0.020
123	19.773	0.166	2.54	104	1.8	-	84	-0.045	7.39	0.020
124	19.932	0.159	2.54	104	2.1	-	84	-0.046	7.43	0.022
125	20.095	0.163	2.54	104	1.8	-	84	-0.047	7.43	0.020
126	20.259	0.164	2.54	104	2.3	-	84	-0.047	7.38	0.026
127	20.419	0.160	2.54	104	2.0	-	84	-0.048	7.30	0.019
128	20.582	0.163	2.53	105	2.2	-	84	-0.047	7.30	0.024
129	20.745	0.163	2.54	105	1.8	-	84	-0.047	7.37	0.019
130	20.906	0.161	2.54	105	1.7	100	84	-0.045	7.32	0.022
131	21.069	0.163	2.54	105	1.9	-	84	-0.048	7.33	0.020

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
132	21.232	0.163	2.53	105	2.1	-	84	-0.046	7.32	0.022
133	21.392	0.160	2.54	105	1.7	-	84	-0.044	7.32	0.021
134	21.558	0.166	2.54	105	1.9	-	84	-0.045	7.29	0.026
135	21.717	0.159	2.54	105	2.2	-	84	-0.045	7.30	0.025
136	21.880	0.163	2.54	105	1.8	-	84	-0.046	7.21	0.025
137	22.044	0.164	2.54	105	2.0	-	84	-0.045	7.18	0.018
138	22.203	0.159	2.54	105	2.0	-	84	-0.046	7.19	0.021
139	22.367	0.164	2.54	105	2.1	-	84	-0.046	7.13	0.022
140	22.530	0.163	2.54	105	1.8	100	84	-0.047	7.15	0.025
141	22.691	0.161	2.54	105	1.9	-	84	-0.047	7.15	0.021
142	22.854	0.163	2.54	105	1.7	-	84	-0.045	7.20	0.025
143	23.017	0.163	2.53	105	2.3	-	84	-0.046	7.21	0.020
144	23.177	0.160	2.53	105	1.8	-	84	-0.045	7.15	0.025
145	23.343	0.166	2.54	105	2.1	-	84	-0.045	7.07	0.023
146	23.503	0.160	2.54	105	2.2	-	84	-0.045	6.96	0.019
147	23.666	0.163	2.55	105	1.8	-	84	-0.045	6.97	0.019
148	23.830	0.164	2.54	105	1.7	-	84	-0.045	6.95	0.014
149	23.989	0.159	2.54	105	1.7	-	84	-0.046	6.90	0.012
150	24.154	0.165	2.54	105	2.0	100	84	-0.044	6.97	0.015
151	24.316	0.162	2.54	105	1.7	-	84	-0.045	6.86	0.017
152	24.477	0.161	2.53	105	1.8	-	84	-0.044	6.92	0.019
153	24.640	0.163	2.53	105	1.8	-	84	-0.045	6.90	0.027
154	24.804	0.164	2.54	105	2.2	-	84	-0.044	6.89	0.019
155	24.964	0.160	2.54	105	2.1	-	84	-0.045	6.88	0.020
156	25.129	0.165	2.55	105	1.7	-	84	-0.044	6.87	0.019
157	25.290	0.161	2.54	105	1.7	-	84	-0.044	6.76	0.020
158	25.451	0.161	2.54	105	2.2	-	84	-0.044	6.88	0.023
159	25.617	0.166	2.54	105	2.1	-	84	-0.043	6.94	0.021
160	25.776	0.159	2.54	105	1.7	101	84	-0.046	6.97	0.018
161	25.940	0.164	2.54	106	2.2	-	84	-0.046	6.99	0.017
162	26.103	0.163	2.54	106	1.9	-	84	-0.043	6.98	0.033
163	26.265	0.162	2.54	106	1.9	-	84	-0.043	6.98	0.024
164	26.427	0.162	2.54	106	2.0	-	84	-0.047	7.02	0.018

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
165	26.591	0.164	2.54	106	2.0	-	84	-0.044	6.99	0.021
166	26.751	0.160	2.54	106	2.1	-	84	-0.049	7.07	0.023
167	26.915	0.164	2.54	106	1.8	-	84	-0.044	7.15	0.021
168	27.078	0.163	2.54	106	2.2	-	84	-0.045	7.28	0.021
169	27.239	0.161	2.54	106	2.2	-	84	-0.043	7.30	0.019
170	27.404	0.165	2.54	106	2.0	101	84	-0.045	7.30	0.025
171	27.563	0.159	2.54	106	2.1	-	84	-0.045	7.37	0.026
172	27.728	0.165	2.54	106	2.1	-	84	-0.047	7.41	0.025
173	27.890	0.162	2.54	106	1.9	-	84	-0.045	7.48	0.024
174	28.051	0.161	2.54	106	2.2	-	84	-0.046	7.49	0.026
175	28.215	0.164	2.54	106	1.7	-	84	-0.044	7.59	0.024
176	28.377	0.162	2.54	106	1.8	-	84	-0.045	7.61	0.024
177	28.539	0.162	2.53	106	1.8	-	84	-0.047	7.72	0.025
178	28.702	0.163	2.53	106	2.0	-	84	-0.049	7.65	0.021
179	28.865	0.163	2.53	106	1.9	-	84	-0.047	7.66	0.022
180	29.025	0.160	2.54	106	2.2	100	84	-0.046	7.72	0.028
181	29.191	0.166	2.54	106	2.2	-	84	-0.047	7.70	0.023
182	29.350	0.159	2.53	106	2.2	-	84	-0.047	7.76	0.027
183	29.514	0.164	2.54	106	2.0	-	84	-0.048	7.80	0.024
184	29.678	0.164	2.54	106	2.2	-	84	-0.046	7.85	0.030
185	29.838	0.160	2.54	106	2.0	-	85	-0.047	7.82	0.027
186	30.002	0.164	2.53	106	1.8	-	85	-0.046	7.90	0.022
187	30.165	0.163	2.53	106	2.2	-	85	-0.049	8.03	0.027
188	30.325	0.160	2.54	106	2.1	-	85	-0.047	8.24	0.030
189	30.489	0.164	2.54	106	1.7	-	85	-0.049	8.30	0.027
190	30.652	0.163	2.54	106	1.7	100	85	-0.049	8.46	0.033
191	30.812	0.160	2.53	106	1.8	-	85	-0.050	8.63	0.031
192	30.977	0.165	2.54	106	1.7	-	85	-0.048	8.70	0.033
193	31.138	0.161	2.54	106	2.2	-	85	-0.048	8.64	0.030
194	31.300	0.162	2.54	106	1.8	-	85	-0.049	8.61	0.032
195	31.465	0.165	2.54	106	1.8	-	85	-0.049	8.71	0.029
196	31.625	0.160	2.54	106	2.2	-	85	-0.049	8.67	0.034
197	31.788	0.163	2.54	106	2.2	-	85	-0.050	8.60	0.027

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
198	31.951	0.163	2.54	106	2.0	-	85	-0.049	8.47	0.024
199	32.113	0.162	2.54	106	1.8	-	85	-0.050	8.44	0.031
200	32.276	0.163	2.54	106	1.9	100	85	-0.051	8.46	0.033
201	32.440	0.164	2.54	106	2.2	-	85	-0.049	8.42	0.029
202	32.600	0.160	2.54	106	2.1	-	85	-0.049	8.42	0.033
203	32.764	0.164	2.54	106	1.7	-	85	-0.048	8.40	0.031
204	32.927	0.163	2.54	106	2.2	-	85	-0.049	8.24	0.031
205	33.088	0.161	2.54	106	2.0	-	85	-0.049	8.33	0.029
206	33.253	0.165	2.54	106	1.7	-	85	-0.051	7.99	0.022
207	33.413	0.160	2.54	106	1.8	-	85	-0.047	7.85	0.029
208	33.577	0.164	2.54	106	1.7	-	85	-0.048	8.01	0.033
209	33.740	0.163	2.54	106	1.7	-	85	-0.051	8.02	0.033
210	33.901	0.161	2.54	106	1.7	101	85	-0.050	7.89	0.033
211	34.064	0.163	2.54	106	2.2	-	85	-0.050	7.85	0.026
212	34.227	0.163	2.54	106	2.0	-	85	-0.048	7.81	0.029
213	34.388	0.161	2.53	106	2.0	-	85	-0.049	7.69	0.037
214	34.552	0.164	2.54	106	2.3	-	85	-0.050	7.71	0.028
215	34.715	0.163	2.53	106	2.3	-	85	-0.049	7.68	0.028
216	34.875	0.160	2.53	106	2.2	-	85	-0.047	7.66	0.029
217	35.041	0.166	2.54	106	2.1	-	85	-0.050	7.97	0.022
218	35.201	0.160	2.53	107	2.3	-	85	-0.051	8.00	0.017
219	35.364	0.163	2.54	107	1.8	-	85	-0.048	8.10	0.021
220	35.528	0.164	2.53	107	1.8	100	85	-0.050	8.12	0.013
221	35.688	0.160	2.54	107	1.7	-	85	-0.048	8.02	0.018
222	35.852	0.164	2.53	107	1.8	-	85	-0.048	8.00	0.015
223	36.015	0.163	2.54	107	2.0	-	85	-0.048	8.02	0.019
224	36.176	0.161	2.53	107	1.8	-	85	-0.050	7.94	0.013
225	36.339	0.163	2.53	107	1.7	-	85	-0.051	7.97	0.017
226	36.503	0.164	2.53	107	2.3	-	85	-0.049	8.12	0.020
227	36.663	0.160	2.54	107	1.7	-	85	-0.047	7.93	0.016
228	36.828	0.165	2.53	107	2.2	-	85	-0.047	7.87	0.017
229	36.990	0.162	2.54	107	2.2	-	85	-0.051	7.72	0.021
230	37.151	0.161	2.54	107	1.8	99	85	-0.050	7.91	0.017

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
231	37.316	0.165	2.54	107	2.2	-	85	-0.052	7.96	0.013
232	37.476	0.160	2.54	107	2.3	-	85	-0.048	7.78	0.022
233	37.640	0.164	2.54	107	1.9	-	85	-0.049	7.78	0.018
234	37.803	0.163	2.54	107	1.8	-	85	-0.049	7.75	0.023
235	37.965	0.162	2.54	107	2.2	-	85	-0.049	7.82	0.018
236	38.128	0.163	2.53	107	2.1	-	85	-0.050	7.69	0.020
237	38.291	0.163	2.54	107	1.7	-	85	-0.050	7.69	0.019
238	38.452	0.161	2.54	107	2.2	-	85	-0.048	7.71	0.023
239	38.616	0.164	2.54	107	1.8	-	85	-0.048	7.81	0.023
240	38.779	0.163	2.53	107	1.7	98	85	-0.050	7.98	0.018
241	38.940	0.161	2.53	107	2.2	-	85	-0.049	8.05	0.021
242	39.106	0.166	2.54	107	1.7	-	85	-0.050	8.08	0.024
243	39.265	0.159	2.54	107	2.0	-	85	-0.048	8.18	0.022
244	39.429	0.164	2.54	107	2.3	-	85	-0.047	8.23	0.022
245	39.593	0.164	2.53	107	2.0	-	85	-0.049	8.36	0.025
246	39.753	0.160	2.54	107	2.2	-	85	-0.048	8.38	0.027
247	39.917	0.164	2.53	107	1.7	-	85	-0.048	8.55	0.034
248	40.080	0.163	2.54	107	2.0	-	85	-0.049	8.58	0.027
249	40.241	0.161	2.53	107	2.1	-	85	-0.050	8.70	0.030
250	40.404	0.163	2.52	107	1.7	98	85	-0.049	8.85	0.030
251	40.568	0.164	2.54	107	1.8	-	86	-0.051	8.89	0.030
252	40.729	0.161	2.53	107	2.1	-	85	-0.049	9.03	0.034
253	40.893	0.164	2.54	107	2.2	-	86	-0.050	9.11	0.030
254	41.055	0.162	2.54	107	1.8	-	86	-0.050	9.20	0.031
255	41.217	0.162	2.54	107	1.7	-	86	-0.051	9.23	0.035
256	41.382	0.165	2.53	107	1.7	-	86	-0.052	9.33	0.034
257	41.542	0.160	2.54	107	2.3	-	86	-0.049	9.31	0.032
258	41.706	0.164	2.54	107	2.2	-	86	-0.053	9.39	0.031
259	41.869	0.163	2.53	107	1.8	-	86	-0.052	9.43	0.038
260	42.030	0.161	2.54	107	2.2	98	86	-0.051	9.50	0.035
261	42.194	0.164	2.53	107	1.8	-	86	-0.054	9.62	0.019
262	42.356	0.162	2.53	107	2.1	-	86	-0.051	9.70	0.035
263	42.518	0.162	2.53	107	2.2	-	86	-0.055	9.85	0.039

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
264	42.682	0.164	2.53	108	1.7	-	86	-0.053	9.80	0.041
265	42.845	0.163	2.53	107	2.2	-	86	-0.053	9.91	0.040
266	43.005	0.160	2.53	107	1.8	-	86	-0.051	9.79	0.052
267	43.171	0.166	2.53	107	1.9	-	86	-0.054	9.93	0.045
268	43.332	0.161	2.53	108	2.2	-	86	-0.053	10.01	0.054
269	43.494	0.162	2.53	108	1.7	-	86	-0.052	9.99	0.076
270	43.659	0.165	2.53	108	1.7	98	86	-0.052	10.12	0.094
271	43.818	0.159	2.53	108	2.1	-	86	-0.053	10.19	0.092
272	43.982	0.164	2.53	108	2.3	-	86	-0.057	10.27	0.123
273	44.145	0.163	2.53	108	1.8	-	86	-0.056	10.39	0.143
274	44.307	0.162	2.53	108	1.9	-	86	-0.054	10.30	0.169
275	44.470	0.163	2.53	108	2.3	-	86	-0.053	10.39	0.173
276	44.634	0.164	2.54	108	1.9	-	86	-0.055	10.43	0.218
277	44.794	0.160	2.53	108	2.0	-	86	-0.057	10.64	0.236
278	44.958	0.164	2.53	108	1.7	-	86	-0.055	10.73	0.292
279	45.121	0.163	2.53	108	2.1	-	86	-0.056	10.86	0.364
280	45.282	0.161	2.54	108	2.2	98	86	-0.057	10.93	0.414
281	45.447	0.165	2.53	108	2.0	-	86	-0.056	11.14	0.480
282	45.607	0.160	2.53	108	1.9	-	86	-0.058	11.43	0.721
283	45.771	0.164	2.53	108	2.2	-	86	-0.056	11.68	0.851
284	45.934	0.163	2.53	108	2.2	-	86	-0.057	11.72	0.954
285	46.095	0.161	2.53	108	2.0	-	86	-0.061	11.88	1.038
286	46.259	0.164	2.53	108	2.0	-	86	-0.058	11.86	1.140
287	46.421	0.162	2.54	108	1.7	-	86	-0.059	12.01	1.170
288	46.583	0.162	2.53	108	1.8	-	86	-0.057	11.88	1.303
289	46.747	0.164	2.53	108	2.0	-	86	-0.057	11.82	1.323
290	46.910	0.163	2.53	108	1.8	99	86	-0.059	11.80	1.238
291	47.070	0.160	2.53	108	1.7	-	86	-0.058	11.90	1.177
292	47.236	0.166	2.53	108	1.9	-	86	-0.059	11.83	1.112
293	47.396	0.160	2.53	108	2.2	-	86	-0.058	11.76	1.042
294	47.559	0.163	2.53	108	2.3	-	86	-0.056	11.83	0.975
295	47.723	0.164	2.53	108	2.1	-	86	-0.057	11.74	0.899
296	47.883	0.160	2.54	108	2.0	-	86	-0.058	11.77	0.813

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
297	48.047	0.164	2.52	108	1.9	-	86	-0.058	11.75	0.710
298	48.210	0.163	2.53	108	1.8	-	86	-0.059	11.61	0.666
299	48.372	0.162	2.53	108	1.8	-	86	-0.057	11.71	0.631
300	48.535	0.163	2.53	108	2.2	99	86	-0.059	11.66	0.610
301	48.698	0.163	2.53	108	2.3	-	86	-0.054	11.76	0.633
302	48.859	0.161	2.53	108	1.8	-	86	-0.057	11.85	0.663
303	49.023	0.164	2.53	108	1.7	-	86	-0.060	11.93	0.724
304	49.186	0.163	2.53	108	1.7	-	86	-0.058	12.02	0.875
305	49.347	0.161	2.53	108	2.1	-	86	-0.060	11.34	0.587
306	49.512	0.165	2.52	108	2.2	-	86	-0.060	11.21	0.595
307	49.671	0.159	2.53	108	1.7	-	86	-0.061	11.22	0.595
308	49.836	0.165	2.53	108	1.8	-	86	-0.058	11.09	0.623
309	49.998	0.162	2.53	108	1.8	-	86	-0.060	11.02	0.550
310	50.159	0.161	2.53	108	2.3	99	86	-0.062	12.02	0.519
311	50.323	0.164	2.53	108	2.3	-	86	-0.059	11.98	0.568
312	50.485	0.162	2.53	108	2.0	-	86	-0.058	11.24	0.262
313	50.647	0.162	2.53	108	1.8	-	86	-0.058	10.50	0.134
314	50.811	0.164	2.53	108	1.7	-	86	-0.059	9.62	0.040
315	50.974	0.163	2.52	108	1.8	-	86	-0.059	8.83	0.015
316	51.134	0.160	2.52	108	2.1	-	86	-0.053	7.92	0.011
317	51.300	0.166	2.53	108	1.8	-	86	-0.056	7.33	0.009
318	51.460	0.160	2.53	108	2.2	-	86	-0.057	7.16	0.010
319	51.623	0.163	2.53	108	2.2	-	86	-0.055	7.16	0.003
320	51.787	0.164	2.53	108	1.8	100	86	-0.053	7.00	0.012
321	51.947	0.160	2.53	108	2.2	-	86	-0.052	7.15	0.010
322	52.111	0.164	2.52	108	1.7	-	86	-0.055	7.36	0.007
323	52.274	0.163	2.52	108	2.0	-	86	-0.054	7.38	0.012
324	52.435	0.161	2.53	108	2.0	-	86	-0.050	7.39	0.012
325	52.598	0.163	2.52	108	2.2	-	86	-0.052	7.37	0.009
326	52.762	0.164	2.53	108	2.1	-	86	-0.052	7.42	0.010
327	52.922	0.160	2.52	108	1.9	-	86	-0.052	7.52	0.010
328	53.087	0.165	2.53	108	1.8	-	86	-0.049	7.44	0.012
329	53.248	0.161	2.53	108	1.7	-	86	-0.053	7.46	0.010

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
330	53.410	0.162	2.53	108	2.0	99	86	-0.051	7.44	0.010
331	53.575	0.165	2.52	108	2.1	-	86	-0.052	7.42	0.012
332	53.735	0.160	2.52	108	1.8	-	86	-0.050	7.30	0.016
333	53.899	0.164	2.52	108	2.0	-	86	-0.049	7.32	0.010
334	54.062	0.163	2.52	108	2.0	-	86	-0.048	7.24	0.011
335	54.223	0.161	2.53	108	2.0	-	86	-0.050	7.27	0.007
336	54.387	0.164	2.52	108	1.8	-	86	-0.048	7.28	0.011
337	54.549	0.162	2.53	108	1.8	-	86	-0.048	7.25	0.012
338	54.711	0.162	2.53	108	1.8	-	86	-0.048	7.24	0.012
339	54.875	0.164	2.53	108	2.3	-	86	-0.047	7.21	0.011
340	55.037	0.162	2.53	108	2.2	98	86	-0.047	7.20	0.011
341	55.198	0.161	2.53	108	2.0	-	86	-0.050	7.24	0.009
342	55.364	0.166	2.53	108	2.3	-	86	-0.047	7.21	0.012
343	55.523	0.159	2.53	108	2.0	-	86	-0.046	7.24	0.016
344	55.687	0.164	2.54	108	2.2	-	86	-0.045	7.22	0.010
345	55.851	0.164	2.53	108	2.0	-	86	-0.048	7.20	0.011
346	56.011	0.160	2.53	108	2.1	-	86	-0.047	7.22	0.014
347	56.175	0.164	2.53	108	1.9	-	86	-0.044	7.21	0.013
348	56.338	0.163	2.53	108	1.7	-	86	-0.046	7.21	0.014
349	56.499	0.161	2.53	108	1.7	-	86	-0.047	7.23	0.016
350	56.662	0.163	2.53	108	1.8	98	86	-0.046	7.19	0.012
351	56.827	0.165	2.53	108	2.0	-	86	-0.044	7.14	0.011
352	56.987	0.160	2.53	108	2.3	-	86	-0.044	7.18	0.009
353	57.152	0.165	2.53	108	2.2	-	86	-0.043	7.15	0.014
354	57.314	0.162	2.53	108	1.8	-	86	-0.046	7.12	0.014
355	57.475	0.161	2.53	108	2.2	-	86	-0.042	7.13	0.010
356	57.640	0.165	2.53	108	1.9	-	86	-0.044	7.08	0.015
357	57.800	0.160	2.53	108	1.8	-	86	-0.046	7.09	0.012
358	57.964	0.164	2.53	108	2.2	-	86	-0.046	7.05	0.015
359	58.127	0.163	2.53	108	2.3	-	86	-0.043	7.12	0.014
360	58.288	0.161	2.53	108	1.7	99	86	-0.045	7.08	0.015
361	58.452	0.164	2.53	108	2.3	-	86	-0.044	7.05	0.015
362	58.615	0.163	2.53	108	1.8	-	86	-0.043	7.07	0.013

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
363	58.776	0.161	2.53	108	2.2	-	86	-0.043	6.98	0.015
364	58.940	0.164	2.53	108	2.0	-	86	-0.043	6.97	0.013
365	59.103	0.163	2.53	108	1.8	-	86	-0.045	7.02	0.014
366	59.264	0.161	2.52	108	1.9	-	86	-0.042	6.87	0.015
367	59.430	0.166	2.53	108	2.3	-	86	-0.044	7.02	0.015
368	59.590	0.160	2.53	108	1.7	-	86	-0.043	7.17	0.018
369	59.752	0.162	2.52	108	1.7	-	86	-0.045	7.32	0.017
370	59.917	0.165	2.53	108	1.9	99	86	-0.041	7.44	0.016
371	60.077	0.160	2.53	108	1.7	-	86	-0.043	7.49	0.014
372	60.241	0.164	2.53	108	2.3	-	86	-0.045	7.60	0.012
373	60.404	0.163	2.53	108	2.3	-	86	-0.043	7.93	0.013
374	60.566	0.162	2.53	108	2.3	-	86	-0.045	8.05	0.015
375	60.729	0.163	2.53	108	1.7	-	86	-0.046	8.08	0.010
376	60.893	0.164	2.53	108	1.7	-	86	-0.041	8.03	0.012
377	61.053	0.160	2.53	108	1.8	-	86	-0.046	8.15	0.013
378	61.217	0.164	2.53	108	2.2	-	86	-0.042	8.06	0.011
379	61.380	0.163	2.52	108	1.7	-	86	-0.044	8.05	0.014
380	61.541	0.161	2.53	108	2.0	98	86	-0.046	7.95	0.010
381	61.706	0.165	2.52	108	1.9	-	86	-0.043	7.95	0.008
382	61.866	0.160	2.53	108	2.1	-	86	-0.043	7.96	0.009
383	62.030	0.164	2.53	108	2.3	-	86	-0.042	7.86	0.013
384	62.193	0.163	2.53	108	1.7	-	86	-0.043	7.89	0.012
385	62.354	0.161	2.53	108	1.8	-	86	-0.041	7.81	0.013
386	62.518	0.164	2.53	108	1.7	-	86	-0.044	7.77	0.009
387	62.680	0.162	2.53	108	1.8	-	86	-0.045	7.79	0.010
388	62.842	0.162	2.53	108	1.8	-	86	-0.046	7.75	0.008
389	63.005	0.163	2.53	108	1.7	-	86	-0.042	7.74	0.010
390	63.168	0.163	2.52	108	1.8	98	86	-0.044	7.75	0.007
391	63.329	0.161	2.52	108	2.3	-	86	-0.044	7.69	0.005
392	63.495	0.166	2.53	108	2.1	-	86	-0.044	7.64	0.010
393	63.655	0.160	2.53	108	1.8	-	86	-0.043	7.64	0.008
394	63.817	0.162	2.53	108	2.1	-	86	-0.044	7.64	0.010
395	63.982	0.165	2.53	108	1.7	-	86	-0.042	7.68	0.009

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
396	64.142	0.160	2.53	108	1.9	-	86	-0.042	7.66	0.010
397	64.306	0.164	2.52	108	2.1	-	86	-0.041	7.64	0.009
398	64.469	0.163	2.53	108	2.2	-	86	-0.042	7.73	0.011
399	64.631	0.162	2.53	108	2.1	-	86	-0.042	7.72	0.008
400	64.794	0.163	2.53	108	1.9	99	86	-0.042	7.75	0.014
401	64.957	0.163	2.54	108	1.7	-	86	-0.042	7.79	0.007
402	65.118	0.161	2.52	108	2.1	-	86	-0.044	7.78	0.011
403	65.282	0.164	2.53	108	1.8	-	86	-0.043	7.74	0.010
404	65.445	0.163	2.53	108	1.8	-	86	-0.043	7.73	0.011
405	65.606	0.161	2.53	108	1.7	-	86	-0.042	7.80	0.014
406	65.771	0.165	2.53	108	2.3	-	85	-0.043	7.74	0.012
407	65.931	0.160	2.52	108	1.9	-	86	-0.041	7.77	0.009
408	66.095	0.164	2.53	108	1.8	-	86	-0.044	7.73	0.009
409	66.259	0.164	2.53	108	1.7	-	85	-0.043	7.67	0.010
410	66.419	0.160	2.53	108	1.8	99	86	-0.042	7.73	0.009
411	66.583	0.164	2.53	108	1.8	-	85	-0.044	7.68	0.010
412	66.746	0.163	2.53	108	1.7	-	85	-0.041	7.68	0.007
413	66.907	0.161	2.53	108	1.9	-	85	-0.042	7.73	0.008
414	67.071	0.164	2.53	108	1.8	-	85	-0.042	7.70	0.011
415	67.234	0.163	2.53	108	2.3	-	85	-0.041	7.72	0.010
416	67.394	0.160	2.53	108	2.1	-	85	-0.043	7.77	0.012
417	67.560	0.166	2.53	108	2.3	-	85	-0.042	7.73	0.009
418	67.721	0.161	2.53	108	2.1	-	85	-0.044	7.70	0.009
419	67.883	0.162	2.53	108	2.3	-	85	-0.043	7.72	0.009
420	68.048	0.165	2.53	108	1.9	99	85	-0.041	7.71	0.007
421	68.208	0.160	2.53	108	1.8	-	85	-0.042	7.76	0.008
422	68.372	0.164	2.52	108	2.2	-	85	-0.044	7.71	0.012
423	68.534	0.162	2.53	108	2.1	-	85	-0.042	7.77	0.011
424	68.696	0.162	2.53	108	1.8	-	85	-0.044	7.75	0.010
425	68.859	0.163	2.53	108	2.0	-	85	-0.043	7.79	0.013
426	69.022	0.163	2.53	108	2.2	-	85	-0.042	7.74	0.007
427	69.183	0.161	2.53	108	1.8	-	85	-0.044	7.59	0.010
428	69.347	0.164	2.53	108	1.8	-	85	-0.043	7.59	0.005

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
429	69.510	0.163	2.53	108	2.0	-	85	-0.043	7.54	0.012
430	69.671	0.161	2.53	108	2.3	98	85	-0.043	7.58	0.008
431	69.836	0.165	2.53	108	2.3	-	85	-0.043	7.58	0.010
432	69.995	0.159	2.52	108	1.9	-	85	-0.044	7.60	0.013
433	70.160	0.165	2.53	108	2.1	-	85	-0.043	7.58	0.011
434	70.323	0.163	2.53	108	2.3	-	85	-0.044	7.55	0.012
435	70.483	0.160	2.53	108	1.8	-	85	-0.040	7.62	0.009
436	70.647	0.164	2.53	108	2.3	-	85	-0.043	7.61	0.012
437	70.810	0.163	2.53	108	1.9	99	85	-0.043	7.62	0.007
Avg/Tot	70.810	0.162	2.53	104.5	2.0	100	84.9	-0.050	8.13	0.084

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 1

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		0.02	83	0.0		77
1	0.121	0.121	1.04	83	1.5	-	77
2	0.262	0.141	1.04	83	1.5	-	78
3	0.405	0.143	1.05	83	1.6	-	78
4	0.549	0.144	1.07	83	1.4	-	78
5	0.692	0.143	1.06	83	1.6	-	78
6	0.835	0.143	1.07	83	1.4	-	78
7	0.980	0.145	1.07	84	1.6	-	79
8	1.125	0.145	1.08	84	1.5	-	79
9	1.271	0.146	1.09	84	1.5	-	79
10	1.416	0.145	1.09	84	1.5	99	79
11	1.561	0.145	1.08	84	1.5	-	79
12	1.706	0.145	1.08	84	1.5	-	79
13	1.851	0.145	1.08	84	1.6	-	79
14	1.996	0.145	1.09	84	1.6	-	79
15	2.143	0.147	1.10	85	1.4	-	79
16	2.290	0.147	1.10	85	1.5	-	79
17	2.436	0.146	1.10	85	1.4	-	79
18	2.583	0.147	1.10	85	1.5	-	79
19	2.729	0.146	1.10	85	1.4	-	79
20	2.876	0.147	1.10	85	1.4	103	79
21	3.024	0.148	1.10	86	1.6	-	79
22	3.171	0.147	1.10	86	1.4	-	79
23	3.319	0.148	1.10	86	1.5	-	79
24	3.467	0.148	1.10	86	1.6	-	79
25	3.615	0.148	1.11	87	1.4	-	79
26	3.764	0.149	1.11	87	1.6	-	79
27	3.912	0.148	1.11	87	1.4	-	79
28	4.061	0.149	1.11	87	1.4	-	79
29	4.210	0.149	1.11	88	1.6	-	79
30	4.359	0.149	1.11	88	1.5	103	79
31	4.509	0.150	1.11	88	1.6	-	79
32	4.658	0.149	1.11	88	1.5	-	79

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 1

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/11/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
33	4.808	0.150	1.12	89	1.5	-	79
34	4.958	0.150	1.11	89	1.5	-	79
35	5.108	0.150	1.11	89	1.4	-	79
36	5.258	0.150	1.11	90	1.5	-	79
37	5.408	0.150	1.11	90	1.6	-	79
38	5.558	0.150	1.11	90	1.6	-	79
39	5.709	0.151	1.11	90	1.6	-	79
40	5.859	0.150	1.11	91	1.6	103	79
41	6.009	0.150	1.12	91	1.4	-	79
42	6.160	0.151	1.11	91	1.4	-	79
43	6.311	0.151	1.11	92	1.4	-	79
44	6.461	0.150	1.12	92	1.6	-	79
45	6.612	0.151	1.12	92	1.5	-	79
46	6.763	0.151	1.12	93	1.5	-	79
47	6.914	0.151	1.13	93	1.5	-	79
48	7.064	0.150	1.13	93	1.6	-	79
49	7.214	0.150	1.12	93	1.6	-	79
50	7.366	0.152	1.11	94	1.6	103	79
51	7.517	0.151	1.11	94	1.5	-	79
52	7.668	0.151	1.11	94	1.6	-	79
53	7.820	0.152	1.12	94	1.6	-	79
54	7.971	0.151	1.11	95	1.4	-	79
55	8.123	0.152	1.12	95	1.6	-	79
56	8.274	0.151	1.12	95	1.4	-	79
57	8.426	0.152	1.13	95	1.5	-	79
58	8.578	0.152	1.13	96	1.4	-	79
59	8.728	0.150	1.13	96	1.4	-	79
60	8.880	0.152	1.12	96	1.4	102	79
Avg/Tot	8.880	0.148	1.08	88.4	1.5	102	78.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
0	266	201	123	207	157	190.5	850.9
1	265	202	123	208	156	190.5	769.4
2	263	199	123	209	156	189.9	742.3
3	262	200	123	215	155	191.2	750.9
4	261	200	124	218	155	191.4	776.3
5	259	200	124	221	155	192.0	807.7
6	259	199	126	221	155	191.8	823.3
7	257	198	127	224	155	192.1	835.5
8	256	198	128	226	155	192.7	838.6
9	255	198	129	231	155	193.6	829.4
10	255	198	129	232	155	193.6	816.2
11	254	197	129	232	155	193.4	806.3
12	254	198	130	235	156	194.6	802.5
13	254	198	130	234	157	194.5	803.5
14	255	198	128	233	157	194.3	804.1
15	255	197	130	231	158	193.9	803.6
16	256	195	127	228	158	192.9	802.6
17	255	195	126	225	158	191.6	802.0
18	255	194	125	224	157	190.9	804.1
19	254	192	125	222	157	190.0	810.3
20	253	191	122	217	157	188.0	819.5
21	252	190	123	216	156	187.4	829.9
22	251	188	122	214	155	186.1	842.0
23	251	187	121	213	155	185.3	854.6
24	250	185	120	210	154	183.8	866.0
25	249	184	119	210	153	183.1	873.7
26	248	182	119	204	153	181.3	879.2
27	247	181	119	206	152	181.0	881.8
28	247	180	117	202	151	179.3	880.2
29	246	179	118	201	151	178.8	877.1
30	246	177	118	199	150	178.0	873.0
31	245	176	118	199	149	177.5	869.8
32	244	174	116	197	149	176.1	867.0
33	243	174	115	195	148	175.1	865.7
34	243	173	116	193	147	174.5	866.0
35	242	172	115	191	147	173.4	867.0
36	242	171	114	188	146	172.4	867.8
37	241	171	114	187	145	171.6	868.0
38	241	170	114	186	145	171.1	868.0
39	240	169	114	185	144	170.1	867.7
40	239	168	114	186	144	169.9	867.3
41	238	167	112	184	143	168.9	867.2
42	237	167	114	183	142	168.5	866.5
43	236	166	113	182	142	167.7	864.1
44	235	165	111	180	141	166.5	860.9
45	235	164	112	180	141	166.3	857.3
46	234	163	112	179	140	165.5	854.4
47	234	163	111	177	140	164.7	851.2
48	233	162	111	178	139	164.6	849.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
49	233	161	111	177	139	164.1	845.5
50	233	161	111	177	138	164.0	839.2
51	233	160	111	174	138	163.0	833.0
52	232	159	111	178	137	163.5	828.8
53	232	159	110	174	137	162.3	826.7
54	232	158	110	175	136	162.2	825.5
55	232	158	110	174	136	161.8	825.9
56	232	158	110	173	135	161.5	827.8
57	232	157	110	174	135	161.4	830.8
58	232	157	110	171	134	160.6	833.2
59	232	156	110	171	134	160.5	833.8
60	232	156	108	170	134	159.8	833.7
61	232	156	109	168	133	159.5	834.7
62	231	155	109	168	133	159.1	837.4
63	231	154	109	169	133	159.2	842.0
64	231	155	109	167	132	158.8	848.7
65	231	155	108	167	132	158.5	856.7
66	231	154	108	166	131	158.0	865.8
67	230	154	108	167	131	158.0	875.4
68	230	153	108	168	131	158.1	884.9
69	230	153	108	167	130	157.6	892.6
70	229	153	108	167	130	157.4	898.9
71	229	152	107	169	130	157.4	903.4
72	229	152	107	167	130	157.0	907.4
73	229	151	107	166	129	156.4	913.2
74	229	151	108	167	129	156.7	924.3
75	229	151	107	168	129	156.7	940.2
76	229	150	106	165	128	155.7	957.1
77	228	150	106	165	128	155.4	970.6
78	228	150	107	166	128	155.6	980.1
79	228	149	106	167	128	155.5	985.8
80	227	149	107	167	127	155.4	988.8
81	227	149	107	168	127	155.5	989.4
82	226	149	106	166	127	154.6	988.5
83	226	148	107	167	126	154.9	986.2
84	226	148	105	166	126	154.3	983.0
85	225	148	106	166	126	154.2	980.2
86	225	148	106	167	126	154.3	977.1
87	224	147	106	166	125	153.7	974.8
88	224	147	105	166	125	153.4	973.7
89	223	147	106	167	125	153.6	975.0
90	223	147	105	167	125	153.3	978.3
91	223	146	106	168	124	153.3	982.9
92	222	147	105	167	124	153.0	987.8
93	221	147	106	166	124	152.6	991.8
94	221	147	107	166	124	152.9	991.8
95	220	146	106	168	124	152.8	991.1
96	220	146	106	166	124	152.2	992.0
97	219	146	104	167	123	151.9	991.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
98	219	146	104	166	123	151.6	986.6
99	219	145	105	166	123	151.3	982.4
100	219	145	105	167	123	151.6	983.6
101	218	145	105	168	123	151.6	986.1
102	218	144	104	167	122	151.1	987.8
103	217	145	106	169	122	151.9	987.1
104	217	144	105	167	122	151.1	984.6
105	216	144	105	163	122	150.1	981.0
106	216	144	104	167	122	150.4	976.9
107	215	144	105	166	122	150.1	973.0
108	215	143	105	165	121	149.9	968.1
109	214	144	105	165	121	149.9	960.7
110	213	143	104	165	121	149.4	947.6
111	213	144	105	166	121	149.6	932.6
112	213	143	103	163	121	148.4	922.2
113	212	142	104	164	121	148.5	915.2
114	212	142	104	165	120	148.5	909.0
115	212	142	103	163	120	148.0	901.0
116	212	142	103	165	120	148.4	892.8
117	211	142	103	163	120	147.9	885.4
118	211	142	103	162	120	147.6	878.5
119	211	141	104	164	120	147.8	874.5
120	210	141	103	163	120	147.5	875.8
121	210	140	103	162	120	146.9	881.4
122	210	141	103	161	119	146.8	887.2
123	210	141	103	161	119	146.7	891.4
124	209	140	102	160	119	146.0	893.5
125	209	140	102	161	119	146.3	893.4
126	209	140	103	159	119	145.9	892.0
127	208	140	102	159	119	145.6	890.1
128	208	140	103	159	119	145.6	888.9
129	208	140	102	158	118	145.3	887.6
130	207	140	102	159	118	145.3	886.4
131	207	140	102	157	118	144.7	885.7
132	206	140	102	157	118	144.7	885.2
133	206	139	102	158	118	144.6	884.9
134	206	139	102	156	118	144.2	884.2
135	205	139	103	158	118	144.5	883.6
136	205	139	102	158	118	144.2	882.7
137	205	139	102	156	117	143.9	881.8
138	205	138	102	158	117	144.1	882.2
139	204	139	103	157	117	143.9	882.9
140	204	138	102	156	117	143.6	883.3
141	204	138	102	156	117	143.4	884.2
142	204	139	102	155	117	143.2	883.1
143	203	138	102	156	117	143.3	880.8
144	203	138	102	156	117	143.2	877.8
145	203	138	102	156	117	143.0	874.3
146	203	138	103	156	117	143.1	870.4

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
147	203	137	102	156	117	142.9	866.2
148	202	138	102	154	117	142.6	862.3
149	202	137	102	154	116	142.1	858.7
150	202	138	102	155	116	142.4	855.4
151	202	137	102	153	116	142.0	852.9
152	201	136	102	155	116	142.0	853.3
153	201	137	102	153	116	141.8	856.7
154	201	137	102	154	116	141.7	862.1
155	200	137	102	154	116	141.6	867.3
156	200	137	102	153	116	141.4	872.6
157	200	136	102	152	116	141.0	877.2
158	199	137	101	153	116	141.1	881.4
159	199	136	101	153	115	140.8	884.9
160	199	136	101	154	115	140.9	888.6
161	198	136	102	152	115	140.8	892.8
162	198	136	101	153	115	140.7	897.2
163	197	136	101	152	115	140.3	901.4
164	197	135	101	153	115	140.2	906.0
165	197	135	101	152	115	140.0	910.1
166	197	135	101	152	115	139.9	914.2
167	196	135	101	153	115	139.9	918.4
168	196	134	101	153	114	139.7	922.3
169	195	135	101	152	114	139.5	926.2
170	195	135	101	151	114	139.2	930.6
171	195	135	101	152	114	139.2	934.8
172	194	135	100	151	114	138.7	939.1
173	193	135	100	149	114	138.3	943.4
174	193	134	101	151	114	138.7	947.8
175	193	134	101	152	114	138.6	952.4
176	193	134	101	152	114	138.7	957.0
177	192	134	101	152	114	138.6	963.5
178	192	134	101	152	114	138.5	969.9
179	192	133	102	153	114	138.5	975.2
180	191	134	101	153	113	138.4	980.3
181	191	133	102	153	113	138.5	985.2
182	191	133	101	153	113	138.4	989.5
183	191	133	100	153	113	137.9	993.4
184	191	134	100	152	113	137.9	996.7
185	190	133	101	155	113	138.5	1000.1
186	190	133	101	154	113	138.3	1004.0
187	190	133	100	154	113	137.9	1009.2
188	190	133	100	154	113	137.9	1015.3
189	190	133	101	153	113	138.0	1022.9
190	190	132	101	156	113	138.2	1031.7
191	190	133	101	155	113	138.0	1041.4
192	190	133	101	157	113	138.5	1050.9
193	189	133	100	156	113	138.1	1059.8
194	189	133	101	155	113	138.1	1066.6
195	189	133	101	158	113	138.7	1071.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
196	189	132	101	158	112	138.5	1075.1
197	189	133	100	157	112	138.3	1077.4
198	189	134	100	156	112	138.1	1078.2
199	188	134	101	158	112	138.6	1077.6
200	188	134	100	158	112	138.5	1076.4
201	188	134	100	157	112	138.0	1075.4
202	187	135	100	157	112	138.1	1074.1
203	188	135	99	158	112	138.3	1072.8
204	188	135	101	160	112	139.2	1071.6
205	188	135	101	162	112	139.6	1072.2
206	188	136	101	162	112	140.0	1061.8
207	189	136	101	162	113	140.0	1051.4
208	189	136	101	161	113	139.8	1041.5
209	189	137	101	163	113	140.5	1036.4
210	189	137	100	162	113	140.1	1034.3
211	189	137	102	162	113	140.6	1032.3
212	189	137	101	163	113	140.7	1029.8
213	189	138	102	163	113	141.0	1026.5
214	189	138	102	161	113	140.7	1022.8
215	189	138	102	163	113	141.1	1019.4
216	189	139	102	163	113	141.1	1018.1
217	189	138	101	163	113	141.1	1010.4
218	189	139	102	163	113	141.4	997.0
219	189	139	102	163	114	141.3	977.6
220	189	139	102	162	114	141.1	960.0
221	189	139	102	162	114	141.3	945.5
222	189	140	102	161	114	141.1	934.4
223	189	140	102	163	114	141.5	925.9
224	189	140	102	162	114	141.3	920.1
225	190	141	102	162	114	141.7	915.1
226	190	141	102	163	114	141.8	915.2
227	190	141	102	161	114	141.5	919.0
228	190	141	102	161	114	141.6	925.7
229	190	141	102	162	114	141.9	928.6
230	190	141	102	161	114	141.8	930.0
231	190	142	102	162	114	142.0	929.9
232	191	142	102	161	114	142.0	929.1
233	191	142	102	161	114	141.9	925.5
234	191	142	102	161	114	141.9	922.1
235	191	142	102	158	114	141.3	920.1
236	191	142	102	159	114	141.8	920.5
237	191	142	102	159	114	141.8	922.3
238	191	142	102	160	115	141.8	925.2
239	191	143	102	159	115	141.9	931.8
240	191	143	102	159	115	141.8	944.2
241	191	142	102	159	115	141.7	959.5
242	191	143	102	160	115	142.0	973.6
243	190	142	102	159	115	141.6	984.8
244	190	143	102	158	115	141.6	993.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
245	190	143	102	159	115	141.6	1001.7
246	190	143	103	157	115	141.5	1009.4
247	190	143	102	159	115	141.7	1017.3
248	190	143	102	159	115	141.8	1025.3
249	190	143	102	159	115	141.6	1034.1
250	190	143	102	161	115	142.0	1043.1
251	190	143	102	159	115	141.7	1052.6
252	190	143	102	160	115	141.9	1061.8
253	190	143	102	160	115	142.0	1070.5
254	189	143	102	160	115	141.8	1078.4
255	189	143	102	161	115	142.1	1086.6
256	189	143	102	161	115	142.2	1094.6
257	189	143	103	162	115	142.5	1103.0
258	189	144	102	161	115	142.3	1111.6
259	189	144	102	162	115	142.5	1119.8
260	189	144	102	163	115	142.6	1127.9
261	189	144	102	163	115	142.7	1136.0
262	189	144	103	165	116	143.2	1144.7
263	189	145	103	166	116	143.4	1154.0
264	188	144	103	164	116	143.0	1163.1
265	188	145	103	167	116	143.6	1171.7
266	188	145	103	167	116	143.6	1179.1
267	188	145	103	167	116	143.7	1185.0
268	188	146	103	166	116	143.5	1190.6
269	188	146	102	169	116	143.9	1195.5
270	188	146	102	170	116	144.1	1200.4
271	188	145	103	169	116	144.0	1203.8
272	187	146	102	170	116	144.0	1208.1
273	187	146	102	172	116	144.6	1212.2
274	187	145	101	175	116	144.7	1215.5
275	187	146	101	175	116	144.9	1219.6
276	188	146	101	173	116	144.5	1225.0
277	188	146	100	176	116	145.1	1229.1
278	188	147	102	178	116	145.9	1232.9
279	188	147	102	176	116	145.6	1238.4
280	188	148	102	175	116	145.8	1244.0
281	188	148	102	179	116	146.6	1250.2
282	189	148	102	177	116	146.5	1261.8
283	189	149	102	180	116	147.0	1269.5
284	189	149	103	181	117	147.6	1273.8
285	189	150	102	183	117	148.0	1286.7
286	189	151	103	182	117	148.2	1293.1
287	189	151	102	184	117	148.7	1298.6
288	189	152	103	185	117	149.0	1303.7
289	189	152	103	188	117	150.0	1304.3
290	189	153	102	190	117	150.4	1307.3
291	190	153	102	189	118	150.4	1308.4
292	190	154	103	190	118	150.9	1309.7
293	191	155	102	191	118	151.3	1310.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
294	191	155	103	196	118	152.6	1308.7
295	192	155	102	195	118	152.6	1308.3
296	193	156	102	194	118	152.7	1306.9
297	194	157	103	200	119	154.2	1305.0
298	194	158	103	197	119	154.0	1304.6
299	195	158	103	199	119	154.8	1301.1
300	196	159	103	200	119	155.2	1303.1
301	196	159	103	201	119	155.7	1306.3
302	197	160	103	203	120	156.3	1304.2
303	197	161	103	202	120	156.4	1308.6
304	198	161	103	203	120	156.8	1288.9
305	198	162	104	205	120	157.8	1279.2
306	199	162	103	206	120	157.9	1246.1
307	199	163	103	207	120	158.5	1211.3
308	200	163	103	206	120	158.5	1182.7
309	200	164	104	210	121	159.7	1157.3
310	200	165	103	211	121	159.9	1144.5
311	201	166	104	208	121	160.1	1134.9
312	201	167	104	207	121	160.0	1131.2
313	202	168	103	207	121	160.4	1125.9
314	203	169	104	204	122	160.3	1111.1
315	203	171	105	205	122	161.2	1084.4
316	204	171	105	201	122	160.7	1047.6
317	205	172	105	202	123	161.3	1007.7
318	205	173	105	203	123	161.9	970.6
319	206	174	105	201	123	161.8	937.7
320	206	175	105	197	123	161.3	911.8
321	207	176	105	198	124	161.7	898.8
322	207	176	105	197	124	161.8	893.9
323	207	177	105	197	124	161.8	891.8
324	207	177	104	193	125	161.1	890.2
325	207	177	105	191	125	160.8	888.3
326	206	177	105	191	125	160.9	885.4
327	206	178	105	191	126	161.1	881.2
328	206	178	105	190	126	161.0	876.4
329	206	178	106	186	126	160.2	871.1
330	205	179	106	186	126	160.5	865.1
331	205	179	106	185	127	160.1	858.9
332	204	179	106	183	127	159.9	851.9
333	204	179	106	183	127	159.7	844.2
334	203	179	106	181	127	159.3	837.3
335	203	179	106	181	128	159.4	831.2
336	202	179	106	179	128	158.9	826.2
337	202	179	105	180	128	158.7	821.9
338	201	178	105	181	128	158.5	817.8
339	201	178	104	179	128	158.1	814.6
340	200	178	104	175	128	157.1	812.2
341	200	178	105	175	128	157.0	810.4
342	199	177	104	168	128	155.4	809.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
343	199	177	104	173	129	156.4	809.2
344	198	177	104	173	129	156.1	809.2
345	198	177	104	172	129	156.0	809.4
346	198	177	105	170	129	155.7	808.9
347	198	177	105	171	129	155.8	808.4
348	197	177	105	168	129	155.0	808.3
349	196	177	105	168	129	155.1	808.2
350	196	177	105	164	130	154.3	808.0
351	195	177	105	166	130	154.5	807.6
352	195	177	105	166	130	154.3	806.5
353	194	177	105	164	130	153.9	804.9
354	194	177	106	164	130	153.9	802.8
355	193	176	106	162	130	153.5	800.5
356	192	176	105	163	131	153.4	798.4
357	191	177	105	163	131	153.4	796.6
358	191	176	106	162	131	153.1	795.1
359	191	176	106	162	131	152.9	794.0
360	190	176	106	162	131	152.9	793.1
361	190	176	105	160	131	152.4	792.4
362	190	176	105	161	131	152.5	791.6
363	189	175	105	161	131	152.3	791.1
364	189	176	105	160	131	152.1	790.4
365	188	175	105	158	132	151.6	789.9
366	188	175	105	158	132	151.6	789.4
367	188	175	105	159	132	151.5	788.2
368	188	175	105	158	132	151.4	787.1
369	187	175	105	157	132	151.0	787.9
370	187	175	105	158	132	151.3	790.0
371	186	175	105	156	132	150.8	794.0
372	186	174	106	156	132	150.8	797.8
373	185	174	105	157	132	150.6	801.3
374	185	174	105	156	132	150.4	804.3
375	185	174	106	157	132	150.7	807.3
376	184	174	106	158	132	150.7	810.2
377	184	174	105	155	132	149.8	812.5
378	183	174	106	155	132	150.0	813.5
379	183	174	105	156	132	150.1	813.1
380	183	174	105	156	132	150.0	811.9
381	182	174	105	157	132	150.0	811.0
382	182	174	105	156	132	149.8	809.9
383	182	174	105	155	132	149.7	808.5
384	182	174	104	156	132	149.8	807.6
385	183	174	105	155	132	149.7	806.1
386	183	174	104	156	132	149.7	805.7
387	183	174	104	155	132	149.5	802.0
388	183	174	104	155	132	149.5	795.8
389	183	174	105	155	132	149.6	788.9
390	182	174	104	153	132	149.0	781.7
391	182	173	105	156	132	149.7	775.2

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 1Technician: AKDate: 8/11/2025Stove ΔT: 42

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
392	182	173	105	156	132	149.5	769.9
393	182	173	105	154	132	149.1	765.3
394	182	173	105	155	132	149.2	761.8
395	182	173	104	154	132	148.9	758.8
396	182	173	105	155	132	149.1	756.8
397	182	173	106	155	132	149.4	755.5
398	182	172	106	155	132	149.2	755.0
399	182	172	106	156	132	149.4	754.5
400	181	172	106	155	132	149.1	754.1
401	181	172	105	155	132	149.0	753.7
402	181	172	106	154	132	149.0	754.0
403	181	172	105	154	132	148.7	754.1
404	181	172	105	155	132	148.8	754.4
405	181	172	105	156	132	148.9	754.4
406	181	171	105	155	132	148.8	754.3
407	181	171	105	154	132	148.6	755.2
408	181	171	105	154	132	148.4	755.3
409	181	171	104	153	132	148.3	755.5
410	182	170	105	154	132	148.5	755.3
411	182	170	105	156	132	149.0	754.4
412	182	170	105	154	132	148.5	754.1
413	182	170	105	153	132	148.4	753.7
414	182	170	105	153	132	148.3	753.6
415	182	170	105	154	132	148.3	754.6
416	182	170	105	152	132	148.3	755.2
417	182	170	105	154	132	148.6	755.9
418	182	170	105	153	132	148.5	756.5
419	182	170	106	154	132	148.6	757.1
420	182	170	106	154	132	148.7	757.7
421	182	170	105	154	132	148.5	758.0
422	181	170	106	154	132	148.5	758.2
423	181	170	106	154	132	148.5	758.8
424	181	170	106	155	132	148.8	759.3
425	182	170	107	155	132	149.1	759.4
426	181	170	106	154	132	148.6	760.0
427	181	170	105	155	132	148.6	760.0
428	181	170	106	155	132	148.8	760.8
429	181	170	105	154	132	148.5	760.6
430	181	170	106	154	132	148.5	760.5
431	182	170	105	154	132	148.4	760.1
432	182	170	106	155	132	148.9	759.4
433	182	170	106	155	132	148.9	760.0
434	182	170	106	155	132	148.7	760.4
435	182	169	105	155	132	148.7	761.1
436	182	170	106	154	132	148.7	762.3
437	182	169	105	155	132	148.5	763.6
Average	203.6	156.9	105.6	170.1	125.5	152.3	931.4

LAB SAMPLE DATA - ASTM E2515

Client: Buck
 Model: 81C
 Run #: 1

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/11/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	A	G01323	243.1	249.5	6.4
	B	G01324	243.8	250.1	6.3
	C - 1st Hour	G01325	241.6	244.2	2.6
	Amb	G01326	247.3	247.7	0.4
Probes	A	6A	116384.0	116384.0	0.0
	B	6B	115955.9	115956.0	0.1
	C - 1st Hour	6C	115129.3	115129.4	0.1
O-rings	A	6A	3394.7	3394.8	0.1
	B	6B	3611.4	3611.4	0.0
	C - 1st Hour	6C	3399.1	3399.3	0.2

Placed in Dessicator on: 8/11/2025

Balance Audit (mg):

200.0

200.0

		Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time
Filters	A	249.4	8/15 16:00	249.5	8/25 15:00				
	B	250.0	8/15 16:00	250.1	8/25 15:00				
	C - 1st Hour	244.1	8/15 16:00	244.2	8/25 15:00				
	Amb	247.6	8/15 16:00	247.7	8/25 15:00				
Probes	A	116384.0	8/15 16:00	116384.0	8/25 15:00				
	B	115955.9	8/15 16:00	115956.0	8/25 15:00				
	C - 1st Hour	115129.3	8/15 16:00	115129.4	8/25 15:00				
O-Rings	A	3394.7	8/15 16:00	3394.8	8/25 15:00				
	B	3611.4	8/15 16:00	3611.4	8/25 15:00				
	C - 1st Hour	3399.3	8/15 16:00	3399.3	8/25 15:00				

Train A Aggregate, mg: 6.5

Train B Aggregate, mg: 6.4

Train C Aggregate, mg: 2.9

Ambient, mg: 0.4

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove Job Number: 25-422 Tracking #: 227
Model: 81C Run Number: 1 Test Date: 8/11/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary fully closed (0.97"), secondary fully closed (1.675")
Targeted Burn Category: I

Preburn Notes

Time	Notes
35:00	+1.6 lb

Test Notes

Test Burn Start Time: 13:42 Test Fuel Loaded by: 35 seconds
Door Closed: 45 seconds Air Control Set at: 300 seconds
Other Loading Notes: Bypass opened & closed with door, fan on auto low

Time	Notes
	-None-

Test Burn End Time: 20:59

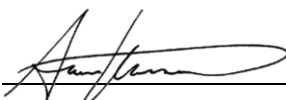
Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO₂ (%): 17.32 CO (%): 4.350
Mid Gas CO₂ (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	12:31	12:33	12:34	8/12 8:11	8/12 8:12	8/12 8:13
CO ₂	0.00	17.34	10.33	0.08	17.18	10.03
CO	0.000	4.357	2.540	0.006	4.390	2.501

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: 

Date: 8/12/25

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove

Job Number: 25-422

Tracking #: 227

Model: 81C

Run Number: 1

Test Date: 8/11/25



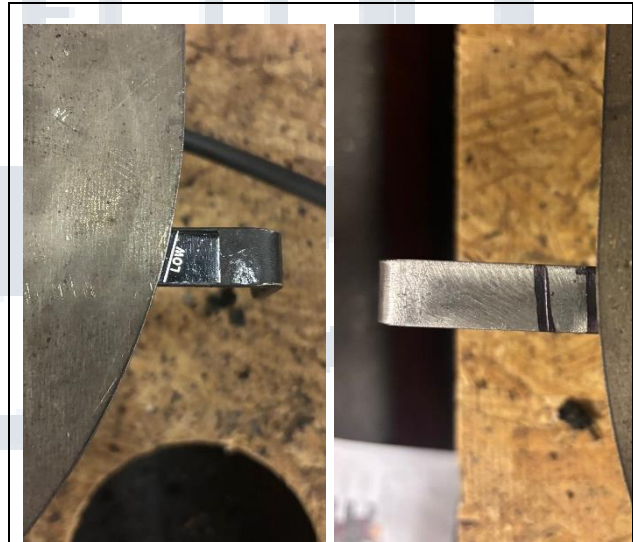
Test Fuel Front/Side View



Test Fuel Iso View



Test Fuel Loaded in Stove



Primary

Secondary

Air Settings

Technician Signature: _____

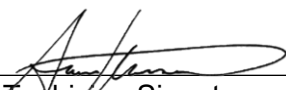
Date: 8/12/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515



Run 2 Data Summary

Client:	Buck
Model:	81C
Job #:	25-422
Tracking #:	227
Test Date:	8/12/2025



Technician Signature

9/4/2025

Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 2

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/12/2025

Burn Rate (kg/hr):	1.19
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	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	74.493	52.454	51.987	8.800
Average Gas Velocity in Dilution Tunnel (ft/sec)	17.5			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11399.0			
Average Gas Meter Temperature (°F)	77.6	102.1	101.9	89.4
Total Sample Volume (dscf)	73.697	50.291	49.173	8.644
Average Tunnel Temperature (°F)	99.4			
Total Time of Test (min)	322			
Total Particulate Catch (mg)	0.4	8.9	8.8	4.3
Particulate Concentration, dry-standard (g/dscf)	0.0000054	0.0001770	0.0001790	0.0004975
Total PM Emissions (g)	0.33	10.49	10.62	5.61
Particulate Emission Rate (g/hr)	0.06	1.96	1.98	5.61
Emissions Factor (g/kg)	-	1.65	1.67	-
Difference from Average Total Particulate Emissions (g)	-	0.06	0.06	-
Difference from Average Total Particulate Emissions (%)	-	0.6%	0.6%	
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	10.55
Particulate Emission Rate (g/hr)	1.97
Emissions Factor (g/kg)	1.66
HHV Efficiency (%)	79.8%
LHV Efficiency (%)	86.2%
CO Emissions (g/min)	0.43

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	<90 °F	87.8	OK
Face Velocity	< 30 ft/min	9.1	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	Min:76.4/Max:78.5	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	20.6	OK

B415.1 Efficiency Results

Manufacturer: Buck
Model: 81C
Date: 08/12/25
Run: 2
Control #: 25-422
Test Duration: 322
Output Category: 2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	79.8%	86.2%
Combustion Efficiency	98.7%	98.7%
Heat Transfer Efficiency	80.8%	87.3%

Output Rate (kJ/h)	18,437	17,489	(Btu/h)
Burn Rate (kg/h)	1.17	2.57	(lb/h)
Input (kJ/h)	23,117	21,929	(Btu/h)

Test Load Weight (dry kg)	6.26	13.80	dry lb
MC wet (%)	18.28		
MC dry (%)	22.37		
Particulate (g)	10.55		
CO (g)	137		
Test Duration (h)	5.37		

Emissions	Particulate	CO
g/MJ Output	0.11	1.39
g/kg Dry Fuel	1.69	21.92
g/h	1.97	25.58
g/min	0.03	0.43
lb/MM Btu Output	0.25	3.22

Air/Fuel Ratio (A/F)	14.11
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VERSION:

2.4

4/15/2010

WOODSTOVE FUEL DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 2

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/12/2025

Preburn Fuel Information						
Size	Length (in)	Moisture Content (% DB)		Size	Length (in)	Moisture Content (% DB)
2x4	16.00	20.9				
2x4	16.00	21.3				
2x4	16.00	21.1				
2x4	16.00	22.2				
2x4	16.00	19.3				
2x4	16.00	24.6				
2x4	16.00	23.5				
2x4	16.00	19.8				
Total Fuel Weight (lbs):		13.24	Average Moisture (%DB):		21.6	

Firebox Volume (ft ³):	2.25
Total 2x4 Crib Weight, with spacers (lbs):	6.15
Total 4x4 Crib Weight, with spacers (lbs):	10.89
Total Wet Fuel Weight, with spacers (lbs):	17.04

Coal Bed Range (20-25%):

Min (lbs): 3.41
 Max (lbs): 4.26

Test Fuel Information						
Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	17.00	1.61	23.5	22.9	24.3	1.30
2x4	17.00	1.61	22.3	22.1	24.2	1.31
2x4	17.00	1.57	19.2	23.1	20.5	1.30
4x4	17.00	5.34	23.7	23.9	23.1	4.32
4x4	17.00	5.16	20.5	21.1	21.1	4.27
Total Dry Weight, no spacers (lbs):						12.50
Total Dry Weight, with spacers (lbs):						14.05

Spacer Moisture Readings (%DB)							
14.3	13.2						
12.5	13.2						
12.1	13.0						
14.1	13.8						
11.8	11.7						
12.2	14.7						
11.5	13.8						
13.6	13.2						

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft ³ , DB)	31.6	OK
Loading Density	6.3 - 7.7 (lbs/ft ³ , WB)	7.57	OK
2x4 Fuel Mix	35 - 65 % of total weight	36%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client: Buck
 Model: 81C
 Run #: 2
 Test Start Time: 13:16

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/12/2025

Total Sampling Time (min): 322
 Recording Interval (min): 1

Meter Box γ Factor: 1.019 (A)
 Meter Box γ Factor: 1.005 (B)
 Meter Box γ Factor: 1.024 (C)
 Meter Box γ Factor: 1.012 (Ambient)

Induced Draft Check (in. H₂O): 0
 Smoke Capture Check (%): 100%
 Date Flue Pipe Last Cleaned: 8/8/2025
 Test Fuel Scale Audit (lbs): 10.00
 Platform Scale Audit (lbs): 10.0

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.78	29.81	29.80
Relative Humidity (%)	41.1	38.7	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:	74.493		ft ³

Sample Train Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-6 in. Hg
(B)	0.000	0.000	cfm @	-7 in. Hg
(C)	0.001	0.001	cfm @	-7 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.052	82
2	0.082	82
3	0.080	82
4	0.054	82
5	0.052	82
6	0.086	82
7	0.086	82
8	0.046	82
Center	0.086	82

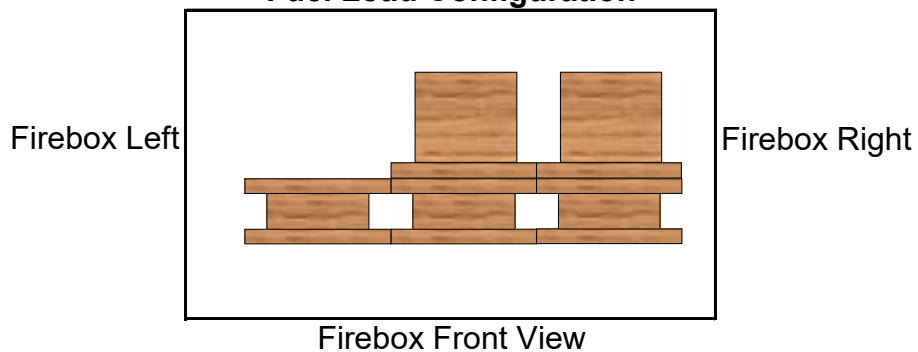
Dilution Tunnel H₂O: 2.00 percent
 Tunnel Diameter: 6 inches
 Pitot Tube Cp: 0.99 [unitless]
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Tunnel Area: 0.1963 ft²

 V_{strav} : 17.32 ft/sec
 V_{scent} : 19.74 ft/sec
 F_p : 0.877 [ratio]
 Initial Tunnel Flow: 193.9 scf/min

Static Pressure: -0.120 in. H₂O

TEST FUEL PROPERTIES

Fuel Load Configuration



Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	22.4

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 2

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/12/2025

Recording Interval (min): 1
 Run Time (min): 75

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	6.56	-0.081	274	241	120	267	157	211.8	453	76
1	6.42	-0.080	276	243	120	280	158	215.4	420	76
2	6.29	-0.078	277	245	121	275	158	215.2	404	76
3	6.20	-0.075	279	247	120	283	159	217.4	395	76
4	6.12	-0.077	280	247	121	281	159	217.6	388	76
5	6.05	-0.076	281	248	119	285	160	218.5	382	76
6	5.96	-0.075	282	249	120	285	160	219.1	379	76
7	5.89	-0.074	283	249	120	283	160	219.1	374	76
8	5.84	-0.074	284	250	120	281	161	218.9	371	76
9	5.78	-0.073	285	250	121	279	161	219.1	367	76
10	5.74	-0.071	285	249	121	277	161	218.9	364	76
11	5.67	-0.071	285	249	119	271	162	217.2	359	76
12	5.64	-0.070	285	248	120	280	162	218.8	358	76
13	5.57	-0.070	285	247	121	274	162	217.6	355	76
14	5.50	-0.071	284	246	120	274	162	217.3	353	76
15	5.43	-0.072	284	245	120	266	162	215.4	352	76
16	5.39	-0.070	284	244	120	273	162	216.5	353	76
17	5.31	-0.069	284	243	120	265	162	214.8	352	76
18	5.25	-0.070	284	242	119	268	162	214.8	352	76
19	5.18	-0.071	283	241	121	263	162	214.1	352	76
20	5.13	-0.069	283	239	121	263	162	213.6	351	76
21	5.07	-0.071	283	238	121	261	162	212.7	351	76
22	5.00	-0.067	282	237	120	261	161	212.3	350	76
23	4.94	-0.069	282	236	120	261	161	212.1	351	76
24	4.87	-0.069	282	234	121	254	161	210.5	348	76
25	4.79	-0.069	282	233	120	257	161	210.6	348	76
26	4.72	-0.069	282	232	120	253	160	209.3	347	76
27	4.66	-0.068	282	231	120	252	160	209.0	348	76
28	4.59	-0.069	282	229	120	252	160	208.6	349	76
29	4.51	-0.070	282	229	120	252	160	208.3	349	76
30	4.45	-0.069	282	228	119	249	159	207.3	348	76
31	4.38	-0.070	282	227	119	248	159	207.0	347	76
32	4.32	-0.069	282	226	118	248	159	206.5	347	76
33	4.26	-0.069	281	226	118	249	159	206.5	345	76
34	4.22	-0.069	281	225	119	249	158	206.5	344	76
35	4.14	-0.067	281	225	119	245	158	205.5	343	76
36	4.08	-0.068	281	224	119	243	158	205.0	342	76
37	4.02	-0.068	281	224	118	240	157	204.1	338	76
38	3.97	-0.068	281	223	118	246	157	205.0	334	76
39	3.90	-0.065	280	223	119	241	157	203.9	329	76
40	3.83	-0.065	280	221	118	245	157	204.2	327	76
41	3.80	-0.065	280	221	118	243	157	203.6	326	76
42	3.74	-0.065	280	221	119	240	156	203.1	326	76
43	3.69	-0.064	280	220	117	239	156	202.4	324	76
44	3.63	-0.065	280	220	118	238	156	202.2	322	76
45	3.59	-0.063	280	219	118	239	156	202.1	320	76

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 2

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/12/2025

Recording Interval (min): 1
 Run Time (min): 75

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
46	3.56	-0.064	279	218	119	238	155	201.7	322	76
47	4.87	-0.066	279	217	119	236	155	201.2	342	76
48	4.81	-0.065	278	216	118	238	155	201.0	332	76
49	4.74	-0.064	278	216	118	234	155	200.2	324	76
50	4.67	-0.064	278	215	117	233	154	199.4	320	76
51	4.62	-0.065	278	214	118	230	154	198.7	321	76
52	4.58	-0.065	277	214	117	234	154	199.3	320	76
53	4.52	-0.065	277	213	117	234	154	198.9	317	76
54	4.47	-0.064	277	212	116	232	154	198.1	318	76
55	4.42	-0.063	276	211	117	232	153	197.9	314	76
56	4.39	-0.063	275	211	117	231	153	197.5	312	76
57	4.33	-0.065	275	210	117	228	153	196.3	309	76
58	4.28	-0.062	274	209	116	233	153	196.9	307	76
59	4.24	-0.062	273	208	117	231	153	196.2	307	76
60	4.20	-0.061	272	208	116	226	153	194.7	304	76
61	4.16	-0.062	271	206	116	227	152	194.5	302	76
62	4.12	-0.062	270	206	116	225	152	193.8	302	76
63	4.08	-0.061	269	205	116	223	152	193.0	299	76
64	4.04	-0.060	268	205	116	224	152	192.9	297	76
65	4.02	-0.060	267	204	117	222	152	192.3	296	76
66	3.99	-0.059	265	203	117	221	152	191.4	294	76
67	3.94	-0.059	264	202	116	218	151	190.1	293	76
68	3.92	-0.059	262	202	116	215	151	189.2	289	77
69	3.88	-0.058	260	201	116	216	151	189.0	286	76
70	3.86	-0.058	259	201	116	215	151	188.1	286	76
71	3.84	-0.056	257	200	115	210	151	186.6	283	76
72	3.81	-0.056	256	199	116	212	150	186.7	283	77
73	3.76	-0.055	255	198	115	210	150	185.9	280	76
74	3.73	-0.055	254	198	117	205	150	184.9	276	77
75	3.70	-0.055	253	196	115	208	150	184.4	276	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.084	0.01	81	0.1		16.89		106	323	79	77
1	0.136	0.136	0.074	2.11	81	1.0	-	16.84	-0.05	112	348	81	77
2	0.285	0.149	0.076	2.16	81	1.0	-	16.71	-0.13	111	331	82	77
3	0.429	0.144	0.078	2.17	81	1.0	-	16.59	-0.12	110	328	82	77
4	0.580	0.151	0.077	2.21	81	1.0	-	16.48	-0.11	110	331	82	76
5	0.725	0.145	0.076	2.23	81	1.0	-	16.36	-0.12	110	337	82	77
6	0.878	0.153	0.079	2.25	81	1.0	-	16.29	-0.07	108	326	82	77
7	1.024	0.146	0.076	2.26	81	1.0	-	16.21	-0.08	106	312	82	77
8	1.178	0.154	0.077	2.30	81	1.0	-	16.15	-0.06	104	303	82	77
9	1.327	0.149	0.078	2.32	81	1.0	-	16.09	-0.06	103	300	82	77
10	1.482	0.155	0.078	2.33	82	1.0	97	16.06	-0.03	102	295	82	77
11	1.632	0.150	0.078	2.35	82	1.0	-	15.97	-0.09	102	293	82	77
12	1.788	0.156	0.078	2.35	82	1.0	-	15.91	-0.06	102	289	82	77
13	1.939	0.151	0.079	2.36	82	1.0	-	15.85	-0.06	102	287	82	77
14	2.093	0.154	0.078	2.36	82	1.0	-	15.78	-0.07	101	283	82	77
15	2.246	0.153	0.079	2.38	83	1.0	-	15.70	-0.08	101	281	83	77
16	2.401	0.155	0.081	2.38	83	1.0	-	15.64	-0.06	101	281	83	77
17	2.557	0.156	0.078	2.40	83	1.0	-	15.59	-0.05	101	276	83	77
18	2.710	0.153	0.080	2.41	83	1.0	-	15.49	-0.10	100	273	83	77
19	2.867	0.157	0.078	2.41	84	1.0	-	15.42	-0.07	100	272	83	77
20	3.019	0.152	0.080	2.42	84	1.0	102	15.34	-0.08	100	271	83	77
21	3.178	0.159	0.080	2.43	84	1.0	-	15.27	-0.07	100	272	83	77
22	3.332	0.154	0.080	2.44	85	1.0	-	15.20	-0.07	100	270	83	77
23	3.490	0.158	0.078	2.43	85	1.0	-	15.13	-0.07	100	270	83	77
24	3.644	0.154	0.079	2.43	85	1.0	-	15.06	-0.07	100	270	83	77
25	3.802	0.158	0.080	2.44	86	1.0	-	14.98	-0.08	100	270	83	77
26	3.960	0.158	0.083	2.45	86	1.0	-	14.90	-0.08	100	270	83	77
27	4.114	0.154	0.082	2.45	86	1.0	-	14.85	-0.05	100	271	83	77
28	4.274	0.160	0.080	2.45	87	1.0	-	14.74	-0.11	100	271	83	77
29	4.429	0.155	0.080	2.47	87	1.0	-	14.68	-0.06	100	270	83	77
30	4.589	0.160	0.080	2.46	87	1.0	103	14.59	-0.09	100	270	83	77
31	4.744	0.155	0.083	2.47	88	1.0	-	14.53	-0.06	100	270	83	77
32	4.903	0.159	0.082	2.47	88	1.0	-	14.44	-0.09	100	269	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.063	0.160	0.081	2.48	88	1.0	-	14.37	-0.07	99	268	83	77
34	5.218	0.155	0.083	2.48	89	1.0	-	14.30	-0.07	99	268	83	77
35	5.380	0.162	0.082	2.49	89	1.0	-	14.22	-0.08	99	266	83	77
36	5.536	0.156	0.084	2.49	89	1.0	-	14.16	-0.06	99	265	83	77
37	5.695	0.159	0.082	2.49	90	1.0	-	14.11	-0.05	99	265	83	77
38	5.855	0.160	0.081	2.50	90	1.0	-	14.02	-0.09	99	264	83	77
39	6.012	0.157	0.086	2.50	90	1.0	-	13.95	-0.07	99	263	83	77
40	6.173	0.161	0.086	2.50	91	1.0	101	13.88	-0.07	98	262	83	77
41	6.331	0.158	0.084	2.51	91	1.0	-	13.81	-0.07	98	261	83	77
42	6.491	0.160	0.083	2.50	91	1.0	-	13.76	-0.05	98	260	83	77
43	6.651	0.160	0.084	2.50	92	1.0	-	13.70	-0.06	98	259	83	77
44	6.810	0.159	0.084	2.51	92	1.0	-	13.62	-0.08	98	259	83	77
45	6.971	0.161	0.086	2.51	92	1.0	-	13.57	-0.05	98	258	83	77
46	7.130	0.159	0.085	2.52	92	1.0	-	13.50	-0.07	98	257	83	77
47	7.290	0.160	0.083	2.52	93	1.0	-	13.45	-0.05	98	258	83	77
48	7.451	0.161	0.082	2.52	93	1.0	-	13.38	-0.07	98	258	83	77
49	7.610	0.159	0.085	2.52	93	1.0	-	13.31	-0.07	98	258	83	77
50	7.772	0.162	0.085	2.51	94	1.0	100	13.25	-0.06	98	259	83	77
51	7.931	0.159	0.085	2.53	94	1.0	-	13.17	-0.08	98	259	83	77
52	8.093	0.162	0.084	2.53	94	1.0	-	13.12	-0.05	98	260	83	77
53	8.255	0.162	0.082	2.54	94	1.0	-	13.06	-0.06	98	260	83	77
54	8.412	0.157	0.088	2.54	95	1.0	-	12.98	-0.08	98	261	83	77
55	8.577	0.165	0.085	2.53	95	1.0	-	12.91	-0.07	98	263	83	77
56	8.735	0.158	0.086	2.54	95	1.0	-	12.84	-0.07	98	263	83	77
57	8.898	0.163	0.087	2.54	95	1.0	-	12.76	-0.08	98	264	83	77
58	9.061	0.163	0.081	2.54	96	1.0	-	12.69	-0.07	98	265	83	77
59	9.218	0.157	0.085	2.54	96	1.1	-	12.61	-0.08	98	265	83	77
60	9.384	0.166	0.084	2.55	96	1.1	101	12.55	-0.06	98	265	83	77
61	9.542	0.158	0.084	2.55	96	1.0	-	12.48	-0.07	98	265	83	77
62	9.705	0.163	0.086	2.55	97	1.0	-	12.42	-0.06	98	267	83	77
63	9.868	0.163	0.086	2.54	97	1.0	-	12.34	-0.08	98	267	83	77
64	10.028	0.160	0.085	2.55	97	1.0	-	12.27	-0.07	98	268	83	77
65	10.191	0.163	0.085	2.56	97	1.0	-	12.21	-0.06	98	269	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	10.354	0.163	0.086	2.56	98	1.0	-	12.12	-0.09	98	271	83	77
67	10.513	0.159	0.085	2.57	98	1.0	-	12.08	-0.04	98	270	83	77
68	10.678	0.165	0.088	2.57	98	1.0	-	12.03	-0.05	98	270	83	77
69	10.837	0.159	0.086	2.55	98	1.0	-	11.98	-0.05	98	270	83	77
70	11.001	0.164	0.083	2.56	98	1.0	101	11.91	-0.07	98	270	83	77
71	11.163	0.162	0.084	2.56	98	1.0	-	11.86	-0.05	98	270	83	77
72	11.324	0.161	0.086	2.56	99	1.0	-	11.82	-0.04	98	267	83	77
73	11.487	0.163	0.087	2.55	99	1.0	-	11.77	-0.05	98	267	83	77
74	11.651	0.164	0.086	2.56	99	1.1	-	11.72	-0.05	98	266	83	77
75	11.810	0.159	0.087	2.55	99	1.0	-	11.67	-0.05	98	265	83	77
76	11.976	0.166	0.086	2.57	99	1.0	-	11.63	-0.04	98	265	83	77
77	12.135	0.159	0.085	2.56	99	1.0	-	11.56	-0.07	98	264	83	77
78	12.299	0.164	0.086	2.56	100	1.0	-	11.52	-0.04	98	263	83	77
79	12.462	0.163	0.084	2.56	100	1.0	-	11.48	-0.04	98	262	83	77
80	12.624	0.162	0.087	2.57	100	1.0	100	11.41	-0.07	98	262	83	77
81	12.787	0.163	0.086	2.58	100	1.1	-	11.37	-0.04	98	261	83	77
82	12.951	0.164	0.086	2.56	100	1.1	-	11.32	-0.05	98	259	83	77
83	13.111	0.160	0.083	2.57	100	1.0	-	11.27	-0.05	98	259	83	77
84	13.278	0.167	0.084	2.57	101	1.0	-	11.22	-0.05	98	260	83	77
85	13.438	0.160	0.085	2.57	101	1.1	-	11.17	-0.05	98	259	83	77
86	13.601	0.163	0.085	2.57	101	1.0	-	11.13	-0.04	98	258	83	77
87	13.766	0.165	0.084	2.58	101	1.1	-	11.09	-0.04	98	257	83	77
88	13.927	0.161	0.085	2.57	101	1.0	-	11.04	-0.05	97	258	83	77
89	14.090	0.163	0.085	2.57	101	1.0	-	11.00	-0.04	98	258	83	77
90	14.256	0.166	0.085	2.57	101	1.0	100	10.95	-0.05	98	258	83	77
91	14.415	0.159	0.085	2.57	101	1.0	-	10.91	-0.04	97	258	83	77
92	14.582	0.167	0.085	2.57	102	1.0	-	10.86	-0.05	97	258	83	77
93	14.743	0.161	0.087	2.58	102	1.0	-	10.81	-0.05	97	257	83	77
94	14.906	0.163	0.084	2.58	102	1.1	-	10.76	-0.05	97	257	83	77
95	15.072	0.166	0.086	2.58	102	1.0	-	10.73	-0.03	97	258	83	77
96	15.232	0.160	0.085	2.59	102	1.0	-	10.68	-0.05	97	258	83	77
97	15.397	0.165	0.083	2.58	102	1.0	-	10.62	-0.06	97	256	83	77
98	15.561	0.164	0.087	2.58	102	1.0	-	10.59	-0.03	97	255	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	15.723	0.162	0.085	2.58	102	1.0	-	10.53	-0.06	97	255	83	77
100	15.888	0.165	0.085	2.59	102	1.0	100	10.48	-0.05	97	255	83	77
101	16.052	0.164	0.084	2.58	103	1.0	-	10.46	-0.02	97	255	83	77
102	16.212	0.160	0.085	2.57	103	1.1	-	10.42	-0.04	97	255	83	77
103	16.380	0.168	0.086	2.59	103	1.0	-	10.38	-0.04	97	255	83	77
104	16.541	0.161	0.087	2.58	103	1.1	-	10.34	-0.04	97	254	83	77
105	16.704	0.163	0.086	2.58	103	1.1	-	10.29	-0.05	97	254	83	77
106	16.870	0.166	0.085	2.59	103	1.0	-	10.26	-0.03	97	252	83	77
107	17.030	0.160	0.086	2.58	103	1.0	-	10.21	-0.05	97	253	83	77
108	17.196	0.166	0.085	2.58	103	1.0	-	10.17	-0.04	97	253	83	77
109	17.360	0.164	0.084	2.60	103	1.0	-	10.13	-0.04	97	252	83	77
110	17.522	0.162	0.085	2.59	103	1.0	100	10.09	-0.04	97	252	83	77
111	17.687	0.165	0.085	2.59	103	1.0	-	10.04	-0.05	97	251	83	77
112	17.853	0.166	0.085	2.59	103	1.1	-	10.00	-0.04	97	251	83	77
113	18.012	0.159	0.086	2.59	104	1.0	-	9.96	-0.04	97	251	83	77
114	18.180	0.168	0.084	2.59	104	1.1	-	9.93	-0.03	97	250	83	77
115	18.343	0.163	0.085	2.59	104	1.1	-	9.88	-0.05	97	250	83	77
116	18.504	0.161	0.087	2.59	104	1.0	-	9.85	-0.03	97	250	83	77
117	18.672	0.168	0.086	2.59	104	1.0	-	9.79	-0.06	97	251	83	77
118	18.834	0.162	0.085	2.59	104	1.0	-	9.76	-0.03	97	250	83	77
119	18.998	0.164	0.085	2.57	104	1.1	-	9.71	-0.05	97	251	83	77
120	19.163	0.165	0.084	2.57	104	1.1	101	9.68	-0.03	97	252	83	77
121	19.326	0.163	0.085	2.57	104	1.1	-	9.63	-0.05	97	250	83	77
122	19.490	0.164	0.084	2.57	104	1.0	-	9.58	-0.05	97	249	83	77
123	19.655	0.165	0.086	2.58	104	1.1	-	9.53	-0.05	97	250	83	77
124	19.817	0.162	0.088	2.59	104	1.1	-	9.48	-0.05	97	249	83	77
125	19.982	0.165	0.086	2.59	104	1.0	-	9.42	-0.06	97	249	83	77
126	20.147	0.165	0.086	2.58	104	1.1	-	9.38	-0.04	97	251	83	78
127	20.308	0.161	0.087	2.59	104	1.1	-	9.34	-0.04	97	251	83	77
128	20.476	0.168	0.083	2.59	104	1.1	-	9.28	-0.06	97	252	83	77
129	20.638	0.162	0.088	2.58	105	1.0	-	9.25	-0.03	97	252	83	78
130	20.801	0.163	0.086	2.57	105	1.1	100	9.20	-0.05	97	251	83	77
131	20.968	0.167	0.085	2.57	105	1.1	-	9.16	-0.04	97	254	83	77

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	21.129	0.161	0.085	2.58	105	1.1	-	9.11	-0.05	97	253	83	77
133	21.295	0.166	0.085	2.57	105	1.1	-	9.06	-0.05	97	254	83	77
134	21.460	0.165	0.084	2.58	105	1.0	-	9.03	-0.03	97	256	83	77
135	21.623	0.163	0.085	2.56	105	1.0	-	8.99	-0.04	97	256	83	78
136	21.787	0.164	0.085	2.56	105	1.1	-	8.96	-0.03	97	257	83	77
137	21.953	0.166	0.084	2.54	105	1.0	-	8.90	-0.06	97	255	83	77
138	22.115	0.162	0.084	2.56	105	1.1	-	8.88	-0.02	97	255	83	77
139	22.280	0.165	0.086	2.57	105	1.1	-	8.84	-0.04	97	254	83	78
140	22.446	0.166	0.086	2.57	105	1.0	100	8.80	-0.04	97	254	83	78
141	22.607	0.161	0.086	2.57	105	1.0	-	8.76	-0.04	97	254	83	77
142	22.775	0.168	0.085	2.59	105	1.0	-	8.72	-0.04	97	254	83	78
143	22.937	0.162	0.086	2.58	105	1.0	-	8.67	-0.05	97	252	83	77
144	23.100	0.163	0.085	2.59	105	1.0	-	8.63	-0.04	97	252	84	78
145	23.268	0.168	0.083	2.59	105	1.0	-	8.59	-0.04	97	253	83	77
146	23.430	0.162	0.085	2.60	105	1.1	-	8.56	-0.03	97	252	84	78
147	23.595	0.165	0.083	2.59	105	1.0	-	8.51	-0.05	97	251	84	78
148	23.760	0.165	0.088	2.58	105	1.1	-	8.45	-0.06	97	252	84	78
149	23.923	0.163	0.087	2.58	105	1.0	-	8.42	-0.03	97	253	84	78
150	24.088	0.165	0.086	2.58	106	1.0	100	8.36	-0.06	97	253	84	78
151	24.253	0.165	0.086	2.57	105	1.1	-	8.32	-0.04	97	255	84	78
152	24.416	0.163	0.087	2.59	105	1.1	-	8.25	-0.07	97	255	84	78
153	24.581	0.165	0.084	2.58	106	1.0	-	8.22	-0.03	97	255	84	78
154	24.747	0.166	0.087	2.60	106	1.1	-	8.17	-0.05	97	257	84	78
155	24.908	0.161	0.085	2.58	106	1.0	-	8.10	-0.07	98	257	84	78
156	25.075	0.167	0.088	2.60	106	1.1	-	7.99	-0.11	98	263	84	78
157	25.240	0.165	0.084	2.58	106	1.1	-	7.90	-0.09	99	267	84	78
158	25.401	0.161	0.083	2.60	106	1.0	-	7.81	-0.09	99	270	84	78
159	25.569	0.168	0.086	2.58	106	1.0	-	7.74	-0.07	99	271	84	78
160	25.731	0.162	0.083	2.58	106	1.1	101	7.67	-0.07	99	272	84	78
161	25.897	0.166	0.088	2.58	106	1.1	-	7.62	-0.05	99	271	84	78
162	26.063	0.166	0.086	2.57	106	1.0	-	7.55	-0.07	99	271	84	78
163	26.224	0.161	0.088	2.58	106	1.1	-	7.48	-0.07	99	271	84	78
164	26.391	0.167	0.086	2.58	106	1.0	-	7.40	-0.08	99	272	84	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	26.556	0.165	0.087	2.57	106	1.1	-	7.35	-0.05	99	271	84	78
166	26.719	0.163	0.088	2.55	106	1.0	-	7.27	-0.08	99	271	84	78
167	26.884	0.165	0.086	2.54	106	1.1	-	7.22	-0.05	99	272	84	78
168	27.050	0.166	0.086	2.55	106	1.0	-	7.15	-0.07	99	271	84	78
169	27.212	0.162	0.085	2.55	106	1.0	-	7.10	-0.05	99	272	84	78
170	27.378	0.166	0.085	2.57	106	1.1	101	7.05	-0.05	99	270	84	78
171	27.544	0.166	0.086	2.56	106	1.0	-	6.98	-0.07	99	271	84	78
172	27.705	0.161	0.086	2.57	106	1.0	-	6.93	-0.05	99	270	84	78
173	27.873	0.168	0.085	2.58	106	1.1	-	6.88	-0.05	99	269	84	78
174	28.037	0.164	0.087	2.56	106	1.0	-	6.83	-0.05	99	268	84	78
175	28.198	0.161	0.085	2.58	106	1.1	-	6.78	-0.05	99	268	84	78
176	28.367	0.169	0.086	2.58	106	1.0	-	6.72	-0.06	99	266	84	78
177	28.529	0.162	0.085	2.60	106	1.0	-	6.67	-0.05	99	265	84	78
178	28.694	0.165	0.085	2.58	106	1.0	-	6.63	-0.04	99	265	84	78
179	28.860	0.166	0.086	2.59	106	1.1	-	6.57	-0.06	99	264	84	78
180	29.022	0.162	0.087	2.60	106	1.1	100	6.52	-0.05	99	263	84	78
181	29.188	0.166	0.084	2.60	106	1.0	-	6.48	-0.04	99	263	84	78
182	29.354	0.166	0.084	2.60	106	1.1	-	6.42	-0.06	99	263	84	78
183	29.517	0.163	0.085	2.59	106	1.0	-	6.37	-0.05	99	264	84	78
184	29.682	0.165	0.085	2.59	106	1.1	-	6.31	-0.06	99	265	84	78
185	29.848	0.166	0.086	2.59	107	1.1	-	6.25	-0.06	99	265	84	78
186	30.010	0.162	0.085	2.59	107	1.0	-	6.20	-0.05	99	268	84	78
187	30.177	0.167	0.084	2.60	107	1.1	-	6.13	-0.07	99	266	84	78
188	30.342	0.165	0.085	2.59	107	1.1	-	6.07	-0.06	99	267	84	78
189	30.503	0.161	0.087	2.58	107	1.1	-	6.00	-0.07	99	267	84	78
190	30.671	0.168	0.085	2.56	107	1.0	100	5.95	-0.05	99	271	84	78
191	30.835	0.164	0.088	2.55	107	1.0	-	5.89	-0.06	100	270	84	78
192	30.997	0.162	0.085	2.54	107	1.1	-	5.81	-0.08	100	272	84	78
193	31.166	0.169	0.087	2.57	107	1.0	-	5.73	-0.08	100	272	84	78
194	31.327	0.161	0.085	2.58	107	1.1	-	5.65	-0.08	100	275	84	78
195	31.493	0.166	0.083	2.60	107	1.1	-	5.55	-0.10	100	281	84	78
196	31.659	0.166	0.086	2.58	107	1.0	-	5.47	-0.08	101	283	84	78
197	31.820	0.161	0.084	2.57	107	1.1	-	5.39	-0.08	101	285	84	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	31.987	0.167	0.085	2.57	107	1.0	-	5.30	-0.09	101	287	84	78
199	32.153	0.166	0.086	2.57	107	1.1	-	5.20	-0.10	101	286	84	78
200	32.316	0.163	0.086	2.57	107	1.1	100	5.12	-0.08	101	287	84	78
201	32.480	0.164	0.085	2.56	107	1.1	-	5.02	-0.10	101	288	84	78
202	32.646	0.166	0.085	2.57	107	1.1	-	4.94	-0.08	101	292	85	78
203	32.809	0.163	0.085	2.56	107	1.1	-	4.84	-0.10	102	296	85	78
204	32.975	0.166	0.087	2.57	107	1.1	-	4.73	-0.11	102	299	85	78
205	33.140	0.165	0.087	2.55	107	1.1	-	4.63	-0.10	102	302	85	78
206	33.301	0.161	0.084	2.56	107	1.1	-	4.52	-0.11	102	302	85	78
207	33.469	0.168	0.086	2.56	107	1.1	-	4.40	-0.12	103	303	85	78
208	33.634	0.165	0.086	2.56	107	1.0	-	4.30	-0.10	103	307	85	78
209	33.796	0.162	0.085	2.56	107	1.1	-	4.19	-0.11	103	308	85	78
210	33.964	0.168	0.085	2.55	107	1.1	100	4.09	-0.10	103	311	85	78
211	34.126	0.162	0.087	2.54	107	1.1	-	4.00	-0.09	103	314	85	78
212	34.291	0.165	0.085	2.55	107	1.1	-	3.89	-0.11	103	317	85	78
213	34.459	0.168	0.085	2.55	107	1.1	-	3.80	-0.09	103	318	85	78
214	34.620	0.161	0.087	2.55	107	1.1	-	3.69	-0.11	103	317	85	78
215	34.786	0.166	0.088	2.55	107	1.1	-	3.60	-0.09	103	317	85	78
216	34.952	0.166	0.089	2.55	107	1.0	-	3.51	-0.09	103	317	85	79
217	35.115	0.163	0.088	2.55	107	1.1	-	3.43	-0.08	103	317	85	78
218	35.281	0.166	0.087	2.55	107	1.1	-	3.35	-0.08	103	319	85	78
219	35.446	0.165	0.084	2.57	107	1.1	-	3.27	-0.08	104	318	85	78
220	35.610	0.164	0.087	2.57	107	1.0	100	3.21	-0.06	103	317	85	78
221	35.775	0.165	0.086	2.56	107	1.0	-	3.12	-0.09	103	318	85	78
222	35.942	0.167	0.085	2.57	107	1.1	-	3.07	-0.05	103	316	85	78
223	36.104	0.162	0.085	2.57	107	1.1	-	3.00	-0.07	103	314	85	78
224	36.270	0.166	0.089	2.59	107	1.1	-	2.94	-0.06	103	317	85	78
225	36.436	0.166	0.088	2.60	107	1.1	-	2.88	-0.06	103	316	85	78
226	36.597	0.161	0.087	2.60	107	1.1	-	2.82	-0.06	103	315	85	78
227	36.766	0.169	0.086	2.59	107	1.1	-	2.77	-0.05	103	315	85	78
228	36.930	0.164	0.085	2.59	107	1.0	-	2.73	-0.04	103	311	85	78
229	37.092	0.162	0.088	2.60	107	1.1	-	2.68	-0.05	103	310	85	78
230	37.261	0.169	0.085	2.59	107	1.1	100	2.64	-0.04	103	309	85	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	37.423	0.162	0.085	2.60	107	1.1	-	2.59	-0.05	103	308	85	78
232	37.589	0.166	0.087	2.60	107	1.1	-	2.55	-0.04	103	309	85	78
233	37.756	0.167	0.088	2.59	107	1.1	-	2.52	-0.03	103	306	85	78
234	37.917	0.161	0.088	2.61	107	1.1	-	2.47	-0.05	103	306	85	78
235	38.084	0.167	0.086	2.60	107	1.1	-	2.43	-0.04	103	304	85	78
236	38.250	0.166	0.087	2.60	107	1.1	-	2.39	-0.04	103	303	85	78
237	38.413	0.163	0.087	2.59	107	1.1	-	2.33	-0.06	103	302	85	78
238	38.579	0.166	0.087	2.58	107	1.1	-	2.29	-0.04	103	300	85	78
239	38.744	0.165	0.084	2.59	107	1.1	-	2.25	-0.04	102	300	85	79
240	38.908	0.164	0.087	2.59	107	1.1	100	2.22	-0.03	102	301	85	78
241	39.073	0.165	0.088	2.58	107	1.0	-	2.17	-0.05	102	298	85	78
242	39.240	0.167	0.086	2.59	107	1.1	-	2.14	-0.03	102	295	85	78
243	39.402	0.162	0.086	2.60	107	1.0	-	2.10	-0.04	102	294	85	78
244	39.569	0.167	0.088	2.59	107	1.1	-	2.06	-0.04	102	294	85	78
245	39.735	0.166	0.086	2.59	108	1.1	-	2.02	-0.04	102	294	85	79
246	39.896	0.161	0.086	2.59	108	1.1	-	1.97	-0.05	102	294	85	79
247	40.065	0.169	0.086	2.60	108	1.1	-	1.95	-0.02	102	292	85	78
248	40.229	0.164	0.088	2.59	107	1.1	-	1.91	-0.04	102	291	85	78
249	40.392	0.163	0.087	2.60	108	1.0	-	1.87	-0.04	102	288	85	78
250	40.560	0.168	0.086	2.59	108	1.1	100	1.85	-0.02	102	289	85	78
251	40.723	0.163	0.087	2.60	108	1.1	-	1.81	-0.04	102	288	85	78
252	40.887	0.164	0.087	2.58	108	1.1	-	1.75	-0.06	102	288	85	78
253	41.055	0.168	0.087	2.59	108	1.1	-	1.74	-0.01	102	288	85	78
254	41.218	0.163	0.086	2.59	108	1.1	-	1.71	-0.03	102	288	85	78
255	41.383	0.165	0.087	2.59	108	1.1	-	1.66	-0.05	101	287	85	78
256	41.550	0.167	0.086	2.60	108	1.1	-	1.62	-0.04	101	285	85	79
257	41.712	0.162	0.088	2.59	108	1.1	-	1.59	-0.03	101	286	85	78
258	41.879	0.167	0.089	2.60	108	1.1	-	1.56	-0.03	101	285	85	78
259	42.045	0.166	0.084	2.60	108	1.1	-	1.52	-0.04	101	284	85	78
260	42.208	0.163	0.087	2.60	108	1.1	100	1.47	-0.05	101	283	85	78
261	42.373	0.165	0.087	2.61	108	1.1	-	1.45	-0.02	101	282	85	78
262	42.540	0.167	0.089	2.61	108	1.1	-	1.41	-0.04	101	284	85	78
263	42.703	0.163	0.088	2.61	108	1.1	-	1.37	-0.04	101	280	85	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	42.869	0.166	0.086	2.62	108	1.1	-	1.35	-0.02	101	280	85	78
265	43.036	0.167	0.090	2.59	108	1.1	-	1.31	-0.04	101	282	85	78
266	43.197	0.161	0.086	2.61	108	1.1	-	1.27	-0.04	101	281	85	78
267	43.364	0.167	0.086	2.62	108	1.1	-	1.25	-0.02	101	279	85	78
268	43.531	0.167	0.088	2.62	108	1.0	-	1.22	-0.03	101	278	85	78
269	43.692	0.161	0.088	2.63	108	1.0	-	1.18	-0.04	101	278	85	78
270	43.861	0.169	0.085	2.63	108	1.1	100	1.16	-0.02	100	276	85	78
271	44.025	0.164	0.085	2.60	108	1.1	-	1.14	-0.02	100	277	85	78
272	44.187	0.162	0.088	2.61	108	1.1	-	1.09	-0.05	100	276	85	78
273	44.356	0.169	0.087	2.60	108	1.1	-	1.08	-0.01	100	274	85	78
274	44.519	0.163	0.088	2.60	108	1.0	-	1.05	-0.03	100	275	85	78
275	44.684	0.165	0.085	2.60	108	1.1	-	1.02	-0.03	100	272	85	78
276	44.852	0.168	0.086	2.60	108	1.1	-	1.00	-0.02	100	272	85	78
277	45.014	0.162	0.087	2.59	108	1.1	-	0.98	-0.02	100	270	85	78
278	45.180	0.166	0.088	2.58	108	1.1	-	0.96	-0.02	100	270	85	78
279	45.346	0.166	0.088	2.58	108	1.1	-	0.94	-0.02	100	269	84	78
280	45.509	0.163	0.088	2.59	108	1.1	99	0.91	-0.03	100	266	84	78
281	45.676	0.167	0.088	2.58	108	1.1	-	0.90	-0.01	100	265	84	78
282	45.842	0.166	0.085	2.59	108	1.0	-	0.86	-0.04	99	264	84	78
283	46.006	0.164	0.086	2.57	108	1.1	-	0.84	-0.02	99	264	84	78
284	46.171	0.165	0.088	2.57	108	1.1	-	0.82	-0.02	99	261	84	78
285	46.337	0.166	0.089	2.57	108	1.1	-	0.81	-0.01	99	258	84	78
286	46.501	0.164	0.087	2.59	108	1.1	-	0.79	-0.02	99	258	84	78
287	46.667	0.166	0.088	2.60	108	1.0	-	0.76	-0.03	99	257	84	78
288	46.834	0.167	0.087	2.60	108	1.0	-	0.74	-0.02	99	257	84	78
289	46.996	0.162	0.089	2.60	108	1.0	-	0.72	-0.02	99	256	84	78
290	47.163	0.167	0.090	2.61	108	1.1	98	0.70	-0.02	99	255	84	78
291	47.329	0.166	0.087	2.61	108	1.1	-	0.68	-0.02	99	254	84	78
292	47.491	0.162	0.087	2.62	108	1.1	-	0.65	-0.03	98	253	84	78
293	47.660	0.169	0.089	2.62	108	1.0	-	0.62	-0.03	98	252	84	78
294	47.824	0.164	0.088	2.59	108	1.1	-	0.60	-0.02	98	252	84	78
295	47.987	0.163	0.088	2.61	108	1.0	-	0.60	0.00	98	249	84	78
296	48.156	0.169	0.086	2.58	108	1.1	-	0.56	-0.04	98	251	84	78

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	48.319	0.163	0.086	2.58	108	1.0	-	0.53	-0.03	98	249	84	78
298	48.483	0.164	0.087	2.60	108	1.0	-	0.51	-0.02	98	247	84	78
299	48.652	0.169	0.088	2.59	108	1.0	-	0.49	-0.02	98	247	84	78
300	48.814	0.162	0.089	2.60	108	1.1	98	0.46	-0.03	98	249	84	78
301	48.980	0.166	0.088	2.60	108	1.1	-	0.43	-0.03	98	248	84	78
302	49.147	0.167	0.085	2.59	108	1.1	-	0.43	0.00	98	248	84	78
303	49.309	0.162	0.089	2.58	108	1.1	-	0.40	-0.03	98	248	84	78
304	49.476	0.167	0.087	2.58	108	1.1	-	0.38	-0.02	98	248	84	78
305	49.642	0.166	0.087	2.59	108	1.1	-	0.35	-0.03	98	245	84	78
306	49.806	0.164	0.088	2.59	108	1.1	-	0.34	-0.01	98	246	84	78
307	49.972	0.166	0.088	2.59	108	1.0	-	0.31	-0.03	97	243	84	78
308	50.139	0.167	0.088	2.60	108	1.0	-	0.28	-0.03	97	245	84	78
309	50.302	0.163	0.087	2.60	108	1.0	-	0.26	-0.02	97	244	84	78
310	50.467	0.165	0.087	2.60	108	1.1	99	0.25	-0.01	97	245	84	78
311	50.634	0.167	0.088	2.59	108	1.1	-	0.22	-0.03	97	244	84	78
312	50.798	0.164	0.086	2.61	108	1.1	-	0.21	-0.01	97	246	84	78
313	50.964	0.166	0.088	2.61	108	1.0	-	0.17	-0.04	97	245	84	78
314	51.131	0.167	0.089	2.59	108	1.1	-	0.16	-0.01	97	244	84	78
315	51.293	0.162	0.089	2.59	108	1.1	-	0.13	-0.03	97	245	84	78
316	51.460	0.167	0.089	2.59	108	1.1	-	0.11	-0.02	97	244	84	78
317	51.627	0.167	0.087	2.59	108	1.1	-	0.09	-0.02	97	244	84	78
318	51.789	0.162	0.086	2.59	108	1.0	-	0.07	-0.02	97	243	84	78
319	51.957	0.168	0.086	2.60	108	1.1	-	0.05	-0.02	97	244	84	78
320	52.123	0.166	0.089	2.59	108	1.1	99	0.04	-0.01	97	243	84	78
321	52.285	0.162	0.087	2.60	108	1.1	-	0.01	-0.03	97	244	84	78
322	52.454	0.169	0.089	2.61	109	1.0	99	0.00	-0.01	97	244	84	78
Avg/Tot	52.454	0.163	0.085	2.55	102.1	1.0	100			99.4	271.3	83.7	77.6

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.000		0.01	81	1.0		82	-0.065	4.39	0.050
1	0.135	0.135	2.50	80	2.2	-	83	-0.066	5.11	0.032
2	0.293	0.158	2.49	80	2.0	-	84	-0.067	7.43	0.028
3	0.449	0.156	2.50	80	2.0	-	84	-0.068	8.68	0.022
4	0.607	0.158	2.50	80	2.3	-	84	-0.070	8.81	0.025
5	0.762	0.155	2.49	81	1.8	-	85	-0.070	8.98	0.032
6	0.920	0.158	2.50	81	2.3	-	85	-0.064	8.93	0.033
7	1.078	0.158	2.49	81	1.8	-	85	-0.063	7.28	0.014
8	1.232	0.154	2.49	81	2.3	-	85	-0.063	6.76	0.010
9	1.391	0.159	2.50	81	1.8	-	85	-0.062	6.40	0.010
10	1.546	0.155	2.48	81	2.1	102	85	-0.063	6.12	0.013
11	1.703	0.157	2.49	82	2.4	-	85	-0.060	6.67	0.012
12	1.860	0.157	2.49	82	1.9	-	85	-0.061	6.73	0.011
13	2.017	0.157	2.50	82	2.4	-	85	-0.061	6.91	0.008
14	2.175	0.158	2.49	82	1.8	-	85	-0.060	6.77	0.013
15	2.330	0.155	2.50	82	2.4	-	85	-0.061	6.82	0.015
16	2.490	0.160	2.50	83	2.2	-	85	-0.060	6.98	0.009
17	2.644	0.154	2.49	83	2.4	-	85	-0.059	7.37	0.009
18	2.803	0.159	2.50	83	2.3	-	85	-0.059	7.17	0.008
19	2.961	0.158	2.50	84	2.2	-	85	-0.057	7.32	0.012
20	3.116	0.155	2.50	84	2.3	105	85	-0.058	7.49	0.011
21	3.277	0.161	2.50	84	2.2	-	86	-0.058	7.78	0.014
22	3.432	0.155	2.51	84	2.4	-	85	-0.056	7.92	0.015
23	3.590	0.158	2.49	85	2.4	-	86	-0.058	7.53	0.015
24	3.748	0.158	2.50	85	2.3	-	86	-0.059	7.36	0.012
25	3.904	0.156	2.49	85	2.1	-	86	-0.059	7.55	0.012
26	4.064	0.160	2.50	86	1.9	-	86	-0.057	7.85	0.012
27	4.220	0.156	2.50	86	2.0	-	86	-0.057	8.11	0.011
28	4.380	0.160	2.50	86	1.9	-	86	-0.058	8.32	0.015
29	4.537	0.157	2.50	87	2.1	-	86	-0.056	8.31	0.010
30	4.695	0.158	2.51	87	1.9	104	86	-0.058	8.13	0.016
31	4.854	0.159	2.50	87	2.3	-	86	-0.057	8.19	0.011
32	5.011	0.157	2.50	88	1.9	-	86	-0.057	8.16	0.012

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
33	5.171	0.160	2.50	88	2.3	-	86	-0.057	7.97	0.011
34	5.329	0.158	2.50	88	2.0	-	86	-0.059	7.57	0.009
35	5.488	0.159	2.50	89	1.9	-	86	-0.058	7.63	0.007
36	5.647	0.159	2.50	89	2.1	-	86	-0.056	7.56	0.008
37	5.804	0.157	2.51	89	2.3	-	86	-0.057	7.71	0.010
38	5.964	0.160	2.51	90	2.4	-	86	-0.054	7.66	0.010
39	6.123	0.159	2.51	90	2.0	-	86	-0.055	7.73	0.010
40	6.282	0.159	2.51	90	2.3	102	86	-0.056	7.84	0.009
41	6.441	0.159	2.50	90	2.0	-	86	-0.056	7.78	0.009
42	6.599	0.158	2.51	91	2.3	-	86	-0.055	7.37	0.011
43	6.759	0.160	2.51	91	2.0	-	86	-0.055	7.42	0.010
44	6.919	0.160	2.51	91	2.3	-	85	-0.055	7.30	0.013
45	7.077	0.158	2.51	92	2.4	-	85	-0.054	7.48	0.010
46	7.238	0.161	2.51	92	2.0	-	85	-0.055	7.43	0.008
47	7.396	0.158	2.51	92	2.4	-	86	-0.055	7.61	0.011
48	7.555	0.159	2.51	92	2.2	-	85	-0.053	7.77	0.013
49	7.716	0.161	2.52	93	2.0	-	85	-0.055	8.26	0.015
50	7.874	0.158	2.51	93	2.1	100	85	-0.057	8.31	0.013
51	8.036	0.162	2.52	93	2.0	-	85	-0.055	8.19	0.015
52	8.193	0.157	2.52	94	2.2	-	85	-0.055	8.29	0.013
53	8.355	0.162	2.52	94	2.0	-	85	-0.055	8.56	0.019
54	8.515	0.160	2.52	94	2.0	-	86	-0.057	8.75	0.015
55	8.674	0.159	2.52	94	1.9	-	86	-0.055	8.91	0.016
56	8.836	0.162	2.53	95	2.1	-	86	-0.054	9.02	0.015
57	8.994	0.158	2.52	95	2.3	-	85	-0.054	8.99	0.014
58	9.156	0.162	2.52	95	2.3	-	86	-0.057	9.03	0.019
59	9.316	0.160	2.52	95	2.0	-	86	-0.055	9.20	0.017
60	9.475	0.159	2.52	96	2.0	101	86	-0.055	9.32	0.022
61	9.636	0.161	2.52	96	2.4	-	86	-0.056	9.30	0.020
62	9.797	0.161	2.52	96	2.2	-	86	-0.057	9.48	0.021
63	9.956	0.159	2.53	96	2.1	-	86	-0.057	9.59	0.022
64	10.119	0.163	2.53	96	1.9	-	86	-0.057	9.48	0.025
65	10.277	0.158	2.53	97	2.0	-	86	-0.056	9.16	0.023

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
66	10.439	0.162	2.53	97	2.2	-	86	-0.056	8.67	0.028
67	10.600	0.161	2.53	97	2.0	-	86	-0.057	8.41	0.032
68	10.759	0.159	2.53	97	2.3	-	86	-0.057	8.20	0.029
69	10.921	0.162	2.53	97	2.2	-	86	-0.056	8.10	0.024
70	11.082	0.161	2.53	98	2.2	101	86	-0.058	7.96	0.018
71	11.241	0.159	2.53	98	1.9	-	86	-0.056	7.90	0.019
72	11.405	0.164	2.53	98	2.2	-	86	-0.056	7.85	0.020
73	11.563	0.158	2.52	98	2.0	-	86	-0.056	7.83	0.024
74	11.726	0.163	2.53	98	2.2	-	86	-0.059	7.76	0.021
75	11.887	0.161	2.53	99	2.1	-	86	-0.055	7.73	0.016
76	12.046	0.159	2.53	99	1.9	-	86	-0.057	7.72	0.021
77	12.209	0.163	2.53	99	2.4	-	86	-0.055	7.77	0.022
78	12.370	0.161	2.53	99	2.0	-	86	-0.056	7.75	0.020
79	12.530	0.160	2.53	99	2.4	-	86	-0.057	7.66	0.017
80	12.693	0.163	2.53	99	2.3	100	86	-0.056	7.71	0.016
81	12.852	0.159	2.53	100	2.4	-	86	-0.054	7.74	0.016
82	13.015	0.163	2.53	100	2.4	-	86	-0.057	7.73	0.018
83	13.176	0.161	2.53	100	2.4	-	86	-0.055	7.70	0.019
84	13.336	0.160	2.53	100	2.4	-	86	-0.056	7.80	0.016
85	13.499	0.163	2.53	100	2.4	-	86	-0.055	7.83	0.018
86	13.660	0.161	2.53	100	2.4	-	86	-0.053	7.71	0.020
87	13.820	0.160	2.53	101	2.0	-	86	-0.052	7.69	0.012
88	13.984	0.164	2.53	101	2.4	-	86	-0.053	7.70	0.015
89	14.143	0.159	2.53	101	2.2	-	86	-0.054	7.69	0.016
90	14.306	0.163	2.53	101	2.0	100	86	-0.053	7.58	0.019
91	14.468	0.162	2.53	101	2.3	-	86	-0.053	7.55	0.023
92	14.627	0.159	2.53	101	2.4	-	86	-0.054	7.62	0.023
93	14.790	0.163	2.53	101	1.9	-	86	-0.052	7.63	0.019
94	14.952	0.162	2.53	101	2.1	-	86	-0.057	7.67	0.019
95	15.112	0.160	2.53	102	2.4	-	86	-0.056	7.63	0.017
96	15.276	0.164	2.53	102	2.2	-	86	-0.053	7.60	0.013
97	15.435	0.159	2.53	102	1.9	-	86	-0.053	7.56	0.014
98	15.599	0.164	2.54	102	2.4	-	86	-0.052	7.47	0.014

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
99	15.760	0.161	2.53	102	2.0	-	86	-0.054	7.45	0.013
100	15.921	0.161	2.54	102	2.0	100	86	-0.053	7.34	0.024
101	16.083	0.162	2.53	102	2.2	-	86	-0.054	7.02	0.019
102	16.246	0.163	2.54	102	2.1	-	86	-0.055	6.98	0.015
103	16.406	0.160	2.53	102	1.9	-	86	-0.052	6.91	0.020
104	16.570	0.164	2.53	103	2.3	-	86	-0.053	6.89	0.024
105	16.731	0.161	2.53	103	2.0	-	86	-0.054	6.95	0.017
106	16.892	0.161	2.53	103	2.1	-	86	-0.051	6.96	0.020
107	17.056	0.164	2.53	103	2.2	-	86	-0.056	6.89	0.014
108	17.215	0.159	2.53	103	2.2	-	86	-0.052	6.94	0.015
109	17.379	0.164	2.54	103	2.3	-	86	-0.052	6.88	0.020
110	17.541	0.162	2.54	103	2.2	100	86	-0.053	6.87	0.013
111	17.702	0.161	2.53	103	1.9	-	86	-0.050	6.93	0.020
112	17.865	0.163	2.54	103	2.0	-	86	-0.053	6.92	0.019
113	18.028	0.163	2.54	103	2.2	-	86	-0.051	6.88	0.017
114	18.187	0.159	2.54	103	2.0	-	86	-0.052	6.84	0.023
115	18.353	0.166	2.53	103	2.4	-	86	-0.056	6.83	0.015
116	18.512	0.159	2.54	104	2.4	-	86	-0.052	6.81	0.016
117	18.675	0.163	2.54	104	2.1	-	86	-0.052	6.99	0.016
118	18.839	0.164	2.54	104	2.2	-	86	-0.050	7.65	0.013
119	18.998	0.159	2.54	104	1.9	-	86	-0.052	7.65	0.019
120	19.162	0.164	2.54	104	2.3	100	86	-0.053	7.74	0.011
121	19.324	0.162	2.54	104	2.2	-	86	-0.053	7.84	0.012
122	19.485	0.161	2.54	104	2.0	-	86	-0.052	7.88	0.016
123	19.648	0.163	2.53	104	2.3	-	86	-0.054	7.90	0.013
124	19.811	0.163	2.53	104	2.4	-	86	-0.054	7.92	0.015
125	19.971	0.160	2.53	104	1.9	-	86	-0.054	7.85	0.016
126	20.136	0.165	2.54	104	2.2	-	86	-0.055	7.67	0.014
127	20.295	0.159	2.53	104	1.9	-	86	-0.053	7.54	0.016
128	20.459	0.164	2.54	104	1.9	-	86	-0.054	7.35	0.017
129	20.622	0.163	2.53	104	2.2	-	86	-0.055	7.14	0.012
130	20.782	0.160	2.53	104	1.9	100	86	-0.055	7.02	0.019
131	20.946	0.164	2.54	104	2.1	-	86	-0.054	7.15	0.030

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
132	21.108	0.162	2.54	105	1.9	-	86	-0.054	7.08	0.027
133	21.269	0.161	2.54	105	2.4	-	86	-0.052	6.93	0.033
134	21.432	0.163	2.53	105	2.0	-	86	-0.055	6.81	0.028
135	21.595	0.163	2.53	105	2.4	-	86	-0.055	6.73	0.023
136	21.755	0.160	2.53	105	2.2	-	86	-0.053	6.63	0.022
137	21.921	0.166	2.54	105	2.4	-	86	-0.054	6.59	0.028
138	22.080	0.159	2.53	105	2.2	-	86	-0.056	6.56	0.021
139	22.244	0.164	2.54	105	2.0	-	86	-0.053	6.57	0.020
140	22.407	0.163	2.54	105	1.9	99	86	-0.055	6.58	0.022
141	22.567	0.160	2.53	105	2.1	-	86	-0.055	6.67	0.021
142	22.731	0.164	2.54	105	1.9	-	86	-0.052	6.75	0.025
143	22.894	0.163	2.54	105	2.4	-	86	-0.056	6.83	0.018
144	23.055	0.161	2.52	105	1.9	-	86	-0.056	7.00	0.026
145	23.218	0.163	2.53	105	1.9	-	86	-0.053	7.14	0.023
146	23.382	0.164	2.53	105	2.0	-	86	-0.055	7.20	0.029
147	23.542	0.160	2.53	105	2.4	-	86	-0.054	7.30	0.024
148	23.707	0.165	2.54	105	2.1	-	86	-0.052	7.36	0.029
149	23.868	0.161	2.54	105	2.0	-	86	-0.054	7.44	0.034
150	24.030	0.162	2.54	105	1.9	99	86	-0.052	7.49	0.030
151	24.195	0.165	2.53	105	1.9	-	86	-0.055	7.52	0.031
152	24.354	0.159	2.54	105	1.9	-	86	-0.055	7.68	0.031
153	24.518	0.164	2.53	106	2.4	-	86	-0.053	7.76	0.033
154	24.681	0.163	2.53	106	1.9	-	86	-0.056	7.89	0.032
155	24.842	0.161	2.54	106	2.2	-	86	-0.054	8.44	0.043
156	25.005	0.163	2.53	106	2.3	-	86	-0.056	11.36	1.649
157	25.169	0.164	2.53	106	2.3	-	86	-0.059	11.50	2.018
158	25.329	0.160	2.53	106	2.4	-	86	-0.061	11.24	1.067
159	25.493	0.164	2.53	106	2.1	-	86	-0.060	10.06	0.781
160	25.655	0.162	2.53	106	2.3	100	86	-0.058	9.74	0.631
161	25.816	0.161	2.54	106	2.0	-	86	-0.060	9.69	0.557
162	25.981	0.165	2.53	106	1.9	-	86	-0.059	9.73	0.420
163	26.141	0.160	2.54	106	2.0	-	86	-0.061	9.78	0.415
164	26.304	0.163	2.53	106	1.9	-	86	-0.058	9.76	0.364

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
165	26.467	0.163	2.53	106	1.9	-	86	-0.061	9.76	0.308
166	26.629	0.162	2.54	106	2.3	-	86	-0.059	9.77	0.250
167	26.792	0.163	2.53	106	2.2	-	86	-0.059	9.74	0.225
168	26.955	0.163	2.54	106	2.4	-	86	-0.058	9.58	0.157
169	27.115	0.160	2.53	106	2.2	-	86	-0.060	9.52	0.172
170	27.279	0.164	2.53	106	2.0	101	86	-0.057	9.46	0.122
171	27.442	0.163	2.53	106	1.9	-	87	-0.058	9.25	0.088
172	27.603	0.161	2.53	106	1.9	-	86	-0.059	9.01	0.024
173	27.767	0.164	2.53	106	2.3	-	86	-0.058	8.75	0.013
174	27.927	0.160	2.53	106	1.9	-	87	-0.058	8.55	0.011
175	28.091	0.164	2.53	106	1.9	-	87	-0.058	8.40	0.010
176	28.254	0.163	2.53	106	2.0	-	87	-0.057	8.36	0.011
177	28.415	0.161	2.54	106	2.3	-	87	-0.056	8.28	0.007
178	28.578	0.163	2.53	106	1.9	-	87	-0.057	8.23	0.007
179	28.741	0.163	2.53	106	2.0	-	87	-0.054	8.25	0.010
180	28.902	0.161	2.53	106	2.1	99	87	-0.053	8.37	0.009
181	29.066	0.164	2.53	106	2.4	-	87	-0.056	8.56	0.010
182	29.229	0.163	2.53	107	2.0	-	87	-0.057	8.67	0.006
183	29.389	0.160	2.53	106	2.0	-	87	-0.058	8.93	0.010
184	29.555	0.166	2.53	106	2.1	-	87	-0.059	9.32	0.011
185	29.715	0.160	2.53	107	2.4	-	87	-0.057	9.62	0.016
186	29.878	0.163	2.54	107	2.0	-	87	-0.056	9.84	0.017
187	30.042	0.164	2.53	107	1.9	-	87	-0.059	9.85	0.028
188	30.202	0.160	2.53	107	2.4	-	87	-0.057	9.96	0.038
189	30.366	0.164	2.53	107	2.3	-	87	-0.057	9.96	0.024
190	30.529	0.163	2.53	107	1.9	99	87	-0.058	9.97	0.030
191	30.690	0.161	2.52	107	2.3	-	87	-0.058	10.10	0.055
192	30.853	0.163	2.53	107	2.0	-	87	-0.060	10.27	0.102
193	31.017	0.164	2.53	107	2.2	-	87	-0.058	10.58	0.098
194	31.176	0.159	2.52	107	2.4	-	87	-0.061	10.87	0.104
195	31.341	0.165	2.53	107	2.4	-	87	-0.059	11.66	0.433
196	31.502	0.161	2.53	107	1.9	-	87	-0.063	12.51	0.718
197	31.664	0.162	2.53	107	2.4	-	87	-0.061	12.73	0.692

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
198	31.829	0.165	2.53	107	2.0	-	87	-0.060	12.56	0.491
199	31.988	0.159	2.53	107	2.0	-	87	-0.060	12.26	0.273
200	32.152	0.164	2.52	107	2.4	100	87	-0.062	12.47	0.230
201	32.314	0.162	2.53	107	1.9	-	87	-0.062	12.77	0.423
202	32.476	0.162	2.53	107	2.0	-	87	-0.063	13.02	0.610
203	32.638	0.162	2.53	107	2.1	-	87	-0.065	13.17	0.990
204	32.802	0.164	2.53	107	2.3	-	87	-0.061	13.18	1.376
205	32.962	0.160	2.52	107	2.4	-	87	-0.064	13.12	1.757
206	33.126	0.164	2.53	107	2.1	-	87	-0.065	13.09	1.958
207	33.288	0.162	2.52	107	2.0	-	87	-0.067	13.08	2.084
208	33.449	0.161	2.53	107	2.1	-	87	-0.067	13.09	1.947
209	33.614	0.165	2.53	107	2.0	-	88	-0.067	13.08	2.205
210	33.774	0.160	2.53	107	2.4	100	88	-0.066	13.06	2.270
211	33.937	0.163	2.52	107	1.9	-	88	-0.065	13.09	2.330
212	34.100	0.163	2.52	107	2.4	-	88	-0.067	13.05	2.170
213	34.261	0.161	2.53	107	2.4	-	88	-0.064	13.00	1.877
214	34.424	0.163	2.52	107	2.0	-	88	-0.068	13.01	1.573
215	34.587	0.163	2.53	107	2.3	-	88	-0.064	13.03	1.166
216	34.748	0.161	2.53	107	2.4	-	88	-0.068	12.80	0.877
217	34.912	0.164	2.53	107	2.2	-	88	-0.065	12.71	0.680
218	35.074	0.162	2.53	107	1.9	-	88	-0.063	12.42	0.542
219	35.235	0.161	2.53	107	2.0	-	88	-0.066	12.27	0.452
220	35.400	0.165	2.52	107	2.4	100	88	-0.065	12.07	0.407
221	35.559	0.159	2.53	107	1.9	-	88	-0.067	11.72	0.281
222	35.724	0.165	2.53	107	2.0	-	88	-0.066	11.47	0.185
223	35.886	0.162	2.52	107	2.4	-	88	-0.065	11.25	0.178
224	36.047	0.161	2.53	107	2.3	-	88	-0.065	11.12	0.126
225	36.211	0.164	2.53	107	2.3	-	88	-0.065	11.00	0.086
226	36.373	0.162	2.53	107	2.2	-	88	-0.066	10.86	0.080
227	36.535	0.162	2.53	107	2.4	-	88	-0.066	10.53	0.051
228	36.699	0.164	2.53	107	2.2	-	88	-0.064	10.22	0.037
229	36.861	0.162	2.52	107	2.3	-	88	-0.062	9.91	0.025
230	37.022	0.161	2.53	107	2.1	99	88	-0.064	9.73	0.036

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
231	37.188	0.166	2.53	107	2.2	-	88	-0.064	9.40	0.032
232	37.347	0.159	2.52	107	2.0	-	88	-0.062	9.26	0.029
233	37.511	0.164	2.53	107	1.9	-	88	-0.064	9.27	0.027
234	37.675	0.164	2.53	107	1.9	-	88	-0.062	9.37	0.027
235	37.834	0.159	2.52	107	2.0	-	88	-0.060	9.35	0.028
236	37.999	0.165	2.52	107	2.2	-	88	-0.063	9.39	0.032
237	38.162	0.163	2.53	107	2.4	-	88	-0.061	9.27	0.016
238	38.322	0.160	2.52	107	2.2	-	88	-0.063	9.20	0.014
239	38.486	0.164	2.52	107	2.0	-	88	-0.062	8.96	0.012
240	38.650	0.164	2.53	107	2.0	100	88	-0.063	8.90	0.017
241	38.809	0.159	2.52	107	2.0	-	88	-0.061	8.90	0.014
242	38.975	0.166	2.53	107	1.9	-	88	-0.061	8.86	0.014
243	39.136	0.161	2.52	107	2.1	-	88	-0.061	8.92	0.014
244	39.297	0.161	2.53	107	2.0	-	88	-0.060	8.87	0.017
245	39.463	0.166	2.53	107	1.9	-	88	-0.061	8.90	0.007
246	39.623	0.160	2.53	107	2.4	-	88	-0.060	8.87	0.011
247	39.786	0.163	2.52	107	2.4	-	88	-0.060	8.86	0.011
248	39.949	0.163	2.53	107	2.1	-	88	-0.059	8.79	0.011
249	40.111	0.162	2.53	107	1.9	-	88	-0.060	8.72	0.009
250	40.274	0.163	2.53	107	2.0	99	88	-0.058	8.68	0.012
251	40.437	0.163	2.53	107	1.9	-	88	-0.060	8.66	0.010
252	40.598	0.161	2.53	108	2.4	-	88	-0.059	8.65	0.007
253	40.762	0.164	2.53	108	1.9	-	88	-0.058	8.72	0.012
254	40.925	0.163	2.52	108	2.3	-	88	-0.060	8.74	0.014
255	41.086	0.161	2.53	108	2.2	-	88	-0.059	8.86	0.014
256	41.251	0.165	2.52	108	2.0	-	88	-0.059	8.82	0.014
257	41.410	0.159	2.52	108	2.4	-	88	-0.059	8.85	0.014
258	41.575	0.165	2.53	108	2.4	-	88	-0.059	8.89	0.011
259	41.738	0.163	2.53	108	2.0	-	88	-0.061	8.92	0.010
260	41.898	0.160	2.52	108	1.9	99	88	-0.057	8.95	0.012
261	42.063	0.165	2.53	108	2.0	-	88	-0.060	8.96	0.011
262	42.225	0.162	2.53	108	1.9	-	88	-0.056	9.00	0.012
263	42.386	0.161	2.53	108	2.2	-	88	-0.061	9.08	0.014

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
264	42.550	0.164	2.53	108	2.0	-	88	-0.057	9.08	0.013
265	42.714	0.164	2.53	108	2.1	-	88	-0.058	8.83	0.009
266	42.874	0.160	2.52	108	2.2	-	88	-0.058	8.72	0.010
267	43.039	0.165	2.53	108	2.3	-	87	-0.056	8.54	0.011
268	43.200	0.161	2.52	108	2.1	-	88	-0.056	8.42	0.009
269	43.362	0.162	2.53	108	1.9	-	88	-0.058	8.38	0.010
270	43.527	0.165	2.53	108	2.1	100	87	-0.058	8.27	0.010
271	43.687	0.160	2.53	108	2.4	-	87	-0.058	8.20	0.006
272	43.851	0.164	2.52	108	1.9	-	87	-0.058	8.13	0.007
273	44.014	0.163	2.53	108	2.3	-	87	-0.054	8.09	0.007
274	44.176	0.162	2.53	108	2.3	-	87	-0.054	7.95	0.010
275	44.339	0.163	2.53	108	2.4	-	87	-0.057	7.87	0.007
276	44.502	0.163	2.53	108	2.1	-	87	-0.053	7.84	0.006
277	44.663	0.161	2.53	108	2.4	-	87	-0.055	7.78	0.008
278	44.827	0.164	2.53	108	1.9	-	87	-0.055	7.69	0.006
279	44.990	0.163	2.53	108	1.9	-	87	-0.054	7.68	0.008
280	45.151	0.161	2.53	108	1.9	99	87	-0.055	7.68	0.006
281	45.317	0.166	2.53	108	2.3	-	87	-0.052	7.67	0.006
282	45.476	0.159	2.52	108	2.2	-	87	-0.053	7.62	0.006
283	45.640	0.164	2.53	108	2.2	-	87	-0.054	7.53	0.008
284	45.804	0.164	2.53	108	1.9	-	87	-0.054	7.47	0.007
285	45.964	0.160	2.53	108	1.9	-	87	-0.052	7.38	0.009
286	46.129	0.165	2.53	108	2.1	-	87	-0.053	7.41	0.007
287	46.292	0.163	2.53	108	2.0	-	87	-0.055	7.48	0.002
288	46.453	0.161	2.53	108	1.9	-	87	-0.050	7.54	0.004
289	46.616	0.163	2.52	108	1.9	-	87	-0.052	7.62	0.006
290	46.780	0.164	2.53	108	2.3	98	87	-0.053	7.63	0.003
291	46.941	0.161	2.52	108	2.5	-	87	-0.053	7.65	0.006
292	47.105	0.164	2.53	108	1.9	-	87	-0.053	7.67	0.007
293	47.268	0.163	2.53	108	2.1	-	87	-0.051	7.61	0.006
294	47.429	0.161	2.53	108	2.4	-	87	-0.053	7.63	0.005
295	47.594	0.165	2.52	108	2.2	-	87	-0.052	7.69	0.007
296	47.754	0.160	2.53	108	2.1	-	87	-0.053	7.68	0.003

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 2

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
297	47.919	0.165	2.53	108	2.0	-	87	-0.053	7.72	0.005
298	48.082	0.163	2.53	108	2.4	-	87	-0.051	7.62	0.006
299	48.243	0.161	2.53	108	2.4	-	87	-0.049	7.65	0.006
300	48.407	0.164	2.53	108	2.3	97	87	-0.050	7.69	0.007
301	48.570	0.163	2.53	108	2.3	-	87	-0.052	7.69	0.006
302	48.731	0.161	2.52	108	2.3	-	87	-0.049	7.68	0.008
303	48.895	0.164	2.53	108	1.9	-	87	-0.051	7.74	0.004
304	49.058	0.163	2.53	108	2.2	-	87	-0.052	7.75	0.007
305	49.219	0.161	2.53	108	1.9	-	87	-0.051	7.78	0.004
306	49.384	0.165	2.53	108	2.2	-	87	-0.051	7.82	0.005
307	49.545	0.161	2.53	108	2.2	-	87	-0.051	7.81	0.005
308	49.707	0.162	2.53	108	2.0	-	87	-0.052	7.79	0.007
309	49.873	0.166	2.53	108	2.4	-	87	-0.049	7.73	0.005
310	50.033	0.160	2.53	108	2.0	98	87	-0.050	7.74	0.005
311	50.197	0.164	2.53	108	2.0	-	87	-0.051	7.74	0.005
312	50.360	0.163	2.53	108	2.4	-	87	-0.051	7.77	0.005
313	50.522	0.162	2.53	108	1.9	-	87	-0.049	7.77	0.006
314	50.686	0.164	2.53	108	2.4	-	87	-0.052	7.83	0.007
315	50.848	0.162	2.53	108	2.0	-	87	-0.050	7.83	0.005
316	51.010	0.162	2.53	108	2.1	-	87	-0.051	7.85	0.006
317	51.174	0.164	2.53	108	1.9	-	87	-0.049	7.92	0.005
318	51.337	0.163	2.53	108	2.0	-	87	-0.051	7.90	0.009
319	51.498	0.161	2.53	108	1.9	-	87	-0.052	7.96	0.005
320	51.664	0.166	2.54	108	1.8	98	87	-0.051	7.89	0.007
321	51.825	0.161	2.53	108	2.1	-	87	-0.049	7.93	0.006
322	51.987	0.162	2.53	108	2.4	98	87	-0.051	7.89	0.006
Avg/Tot	51.987	0.161	2.52	101.9	2.1	100	86.3	-0.057	8.53	0.140

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 2

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	-0.002		0.05	84	0.0		78
1	0.114	0.116	1.03	84	1.5	-	78
2	0.255	0.141	1.04	84	1.5	-	78
3	0.398	0.143	1.04	84	1.6	-	78
4	0.539	0.141	1.04	84	1.4	-	79
5	0.681	0.142	1.05	84	1.4	-	79
6	0.825	0.144	1.06	84	1.5	-	79
7	0.968	0.143	1.06	84	1.5	-	79
8	1.111	0.143	1.06	84	1.6	-	79
9	1.255	0.144	1.06	84	1.6	-	79
10	1.399	0.144	1.07	84	1.6	99	79
11	1.543	0.144	1.08	85	1.6	-	79
12	1.687	0.144	1.07	85	1.6	-	79
13	1.831	0.144	1.07	85	1.4	-	79
14	1.975	0.144	1.06	85	1.6	-	79
15	2.120	0.145	1.08	85	1.4	-	79
16	2.266	0.146	1.08	85	1.6	-	79
17	2.411	0.145	1.08	85	1.5	-	79
18	2.556	0.145	1.08	86	1.4	-	80
19	2.702	0.146	1.08	86	1.6	-	79
20	2.847	0.145	1.08	86	1.5	103	79
21	2.993	0.146	1.08	86	1.6	-	80
22	3.139	0.146	1.09	87	1.6	-	79
23	3.287	0.148	1.10	87	1.6	-	80
24	3.434	0.147	1.10	87	1.6	-	79
25	3.581	0.147	1.10	87	1.5	-	79
26	3.728	0.147	1.10	88	1.6	-	79
27	3.875	0.147	1.10	88	1.5	-	80
28	4.023	0.148	1.10	88	1.6	-	80
29	4.170	0.147	1.09	89	1.4	-	79
30	4.318	0.148	1.09	89	1.6	104	80
31	4.466	0.148	1.10	89	1.5	-	79
32	4.614	0.148	1.09	90	1.6	-	79

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 2

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/12/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
33	4.762	0.148	1.10	90	1.5	-	79
34	4.910	0.148	1.10	90	1.4	-	79
35	5.059	0.149	1.09	90	1.6	-	79
36	5.207	0.148	1.09	91	1.5	-	79
37	5.356	0.149	1.09	91	1.5	-	80
38	5.505	0.149	1.09	91	1.6	-	80
39	5.654	0.149	1.09	92	1.5	-	80
40	5.802	0.148	1.09	92	1.5	102	80
41	5.951	0.149	1.08	92	1.5	-	80
42	6.101	0.150	1.09	92	1.5	-	80
43	6.250	0.149	1.09	93	1.6	-	80
44	6.399	0.149	1.09	93	1.6	-	80
45	6.549	0.150	1.08	93	1.6	-	80
46	6.698	0.149	1.09	94	1.6	-	80
47	6.848	0.150	1.09	94	1.6	-	80
48	6.997	0.149	1.08	94	1.6	-	80
49	7.147	0.150	1.09	94	1.4	-	80
50	7.297	0.150	1.09	95	1.6	101	80
51	7.447	0.150	1.09	95	1.6	-	80
52	7.597	0.150	1.10	95	1.5	-	80
53	7.747	0.150	1.09	96	1.5	-	80
54	7.897	0.150	1.09	96	1.6	-	80
55	8.047	0.150	1.09	96	1.6	-	80
56	8.197	0.150	1.10	96	1.5	-	80
57	8.347	0.150	1.10	97	1.5	-	80
58	8.497	0.150	1.10	97	1.6	-	80
59	8.648	0.151	1.10	97	1.6	-	80
60	8.798	0.150	1.11	97	1.5	101	80
Avg/Tot	8.800	0.147	1.07	89.4	1.5	102	79.3

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
0	252	197	116	201	150	183.1	816.1
1	251	196	116	198	150	181.9	753.8
2	250	195	115	203	150	182.4	733.5
3	249	195	115	201	149	181.9	754.3
4	248	194	115	201	149	181.4	798.0
5	247	192	116	200	149	180.8	841.6
6	246	191	116	195	149	179.2	865.2
7	245	190	114	197	149	179.1	872.6
8	244	189	113	197	149	178.3	865.9
9	243	188	114	199	149	178.3	845.5
10	242	187	115	193	148	176.9	823.2
11	240	186	115	197	148	177.2	803.2
12	239	185	115	196	148	176.4	790.8
13	237	183	114	196	148	175.8	787.0
14	236	182	114	194	148	174.8	786.5
15	234	182	115	194	147	174.4	786.2
16	233	180	114	194	147	173.5	783.8
17	231	179	114	189	147	171.9	784.6
18	230	178	114	192	146	171.9	791.4
19	228	178	113	186	146	170.2	799.9
20	227	177	113	188	146	170.1	803.7
21	226	176	113	186	145	169.2	806.2
22	225	176	113	187	145	169.0	812.6
23	224	174	112	184	145	167.8	819.3
24	223	174	112	183	144	167.2	820.8
25	222	173	112	183	144	166.9	817.1
26	222	172	112	182	144	166.3	813.6
27	221	171	111	182	143	165.8	814.6
28	220	171	111	181	143	165.1	820.0
29	220	170	111	180	142	164.6	829.0
30	219	169	112	180	142	164.5	836.4
31	219	169	112	179	142	164.1	836.1
32	218	168	111	179	141	163.5	829.3
33	218	168	111	179	141	163.5	820.4
34	217	168	111	178	141	162.9	813.1
35	217	167	111	177	140	162.3	806.8
36	216	167	111	177	140	162.3	801.9
37	216	166	111	176	140	161.6	801.3
38	215	165	110	175	139	160.9	804.0
39	215	165	111	175	139	161.0	807.2
40	215	165	110	173	139	160.2	809.0
41	215	164	111	175	138	160.5	809.3
42	215	163	110	173	138	159.7	810.6
43	214	163	109	171	137	158.9	812.5
44	214	163	109	170	137	158.6	814.4
45	213	162	109	171	137	158.5	813.4
46	213	162	110	171	136	158.4	811.0
47	213	161	109	171	136	157.9	811.6
48	213	161	109	171	136	157.9	815.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
49	212	161	109	170	135	157.4	821.9
50	213	160	108	171	135	157.4	830.8
51	213	160	108	169	135	156.7	840.6
52	212	159	108	171	135	157.0	849.6
53	213	159	107	170	134	156.5	859.8
54	213	159	108	169	134	156.6	871.8
55	212	159	108	170	134	156.5	883.2
56	212	158	107	168	133	155.7	892.5
57	212	158	107	165	133	155.0	900.7
58	212	158	108	169	133	155.8	908.3
59	212	157	108	169	132	155.8	916.0
60	212	158	108	170	132	155.7	925.1
61	212	158	108	170	132	155.9	935.6
62	212	157	108	171	131	155.9	951.1
63	212	157	108	170	131	155.6	964.7
64	212	157	107	172	131	155.6	970.5
65	212	157	107	172	131	155.6	974.4
66	212	157	107	170	130	155.2	978.8
67	213	156	106	173	130	155.7	983.8
68	213	156	107	174	130	156.0	985.1
69	213	156	107	173	130	155.8	981.2
70	213	156	107	173	129	155.7	974.5
71	213	156	107	174	129	156.1	967.5
72	214	156	107	175	129	156.2	964.7
73	214	155	107	174	129	155.8	964.2
74	214	155	107	175	129	155.9	962.5
75	214	155	106	174	129	155.5	960.7
76	214	155	106	174	128	155.5	959.9
77	214	154	107	176	128	155.8	960.1
78	215	154	106	174	128	155.3	959.6
79	215	154	106	173	128	155.0	956.9
80	215	154	106	175	128	155.4	953.8
81	215	153	106	175	127	155.1	951.3
82	215	153	106	173	127	154.7	949.4
83	215	153	106	173	127	154.5	949.0
84	215	152	106	172	127	154.5	950.2
85	215	152	106	173	127	154.5	952.1
86	215	152	106	174	126	154.6	953.2
87	215	152	107	172	126	154.5	953.3
88	216	151	106	172	126	154.1	952.4
89	216	151	106	173	126	154.3	950.6
90	216	151	106	173	126	154.5	948.1
91	216	150	106	174	126	154.4	945.0
92	216	151	106	173	125	154.2	942.1
93	217	151	106	172	125	154.0	939.5
94	217	151	106	172	125	154.2	937.8
95	217	150	106	171	125	153.8	935.9
96	217	150	106	171	125	153.6	934.6
97	217	150	106	171	125	153.6	933.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
98	218	150	106	171	125	153.8	933.1
99	218	149	106	171	125	153.7	932.5
100	218	149	106	171	124	153.6	932.7
101	218	149	105	170	124	153.4	933.2
102	218	149	105	169	124	153.2	933.3
103	218	149	106	170	124	153.4	932.2
104	218	149	106	169	124	152.8	930.6
105	217	148	106	169	124	152.8	928.9
106	217	148	106	170	123	152.9	926.9
107	217	148	106	168	123	152.5	924.5
108	217	148	106	168	123	152.2	921.5
109	217	148	106	168	123	152.3	918.9
110	216	148	106	168	123	152.0	916.9
111	216	148	106	168	123	152.0	915.8
112	216	147	106	167	123	151.6	914.9
113	216	148	105	169	123	152.0	914.8
114	216	147	106	168	122	151.8	914.9
115	216	147	105	166	122	151.3	914.8
116	215	147	106	166	122	151.3	914.6
117	215	147	105	168	122	151.3	914.4
118	215	147	105	167	122	151.0	914.2
119	215	147	105	165	122	150.6	916.3
120	215	147	104	167	122	150.8	920.5
121	215	146	105	165	122	150.4	925.1
122	215	146	105	166	122	150.7	930.5
123	214	146	105	165	121	150.3	936.5
124	214	146	105	167	121	150.6	941.2
125	214	146	105	166	121	150.5	944.2
126	214	146	105	166	121	150.3	945.8
127	214	146	105	167	121	150.6	943.8
128	214	146	105	164	121	150.0	938.2
129	214	147	105	167	121	150.8	931.4
130	214	147	106	167	121	150.7	931.7
131	214	146	105	165	121	150.1	943.5
132	214	146	105	166	121	150.3	961.8
133	214	146	105	165	120	150.2	977.3
134	214	146	105	165	120	150.0	986.4
135	214	146	104	166	120	150.1	989.4
136	214	146	105	166	120	150.0	988.4
137	214	146	105	166	120	150.1	984.9
138	213	145	105	166	120	149.9	979.9
139	213	145	104	167	120	149.7	974.5
140	213	145	104	165	120	149.3	969.9
141	213	145	104	164	120	149.2	966.9
142	212	145	105	167	120	149.6	966.5
143	212	145	104	167	120	149.4	969.3
144	211	145	105	167	120	149.4	974.7
145	211	145	104	166	119	148.9	981.9
146	210	144	104	165	119	148.4	990.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
147	209	144	104	167	119	148.7	1000.7
148	209	144	104	167	119	148.6	1011.7
149	208	145	104	167	119	148.3	1023.8
150	207	145	104	167	119	148.4	1035.6
151	207	144	105	165	119	147.9	1046.9
152	206	144	104	167	119	147.9	1058.6
153	206	144	104	164	119	147.3	1069.9
154	205	144	104	168	119	147.9	1081.3
155	205	144	103	167	119	147.6	1097.7
156	204	145	104	168	119	147.9	1118.9
157	204	145	104	166	119	147.4	1127.7
158	204	145	104	167	119	147.7	1130.2
159	204	145	103	170	119	148.1	1132.5
160	204	145	104	170	119	148.0	1128.4
161	204	146	103	169	119	148.2	1121.9
162	204	147	104	170	119	148.6	1117.2
163	204	147	103	172	119	149.0	1108.6
164	204	148	104	172	119	149.4	1097.9
165	204	149	104	171	119	149.3	1086.5
166	204	150	104	173	119	149.7	1075.1
167	204	151	104	174	119	150.3	1064.0
168	204	152	104	174	119	150.4	1052.4
169	205	152	104	176	119	151.0	1040.5
170	205	153	104	176	119	151.2	1029.7
171	205	154	105	174	119	151.3	1019.6
172	205	154	104	173	119	151.1	1006.0
173	206	155	105	173	119	151.6	990.2
174	206	156	104	174	119	151.8	974.4
175	206	157	104	174	119	152.1	959.4
176	206	157	104	176	119	152.5	946.7
177	206	158	104	177	119	152.8	935.2
178	207	158	105	174	120	152.6	923.8
179	207	159	104	175	120	153.0	913.0
180	208	160	105	176	120	153.5	904.2
181	208	160	105	173	120	153.0	902.0
182	208	161	104	174	120	153.2	904.2
183	208	161	105	174	120	153.5	912.8
184	209	161	104	176	120	154.1	924.6
185	209	161	105	174	120	153.8	936.8
186	209	162	104	174	120	153.9	949.1
187	209	162	104	176	120	154.4	958.3
188	210	162	104	175	120	154.4	965.6
189	210	164	105	176	120	154.8	969.9
190	210	164	105	173	121	154.6	972.2
191	210	165	105	175	121	154.9	972.7
192	210	165	105	176	121	155.3	973.1
193	210	166	105	176	121	155.6	975.1
194	210	167	105	177	121	155.9	981.1
195	210	167	106	176	121	156.0	996.5

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
196	210	168	106	177	121	156.4	1011.8
197	210	169	106	179	121	156.8	1029.1
198	210	169	106	177	121	156.6	1044.0
199	210	170	105	176	122	156.5	1054.8
200	211	171	106	181	122	157.8	1062.0
201	211	172	106	181	122	158.2	1067.6
202	211	172	106	182	122	158.5	1079.0
203	212	174	105	183	122	159.0	1095.9
204	212	175	105	184	122	159.7	1113.6
205	213	176	106	185	122	160.4	1128.9
206	213	178	106	187	122	161.1	1140.1
207	213	178	106	187	123	161.6	1148.6
208	214	181	106	189	123	162.5	1155.1
209	214	183	106	192	123	163.5	1158.6
210	215	185	106	193	124	164.4	1161.7
211	215	185	107	194	124	165.0	1163.2
212	216	187	106	198	124	166.2	1164.5
213	216	188	106	199	124	166.9	1168.2
214	217	189	107	203	125	168.1	1172.9
215	217	191	106	198	125	167.3	1179.0
216	218	192	107	204	125	169.1	1175.1
217	219	193	107	206	126	169.9	1161.6
218	219	193	106	209	126	170.7	1144.5
219	220	195	107	209	126	171.3	1133.0
220	221	196	107	206	126	171.1	1130.3
221	221	196	107	212	127	172.6	1130.8
222	222	196	107	210	127	172.4	1129.1
223	222	197	107	218	127	174.2	1123.5
224	223	197	108	219	128	174.8	1114.0
225	223	198	109	220	128	175.5	1104.2
226	224	199	107	220	128	175.7	1095.3
227	224	199	108	217	128	175.3	1085.7
228	225	200	108	219	129	175.9	1075.5
229	226	199	108	220	129	176.3	1065.1
230	226	199	108	218	129	175.9	1055.1
231	226	201	108	218	130	176.5	1044.1
232	227	200	108	221	130	177.1	1032.5
233	227	200	107	218	130	176.5	1022.2
234	227	200	109	220	130	177.2	1014.3
235	228	200	108	221	131	177.3	1008.1
236	228	200	108	220	131	177.3	1003.1
237	228	199	108	215	131	176.3	997.6
238	228	200	108	216	131	176.8	992.8
239	228	199	108	217	132	176.7	989.9
240	228	198	108	217	132	176.5	987.7
241	228	199	108	214	132	176.2	985.4
242	228	198	109	213	132	175.9	982.9
243	228	198	109	211	132	175.8	980.6
244	228	197	109	212	133	175.7	978.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
245	228	197	109	212	133	175.5	975.2
246	228	196	109	212	133	175.5	971.7
247	228	196	109	210	133	175.0	968.3
248	228	196	109	206	133	174.3	965.2
249	227	195	109	206	133	174.2	961.0
250	227	196	108	201	134	173.3	956.2
251	227	195	108	205	134	173.8	951.9
252	227	195	108	204	134	173.7	948.1
253	227	194	110	202	134	173.3	945.1
254	227	193	110	204	134	173.6	942.8
255	227	194	109	202	134	173.2	941.4
256	227	193	110	203	135	173.3	940.7
257	226	193	110	200	135	172.9	940.2
258	226	194	109	198	135	172.4	939.6
259	226	193	110	200	135	172.7	938.9
260	226	193	110	194	135	171.7	937.8
261	225	193	109	199	135	172.3	936.1
262	225	193	109	198	135	172.1	934.3
263	225	193	110	196	136	171.8	932.7
264	225	193	109	197	136	172.0	931.8
265	225	193	109	196	136	171.7	929.1
266	224	192	110	197	136	171.9	923.5
267	224	192	109	195	136	171.2	917.2
268	224	192	109	194	136	170.9	912.3
269	224	192	108	195	136	171.1	908.9
270	224	192	110	195	136	171.3	905.8
271	224	192	109	193	136	170.9	903.0
272	224	192	108	193	136	170.7	900.0
273	224	192	109	192	136	170.5	895.9
274	224	191	109	192	136	170.5	890.0
275	224	192	109	191	136	170.4	882.8
276	224	191	110	191	137	170.4	873.9
277	223	191	109	189	137	169.9	864.2
278	223	192	110	190	137	170.3	854.3
279	223	191	110	190	137	169.9	844.6
280	223	191	109	188	137	169.5	835.7
281	222	191	110	188	137	169.5	828.5
282	222	190	109	187	137	168.8	822.6
283	221	190	110	188	137	169.0	817.5
284	221	190	109	184	137	168.2	812.1
285	221	190	109	183	137	167.9	806.7
286	220	190	110	184	137	168.1	801.8
287	220	189	109	184	137	167.7	797.6
288	220	189	110	183	137	167.6	794.1
289	219	189	109	183	137	167.3	790.1
290	219	189	109	183	137	167.3	785.8
291	219	189	109	179	137	166.6	781.8
292	218	189	109	181	137	166.9	778.0
293	218	188	109	179	137	166.3	775.3

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 2Technician: AKDate: 8/12/2025Stove ΔT: 21

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
294	218	189	110	179	137	166.4	773.1
295	217	187	108	178	137	165.7	771.7
296	217	187	109	176	137	165.3	770.8
297	216	188	109	176	137	165.2	770.6
298	216	188	109	177	137	165.4	770.9
299	216	188	108	175	137	164.9	772.0
300	216	187	108	176	138	164.9	775.3
301	215	186	110	176	138	164.9	779.9
302	215	187	109	174	138	164.5	784.7
303	214	187	109	173	138	164.3	787.9
304	214	187	110	174	138	164.5	789.5
305	213	187	110	173	138	164.2	790.8
306	213	187	110	173	138	164.0	790.1
307	213	187	109	172	138	163.6	787.7
308	212	187	109	170	138	163.1	785.5
309	212	186	108	173	138	163.3	784.4
310	212	186	110	173	138	163.7	784.2
311	212	186	109	172	138	163.4	784.4
312	212	186	109	172	138	163.3	784.1
313	211	187	109	171	138	163.0	783.5
314	211	186	109	171	138	163.0	782.7
315	211	186	109	170	138	162.8	781.9
316	211	187	110	172	138	163.5	781.6
317	210	187	109	170	138	162.8	781.4
318	210	187	110	171	138	163.0	781.7
319	210	187	109	170	138	162.7	781.8
320	210	187	110	170	138	163.0	782.2
321	210	187	110	171	138	162.9	782.6
322	209	187	109	169	138	162.4	782.6
Average	217.4	170.4	107.6	181.5	130.1	161.4	931.3

LAB SAMPLE DATA - ASTM E2515

Client: Buck
 Model: 81C
 Run #: 2

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/12/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	A	G01327	243.5	252.0	8.5
	B	G01328	244.5	252.4	7.9
	C - 1st Hour	G01329	243.0	246.3	3.3
	Amb	G01330	243.4	243.8	0.4
Probes	A	7A	116560.0	116560.2	0.2
	B	7B	117130.3	117130.5	0.2
	C - 1st Hour	7C	116552.0	116552.0	0.0
O-rings	A	7A	3569.1	3569.3	0.2
	B	7B	3520.6	3521.3	0.7
	C - 1st Hour	7C	3404.2	3405.2	1.0

Placed in Dessicator on: 8/12/2025

Balance Audit (mg):

		200.0		200.0					
		Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time
Filters	A	251.9	8/15 16:00	252.0	8/25 15:00				
	B	252.3	8/15 16:00	252.4	8/25 15:00				
	C - 1st Hour	246.2	8/15 16:00	246.3	8/25 15:00				
	Amb	243.6	8/15 16:00	243.8	8/25 15:00				
Probes	A	116560.1	8/15 16:00	116560.2	8/25 15:00				
	B	117130.3	8/15 16:00	117130.5	8/25 15:00				
	C - 1st Hour	116552.0	8/15 16:00	116552.0	8/25 15:00				
O-Rings	A	3569.2	8/15 16:00	3569.3	8/25 15:00				
	B	3521.1	8/15 16:00	3521.3	8/25 15:00				
	C - 1st Hour	3405.2	8/15 16:00	3405.2	8/25 15:00				

Train A Aggregate, mg:	8.9
Train B Aggregate, mg:	8.8
Train C Aggregate, mg:	4.3
Ambient, mg:	0.4

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove Job Number: 25-422 Tracking #: 227
Model: 81C Run Number: 2 Test Date: 8/12/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary open 1/8" (1.125"), secondary open 0.04" (1.635")
Targeted Burn Category: II

Preburn Notes

Time	Notes
46:00 75:00	+1.3 lb PB End

Test Notes

Test Burn Start Time: 13:16 Test Fuel Loaded by: 25 seconds
Door Closed: 40 seconds Air Control Set at: 300 seconds
Other Loading Notes: Bypass opened & closed with door, fan on auto low

Time	Notes
	-None-

Test Burn End Time: 18:38

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO₂ (%): 17.32 CO (%): 4.350
Mid Gas CO₂ (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	8:11	8:12	8:13	8/13 11:36	8/13 11:37	8/13 11:38
CO ₂	0.08	17.18	10.03	-0.03	17.22	10.33
CO	0.006	4.390	2.501	-0.019	4.316	2.527

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: 

Date: 8/13/25

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove

Job Number: 25-422

Tracking #: 227

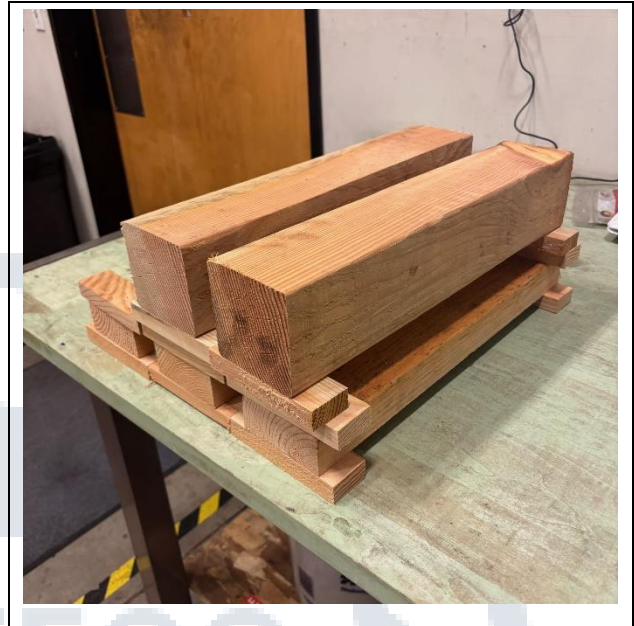
Model: 81C

Run Number: 2

Test Date: 8/12/25



Test Fuel Front/Side View



Test Fuel Iso View



Test Fuel Loaded in Stove

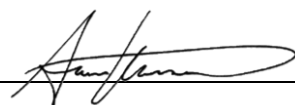


Primary

Secondary

Air Settings

Technician Signature: _____



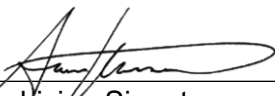
Date: 8/13/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515



Run 3 Data Summary

Client:	Buck
Model:	81C
Job #:	25-422
Tracking #:	227
Test Date:	8/13/2025



Technician Signature

9/4/2025

Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 3

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/13/2025

Burn Rate (kg/hr):	1.91
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	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	22.513	31.951	32.086	8.616
Average Gas Velocity in Dilution Tunnel (ft/sec)	17.9			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11282.6			
Average Gas Meter Temperature (°F)	81.3	101.7	101.6	93.8
Total Sample Volume (dscf)	22.090	30.603	30.320	8.383
Average Tunnel Temperature (°F)	117.1			
Total Time of Test (min)	202			
Total Particulate Catch (mg)	0.2	5.8	6.1	4.2
Particulate Concentration, dry-standard (g/dscf)	0.0000091	0.0001895	0.0002012	0.0005010
Total PM Emissions (g)	0.34	6.86	7.30	5.55
Particulate Emission Rate (g/hr)	0.10	2.04	2.17	5.55
Emissions Factor (g/kg)	-	1.07	1.14	-
Difference from Average Total Particulate Emissions (g)	-	0.22	0.22	-
Difference from Average Total Particulate Emissions (%)	-	3.1%	3.1%	
Difference from Average Emissions Factor (g/kg)	-	0.03	0.03	-

Final Average Results	
Total Particulate Emissions (g)	7.08
Particulate Emission Rate (g/hr)	2.10
Emissions Factor (g/kg)	1.10
HHV Efficiency (%)	78.0%
LHV Efficiency (%)	84.3%
CO Emissions (g/min)	0.20

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	<90 °F	89.8	OK
Face Velocity	< 30 ft/min	12.2	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:80.1/Max:82.2	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	12.7	OK

B415.1 Efficiency Results

Manufacturer: Buck
Model: 81C
Date: 08/13/25
Run: 3
Control #: 25-422
Test Duration: 202
Output Category: 4

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	78.0%	84.3%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	78.4%	84.7%

Output Rate (kJ/h)	29,222	27,721	(Btu/h)
Burn Rate (kg/h)	1.89	4.17	(lb/h)
Input (kJ/h)	37,457	35,532	(Btu/h)

Test Load Weight (dry kg)	6.37	14.03	dry lb
MC wet (%)	18.43		
MC dry (%)	22.59		
Particulate (g)	7.08		
CO (g)	41		
Test Duration (h)	3.37		

Emissions	Particulate	CO
g/MJ Output	0.07	0.42
g/kg Dry Fuel	1.11	6.50
g/h	2.10	12.29
g/min	0.04	0.20
lb/MM Btu Output	0.17	0.98

Air/Fuel Ratio (A/F)	12.15
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VERSION:

2.4

4/15/2010

WOODSTOVE FUEL DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Preburn Fuel Information						
Size	Length (in)	Moisture Content (% DB)		Size	Length (in)	Moisture Content (% DB)
2x4	16.00	24.6		2x4	16.00	19.8
2x4	16.00	19.4		2x4	16.00	21.7
2x4	16.00	19.2				
2x4	16.00	24.2				
2x4	16.00	19.4				
2x4	16.00	19.0				
2x4	16.00	21.7				
2x4	16.00	20.5				
Total Fuel Weight (lbs):		16.8	Average Moisture (%DB):		21.0	

Firebox Volume (ft ³):	2.25
Total 2x4 Crib Weight, with spacers (lbs):	7.12
Total 4x4 Crib Weight, with spacers (lbs):	10.08
Total Wet Fuel Weight, with spacers (lbs):	17.20

Coal Bed Range (20-25%):

Min (lbs): 3.44
 Max (lbs): 4.30

Test Fuel Information						
Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	17.00	1.90	21.2	20.9	21.4	1.57
2x4	17.00	1.90	19.6	19.4	22.5	1.58
2x4	17.00	1.76	24.4	23.3	24.2	1.42
4x4	17.00	5.16	24.2	24.4	23.1	4.16
4x4	17.00	4.45	23.0	24.9	22.4	3.61
Total Dry Weight, no spacers (lbs):						12.33
Total Dry Weight, with spacers (lbs):						14.17

Spacer Moisture Readings (%DB)						
10.1	9.5					
12.0	10.0					
12.4	10.1					
11.7	10.4					
9.8	12.4					
10.1	11.8					
10.8	10.3					
11.4	9.5					

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft ³ , DB)	31.1	OK
Loading Density	6.3 - 7.7 (lbs/ft ³ , WB)	7.64	OK
2x4 Fuel Mix	35 - 65 % of total weight	41%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client: Buck
 Model: 81C
 Run #: 3
 Test Start Time: 14:18

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Total Sampling Time (min): 202
 Recording Interval (min): 1

Meter Box γ Factor: 1.019 (A)
 Meter Box γ Factor: 1.005 (B)
 Meter Box γ Factor: 1.024 (C)
 Meter Box γ Factor: 1.012 (Ambient)

Induced Draft Check (in. H₂O): 0
 Smoke Capture Check (%): 100%
 Date Flue Pipe Last Cleaned: 8/8/2025
 Test Fuel Scale Audit (lbs): 10.00
 Platform Scale Audit (lbs): 10.0

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.80	29.71	29.76
Relative Humidity (%)	37.3	21.3	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:	22.513		ft ³

Sample Train Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-7 in. Hg
(B)	0.000	0.000	cfm @	-7 in. Hg
(C)	0.001	0.000	cfm @	-7 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.050	79
2	0.080	79
3	0.082	79
4	0.052	79
5	0.054	79
6	0.084	79
7	0.086	79
8	0.048	79
Center	0.086	79

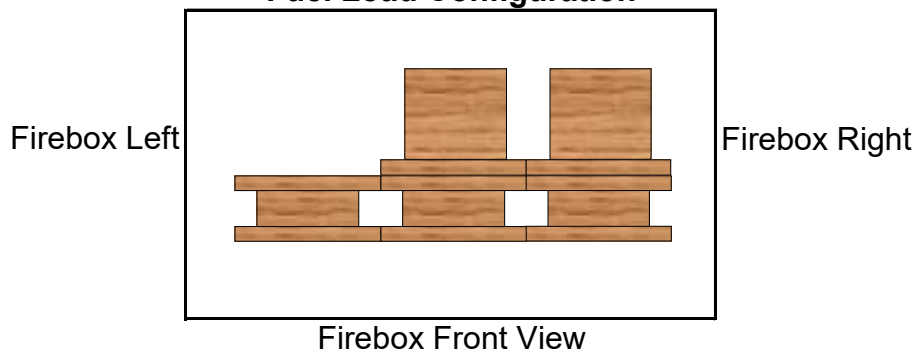
Dilution Tunnel H₂O: 2.00 percent
 Tunnel Diameter: 6 inches
 Pitot Tube Cp: 0.99 [unitless]
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Tunnel Area: 0.1963 ft²

 V_{strav} : 17.24 ft/sec
 V_{scent} : 19.68 ft/sec
 F_p : 0.876 [ratio]
 Initial Tunnel Flow: 194.0 scf/min

Static Pressure: -0.120 in. H₂O

TEST FUEL PROPERTIES

Fuel Load Configuration



Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	22.6

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Recording Interval (min): 1
 Run Time (min): 117

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	18.47	-0.069	255	212	114	200	143	184.8	352	77
1	18.39	-0.070	254	211	114	200	144	184.5	338	77
2	18.31	-0.069	252	209	114	195	144	182.6	329	77
3	18.23	-0.068	250	207	114	198	144	182.5	325	77
4	18.16	-0.067	248	205	113	196	144	181.4	323	77
5	18.08	-0.068	245	203	114	193	144	179.8	322	77
6	18.02	-0.067	243	201	112	191	144	178.2	318	77
7	17.93	-0.066	240	198	112	189	144	176.7	316	77
8	17.86	-0.067	238	196	112	188	144	175.5	316	77
9	17.77	-0.066	235	194	111	186	144	174.1	315	77
10	17.67	-0.067	233	192	111	185	144	172.9	316	77
11	17.58	-0.066	230	190	111	183	144	171.7	315	77
12	17.48	-0.068	228	188	110	181	143	170.2	315	77
13	17.39	-0.068	226	187	111	180	143	169.1	315	77
14	17.28	-0.067	224	185	110	177	143	167.9	316	77
15	17.18	-0.068	222	184	110	177	142	166.8	316	77
16	17.06	-0.069	220	182	109	176	142	165.8	317	77
17	16.91	-0.068	218	181	110	173	142	164.8	323	77
18	16.78	-0.070	217	179	109	174	141	164.0	322	77
19	16.77	-0.070	215	178	109	173	141	163.1	326	77
20	16.67	-0.073	214	177	109	170	141	162.0	329	77
21	16.57	-0.071	212	176	109	168	140	161.1	338	77
22	16.43	-0.072	212	175	108	169	140	160.8	343	77
23	16.35	-0.073	211	174	109	168	139	160.3	349	77
24	16.14	-0.074	211	173	109	170	139	160.4	353	77
25	15.96	-0.074	211	172	109	169	139	160.1	355	77
26	15.79	-0.074	211	172	110	173	140	161.0	358	77
27	15.63	-0.075	211	172	110	176	139	161.6	365	78
28	15.45	-0.074	211	172	109	177	139	161.7	369	78
29	15.30	-0.074	212	172	111	178	139	162.3	372	78
30	15.15	-0.076	212	171	110	181	139	162.6	373	78
31	14.98	-0.075	213	171	110	183	139	163.3	377	78
32	14.81	-0.074	213	171	111	187	139	164.1	377	78
33	14.61	-0.076	214	171	110	188	139	164.4	380	78
34	14.40	-0.075	213	172	111	185	139	164.0	381	78
35	14.25	-0.075	214	173	110	193	138	165.5	382	78
36	14.05	-0.077	214	173	110	191	138	165.2	379	78
37	13.86	-0.077	215	174	110	193	138	165.7	383	78
38	13.69	-0.077	215	174	110	194	137	166.0	387	78
39	13.51	-0.076	216	175	109	193	137	165.9	387	78
40	13.35	-0.077	217	176	110	191	137	166.1	385	78
41	13.19	-0.076	217	177	109	196	137	166.9	388	78
42	12.99	-0.076	219	177	108	196	136	167.4	386	78
43	12.82	-0.078	219	178	109	195	136	167.4	390	78
44	12.64	-0.078	220	179	108	198	136	168.2	392	78
45	12.46	-0.078	221	180	108	198	136	168.5	391	78

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Recording Interval (min): 1
 Run Time (min): 117

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
46	12.31	-0.077	221	181	108	199	136	169.0	389	78
47	12.14	-0.078	223	182	108	198	135	169.4	389	79
48	11.97	-0.077	224	184	109	200	135	170.4	391	79
49	11.80	-0.080	226	185	109	200	135	170.9	391	79
50	11.64	-0.078	227	186	109	200	135	171.3	385	79
51	11.45	-0.077	228	187	109	201	135	171.9	386	79
52	11.30	-0.076	230	188	109	202	135	172.6	391	79
53	11.15	-0.078	231	190	109	204	135	173.5	394	79
54	10.98	-0.077	232	191	109	201	135	173.5	395	79
55	10.85	-0.077	233	192	109	205	135	174.5	393	79
56	10.69	-0.077	234	193	108	208	135	175.5	398	79
57	10.52	-0.077	235	194	108	208	135	176.0	397	79
58	10.36	-0.077	236	194	109	209	135	176.6	398	79
59	10.21	-0.078	237	196	109	210	135	177.4	401	79
60	10.07	-0.077	239	197	109	212	135	178.2	401	79
61	9.91	-0.077	240	198	109	210	135	178.1	401	79
62	9.76	-0.078	240	199	110	208	135	178.3	401	79
63	9.63	-0.078	241	199	109	216	135	180.0	402	79
64	9.47	-0.076	242	200	110	215	135	180.5	401	79
65	9.32	-0.077	243	202	109	215	135	180.8	405	79
66	9.16	-0.078	244	203	109	217	135	181.4	406	79
67	8.99	-0.078	245	204	110	217	135	182.2	407	79
68	8.84	-0.079	246	205	109	219	136	183.0	405	79
69	8.73	-0.076	247	207	110	218	136	183.4	404	80
70	8.58	-0.076	248	208	110	220	136	184.4	407	80
71	8.42	-0.078	249	210	111	218	136	184.7	402	80
72	8.29	-0.077	249	211	110	222	137	185.6	402	80
73	8.18	-0.078	250	213	111	220	137	186.1	405	80
74	8.02	-0.077	251	214	111	218	137	186.2	405	80
75	7.90	-0.077	252	215	111	224	137	187.8	407	80
76	7.77	-0.077	253	217	110	224	138	188.1	408	80
77	7.66	-0.078	253	218	111	223	138	188.6	411	80
78	7.51	-0.078	254	219	111	228	138	190.1	413	79
79	7.38	-0.077	254	220	112	224	139	189.7	410	80
80	7.25	-0.076	255	222	112	228	139	191.1	404	80
81	7.12	-0.078	256	223	111	226	139	191.1	403	80
82	7.00	-0.078	257	224	112	232	140	192.9	403	80
83	6.90	-0.078	258	225	112	233	140	193.3	406	80
84	6.78	-0.076	259	225	112	225	140	192.4	404	80
85	6.67	-0.076	261	226	113	232	141	194.5	402	80
86	6.57	-0.076	262	227	112	231	141	194.4	401	80
87	6.47	-0.076	262	227	113	231	141	194.9	400	80
88	6.38	-0.077	264	228	113	233	142	195.9	399	80
89	6.29	-0.075	264	228	113	230	142	195.6	396	80
90	6.21	-0.075	265	229	113	232	143	196.2	398	80
91	6.13	-0.075	266	229	114	233	143	196.9	399	80

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Recording Interval (min): 1
 Run Time (min): 117

Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	Temperatures (°F)							Stove Surface Average	Flue	Ambient
			FB Left	FB Right	FB Back	FB Top	FB Bottom					
92	6.05	-0.074	267	229	114	234	143			197.4	393	80
93	5.97	-0.073	268	228	114	232	143			197.1	394	80
94	5.90	-0.073	269	228	114	232	144			197.5	393	80
95	5.82	-0.074	270	228	114	231	144			197.6	393	80
96	5.76	-0.074	270	228	113	231	144			197.4	392	80
97	5.68	-0.073	271	228	114	230	144			197.4	392	80
98	5.62	-0.072	271	227	115	226	145			196.8	388	80
99	5.55	-0.075	271	227	115	229	145			197.3	388	80
100	5.49	-0.073	272	227	115	228	145			197.5	385	80
101	5.42	-0.073	272	227	115	224	145			196.7	386	80
102	4.40	-0.074	272	226	116	222	146			196.2	417	80
103	4.31	-0.074	273	226	114	225	146			196.9	402	80
104	4.24	-0.073	274	226	116	227	146			197.7	397	80
105	4.17	-0.074	274	226	115	223	146			196.8	391	80
106	4.10	-0.073	275	226	115	220	146			196.2	387	81
107	4.05	-0.072	276	226	116	224	146			197.6	380	80
108	3.98	-0.071	276	226	116	218	147			196.7	377	80
109	3.93	-0.071	277	227	116	218	147			196.9	374	80
110	3.87	-0.071	277	227	117	217	147			197.1	369	80
111	3.81	-0.071	278	227	117	214	148			196.8	367	80
112	3.77	-0.071	279	227	118	211	148			196.2	363	80
113	3.72	-0.071	279	227	117	214	148			196.9	362	80
114	3.67	-0.068	279	226	117	213	148			196.6	362	81
115	3.62	-0.068	280	226	118	211	148			196.5	360	80
116	3.58	-0.069	280	225	117	212	149			196.6	355	80
117	3.54	-0.067	280	225	118	209	149			196.1	356	80

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.084	0.09	83	0.2		17.20		119	379	82	81
1	0.104	0.104	0.079	2.23	83	0.9	-	17.09	-0.11	123	392	84	81
2	0.332	0.228	0.080	2.08	83	0.9	-	16.97	-0.12	122	371	84	81
3	0.509	0.177	0.080	2.10	83	0.9	-	16.81	-0.16	120	369	85	80
4	0.650	0.141	0.080	2.13	83	0.9	-	16.68	-0.13	119	368	85	80
5	0.799	0.149	0.079	2.14	83	0.9	-	16.55	-0.13	119	371	85	81
6	0.943	0.144	0.081	2.15	83	0.9	-	16.40	-0.15	119	372	85	80
7	1.093	0.150	0.080	2.17	83	0.9	-	16.28	-0.12	118	374	85	80
8	1.238	0.145	0.081	2.21	83	0.9	-	16.12	-0.16	118	374	86	80
9	1.390	0.152	0.082	2.22	84	0.9	-	15.99	-0.13	118	376	86	80
10	1.537	0.147	0.082	2.23	84	0.9	103	15.85	-0.14	118	376	86	80
11	1.688	0.151	0.082	2.24	84	0.9	-	15.72	-0.13	119	376	86	80
12	1.835	0.147	0.083	2.25	84	0.9	-	15.59	-0.13	118	376	86	80
13	1.987	0.152	0.083	2.26	84	0.9	-	15.45	-0.14	118	377	86	80
14	2.137	0.150	0.083	2.28	85	0.9	-	15.30	-0.15	118	375	86	80
15	2.289	0.152	0.083	2.28	85	0.9	-	15.18	-0.12	118	376	87	81
16	2.440	0.151	0.084	2.29	85	0.9	-	15.03	-0.15	118	371	87	80
17	2.593	0.153	0.083	2.28	85	0.9	-	14.90	-0.13	118	368	87	81
18	2.743	0.150	0.084	2.31	86	0.9	-	14.75	-0.15	118	371	87	81
19	2.897	0.154	0.083	2.32	86	0.9	-	14.64	-0.11	118	369	87	81
20	3.057	0.160	0.084	2.32	86	0.9	101	14.50	-0.14	117	371	87	81
21	3.211	0.154	0.084	2.32	87	0.9	-	14.36	-0.14	117	371	87	81
22	3.366	0.155	0.084	2.33	87	0.9	-	14.24	-0.12	118	370	87	81
23	3.521	0.155	0.083	2.33	87	0.9	-	14.10	-0.14	117	368	87	81
24	3.671	0.150	0.083	2.33	88	0.9	-	13.97	-0.13	117	368	87	81
25	3.828	0.157	0.084	2.34	88	0.9	-	13.81	-0.16	117	368	87	81
26	3.979	0.151	0.085	2.35	88	0.9	-	13.68	-0.13	117	368	87	81
27	4.135	0.156	0.085	2.34	89	0.9	-	13.55	-0.13	117	368	87	81
28	4.285	0.150	0.084	2.35	89	0.9	-	13.39	-0.16	118	366	87	81
29	4.440	0.155	0.084	2.35	89	0.9	-	13.23	-0.16	118	366	86	81
30	4.593	0.153	0.084	2.35	90	1.0	101	13.08	-0.15	118	370	86	81
31	4.748	0.155	0.086	2.37	90	1.0	-	12.94	-0.14	118	373	86	81
32	4.904	0.156	0.085	2.38	90	0.9	-	12.83	-0.11	118	375	85	81

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.059	0.155	0.085	2.37	91	0.9	-	12.70	-0.13	117	376	85	81
34	5.213	0.154	0.086	2.37	91	0.9	-	12.59	-0.11	117	370	85	81
35	5.365	0.152	0.085	2.38	91	0.9	-	12.46	-0.13	117	371	85	81
36	5.523	0.158	0.086	2.36	92	0.9	-	12.35	-0.11	117	369	85	81
37	5.675	0.152	0.085	2.39	92	0.9	-	12.22	-0.13	117	367	85	81
38	5.833	0.158	0.085	2.38	92	0.9	-	12.10	-0.12	117	365	85	81
39	5.985	0.152	0.087	2.38	93	1.0	-	11.98	-0.12	117	364	85	81
40	6.142	0.157	0.087	2.39	93	0.9	100	11.87	-0.11	117	366	85	81
41	6.298	0.156	0.086	2.39	93	1.0	-	11.76	-0.11	117	366	85	81
42	6.453	0.155	0.086	2.40	94	1.0	-	11.64	-0.12	116	366	85	81
43	6.611	0.158	0.086	2.40	94	0.9	-	11.53	-0.11	116	367	85	81
44	6.764	0.153	0.086	2.40	94	1.0	-	11.42	-0.11	116	369	85	81
45	6.923	0.159	0.088	2.40	95	1.0	-	11.29	-0.13	116	365	85	81
46	7.077	0.154	0.087	2.41	95	1.0	-	11.17	-0.12	117	365	85	81
47	7.235	0.158	0.086	2.41	95	0.9	-	11.05	-0.12	117	365	85	81
48	7.390	0.155	0.085	2.41	96	1.0	-	10.94	-0.11	117	364	85	81
49	7.547	0.157	0.087	2.41	96	1.0	-	10.84	-0.10	117	364	85	81
50	7.706	0.159	0.087	2.42	96	0.9	100	10.73	-0.11	117	364	85	81
51	7.859	0.153	0.087	2.41	96	0.9	-	10.61	-0.12	117	365	85	81
52	8.019	0.160	0.087	2.41	97	1.0	-	10.51	-0.10	117	363	85	81
53	8.174	0.155	0.086	2.43	97	1.0	-	10.40	-0.11	117	366	85	81
54	8.334	0.160	0.089	2.42	97	0.9	-	10.30	-0.10	117	367	85	81
55	8.489	0.155	0.087	2.43	98	0.9	-	10.20	-0.10	117	368	85	81
56	8.647	0.158	0.088	2.43	98	1.0	-	10.09	-0.11	117	368	85	81
57	8.809	0.162	0.088	2.43	98	1.0	-	9.99	-0.10	117	367	85	81
58	8.961	0.152	0.085	2.42	98	1.0	-	9.90	-0.09	117	368	85	81
59	9.122	0.161	0.087	2.43	98	1.0	-	9.80	-0.10	116	368	85	81
60	9.277	0.155	0.086	2.43	99	0.9	100	9.70	-0.10	116	365	85	81
61	9.436	0.159	0.086	2.43	99	1.0	-	9.60	-0.10	116	363	85	81
62	9.594	0.158	0.087	2.43	99	0.9	-	9.49	-0.11	116	366	85	81
63	9.752	0.158	0.087	2.43	99	0.9	-	9.40	-0.09	116	361	85	81
64	9.911	0.159	0.087	2.43	100	0.9	-	9.32	-0.08	116	362	85	81
65	10.066	0.155	0.087	2.45	100	1.0	-	9.21	-0.11	116	364	85	81

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	10.229	0.163	0.087	2.44	100	0.9	-	9.11	-0.10	116	364	85	81
67	10.384	0.155	0.087	2.44	100	1.0	-	9.00	-0.11	117	362	85	81
68	10.544	0.160	0.089	2.45	100	0.9	-	8.89	-0.11	117	365	85	81
69	10.704	0.160	0.088	2.44	101	1.0	-	8.78	-0.11	117	367	85	81
70	10.859	0.155	0.086	2.45	101	1.0	101	8.68	-0.10	117	371	85	81
71	11.022	0.163	0.087	2.45	101	1.0	-	8.56	-0.12	117	373	85	81
72	11.178	0.156	0.088	2.45	101	0.9	-	8.44	-0.12	117	372	85	81
73	11.338	0.160	0.088	2.45	101	0.9	-	8.33	-0.11	117	375	85	81
74	11.497	0.159	0.088	2.45	102	1.0	-	8.21	-0.12	117	377	85	81
75	11.655	0.158	0.088	2.45	102	1.0	-	8.11	-0.10	118	378	85	81
76	11.815	0.160	0.088	2.45	102	1.0	-	7.98	-0.13	118	377	85	81
77	11.973	0.158	0.087	2.46	102	1.0	-	7.87	-0.11	118	377	85	81
78	12.133	0.160	0.088	2.46	102	1.0	-	7.76	-0.11	118	377	85	81
79	12.291	0.158	0.087	2.45	103	1.0	-	7.65	-0.11	118	377	85	81
80	12.451	0.160	0.089	2.45	103	1.0	100	7.54	-0.11	118	379	85	81
81	12.612	0.161	0.088	2.47	103	1.0	-	7.43	-0.11	118	378	85	81
82	12.769	0.157	0.088	2.46	103	1.0	-	7.31	-0.12	118	382	85	81
83	12.931	0.162	0.087	2.46	103	1.0	-	7.21	-0.10	118	382	85	81
84	13.087	0.156	0.087	2.45	103	1.0	-	7.10	-0.11	119	382	85	81
85	13.248	0.161	0.088	2.46	104	1.0	-	7.00	-0.10	119	384	85	81
86	13.408	0.160	0.088	2.46	104	1.0	-	6.89	-0.11	119	387	85	81
87	13.564	0.156	0.088	2.45	104	1.0	-	6.79	-0.10	119	386	85	81
88	13.727	0.163	0.088	2.44	104	1.0	-	6.69	-0.10	119	387	85	81
89	13.884	0.157	0.088	2.45	104	1.0	-	6.58	-0.11	119	386	85	82
90	14.044	0.160	0.088	2.45	104	1.0	99	6.48	-0.10	119	388	85	82
91	14.205	0.161	0.088	2.44	104	1.0	-	6.40	-0.08	119	386	85	82
92	14.361	0.156	0.088	2.43	105	1.0	-	6.30	-0.10	119	385	85	81
93	14.524	0.163	0.090	2.43	105	1.0	-	6.19	-0.11	119	386	85	82
94	14.680	0.156	0.088	2.42	105	0.9	-	6.10	-0.09	119	388	85	82
95	14.842	0.162	0.089	2.42	105	1.0	-	5.99	-0.11	119	387	85	82
96	15.003	0.161	0.088	2.43	105	1.0	-	5.89	-0.10	119	382	85	82
97	15.158	0.155	0.087	2.43	105	1.0	-	5.82	-0.07	119	385	85	82
98	15.322	0.164	0.090	2.44	105	1.0	-	5.71	-0.11	119	383	85	82

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	15.478	0.156	0.088	2.43	105	1.0	-	5.63	-0.08	119	386	85	82
100	15.638	0.160	0.088	2.43	106	1.0	100	5.54	-0.09	119	386	85	81
101	15.799	0.161	0.088	2.44	106	1.0	-	5.44	-0.10	119	383	85	82
102	15.955	0.156	0.089	2.43	106	1.0	-	5.37	-0.07	120	382	85	82
103	16.119	0.164	0.089	2.43	106	1.0	-	5.27	-0.10	120	386	85	82
104	16.276	0.157	0.090	2.42	106	1.0	-	5.18	-0.09	120	384	85	82
105	16.436	0.160	0.089	2.40	106	1.0	-	5.07	-0.11	119	386	85	82
106	16.597	0.161	0.089	2.42	106	1.0	-	4.96	-0.11	120	385	85	82
107	16.753	0.156	0.089	2.43	106	1.0	-	4.88	-0.08	120	387	85	82
108	16.916	0.163	0.089	2.44	106	1.0	-	4.79	-0.09	119	383	85	82
109	17.073	0.157	0.088	2.44	106	1.0	-	4.69	-0.10	119	386	85	82
110	17.234	0.161	0.089	2.45	106	1.0	99	4.62	-0.07	119	387	85	82
111	17.394	0.160	0.089	2.40	106	1.0	-	4.52	-0.10	119	389	85	82
112	17.552	0.158	0.089	2.44	107	1.0	-	4.43	-0.09	119	387	85	82
113	17.714	0.162	0.089	2.42	107	1.0	-	4.35	-0.08	119	386	85	82
114	17.872	0.158	0.088	2.41	107	1.0	-	4.25	-0.10	119	388	85	82
115	18.033	0.161	0.089	2.41	107	1.0	-	4.18	-0.07	120	389	85	82
116	18.193	0.160	0.090	2.40	107	1.0	-	4.10	-0.08	120	387	85	81
117	18.351	0.158	0.089	2.42	107	1.0	-	4.01	-0.09	119	389	85	82
118	18.513	0.162	0.089	2.43	107	1.0	-	3.95	-0.06	119	389	85	82
119	18.671	0.158	0.089	2.44	107	1.0	-	3.85	-0.10	120	389	85	82
120	18.832	0.161	0.088	2.46	107	1.0	99	3.79	-0.06	119	388	85	82
121	18.992	0.160	0.089	2.45	107	1.0	-	3.72	-0.07	120	387	85	82
122	19.150	0.158	0.088	2.44	107	1.0	-	3.63	-0.09	120	387	85	82
123	19.312	0.162	0.089	2.44	107	1.0	-	3.55	-0.08	119	387	85	82
124	19.470	0.158	0.090	2.44	107	1.0	-	3.49	-0.06	120	385	85	82
125	19.631	0.161	0.089	2.44	108	1.0	-	3.41	-0.08	120	386	85	82
126	19.791	0.160	0.089	2.44	108	1.0	-	3.33	-0.08	120	385	85	82
127	19.949	0.158	0.090	2.45	108	1.0	-	3.27	-0.06	120	384	85	82
128	20.111	0.162	0.088	2.45	108	1.0	-	3.19	-0.08	120	382	85	82
129	20.269	0.158	0.090	2.45	108	1.0	-	3.11	-0.08	119	383	85	82
130	20.432	0.163	0.089	2.44	108	1.0	99	3.04	-0.07	119	381	85	82
131	20.590	0.158	0.089	2.44	108	1.0	-	2.97	-0.07	119	379	85	82

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	20.749	0.159	0.088	2.42	108	1.0	-	2.90	-0.07	119	379	85	82
133	20.910	0.161	0.088	2.42	108	1.0	-	2.82	-0.08	119	377	85	82
134	21.069	0.159	0.088	2.43	108	1.0	-	2.76	-0.06	119	376	85	82
135	21.230	0.161	0.088	2.45	108	1.0	-	2.70	-0.06	119	377	85	82
136	21.390	0.160	0.088	2.46	108	1.0	-	2.61	-0.09	118	375	85	82
137	21.548	0.158	0.088	2.42	108	1.0	-	2.55	-0.06	118	376	85	82
138	21.711	0.163	0.088	2.44	108	1.0	-	2.49	-0.06	118	376	85	82
139	21.869	0.158	0.089	2.44	108	1.0	-	2.41	-0.08	118	371	85	82
140	22.030	0.161	0.089	2.43	108	1.0	99	2.33	-0.08	118	370	85	82
141	22.190	0.160	0.089	2.43	108	1.0	-	2.29	-0.04	118	371	85	82
142	22.348	0.158	0.088	2.44	109	1.0	-	2.23	-0.06	118	368	85	82
143	22.510	0.162	0.088	2.42	109	1.0	-	2.19	-0.04	118	367	85	82
144	22.668	0.158	0.088	2.42	109	1.0	-	2.13	-0.06	118	367	85	82
145	22.829	0.161	0.087	2.44	109	1.0	-	2.06	-0.07	118	365	85	82
146	22.990	0.161	0.088	2.43	109	1.0	-	2.01	-0.05	117	365	85	82
147	23.147	0.157	0.086	2.44	109	1.0	-	1.96	-0.05	117	364	85	82
148	23.310	0.163	0.089	2.44	109	1.0	-	1.91	-0.05	117	362	85	82
149	23.468	0.158	0.089	2.43	109	1.0	-	1.87	-0.04	117	362	85	82
150	23.629	0.161	0.088	2.43	109	1.0	99	1.83	-0.04	117	361	85	82
151	23.790	0.161	0.088	2.44	109	1.0	-	1.76	-0.07	117	358	85	82
152	23.947	0.157	0.089	2.44	109	1.0	-	1.71	-0.05	117	359	85	82
153	24.110	0.163	0.087	2.44	109	1.0	-	1.67	-0.04	117	360	85	82
154	24.268	0.158	0.088	2.44	109	1.0	-	1.62	-0.05	116	361	85	82
155	24.429	0.161	0.087	2.45	109	1.0	-	1.57	-0.05	117	361	85	82
156	24.590	0.161	0.088	2.45	109	1.0	-	1.53	-0.04	116	361	85	82
157	24.747	0.157	0.086	2.44	109	1.0	-	1.46	-0.07	116	362	85	82
158	24.910	0.163	0.085	2.44	109	1.0	-	1.42	-0.04	116	361	85	82
159	25.068	0.158	0.087	2.44	109	1.0	-	1.37	-0.05	116	360	85	82
160	25.229	0.161	0.085	2.45	109	1.0	100	1.34	-0.03	116	358	85	82
161	25.390	0.161	0.088	2.45	109	1.0	-	1.30	-0.04	116	358	85	82
162	25.547	0.157	0.087	2.45	109	1.0	-	1.25	-0.05	116	357	85	82
163	25.711	0.164	0.088	2.45	109	1.0	-	1.22	-0.03	116	356	85	82
164	25.869	0.158	0.087	2.45	109	1.0	-	1.18	-0.04	116	355	85	82

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	26.029	0.160	0.087	2.45	109	1.0	-	1.12	-0.06	116	352	85	82
166	26.190	0.161	0.088	2.45	109	1.0	-	1.09	-0.03	116	350	85	82
167	26.347	0.157	0.087	2.43	109	1.0	-	1.07	-0.02	115	350	85	82
168	26.511	0.164	0.087	2.44	109	1.0	-	1.03	-0.04	115	349	85	82
169	26.669	0.158	0.086	2.46	109	1.0	-	0.99	-0.04	115	349	85	81
170	26.829	0.160	0.086	2.46	109	1.0	100	0.96	-0.03	115	347	85	82
171	26.990	0.161	0.086	2.45	109	1.0	-	0.92	-0.04	115	346	85	82
172	27.147	0.157	0.086	2.45	110	1.0	-	0.89	-0.03	115	346	85	82
173	27.311	0.164	0.086	2.43	110	1.0	-	0.86	-0.03	115	344	85	82
174	27.468	0.157	0.087	2.44	110	1.0	-	0.83	-0.03	115	343	85	82
175	27.629	0.161	0.086	2.44	110	1.0	-	0.79	-0.04	114	340	85	81
176	27.791	0.162	0.086	2.44	110	1.0	-	0.77	-0.02	114	340	85	82
177	27.948	0.157	0.086	2.46	110	1.0	-	0.74	-0.03	114	339	85	81
178	28.111	0.163	0.086	2.45	110	1.0	-	0.70	-0.04	114	340	85	81
179	28.269	0.158	0.086	2.44	110	1.0	-	0.67	-0.03	114	339	85	81
180	28.429	0.160	0.086	2.45	110	1.0	100	0.63	-0.04	113	336	85	82
181	28.591	0.162	0.085	2.44	110	1.0	-	0.60	-0.03	113	336	85	82
182	28.748	0.157	0.085	2.45	110	1.0	-	0.59	-0.01	113	334	85	82
183	28.912	0.164	0.085	2.44	110	1.0	-	0.55	-0.04	113	334	85	82
184	29.069	0.157	0.085	2.45	110	1.0	-	0.52	-0.03	113	333	85	82
185	29.230	0.161	0.086	2.45	110	1.0	-	0.47	-0.05	113	334	85	82
186	29.393	0.163	0.085	2.45	110	1.0	-	0.44	-0.03	113	333	85	82
187	29.549	0.156	0.085	2.46	110	1.0	-	0.42	-0.02	113	332	85	82
188	29.713	0.164	0.085	2.44	110	1.0	-	0.38	-0.04	113	331	85	82
189	29.873	0.160	0.086	2.45	110	1.0	-	0.36	-0.02	113	331	85	82
190	30.034	0.161	0.085	2.45	110	1.0	100	0.33	-0.03	112	331	85	81
191	30.193	0.159	0.086	2.45	110	1.0	-	0.30	-0.03	112	330	85	81
192	30.349	0.156	0.085	2.44	110	1.0	-	0.27	-0.03	112	328	85	81
193	30.513	0.164	0.086	2.44	110	1.0	-	0.24	-0.03	112	328	85	81
194	30.670	0.157	0.085	2.46	110	1.0	-	0.21	-0.03	112	328	85	82
195	30.832	0.162	0.083	2.45	110	1.0	-	0.18	-0.03	112	326	85	81
196	30.994	0.162	0.085	2.46	110	1.0	-	0.14	-0.04	112	326	85	81
197	31.150	0.156	0.084	2.45	110	1.0	-	0.12	-0.02	112	326	85	81

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	31.314	0.164	0.084	2.44	110	1.0	-	0.10	-0.02	112	326	85	81
199	31.472	0.158	0.085	2.47	110	1.0	-	0.07	-0.03	112	324	85	81
200	31.633	0.161	0.084	2.45	110	1.0	100	0.05	-0.02	112	323	85	81
201	31.794	0.161	0.084	2.45	110	1.0	-	0.01	-0.04	112	324	85	81
202	31.951	0.157	0.084	2.45	110	1.0	101	0.00	-0.01	112	324	85	82
Avg/Tot	31.951	0.158	0.087	2.40	101.7	1.0	100			117.1	366.6	85.1	81.3

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.000		0.11	83	1.1		84	-0.071	5.85	0.062
1	0.140	0.140	2.48	83	1.8	-	85	-0.073	5.71	0.041
2	0.269	0.129	2.49	83	1.9	-	86	-0.073	8.50	0.067
3	0.422	0.153	2.48	83	1.8	-	87	-0.075	10.06	0.069
4	0.577	0.155	2.47	83	2.1	-	87	-0.075	10.92	0.074
5	0.734	0.157	2.47	83	2.0	-	87	-0.075	11.42	0.113
6	0.889	0.155	2.47	83	1.7	-	87	-0.075	11.36	0.085
7	1.045	0.156	2.46	83	2.1	-	88	-0.075	11.53	0.084
8	1.202	0.157	2.45	84	2.1	-	88	-0.077	11.70	0.092
9	1.355	0.153	2.45	84	1.7	-	88	-0.077	11.68	0.083
10	1.514	0.159	2.45	84	1.9	101	88	-0.077	11.49	0.074
11	1.668	0.154	2.45	84	1.9	-	88	-0.075	11.34	0.072
12	1.825	0.157	2.45	84	2.1	-	88	-0.075	11.32	0.058
13	1.980	0.155	2.45	84	1.8	-	89	-0.076	11.34	0.051
14	2.131	0.151	2.46	85	1.9	-	89	-0.075	11.41	0.052
15	2.288	0.157	2.45	85	1.6	-	89	-0.074	11.13	0.061
16	2.442	0.154	2.45	85	1.6	-	89	-0.074	11.28	0.048
17	2.601	0.159	2.45	86	2.1	-	89	-0.075	11.28	0.045
18	2.755	0.154	2.46	86	2.1	-	89	-0.075	11.28	0.048
19	2.912	0.157	2.46	86	2.1	-	89	-0.074	11.35	0.043
20	3.001	0.089	2.46	86	1.5	99	90	-0.073	11.21	0.048
21	3.159	0.158	2.46	87	1.6	-	90	-0.074	11.26	0.041
22	3.314	0.155	2.45	87	1.6	-	90	-0.073	11.43	0.041
23	3.468	0.154	2.46	87	2.1	-	90	-0.073	11.58	0.037
24	3.628	0.160	2.46	88	1.6	-	90	-0.074	11.82	0.036
25	3.782	0.154	2.46	88	1.6	-	90	-0.073	12.11	0.041
26	3.940	0.158	2.46	88	2.1	-	89	-0.073	12.09	0.041
27	4.098	0.158	2.46	89	1.6	-	89	-0.074	12.07	0.041
28	4.254	0.156	2.46	89	1.6	-	88	-0.075	12.20	0.222
29	4.412	0.158	2.45	89	2.1	-	88	-0.076	13.00	0.593
30	4.568	0.156	2.46	90	1.6	103	88	-0.076	12.81	0.419
31	4.726	0.158	2.46	90	1.9	-	88	-0.075	12.22	0.128
32	4.882	0.156	2.46	90	1.7	-	88	-0.075	11.54	0.043

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
33	5.043	0.161	2.46	91	1.7	-	88	-0.074	11.01	0.033
34	5.198	0.155	2.46	91	1.7	-	87	-0.073	10.82	0.026
35	5.354	0.156	2.46	91	1.6	-	87	-0.073	10.71	0.024
36	5.515	0.161	2.46	92	2.0	-	87	-0.075	10.73	0.022
37	5.670	0.155	2.46	92	1.9	-	87	-0.071	10.86	0.030
38	5.828	0.158	2.46	92	2.0	-	87	-0.074	10.98	0.023
39	5.987	0.159	2.46	93	1.6	-	87	-0.074	10.96	0.023
40	6.142	0.155	2.46	93	2.1	102	87	-0.073	10.86	0.022
41	6.303	0.161	2.47	93	1.7	-	87	-0.073	10.85	0.023
42	6.459	0.156	2.47	93	1.8	-	87	-0.074	10.86	0.023
43	6.618	0.159	2.47	94	1.9	-	87	-0.072	10.95	0.024
44	6.777	0.159	2.47	94	1.8	-	87	-0.071	11.11	0.027
45	6.934	0.157	2.47	94	2.1	-	87	-0.075	11.29	0.024
46	7.094	0.160	2.47	95	2.0	-	87	-0.072	11.37	0.029
47	7.250	0.156	2.47	95	1.7	-	87	-0.073	11.40	0.027
48	7.409	0.159	2.47	95	1.6	-	87	-0.072	11.17	0.031
49	7.569	0.160	2.47	96	1.6	-	87	-0.073	10.92	0.033
50	7.726	0.157	2.47	96	1.7	101	87	-0.073	10.84	0.035
51	7.887	0.161	2.47	96	1.7	-	87	-0.073	10.65	0.036
52	8.044	0.157	2.48	96	1.7	-	87	-0.074	10.51	0.039
53	8.203	0.159	2.47	97	1.8	-	87	-0.073	10.45	0.032
54	8.363	0.160	2.48	97	1.6	-	87	-0.073	10.41	0.035
55	8.520	0.157	2.48	97	1.6	-	87	-0.074	10.37	0.037
56	8.682	0.162	2.48	97	1.9	-	87	-0.072	10.30	0.030
57	8.841	0.159	2.48	98	1.7	-	87	-0.070	10.20	0.034
58	8.999	0.158	2.48	98	2.0	-	87	-0.072	10.14	0.026
59	9.160	0.161	2.48	98	2.1	-	87	-0.071	10.14	0.028
60	9.316	0.156	2.48	98	1.8	101	87	-0.072	10.08	0.026
61	9.478	0.162	2.48	99	1.7	-	87	-0.072	10.05	0.031
62	9.635	0.157	2.49	99	2.0	-	87	-0.073	9.93	0.028
63	9.796	0.161	2.49	99	1.9	-	87	-0.072	10.05	0.027
64	9.956	0.160	2.48	99	2.0	-	87	-0.071	10.31	0.025
65	10.114	0.158	2.48	99	1.8	-	87	-0.070	10.59	0.025

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
66	10.276	0.162	2.49	100	2.0	-	87	-0.075	10.86	0.043
67	10.433	0.157	2.48	100	1.5	-	87	-0.073	11.11	0.088
68	10.594	0.161	2.49	100	1.7	-	87	-0.073	11.20	0.138
69	10.754	0.160	2.49	100	1.7	-	87	-0.072	11.33	0.174
70	10.912	0.158	2.48	100	1.9	101	87	-0.074	11.43	0.204
71	11.073	0.161	2.49	101	2.0	-	87	-0.073	11.56	0.253
72	11.233	0.160	2.48	101	1.6	-	87	-0.073	11.57	0.222
73	11.392	0.159	2.49	101	1.6	-	87	-0.073	11.67	0.215
74	11.554	0.162	2.48	101	1.6	-	87	-0.074	11.64	0.254
75	11.711	0.157	2.49	102	2.1	-	87	-0.074	11.71	0.261
76	11.872	0.161	2.48	102	1.8	-	87	-0.074	11.63	0.246
77	12.034	0.162	2.49	102	2.0	-	87	-0.074	11.66	0.225
78	12.191	0.157	2.48	102	1.9	-	87	-0.075	11.73	0.175
79	12.354	0.163	2.49	102	1.8	-	87	-0.075	11.64	0.179
80	12.511	0.157	2.49	102	1.6	100	87	-0.073	11.79	0.112
81	12.673	0.162	2.49	103	1.6	-	87	-0.074	12.07	0.108
82	12.834	0.161	2.49	103	1.6	-	87	-0.074	11.90	0.125
83	12.992	0.158	2.48	103	1.8	-	87	-0.075	11.81	0.100
84	13.153	0.161	2.48	103	2.0	-	87	-0.074	11.64	0.110
85	13.313	0.160	2.48	103	1.7	-	87	-0.075	11.41	0.093
86	13.473	0.160	2.48	103	1.8	-	87	-0.074	11.24	0.080
87	13.634	0.161	2.48	104	1.9	-	87	-0.077	11.10	0.085
88	13.793	0.159	2.48	104	2.1	-	87	-0.072	11.07	0.078
89	13.953	0.160	2.47	104	1.7	-	86	-0.075	11.04	0.064
90	14.115	0.162	2.48	104	1.8	100	86	-0.075	11.03	0.073
91	14.272	0.157	2.48	104	1.8	-	86	-0.076	11.15	0.073
92	14.435	0.163	2.48	104	1.6	-	86	-0.075	11.09	0.074
93	14.593	0.158	2.48	104	1.7	-	86	-0.075	11.12	0.072
94	14.754	0.161	2.47	105	1.9	-	86	-0.077	11.01	0.079
95	14.915	0.161	2.48	105	2.1	-	86	-0.075	10.91	0.052
96	15.073	0.158	2.47	105	1.8	-	86	-0.073	10.82	0.052
97	15.235	0.162	2.47	105	1.7	-	86	-0.074	10.64	0.029
98	15.394	0.159	2.47	105	2.1	-	86	-0.076	10.55	0.026

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
99	15.554	0.160	2.47	105	1.7	-	86	-0.076	10.46	0.024
100	15.715	0.161	2.47	105	1.8	100	86	-0.076	10.47	0.022
101	15.874	0.159	2.47	105	2.1	-	86	-0.074	10.45	0.014
102	16.034	0.160	2.47	106	1.8	-	86	-0.074	10.68	0.018
103	16.196	0.162	2.47	106	1.9	-	86	-0.075	10.90	0.016
104	16.354	0.158	2.47	106	2.0	-	86	-0.073	11.05	0.026
105	16.517	0.163	2.46	106	1.7	-	86	-0.076	11.16	0.040
106	16.674	0.157	2.47	106	2.1	-	86	-0.075	11.25	0.050
107	16.836	0.162	2.47	106	1.6	-	86	-0.077	11.22	0.064
108	16.996	0.160	2.47	106	1.7	-	86	-0.076	11.15	0.037
109	17.155	0.159	2.47	106	2.1	-	86	-0.075	10.95	0.033
110	17.317	0.162	2.47	106	2.0	99	86	-0.076	10.95	0.017
111	17.476	0.159	2.47	106	2.1	-	86	-0.075	10.80	0.013
112	17.636	0.160	2.47	107	1.9	-	86	-0.076	10.76	0.016
113	17.798	0.162	2.47	107	2.1	-	86	-0.077	10.71	0.018
114	17.957	0.159	2.47	107	1.7	-	86	-0.077	10.61	0.016
115	18.117	0.160	2.47	107	1.9	-	86	-0.076	10.53	0.020
116	18.279	0.162	2.47	107	2.1	-	86	-0.076	10.46	0.018
117	18.437	0.158	2.47	107	1.6	-	86	-0.075	10.41	0.015
118	18.600	0.163	2.47	107	2.0	-	86	-0.073	10.27	0.016
119	18.758	0.158	2.47	107	2.0	-	86	-0.073	10.23	0.018
120	18.920	0.162	2.47	107	2.1	99	86	-0.073	10.20	0.016
121	19.081	0.161	2.47	107	1.8	-	86	-0.075	10.09	0.015
122	19.240	0.159	2.47	107	1.6	-	86	-0.075	10.04	0.015
123	19.402	0.162	2.47	107	1.8	-	86	-0.074	10.06	0.013
124	19.562	0.160	2.47	108	1.9	-	86	-0.073	10.02	0.024
125	19.721	0.159	2.47	108	2.1	-	86	-0.074	9.98	0.015
126	19.884	0.163	2.47	108	1.7	-	86	-0.076	9.88	0.010
127	20.041	0.157	2.47	108	1.7	-	86	-0.071	9.84	0.013
128	20.203	0.162	2.47	108	1.8	-	86	-0.073	9.83	0.012
129	20.364	0.161	2.47	108	2.1	-	86	-0.075	9.91	0.015
130	20.526	0.162	2.46	108	2.1	99	86	-0.074	9.93	0.017
131	20.686	0.160	2.47	108	1.6	-	86	-0.074	9.96	0.013

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
132	20.844	0.158	2.47	108	1.7	-	86	-0.074	9.98	0.012
133	21.006	0.162	2.47	108	1.7	-	86	-0.074	9.99	0.013
134	21.166	0.160	2.46	108	1.7	-	86	-0.074	9.94	0.012
135	21.326	0.160	2.47	108	1.8	-	86	-0.074	9.83	0.008
136	21.487	0.161	2.46	108	1.7	-	86	-0.071	9.64	0.016
137	21.648	0.161	2.47	108	2.1	-	86	-0.074	9.24	0.014
138	21.806	0.158	2.46	108	1.8	-	86	-0.072	9.19	0.021
139	21.970	0.164	2.46	108	1.9	-	86	-0.075	9.12	0.018
140	22.128	0.158	2.46	108	2.1	98	86	-0.073	9.06	0.026
141	22.289	0.161	2.46	108	1.8	-	86	-0.072	8.97	0.022
142	22.450	0.161	2.46	108	1.6	-	86	-0.072	8.91	0.023
143	22.609	0.159	2.46	109	1.7	-	86	-0.073	8.93	0.013
144	22.771	0.162	2.46	109	1.6	-	86	-0.072	8.89	0.026
145	22.931	0.160	2.46	109	1.6	-	86	-0.071	8.86	0.022
146	23.090	0.159	2.46	109	2.1	-	86	-0.072	8.91	0.015
147	23.253	0.163	2.46	109	1.6	-	86	-0.072	8.87	0.020
148	23.411	0.158	2.47	109	2.1	-	86	-0.072	8.87	0.018
149	23.573	0.162	2.46	109	1.7	-	86	-0.069	8.87	0.021
150	23.734	0.161	2.47	109	1.6	99	86	-0.068	8.99	0.019
151	23.892	0.158	2.47	109	1.8	-	86	-0.073	9.08	0.017
152	24.056	0.164	2.47	109	1.6	-	86	-0.071	9.14	0.016
153	24.213	0.157	2.47	109	1.8	-	86	-0.072	9.20	0.021
154	24.376	0.163	2.47	109	1.9	-	86	-0.072	9.21	0.016
155	24.536	0.160	2.46	109	1.6	-	86	-0.070	9.28	0.020
156	24.695	0.159	2.46	109	1.7	-	86	-0.073	9.29	0.012
157	24.856	0.161	2.46	109	2.0	-	86	-0.071	9.26	0.025
158	25.018	0.162	2.46	109	1.8	-	86	-0.069	9.17	0.019
159	25.176	0.158	2.46	109	1.6	-	86	-0.074	8.87	0.013
160	25.339	0.163	2.46	109	1.6	100	86	-0.071	8.59	0.022
161	25.498	0.159	2.46	109	1.7	-	86	-0.072	8.50	0.014
162	25.660	0.162	2.46	109	2.0	-	86	-0.073	8.07	0.013
163	25.821	0.161	2.47	109	1.9	-	86	-0.072	7.90	0.012
164	25.980	0.159	2.47	109	1.6	-	86	-0.072	7.81	0.018

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 3

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
165	26.142	0.162	2.47	109	2.1	-	86	-0.070	7.87	0.017
166	26.302	0.160	2.46	109	1.6	-	86	-0.070	7.90	0.023
167	26.461	0.159	2.46	109	1.7	-	86	-0.070	7.89	0.024
168	26.624	0.163	2.46	109	1.7	-	86	-0.070	7.93	0.020
169	26.782	0.158	2.46	109	1.7	-	86	-0.069	8.11	0.015
170	26.944	0.162	2.46	109	1.6	100	85	-0.066	8.12	0.022
171	27.105	0.161	2.47	109	1.7	-	86	-0.068	8.14	0.020
172	27.264	0.159	2.46	109	1.6	-	86	-0.069	8.09	0.021
173	27.427	0.163	2.46	109	2.0	-	86	-0.067	8.08	0.021
174	27.585	0.158	2.46	109	1.6	-	86	-0.072	8.06	0.019
175	27.747	0.162	2.46	110	1.8	-	85	-0.068	8.00	0.018
176	27.907	0.160	2.46	110	2.0	-	85	-0.068	8.05	0.026
177	28.067	0.160	2.47	110	1.8	-	85	-0.069	7.96	0.023
178	28.228	0.161	2.46	110	1.7	-	85	-0.069	7.99	0.020
179	28.390	0.162	2.46	110	1.9	-	85	-0.067	7.92	0.024
180	28.548	0.158	2.46	110	1.6	100	85	-0.068	7.91	0.027
181	28.712	0.164	2.46	110	1.6	-	85	-0.067	7.96	0.024
182	28.870	0.158	2.47	110	1.7	-	85	-0.069	7.94	0.017
183	29.032	0.162	2.46	110	1.8	-	85	-0.067	7.87	0.022
184	29.193	0.161	2.47	110	1.8	-	85	-0.065	7.92	0.029
185	29.352	0.159	2.46	110	1.8	-	85	-0.070	7.87	0.019
186	29.514	0.162	2.47	110	2.1	-	85	-0.068	7.85	0.019
187	29.675	0.161	2.46	110	2.1	-	85	-0.068	7.86	0.025
188	29.834	0.159	2.47	110	1.6	-	85	-0.066	7.77	0.019
189	30.000	0.166	2.46	110	1.7	-	85	-0.068	7.79	0.019
190	30.158	0.158	2.47	110	1.9	100	85	-0.066	7.83	0.025
191	30.318	0.160	2.46	110	1.6	-	85	-0.069	7.77	0.022
192	30.478	0.160	2.46	110	1.9	-	85	-0.065	7.81	0.024
193	30.638	0.160	2.46	110	2.1	-	85	-0.064	7.72	0.021
194	30.800	0.162	2.47	110	1.6	-	85	-0.066	7.71	0.027
195	30.960	0.160	2.47	110	1.7	-	85	-0.067	7.71	0.018
196	31.120	0.160	2.47	110	1.7	-	85	-0.068	7.70	0.024
197	31.283	0.163	2.46	110	2.1	-	85	-0.065	7.68	0.023

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
198	31.441	0.158	2.46	110	2.1	-	85	-0.064	7.72	0.022
199	31.603	0.162	2.46	110	1.7	-	85	-0.066	7.65	0.022
200	31.764	0.161	2.47	110	2.0	100	85	-0.065	7.63	0.014
201	31.923	0.159	2.47	110	2.0	-	85	-0.065	7.37	0.022
202	32.086	0.163	2.47	110	1.8	101	85	-0.066	7.30	0.021
Avg/Tot	32.086	0.159	2.46	101.6	1.8	100	86.5	-0.073	10.03	0.050

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 3

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		0.08	88	0.6		81
1	0.118	0.118	1.05	88	1.4	-	81
2	0.261	0.143	1.06	88	1.5	-	82
3	0.404	0.143	1.05	88	1.5	-	82
4	0.547	0.143	1.04	88	1.5	-	82
5	0.690	0.143	1.05	88	1.4	-	82
6	0.834	0.144	1.05	89	1.5	-	82
7	0.977	0.143	1.03	89	1.6	-	83
8	1.120	0.143	1.04	89	1.5	-	83
9	1.263	0.143	1.04	89	1.5	-	83
10	1.407	0.144	1.05	89	1.6	101	83
11	1.549	0.142	1.03	89	1.7	-	83
12	1.692	0.143	1.04	89	1.6	-	83
13	1.835	0.143	1.05	90	1.5	-	83
14	1.980	0.145	1.06	90	1.6	-	84
15	2.124	0.144	1.06	90	1.5	-	84
16	2.268	0.144	1.03	90	1.5	-	84
17	2.412	0.144	1.04	90	1.6	-	84
18	2.556	0.144	1.04	90	1.7	-	84
19	2.691	0.135	0.17	90	3.9	-	84
20	2.731	0.040	1.04	91	1.5	95	83
21	2.877	0.146	1.05	91	1.5	-	84
22	3.023	0.146	1.05	91	1.7	-	84
23	3.169	0.146	1.05	91	1.7	-	84
24	3.314	0.145	1.05	92	1.5	-	84
25	3.460	0.146	1.04	92	1.5	-	84
26	3.606	0.146	1.04	92	1.6	-	84
27	3.752	0.146	1.05	92	1.6	-	84
28	3.898	0.146	1.06	92	1.6	-	84
29	4.045	0.147	1.06	93	1.7	-	84
30	4.192	0.147	1.06	93	1.6	104	84
31	4.338	0.146	1.06	93	1.6	-	84
32	4.484	0.146	1.06	94	1.7	-	84

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 3

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/13/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
33	4.633	0.149	1.06	94	1.6	-	84
34	4.777	0.144	1.05	94	1.7	-	84
35	4.924	0.147	1.05	95	1.5	-	84
36	5.070	0.146	1.05	95	1.6	-	84
37	5.217	0.147	1.06	95	1.5	-	84
38	5.364	0.147	1.06	96	1.7	-	84
39	5.511	0.147	1.07	96	1.7	-	84
40	5.659	0.148	1.07	96	1.6	103	84
41	5.807	0.148	1.07	96	1.7	-	84
42	5.954	0.147	1.06	97	1.6	-	84
43	6.102	0.148	1.06	97	1.6	-	84
44	6.249	0.147	1.06	97	1.5	-	84
45	6.396	0.147	1.06	98	1.7	-	84
46	6.544	0.148	1.06	98	1.6	-	84
47	6.691	0.147	1.05	98	1.6	-	84
48	6.839	0.148	1.05	98	1.6	-	84
49	6.987	0.148	1.05	99	1.5	-	84
50	7.134	0.147	1.06	99	1.5	102	84
51	7.282	0.148	1.06	99	1.5	-	84
52	7.430	0.148	1.06	100	1.5	-	84
53	7.578	0.148	1.06	100	1.6	-	84
54	7.726	0.148	1.07	100	1.6	-	84
55	7.874	0.148	1.07	101	1.7	-	84
56	8.022	0.148	1.07	101	1.5	-	84
57	8.173	0.151	1.07	101	1.6	-	84
58	8.319	0.146	1.07	101	1.6	-	84
59	8.467	0.148	1.08	102	1.6	-	84
60	8.616	0.149	1.08	102	1.6	102	84
Avg/Tot	8.616	0.144	1.02	93.8	1.6	101	83.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 3Technician: AKDate: 8/13/2025Stove ΔT: 13

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
0	278	223	117	207	149	194.7	829.9
1	276	223	118	211	149	195.4	797.0
2	276	222	120	216	150	196.7	791.0
3	276	222	120	213	150	196.3	819.7
4	275	221	118	208	150	194.6	858.7
5	275	219	119	212	150	195.1	899.2
6	274	219	119	213	150	194.9	931.8
7	272	217	118	209	150	193.3	950.8
8	271	215	118	211	150	192.9	965.1
9	269	214	118	209	150	192.0	973.1
10	268	212	118	206	150	191.0	971.5
11	267	211	117	210	150	190.8	965.5
12	265	209	118	204	150	189.2	957.6
13	264	208	118	208	150	189.5	953.5
14	263	208	118	206	150	188.7	952.8
15	262	206	117	206	149	187.9	953.6
16	262	205	116	209	149	188.3	955.5
17	261	204	117	203	149	186.7	957.0
18	261	203	117	204	148	186.5	960.1
19	261	202	117	205	148	186.5	961.2
20	260	201	117	204	148	185.8	960.4
21	260	200	117	199	147	184.6	956.7
22	260	199	116	200	147	184.6	954.5
23	260	199	116	202	147	184.7	952.3
24	260	199	115	202	147	184.4	954.8
25	260	198	116	200	146	184.1	966.4
26	260	198	116	195	146	183.2	979.8
27	261	197	116	203	146	184.5	989.3
28	262	197	116	199	146	184.0	993.4
29	262	197	115	203	145	184.6	1008.8
30	263	197	116	199	145	184.0	1028.4
31	262	197	116	198	145	183.5	1032.7
32	263	197	116	202	145	184.5	1014.5
33	263	197	114	199	144	183.6	987.4
34	263	197	116	198	144	183.5	964.7
35	263	197	115	202	144	184.0	949.2
36	263	197	115	197	144	183.1	938.1
37	263	197	116	201	143	183.9	930.4
38	264	196	116	197	143	183.3	925.2
39	264	196	115	199	143	183.5	925.5
40	264	197	115	196	143	183.0	927.2
41	264	196	114	199	143	183.3	928.1
42	265	195	116	195	143	182.6	929.1
43	265	196	116	199	142	183.4	930.0
44	265	196	116	196	142	182.9	930.6
45	265	196	116	198	142	183.3	931.1
46	266	195	114	199	142	183.4	932.7
47	267	195	114	199	142	183.5	933.6
48	268	195	115	199	141	183.6	937.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 3Technician: AKDate: 8/13/2025Stove ΔT: 13

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
49	269	195	115	200	141	184.0	942.7
50	269	195	114	198	141	183.6	948.7
51	269	195	114	199	141	183.7	956.8
52	270	196	114	198	141	183.8	966.6
53	269	195	115	199	141	183.8	977.5
54	269	196	113	201	141	183.9	986.7
55	269	196	114	201	141	183.9	993.6
56	269	196	114	200	141	183.7	997.1
57	269	196	114	199	141	183.5	999.3
58	268	196	114	200	141	183.7	1001.5
59	268	196	115	201	141	184.1	1002.1
60	267	197	115	200	141	183.9	998.8
61	267	198	114	200	140	183.7	994.6
62	266	197	115	200	140	183.5	990.4
63	265	197	114	200	140	183.3	984.3
64	265	198	115	200	140	183.5	978.9
65	264	198	114	198	140	182.7	975.3
66	263	198	115	200	140	183.0	978.8
67	263	199	114	199	140	182.8	990.3
68	263	199	115	200	140	183.2	1007.5
69	262	199	114	199	140	182.8	1027.7
70	262	200	113	198	140	182.7	1048.3
71	262	201	113	201	140	183.4	1068.5
72	262	201	113	200	140	183.3	1083.1
73	262	202	114	197	140	182.9	1094.5
74	262	202	113	200	140	183.5	1101.4
75	263	203	113	202	140	184.1	1106.0
76	262	204	114	202	140	184.3	1107.8
77	263	205	114	202	139	184.5	1106.0
78	263	205	115	202	139	184.9	1102.4
79	264	206	114	204	140	185.4	1100.1
80	264	207	115	205	140	185.9	1101.3
81	265	207	115	204	140	186.1	1105.9
82	265	208	116	199	140	185.5	1110.1
83	266	208	115	206	140	186.9	1112.2
84	267	209	116	203	140	187.0	1112.6
85	268	210	115	206	140	187.7	1112.2
86	268	211	116	206	140	188.1	1109.6
87	269	211	115	210	140	189.1	1107.5
88	270	212	115	206	140	188.5	1106.2
89	270	213	116	210	140	189.6	1102.5
90	271	213	115	209	140	189.5	1096.9
91	272	214	116	212	140	190.9	1092.6
92	272	214	116	213	140	191.0	1090.7
93	273	215	116	213	140	191.5	1090.2
94	273	216	116	213	140	191.7	1091.1
95	274	216	116	215	140	192.2	1090.4
96	274	217	117	215	140	192.7	1086.7
97	275	218	117	216	141	193.0	1078.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 3Technician: AKDate: 8/13/2025Stove ΔT: 13

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
98	276	218	117	213	141	192.8	1061.8
99	276	219	116	216	141	193.5	1043.7
100	277	219	117	214	141	193.3	1028.4
101	277	220	116	216	141	194.0	1015.7
102	278	220	116	215	141	193.9	1008.9
103	279	221	116	215	141	194.1	1013.9
104	280	221	116	216	141	194.6	1031.5
105	280	222	117	214	141	194.6	1052.8
106	281	222	117	216	141	195.3	1070.2
107	282	222	117	213	141	194.9	1083.7
108	283	222	118	216	141	196.0	1091.4
109	285	222	117	216	141	196.2	1091.7
110	286	223	118	215	141	196.2	1082.0
111	287	223	117	215	141	196.5	1065.6
112	288	224	118	215	141	197.0	1049.5
113	288	224	118	215	141	197.2	1035.7
114	289	224	118	217	141	197.6	1025.4
115	290	225	118	217	141	198.0	1020.3
116	291	225	118	218	141	198.5	1018.3
117	291	226	118	216	141	198.3	1015.6
118	291	226	118	218	141	198.6	1012.6
119	292	226	118	218	141	198.9	1006.0
120	292	226	118	218	141	199.0	996.0
121	292	227	118	218	141	199.2	985.5
122	292	227	118	216	141	198.8	977.1
123	292	227	118	218	141	199.2	972.6
124	292	227	118	218	141	199.2	972.7
125	292	228	118	217	141	199.0	975.8
126	292	228	118	218	141	199.3	978.2
127	292	228	118	217	141	199.3	979.1
128	292	228	118	217	141	199.2	981.7
129	292	229	119	216	141	199.3	990.7
130	291	229	118	217	141	199.3	1003.1
131	291	229	118	216	141	198.9	1013.4
132	291	229	117	215	142	198.8	1022.1
133	291	229	118	214	142	198.7	1027.4
134	291	230	118	215	142	199.1	1028.1
135	291	230	118	215	142	199.0	1026.0
136	291	230	118	215	142	199.3	1023.3
137	291	231	118	214	142	199.1	1012.3
138	291	231	118	214	142	199.1	994.7
139	291	231	118	214	142	199.2	980.5
140	290	231	118	215	142	199.1	973.8
141	289	231	118	214	142	198.9	973.1
142	289	232	117	213	143	198.6	974.4
143	288	232	118	213	143	198.6	976.0
144	287	232	118	214	143	198.7	978.4
145	286	232	117	211	143	197.7	982.9
146	285	232	118	209	143	197.4	984.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 3Technician: AKDate: 8/13/2025Stove ΔT: 13

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
147	285	232	117	209	143	197.2	981.2
148	284	231	118	210	143	197.1	974.8
149	283	231	118	209	143	196.8	969.6
150	282	231	118	208	143	196.3	967.6
151	281	231	117	209	143	196.2	970.1
152	280	231	117	208	144	196.0	974.7
153	280	231	118	207	144	195.8	980.2
154	279	231	117	206	144	195.4	985.8
155	279	230	117	208	144	195.5	992.5
156	278	230	117	207	144	195.3	1000.3
157	277	231	118	206	144	195.1	1004.4
158	277	230	117	206	144	194.9	1004.3
159	277	230	117	205	144	194.6	996.9
160	276	231	117	204	144	194.4	983.5
161	276	230	117	204	145	194.3	968.5
162	275	230	117	204	145	194.0	951.2
163	275	230	118	204	145	194.1	933.4
164	274	229	117	202	145	193.4	919.3
165	274	229	117	204	145	193.7	912.4
166	273	228	118	203	145	193.4	909.5
167	273	228	117	204	145	193.2	905.0
168	272	227	117	201	145	192.4	900.2
169	271	226	117	201	145	192.1	897.0
170	271	226	117	201	145	192.0	895.2
171	270	226	117	201	146	191.8	891.3
172	269	225	117	201	146	191.3	883.4
173	268	224	117	200	146	190.9	875.4
174	267	223	117	199	146	190.5	869.1
175	267	224	117	198	146	190.2	863.2
176	266	223	117	198	146	190.1	858.1
177	265	222	117	196	146	189.4	854.8
178	265	222	117	195	146	189.1	853.8
179	264	222	117	197	146	189.2	850.2
180	263	222	117	194	147	188.6	843.4
181	263	221	117	193	147	187.9	837.6
182	262	221	116	193	147	187.8	834.0
183	261	221	117	193	147	187.6	831.7
184	261	221	116	193	147	187.4	830.6
185	260	220	117	192	147	187.1	833.6
186	259	220	117	192	147	186.9	839.7
187	259	220	116	188	147	186.1	845.6
188	258	219	117	189	147	186.0	848.7
189	258	219	116	190	147	186.0	850.3
190	257	218	116	189	147	185.6	852.1
191	257	218	116	190	148	185.6	855.2
192	256	217	116	189	148	185.3	858.8
193	256	216	117	187	148	184.6	859.1
194	255	217	117	188	148	184.7	856.6
195	254	216	117	186	148	184.1	854.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

Stove ΔT : 13

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
196	254	216	116	186	148	183.8	853.5
197	253	215	117	186	148	183.8	855.3
198	253	215	116	185	148	183.4	857.4
199	252	214	116	185	148	183.1	857.9
200	252	214	116	185	148	182.8	857.1
201	251	213	115	184	148	182.4	855.9
202	251	213	115	184	148	182.0	853.6
Average	271.5	214.6	116.4	204.5	143.5	190.1	973.5

LAB SAMPLE DATA - ASTM E2515

Client: Buck
 Model: 81C
 Run #: 3

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/13/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	A	G01349	240.9	245.9	5.0
	B	G01332	243.1	248.7	5.6
	C - 1st Hour	G01333	242.3	245.6	3.3
	Amb	G01334	243.3	243.5	0.2
Probes	A	8A	116635.3	116635.7	0.4
	B	8B	116667.0	116667.1	0.1
	C - 1st Hour	8C	116664.0	116664.3	0.3
O-rings	A	8A	3550.4	3550.8	0.4
	B	8B	3356.2	3356.6	0.4
	C - 1st Hour	8C	3584.1	3584.7	0.6

Placed in Dessicator on: 8/13/2025

Balance Audit (mg):

200.0

200.0

200.0

		Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time
Filters	A	245.7	8/15 16:00	245.9	8/25 15:00				
	B	248.6	8/15 16:00	248.7	8/25 15:00				
	C - 1st Hour	245.5	8/15 16:00	245.6	8/25 15:00				
	Amb	243.4	8/15 16:00	243.5	8/25 15:00				
Probes	A	116636.0	8/15 16:00	116635.6	8/25 15:00	116635.7	8/26 8:30		
	B	116667.4	8/15 16:00	116667.0	8/25 15:00	116667.1	8/26 8:30		
	C - 1st Hour	116664.3	8/15 16:00	116664.3	8/25 15:00				
O-Rings	A	3550.9	8/15 16:00	3550.8	8/25 15:00				
	B	3356.7	8/15 16:00	3356.6	8/25 15:00				
	C - 1st Hour	3584.7	8/15 16:00	3584.7	8/25 15:00				

Train A Aggregate, mg: 5.8
Train B Aggregate, mg: 6.1
Train C Aggregate, mg: 4.2
Ambient, mg: 0.2

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove Job Number: 25-422 Tracking #: 227
Model: 81C Run Number: 3 Test Date: 8/13/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary fully open (1.540"), secondary fully open (1.305")
Targeted Burn Category: IV

Preburn Notes

Time	Notes
101:00 117:00	-0.9 lb PB End

Test Notes

Test Burn Start Time: 14:18 Test Fuel Loaded by: 35 seconds
Door Closed: 40 seconds Air Control Set at: 0 seconds
Other Loading Notes: Bypass opened & closed with door, fan on auto high

Time	Notes
	-None-

Test Burn End Time: 17:40

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO₂ (%): 17.32 CO (%): 4.350
Mid Gas CO₂ (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	11:36	11:37	11:38	20:11	20:13	20:16
CO ₂	-0.03	17.22	10.33	0.04	17.11	10.30
CO	-0.019	4.316	2.527	-0.027	4.376	2.526

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: 

Date: 8/13/25

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove

Job Number: 25-422

Tracking #: 227

Model: 81C

Run Number: 3

Test Date: 8/13/25



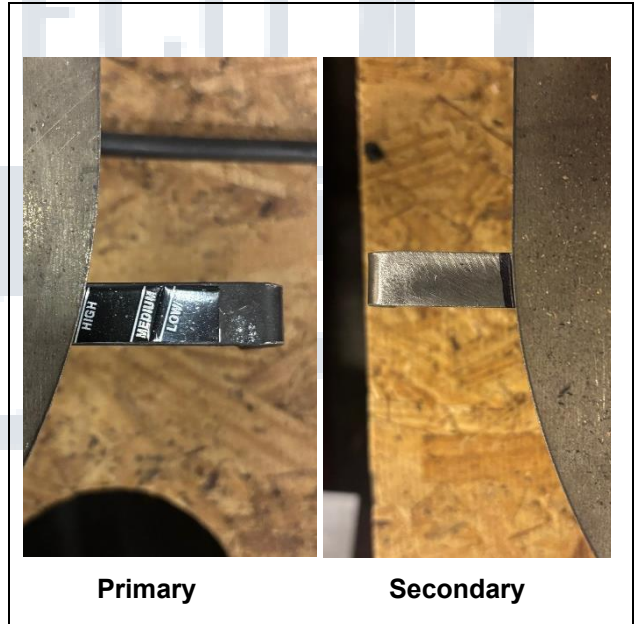
Test Fuel Front/Side View



Test Fuel Iso View



Test Fuel Loaded in Stove



Primary

Secondary

Air Settings

Technician Signature: _____

[Handwritten Signature]

Date: 8/13/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515



Run 4 Data Summary

Client:	Buck
Model:	81C
Job #:	25-422
Tracking #:	227
Test Date:	8/14/2025



Technician Signature

9/4/2025

Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 4

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/14/2025

Burn Rate (kg/hr):	1.29
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	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft ³)	68.812	46.484	47.168	8.577
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.2			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10515.1			
Average Gas Meter Temperature (°F)	74.9	99.0	98.6	89.5
Total Sample Volume (dscf)	68.224	44.672	44.756	8.398
Average Tunnel Temperature (°F)	98.6			
Total Time of Test (min)	294			
Total Particulate Catch (mg)	0.0	7.9	7.6	2.5
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0001768	0.0001698	0.0002977
Total PM Emissions (g)	0.00	9.11	8.75	3.13
Particulate Emission Rate (g/hr)	0.00	1.86	1.79	3.13
Emissions Factor (g/kg)	-	1.44	1.38	-
Difference from Average Total Particulate Emissions (g)	-	0.18	0.18	-
Difference from Average Total Particulate Emissions (%)	-	2.0%	2.0%	
Difference from Average Emissions Factor (g/kg)	-	0.03	0.03	-

Final Average Results	
Total Particulate Emissions (g)	8.93
Particulate Emission Rate (g/hr)	1.82
Emissions Factor (g/kg)	1.41
HHV Efficiency (%)	79.4%
LHV Efficiency (%)	85.8%
CO Emissions (g/min)	0.16

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	<90 °F	83.4	OK
Face Velocity	< 30 ft/min	17.4	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:73.7/Max:75.6	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK
Stove Surface ΔT	<126°F	101.3	OK

B415.1 Efficiency Results

Manufacturer: Buck
Model: 81C
Date: 08/14/25
Run: 4
Control #: 25-422
Test Duration: 294
Output Category: 3

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	79.4%	85.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	79.8%	86.2%

Output Rate (kJ/h)	20,123	19,089	(Btu/h)
Burn Rate (kg/h)	1.28	2.82	(lb/h)
Input (kJ/h)	25,357	24,054	(Btu/h)

Test Load Weight (dry kg)	6.27	13.82	dry lb
MC wet (%)	18.92		
MC dry (%)	23.34		
Particulate (g)	8.93		
CO (g)	48		
Test Duration (h)	4.90		

Emissions	Particulate	CO
g/MJ Output	0.09	0.49
g/kg Dry Fuel	1.42	7.67
g/h	1.82	9.81
g/min	0.03	0.16
lb/MM Btu Output	0.21	1.13

Air/Fuel Ratio (A/F)	13.87
-----------------------------	-------

VERSION:

2.4

4/15/2010

WOODSTOVE FUEL DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 4

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

Preburn Fuel Information						
Size	Length (in)	Moisture Content (% DB)		Size	Length (in)	Moisture Content (% DB)
2x4	16.00	19.3				
2x4	16.00	19.3				
2x4	16.00	20.4				
2x4	16.00	20.3				
2x4	16.00	19.9				
2x4	16.00	21.6				
2x4	16.00	20.2				
2x4	16.00	19.7				
Total Fuel Weight (lbs):		12.83	Average Moisture (%DB):		20.1	

Firebox Volume (ft ³):	2.25
Total 2x4 Crib Weight, with spacers (lbs):	6.83
Total 4x4 Crib Weight, with spacers (lbs):	10.21
Total Wet Fuel Weight, with spacers (lbs):	17.04

Coal Bed Range (20-25%):

Min (lbs): 3.41
 Max (lbs): 4.26

Test Fuel Information						
Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	17.00	1.94	24.2	24.8	24.7	1.56
2x4	17.00	1.98	23.6	23.8	21.9	1.61
2x4	17.00	1.68	23.1	23.5	23.7	1.36
4x4	17.00	5.42	24.6	23.7	21.6	4.40
4x4	17.00	4.34	19.3	23.4	24.2	3.55
Total Dry Weight, no spacers (lbs):						12.47
Total Dry Weight, with spacers (lbs):						13.98

Spacer Moisture Readings (%DB)							
10.0	12.0						
12.0	9.8						
12.1	10.1						
11.9	11.7						
10.9	11.3						
9.9	11.9						
11.4	12.0						
9.9	11.5						

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft ³ , DB)	31.5	OK
Loading Density	6.3 - 7.7 (lbs/ft ³ , WB)	7.57	OK
2x4 Fuel Mix	35 - 65 % of total weight	40%	OK

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client: Buck
 Model: 81C
 Run #: 4
 Test Start Time: 11:13

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

Total Sampling Time (min): 294
 Recording Interval (min): 1

Meter Box γ Factor: 1.019 (A)
 Meter Box γ Factor: 1.005 (B)
 Meter Box γ Factor: 1.024 (C)
 Meter Box γ Factor: 1.012 (Ambient)

Induced Draft Check (in. H₂O): 0
 Smoke Capture Check (%): 100%
 Date Flue Pipe Last Cleaned: 8/8/2025
 Test Fuel Scale Audit (lbs): 10.00
 Platform Scale Audit (lbs): 10.0

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.69	29.73	29.71
Relative Humidity (%)	35.6	41.3	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:	68.812 ft ³		

Sample Train Leak Checks

	Pre-test	Post-test		
(A)	0.000	0.000	cfm @	-7 in. Hg
(B)	0.000	0.000	cfm @	-6 in. Hg
(C)	0.000	0.000	cfm @	-7 in. Hg
(Ambient)	0.000	0.000	cfm @	-12 in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H ₂ O)	Temp (°F)
1	0.050	79
2	0.080	79
3	0.082	79
4	0.052	79
5	0.054	79
6	0.084	79
7	0.086	79
8	0.048	79
Center	0.086	79

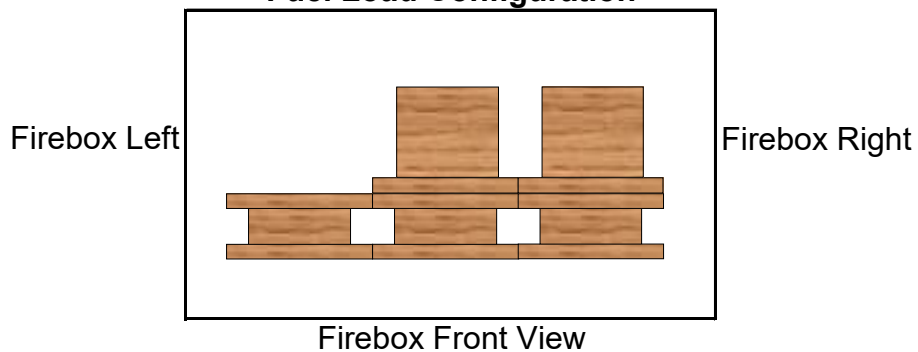
Dilution Tunnel H₂O: 2.00 percent
 Tunnel Diameter: 6 inches
 Pitot Tube Cp: 0.99 [unitless]
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.78 lb/lb-mole
 Tunnel Area: 0.1963 ft²

V_{strav} : 17.27 ft/sec
 V_{scent} : 19.72 ft/sec
 F_p : 0.876 [ratio]
 Initial Tunnel Flow: 193.9 scf/min

Static Pressure: -0.120 in. H₂O

TEST FUEL PROPERTIES

Fuel Load Configuration



Actual Fuel Used Properties

Fuel Type:	D. Fir
HHV (kJ/kg)	19,810
%C	48.73
%H	6.87
%O	43.9
%Ash	0.5
MC (%DB)	23.3

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 4

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

Recording Interval (min): 1
 Run Time (min): 71

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	8.19	-0.092	284	268	157	388	160	251.2	477	75
1	7.98	0.063	286	270	157	394	161	253.7	458	75
2	7.83	0.064	288	271	158	394	163	254.7	444	75
3	7.68	0.062	290	273	158	405	164	257.9	436	74
4	7.52	0.067	292	275	159	406	165	259.2	432	74
5	7.35	0.068	294	276	159	419	167	262.7	429	74
6	7.21	0.062	295	278	159	422	168	264.2	428	75
7	7.06	0.066	297	279	160	414	169	263.6	428	75
8	6.91	0.064	298	280	160	417	170	265.0	428	74
9	6.77	0.072	300	281	160	421	171	266.5	426	75
10	6.63	0.061	301	282	161	425	172	268.0	427	75
11	6.49	0.065	302	283	162	429	173	269.7	427	75
12	6.35	0.068	304	284	162	428	174	270.1	427	75
13	6.24	0.077	305	283	161	428	175	270.4	425	75
14	6.10	0.067	305	285	163	430	175	271.6	425	74
15	5.98	0.061	306	285	162	434	176	272.7	423	75
16	5.88	0.067	308	286	162	437	177	273.9	422	75
17	5.76	0.062	308	286	163	436	178	274.3	423	75
18	5.65	0.068	309	287	164	444	179	276.6	422	75
19	5.52	0.064	311	287	163	440	179	276.0	423	75
20	5.41	0.062	311	287	161	444	180	276.5	421	75
21	5.29	0.066	313	289	163	449	181	278.8	422	74
22	5.18	0.071	314	290	164	446	181	278.9	421	75
23	5.07	0.060	315	291	165	450	182	280.5	420	75
24	4.96	0.065	317	292	166	446	182	280.5	420	75
25	4.85	0.059	319	290	166	456	183	282.5	421	75
26	4.74	0.076	320	292	168	462	183	284.8	418	75
27	4.63	0.075	321	292	166	450	183	282.4	418	76
28	4.52	0.069	323	292	167	447	184	282.6	419	75
29	4.42	0.067	325	293	168	457	184	285.1	418	75
30	4.32	0.073	327	293	168	450	185	284.4	417	75
31	4.21	0.081	328	293	167	452	185	285.1	417	75
32	6.51	0.073	330	291	169	448	186	284.6	434	75
33	6.34	0.066	332	292	170	456	186	287.2	431	75
34	6.19	0.064	333	292	169	460	186	287.9	432	75
35	6.03	0.075	335	293	170	456	187	288.1	429	76
36	5.88	0.067	335	292	168	456	187	287.5	431	75
37	5.76	0.072	335	291	170	454	188	287.4	430	75
38	5.62	0.069	337	291	169	453	188	287.6	432	75
39	5.51	0.074	337	290	169	450	188	286.8	433	75
40	5.40	0.064	338	291	171	457	189	289.1	432	75
41	5.29	0.067	340	292	171	458	189	290.0	431	75
42	5.20	0.068	341	291	170	465	190	291.1	431	74
43	5.11	0.066	341	292	173	458	190	290.8	430	75
44	5.03	0.071	342	291	173	466	190	292.5	430	75
45	4.96	0.067	341	291	172	461	190	291.2	429	76

WOODSTOVE PREBURN DATA - ASTM E2780

Client: Buck
 Model: 81C
 Run #: 4

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

Recording Interval (min): 1
 Run Time (min): 71

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H ₂ O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
46	4.86	0.076	342	292	172	469	190	292.9	426	76
47	4.79	0.074	341	290	174	467	190	292.4	424	76
48	4.70	0.070	342	292	172	467	190	292.5	422	75
49	4.62	0.075	342	291	173	466	190	292.5	422	75
50	4.54	0.071	342	293	172	475	190	294.4	419	75
51	4.48	0.062	342	293	173	461	191	292.0	417	76
52	4.40	0.068	343	294	175	463	191	293.0	415	75
53	4.35	0.069	342	294	175	472	191	294.8	414	75
54	4.28	0.068	342	294	175	455	192	291.3	411	75
55	4.21	0.069	341	295	174	451	192	290.7	410	75
56	4.14	0.066	341	295	175	453	193	291.4	407	75
57	4.07	0.062	341	293	177	453	193	291.3	406	75
58	4.01	0.066	341	296	176	448	193	290.7	405	75
59	3.97	0.071	341	297	177	444	193	290.4	403	75
60	3.89	0.069	341	296	176	437	193	288.8	401	75
61	3.82	0.065	341	298	175	444	194	290.5	399	74
62	3.75	0.067	343	300	173	421	195	286.2	395	75
63	3.73	0.072	344	299	165	412	195	282.9	390	75
64	3.69	0.069	345	299	159	402	194	279.7	386	75
65	3.65	0.059	345	296	152	382	193	273.6	382	75
66	3.62	0.073	345	294	149	359	192	267.6	377	75
67	3.58	0.070	344	290	144	353	190	264.0	374	75
68	3.53	0.065	340	283	138	338	189	257.5	368	75
69	3.50	0.073	338	284	138	335	187	256.3	368	75
70	3.46	0.062	337	282	136	331	186	254.4	364	75
71	3.44	0.062	336	280	135	327	184	252.2	360	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.077	0.01	78	0.1		17.05		112	382	76	75
1	0.107	0.107	0.079	1.97	78	0.9	-	17.00	-0.05	118	404	78	75
2	0.252	0.145	0.081	2.02	78	0.9	-	16.91	-0.09	115	377	78	75
3	0.392	0.140	0.083	2.04	78	0.9	-	16.79	-0.12	112	365	78	75
4	0.534	0.142	0.082	2.06	78	0.9	-	16.68	-0.11	111	358	79	75
5	0.678	0.144	0.081	2.07	79	0.9	-	16.59	-0.09	110	354	79	75
6	0.820	0.142	0.080	2.10	79	0.9	-	16.50	-0.09	109	353	79	74
7	0.967	0.147	0.079	2.12	79	0.9	-	16.38	-0.12	108	352	79	74
8	1.108	0.141	0.075	2.13	79	0.9	-	16.26	-0.12	108	351	79	74
9	1.257	0.149	0.075	2.16	79	0.9	-	16.13	-0.13	107	349	79	74
10	1.400	0.143	0.074	2.18	79	0.9	91	16.00	-0.13	107	350	79	74
11	1.551	0.151	0.076	2.21	79	0.9	-	15.89	-0.11	107	349	79	74
12	1.696	0.145	0.077	2.21	80	0.9	-	15.79	-0.10	107	348	79	74
13	1.846	0.150	0.078	2.21	80	0.9	-	15.70	-0.09	107	345	79	74
14	1.992	0.146	0.076	2.24	80	0.9	-	15.60	-0.10	106	343	79	74
15	2.142	0.150	0.075	2.25	80	0.9	-	15.49	-0.11	105	339	79	74
16	2.289	0.147	0.073	2.26	80	0.9	-	15.37	-0.12	105	338	79	74
17	2.439	0.150	0.071	2.26	81	0.9	-	15.26	-0.11	105	337	79	74
18	2.585	0.146	0.072	2.27	81	0.9	-	15.16	-0.10	105	336	79	74
19	2.738	0.153	0.073	2.28	81	0.9	-	15.05	-0.11	105	336	79	74
20	2.887	0.149	0.073	2.29	82	0.9	98	14.94	-0.11	105	334	79	74
21	3.039	0.152	0.074	2.29	82	0.9	-	14.84	-0.10	105	334	79	74
22	3.188	0.149	0.073	2.30	82	0.9	-	14.74	-0.10	105	330	79	74
23	3.340	0.152	0.074	2.31	83	0.9	-	14.65	-0.09	104	328	79	74
24	3.490	0.150	0.073	2.32	83	0.9	-	14.55	-0.10	104	325	79	74
25	3.642	0.152	0.074	2.32	83	0.9	-	14.45	-0.10	104	324	79	74
26	3.792	0.150	0.074	2.32	84	0.9	-	14.33	-0.12	104	323	79	74
27	3.946	0.154	0.074	2.33	84	0.9	-	14.22	-0.11	104	322	79	74
28	4.096	0.150	0.074	2.34	84	0.9	-	14.11	-0.11	104	322	79	74
29	4.250	0.154	0.073	2.34	85	0.9	-	14.00	-0.11	103	322	79	74
30	4.398	0.148	0.075	2.33	85	0.9	98	13.90	-0.10	103	322	79	74
31	4.554	0.156	0.076	2.36	85	0.9	-	13.80	-0.10	103	321	79	74
32	4.703	0.149	0.077	2.35	86	0.9	-	13.72	-0.08	102	320	79	74

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	4.859	0.156	0.075	2.34	86	0.9	-	13.62	-0.10	102	318	79	74
34	5.006	0.147	0.075	2.36	86	0.9	-	13.52	-0.10	102	317	79	74
35	5.166	0.160	0.074	2.37	87	0.9	-	13.42	-0.10	102	315	79	74
36	5.316	0.150	0.073	2.36	87	0.9	-	13.32	-0.10	102	314	79	74
37	5.472	0.156	0.074	2.36	87	0.9	-	13.23	-0.09	102	314	79	74
38	5.622	0.150	0.075	2.36	88	0.9	-	13.14	-0.09	102	313	80	74
39	5.794	0.172	0.076	2.38	88	0.9	-	13.05	-0.09	102	312	79	74
40	5.946	0.152	0.076	2.36	88	0.9	99	12.94	-0.11	102	311	80	74
41	6.101	0.155	0.078	2.37	88	0.9	-	12.84	-0.10	102	311	79	74
42	6.256	0.155	0.077	2.39	89	0.9	-	12.75	-0.09	102	310	80	75
43	6.409	0.153	0.074	2.38	89	0.9	-	12.65	-0.10	101	310	80	75
44	6.565	0.156	0.074	2.38	90	0.9	-	12.58	-0.07	101	310	80	75
45	6.716	0.151	0.076	2.38	90	0.9	-	12.48	-0.10	101	310	80	74
46	6.873	0.157	0.073	2.39	90	0.9	-	12.38	-0.10	101	310	80	75
47	7.025	0.152	0.075	2.39	90	0.9	-	12.28	-0.10	101	310	80	75
48	7.183	0.158	0.078	2.39	91	0.9	-	12.19	-0.09	101	309	80	75
49	7.335	0.152	0.079	2.39	91	0.9	-	12.11	-0.08	101	309	80	75
50	7.489	0.154	0.078	2.40	91	0.9	97	12.02	-0.09	101	309	80	75
51	7.643	0.154	0.078	2.40	92	0.9	-	11.94	-0.08	101	308	80	75
52	7.801	0.158	0.076	2.40	92	0.9	-	11.84	-0.10	100	307	80	75
53	7.958	0.157	0.075	2.40	92	0.9	-	11.76	-0.08	100	306	80	75
54	8.111	0.153	0.075	2.41	92	0.9	-	11.66	-0.10	100	307	80	75
55	8.269	0.158	0.076	2.41	93	0.9	-	11.57	-0.09	101	308	80	75
56	8.421	0.152	0.077	2.42	93	0.9	-	11.48	-0.09	101	309	80	75
57	8.581	0.160	0.077	2.42	93	0.9	-	11.37	-0.11	101	309	80	75
58	8.734	0.153	0.077	2.42	93	0.9	-	11.28	-0.09	101	309	80	75
59	8.892	0.158	0.077	2.43	94	0.9	-	11.17	-0.11	101	310	80	75
60	9.047	0.155	0.075	2.42	94	0.9	97	11.07	-0.10	101	310	80	75
61	9.204	0.157	0.076	2.42	94	0.9	-	10.99	-0.08	101	311	80	75
62	9.362	0.158	0.076	2.44	94	0.9	-	10.89	-0.10	101	311	80	75
63	9.515	0.153	0.075	2.42	95	0.9	-	10.82	-0.07	101	310	80	75
64	9.675	0.160	0.077	2.42	95	0.9	-	10.72	-0.10	101	310	80	75
65	9.829	0.154	0.077	2.43	95	0.9	-	10.62	-0.10	100	310	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	9.987	0.158	0.077	2.44	95	0.9	-	10.53	-0.09	101	311	80	75
67	10.142	0.155	0.078	2.44	95	1.0	-	10.44	-0.09	100	312	80	75
68	10.300	0.158	0.078	2.43	96	0.9	-	10.35	-0.09	100	313	80	75
69	10.459	0.159	0.075	2.44	96	0.9	-	10.28	-0.07	100	313	80	75
70	10.612	0.153	0.075	2.43	96	0.9	98	10.20	-0.08	100	313	80	75
71	10.773	0.161	0.075	2.44	96	0.9	-	10.12	-0.08	100	314	80	75
72	10.928	0.155	0.073	2.44	96	0.9	-	10.05	-0.07	100	313	80	75
73	11.086	0.158	0.073	2.45	96	0.9	-	9.98	-0.07	100	314	80	75
74	11.242	0.156	0.072	2.43	97	0.9	-	9.91	-0.07	100	313	80	75
75	11.398	0.156	0.070	2.44	97	0.9	-	9.85	-0.06	100	313	80	75
76	11.560	0.162	0.070	2.44	97	0.9	-	9.78	-0.07	100	312	80	75
77	11.713	0.153	0.072	2.44	97	0.9	-	9.70	-0.08	100	311	80	75
78	11.874	0.161	0.073	2.44	97	0.9	-	9.63	-0.07	100	312	80	75
79	12.029	0.155	0.075	2.44	97	0.9	-	9.56	-0.07	100	310	80	75
80	12.188	0.159	0.077	2.44	98	0.9	98	9.49	-0.07	100	309	80	75
81	12.345	0.157	0.077	2.44	98	0.9	-	9.43	-0.06	100	306	80	75
82	12.503	0.158	0.077	2.44	98	1.0	-	9.38	-0.05	100	306	80	75
83	12.661	0.158	0.075	2.44	98	0.9	-	9.30	-0.08	100	305	80	75
84	12.816	0.155	0.074	2.44	98	0.9	-	9.23	-0.07	100	303	80	75
85	12.978	0.162	0.073	2.45	98	0.9	-	9.16	-0.07	99	304	80	75
86	13.133	0.155	0.074	2.45	98	0.9	-	9.09	-0.07	99	303	80	75
87	13.291	0.158	0.072	2.44	99	0.9	-	9.04	-0.05	99	301	80	75
88	13.451	0.160	0.074	2.44	99	0.9	-	8.98	-0.06	99	300	80	75
89	13.607	0.156	0.074	2.46	99	0.9	-	8.92	-0.06	99	299	80	75
90	13.766	0.159	0.075	2.45	99	0.9	98	8.85	-0.07	99	298	80	75
91	13.922	0.156	0.074	2.45	99	0.9	-	8.80	-0.05	99	297	80	75
92	14.083	0.161	0.074	2.45	99	0.9	-	8.74	-0.06	99	296	80	75
93	14.235	0.152	0.074	2.45	99	0.9	-	8.68	-0.06	99	295	80	75
94	14.398	0.163	0.073	2.45	99	0.9	-	8.63	-0.05	99	295	80	75
95	14.558	0.160	0.073	2.45	100	0.9	-	8.57	-0.06	99	294	80	75
96	14.709	0.151	0.073	2.46	100	0.9	-	8.51	-0.06	99	293	80	75
97	14.874	0.165	0.073	2.45	100	1.0	-	8.46	-0.05	99	292	80	75
98	15.030	0.156	0.073	2.45	100	0.9	-	8.41	-0.05	98	291	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	15.189	0.159	0.074	2.46	100	0.9	-	8.35	-0.06	98	290	80	75
100	15.513	0.324	0.073	2.45	100	0.9	110	8.30	-0.05	98	288	80	75
101	15.670	0.157	0.073	2.46	100	0.9	-	8.25	-0.05	98	288	80	75
102	15.830	0.160	0.074	2.46	100	0.9	-	8.20	-0.05	98	286	80	75
103	15.986	0.156	0.075	2.46	100	0.9	-	8.14	-0.06	98	284	80	75
104	16.147	0.161	0.075	2.45	101	0.9	-	8.10	-0.04	98	283	80	75
105	16.304	0.157	0.076	2.46	101	0.9	-	8.06	-0.04	98	282	80	75
106	16.463	0.159	0.075	2.46	101	0.9	-	8.00	-0.06	98	281	80	75
107	16.623	0.160	0.075	2.46	101	0.9	-	7.95	-0.05	97	280	80	75
108	16.778	0.155	0.074	2.46	101	0.9	-	7.90	-0.05	97	278	80	75
109	16.941	0.163	0.073	2.46	101	1.0	-	7.84	-0.06	97	277	80	75
110	17.096	0.155	0.071	2.46	101	0.9	100	7.79	-0.05	97	276	80	75
111	17.256	0.160	0.070	2.45	101	0.9	-	7.75	-0.04	97	275	80	75
112	17.414	0.158	0.070	2.46	101	0.9	-	7.70	-0.05	97	274	80	75
113	17.572	0.158	0.068	2.46	101	0.9	-	7.65	-0.05	97	272	80	75
114	17.734	0.162	0.068	2.47	101	0.9	-	7.59	-0.06	97	273	80	75
115	17.891	0.157	0.069	2.46	101	0.9	-	7.54	-0.05	97	273	80	75
116	18.051	0.160	0.069	2.47	101	1.0	-	7.51	-0.03	97	271	80	75
117	18.210	0.159	0.070	2.46	101	0.9	-	7.45	-0.06	97	271	80	75
118	18.368	0.158	0.070	2.46	101	0.9	-	7.42	-0.03	96	270	80	75
119	18.528	0.160	0.069	2.47	102	0.9	-	7.35	-0.07	96	270	80	75
120	18.685	0.157	0.069	2.47	102	0.9	102	7.29	-0.06	96	270	80	75
121	18.846	0.161	0.070	2.46	102	0.9	-	7.24	-0.05	96	271	80	75
122	19.002	0.156	0.069	2.45	102	0.9	-	7.19	-0.05	96	270	80	75
123	19.162	0.160	0.070	2.47	102	0.9	-	7.14	-0.05	97	271	80	75
124	19.322	0.160	0.071	2.48	102	0.9	-	7.08	-0.06	97	271	80	75
125	19.478	0.156	0.071	2.47	102	0.9	-	7.03	-0.05	97	272	80	75
126	19.641	0.163	0.072	2.46	102	0.9	-	6.96	-0.07	97	273	80	75
127	19.797	0.156	0.072	2.46	102	0.9	-	6.90	-0.06	97	273	80	75
128	19.958	0.161	0.072	2.47	102	0.9	-	6.85	-0.05	97	276	80	75
129	20.119	0.161	0.071	2.48	102	0.9	-	6.78	-0.07	97	277	80	75
130	20.274	0.155	0.072	2.47	102	0.9	101	6.72	-0.06	97	279	80	75
131	20.437	0.163	0.072	2.46	102	0.9	-	6.67	-0.05	97	280	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	20.593	0.156	0.071	2.46	102	0.9	-	6.60	-0.07	97	280	80	75
133	20.753	0.160	0.072	2.47	102	0.9	-	6.55	-0.05	97	281	80	75
134	20.914	0.161	0.071	2.47	102	1.0	-	6.49	-0.06	97	283	80	75
135	21.069	0.155	0.071	2.47	102	0.9	-	6.42	-0.07	97	284	80	75
136	21.233	0.164	0.071	2.47	103	0.9	-	6.36	-0.06	97	285	80	75
137	21.389	0.156	0.072	2.47	103	1.0	-	6.30	-0.06	97	286	80	75
138	21.549	0.160	0.072	2.47	103	0.9	-	6.24	-0.06	97	287	80	75
139	21.709	0.160	0.072	2.46	103	0.9	-	6.18	-0.06	97	286	80	75
140	21.867	0.158	0.072	2.47	103	0.9	101	6.12	-0.06	97	287	80	75
141	22.028	0.161	0.071	2.46	103	0.9	-	6.07	-0.05	97	289	80	75
142	22.185	0.157	0.071	2.47	103	0.9	-	6.00	-0.07	98	290	80	75
143	22.346	0.161	0.073	2.47	103	1.0	-	5.94	-0.06	97	290	80	75
144	22.505	0.159	0.074	2.47	103	0.9	-	5.87	-0.07	98	290	80	75
145	22.664	0.159	0.073	2.47	103	0.9	-	5.80	-0.07	98	290	80	75
146	22.825	0.161	0.073	2.47	103	0.9	-	5.75	-0.05	98	292	80	75
147	22.982	0.157	0.072	2.47	103	0.9	-	5.68	-0.07	98	293	80	75
148	23.143	0.161	0.070	2.47	103	0.9	-	5.64	-0.04	98	292	80	75
149	23.301	0.158	0.068	2.46	103	0.9	-	5.59	-0.05	98	293	80	75
150	23.461	0.160	0.069	2.47	103	0.9	102	5.52	-0.07	98	293	80	75
151	23.621	0.160	0.069	2.48	103	0.9	-	5.46	-0.06	98	294	80	75
152	23.779	0.158	0.069	2.47	103	0.9	-	5.41	-0.05	98	293	80	75
153	23.942	0.163	0.070	2.47	103	0.9	-	5.37	-0.04	98	292	80	75
154	24.098	0.156	0.070	2.47	103	0.9	-	5.30	-0.07	98	292	80	75
155	24.256	0.158	0.072	2.46	103	0.9	-	5.26	-0.04	98	291	80	75
156	24.419	0.163	0.073	2.47	103	0.9	-	5.21	-0.05	98	290	80	75
157	24.576	0.157	0.072	2.48	103	0.9	-	5.16	-0.05	98	289	80	75
158	24.739	0.163	0.073	2.47	103	0.9	-	5.11	-0.05	98	290	80	75
159	24.896	0.157	0.072	2.48	104	1.0	-	5.06	-0.05	98	288	80	75
160	25.056	0.160	0.072	2.48	104	0.9	102	5.02	-0.04	98	288	80	75
161	25.217	0.161	0.070	2.48	104	0.9	-	4.97	-0.05	98	287	80	75
162	25.373	0.156	0.071	2.47	104	0.9	-	4.92	-0.05	98	287	80	75
163	25.537	0.164	0.069	2.47	104	0.9	-	4.85	-0.07	98	286	80	75
164	25.693	0.156	0.070	2.48	104	0.9	-	4.80	-0.05	98	286	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	25.854	0.161	0.069	2.46	104	1.0	-	4.75	-0.05	97	286	80	75
166	26.016	0.162	0.069	2.47	104	1.0	-	4.70	-0.05	97	285	80	75
167	26.171	0.155	0.068	2.46	104	0.9	-	4.66	-0.04	98	284	80	75
168	26.335	0.164	0.070	2.47	104	0.9	-	4.59	-0.07	98	285	80	75
169	26.488	0.153	0.072	2.47	104	0.9	-	4.54	-0.05	98	286	80	75
170	26.652	0.164	0.073	2.47	104	0.9	100	4.49	-0.05	98	285	80	75
171	26.814	0.162	0.077	2.47	104	0.9	-	4.44	-0.05	98	283	80	75
172	26.970	0.156	0.077	2.48	104	0.9	-	4.38	-0.06	98	283	80	75
173	27.134	0.164	0.076	2.48	104	0.9	-	4.32	-0.06	98	284	80	75
174	27.290	0.156	0.075	2.47	104	0.9	-	4.27	-0.05	98	284	80	75
175	27.452	0.162	0.073	2.47	104	0.9	-	4.22	-0.05	98	285	80	75
176	27.610	0.158	0.070	2.47	104	1.0	-	4.17	-0.05	98	285	80	75
177	27.769	0.159	0.070	2.48	104	0.9	-	4.11	-0.06	98	285	80	75
178	27.933	0.164	0.071	2.47	104	0.9	-	4.06	-0.05	98	287	80	75
179	28.089	0.156	0.072	2.48	104	0.9	-	4.02	-0.04	98	287	80	75
180	28.250	0.161	0.073	2.47	104	0.9	100	3.96	-0.06	98	287	80	75
181	28.412	0.162	0.074	2.48	104	0.9	-	3.91	-0.05	98	287	80	75
182	28.568	0.156	0.075	2.49	104	0.9	-	3.87	-0.04	98	286	80	75
183	28.729	0.161	0.072	2.48	104	0.9	-	3.80	-0.07	98	285	80	75
184	28.888	0.159	0.072	2.48	104	0.9	-	3.75	-0.05	98	286	80	75
185	29.049	0.161	0.070	2.49	104	0.9	-	3.70	-0.05	98	286	80	75
186	29.211	0.162	0.070	2.48	104	0.9	-	3.66	-0.04	98	286	80	75
187	29.367	0.156	0.071	2.48	104	0.9	-	3.63	-0.03	98	284	80	75
188	29.531	0.164	0.071	2.46	104	0.9	-	3.55	-0.08	98	283	80	75
189	29.687	0.156	0.070	2.47	104	0.9	-	3.52	-0.03	98	282	80	75
190	29.848	0.161	0.070	2.45	104	0.9	101	3.48	-0.04	98	283	80	75
191	30.009	0.161	0.071	2.47	104	0.9	-	3.43	-0.05	98	282	80	75
192	30.166	0.157	0.071	2.47	104	0.9	-	3.39	-0.04	98	281	80	75
193	30.329	0.163	0.073	2.46	104	0.9	-	3.33	-0.06	98	283	80	75
194	30.486	0.157	0.072	2.46	104	1.0	-	3.30	-0.03	98	282	80	75
195	30.646	0.160	0.073	2.46	104	0.9	-	3.24	-0.06	98	282	80	75
196	30.808	0.162	0.073	2.45	104	0.9	-	3.19	-0.05	98	282	80	75
197	30.965	0.157	0.072	2.46	104	1.0	-	3.15	-0.04	98	282	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	31.128	0.163	0.070	2.46	104	0.9	-	3.10	-0.05	98	282	80	75
199	31.285	0.157	0.072	2.45	104	0.9	-	3.06	-0.04	98	283	80	75
200	31.445	0.160	0.070	2.45	104	0.9	102	3.00	-0.06	98	282	80	75
201	31.606	0.161	0.069	2.45	104	1.0	-	2.96	-0.04	97	282	80	75
202	31.763	0.157	0.069	2.45	104	0.9	-	2.92	-0.04	98	282	80	75
203	31.927	0.164	0.068	2.46	104	0.9	-	2.88	-0.04	97	280	80	75
204	32.081	0.154	0.069	2.46	104	0.9	-	2.83	-0.05	98	281	80	75
205	32.244	0.163	0.070	2.46	104	0.9	-	2.79	-0.04	98	282	80	75
206	32.405	0.161	0.071	2.46	104	0.9	-	2.75	-0.04	98	282	80	75
207	32.562	0.157	0.071	2.47	104	0.9	-	2.70	-0.05	97	282	80	75
208	32.726	0.164	0.074	2.45	104	0.9	-	2.66	-0.04	97	281	80	75
209	32.883	0.157	0.072	2.46	104	0.9	-	2.62	-0.04	97	282	80	76
210	33.043	0.160	0.071	2.47	104	0.9	102	2.57	-0.05	97	280	80	76
211	33.205	0.162	0.072	2.46	104	0.9	-	2.54	-0.03	97	279	80	76
212	33.361	0.156	0.072	2.47	104	0.9	-	2.49	-0.05	97	280	80	75
213	33.525	0.164	0.069	2.46	104	1.0	-	2.45	-0.04	97	281	80	75
214	33.682	0.157	0.070	2.47	104	0.9	-	2.41	-0.04	97	280	80	75
215	33.843	0.161	0.070	2.47	104	0.9	-	2.37	-0.04	97	280	80	75
216	34.004	0.161	0.070	2.47	104	0.9	-	2.34	-0.03	97	279	80	75
217	34.161	0.157	0.071	2.48	104	0.9	-	2.31	-0.03	97	279	80	76
218	34.321	0.160	0.073	2.47	104	0.9	-	2.25	-0.06	97	279	80	76
219	34.482	0.161	0.073	2.47	104	0.9	-	2.20	-0.05	97	279	80	75
220	34.643	0.161	0.075	2.48	104	0.9	100	2.17	-0.03	97	279	80	75
221	34.804	0.161	0.075	2.46	104	0.9	-	2.13	-0.04	97	278	80	75
222	34.961	0.157	0.073	2.48	104	0.9	-	2.09	-0.04	97	280	80	75
223	35.125	0.164	0.072	2.47	104	1.0	-	2.06	-0.03	97	280	80	75
224	35.282	0.157	0.072	2.47	105	0.9	-	2.01	-0.05	97	280	80	75
225	35.440	0.158	0.072	2.47	104	0.9	-	1.97	-0.04	97	279	80	75
226	35.604	0.164	0.071	2.47	104	1.0	-	1.94	-0.03	97	279	80	76
227	35.761	0.157	0.071	2.46	104	0.9	-	1.89	-0.05	97	279	80	75
228	35.924	0.163	0.072	2.47	104	1.0	-	1.87	-0.02	97	277	80	75
229	36.082	0.158	0.071	2.47	105	0.9	-	1.83	-0.04	97	277	80	75
230	36.242	0.160	0.069	2.47	105	0.9	101	1.76	-0.07	97	278	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	36.404	0.162	0.069	2.46	105	0.9	-	1.74	-0.02	97	276	80	75
232	36.558	0.154	0.070	2.46	105	0.9	-	1.70	-0.04	97	276	80	75
233	36.724	0.166	0.070	2.47	105	0.9	-	1.67	-0.03	97	277	80	75
234	36.881	0.157	0.071	2.47	105	0.9	-	1.63	-0.04	97	277	80	75
235	37.042	0.161	0.073	2.47	105	0.9	-	1.61	-0.02	97	277	80	75
236	37.204	0.162	0.073	2.47	105	0.9	-	1.57	-0.04	97	276	80	75
237	37.361	0.157	0.074	2.48	105	0.9	-	1.54	-0.03	97	274	80	75
238	37.525	0.164	0.073	2.48	105	1.0	-	1.49	-0.05	97	274	80	76
239	37.681	0.156	0.073	2.48	105	0.9	-	1.47	-0.02	97	274	80	75
240	37.842	0.161	0.073	2.47	105	0.9	101	1.43	-0.04	97	273	80	76
241	38.004	0.162	0.072	2.47	105	0.9	-	1.40	-0.03	97	273	80	75
242	38.161	0.157	0.070	2.48	105	0.9	-	1.36	-0.04	97	274	80	75
243	38.325	0.164	0.073	2.47	105	1.0	-	1.32	-0.04	97	273	80	76
244	38.481	0.156	0.073	2.47	105	0.9	-	1.30	-0.02	97	272	80	75
245	38.642	0.161	0.073	2.47	105	0.9	-	1.27	-0.03	97	271	80	75
246	38.804	0.162	0.073	2.46	105	0.9	-	1.24	-0.03	97	271	80	75
247	38.961	0.157	0.074	2.46	105	0.9	-	1.22	-0.02	97	270	80	75
248	39.124	0.163	0.071	2.45	105	0.9	-	1.18	-0.04	97	269	80	75
249	39.281	0.157	0.071	2.45	105	0.9	-	1.14	-0.04	96	267	80	75
250	39.442	0.161	0.072	2.45	105	0.9	100	1.12	-0.02	96	266	80	75
251	39.604	0.162	0.073	2.47	105	0.9	-	1.09	-0.03	96	265	80	75
252	39.760	0.156	0.072	2.45	105	1.0	-	1.08	-0.01	96	263	80	75
253	39.924	0.164	0.073	2.46	105	0.9	-	1.05	-0.03	96	262	80	75
254	40.081	0.157	0.073	2.47	105	0.9	-	1.02	-0.03	96	262	80	75
255	40.242	0.161	0.072	2.46	105	0.9	-	1.00	-0.02	96	261	80	75
256	40.404	0.162	0.072	2.46	105	0.9	-	0.97	-0.03	96	259	80	75
257	40.560	0.156	0.072	2.46	105	0.9	-	0.93	-0.04	96	258	80	75
258	40.724	0.164	0.072	2.45	105	0.9	-	0.92	-0.01	96	257	80	75
259	40.881	0.157	0.073	2.46	105	1.0	-	0.89	-0.03	96	256	80	75
260	41.043	0.162	0.072	2.46	105	0.9	101	0.87	-0.02	96	255	80	75
261	41.205	0.162	0.070	2.46	105	0.9	-	0.84	-0.03	96	253	80	75
262	41.360	0.155	0.072	2.46	105	0.9	-	0.82	-0.02	95	253	80	75
263	41.524	0.164	0.071	2.46	105	0.9	-	0.78	-0.04	95	251	80	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
	Gas Meter (ft ³)	Sample Rate (cfm)	Dilution Tunnel dP (in H ₂ O)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	41.681	0.157	0.069	2.46	105	0.9	-	0.76	-0.02	95	251	80	75
265	41.843	0.162	0.071	2.46	105	0.9	-	0.76	0.00	95	250	80	75
266	42.005	0.162	0.072	2.46	105	0.9	-	0.71	-0.05	95	250	80	75
267	42.161	0.156	0.071	2.46	105	0.9	-	0.69	-0.02	95	249	80	75
268	42.325	0.164	0.069	2.45	105	0.9	-	0.66	-0.03	95	249	80	75
269	42.482	0.157	0.068	2.47	105	0.9	-	0.63	-0.03	95	248	80	75
270	42.643	0.161	0.069	2.46	105	0.9	101	0.60	-0.03	95	250	80	75
271	42.805	0.162	0.071	2.46	105	0.9	-	0.57	-0.03	95	249	80	75
272	42.961	0.156	0.071	2.44	105	1.0	-	0.54	-0.03	95	248	80	75
273	43.123	0.162	0.074	2.44	105	0.9	-	0.51	-0.03	95	249	80	75
274	43.283	0.160	0.075	2.44	105	0.9	-	0.49	-0.02	95	249	80	75
275	43.444	0.161	0.075	2.43	105	0.9	-	0.46	-0.03	95	249	80	76
276	43.605	0.161	0.073	2.45	105	0.9	-	0.43	-0.03	95	249	80	75
277	43.762	0.157	0.074	2.44	105	0.9	-	0.41	-0.02	95	249	80	75
278	43.926	0.164	0.071	2.45	105	0.9	-	0.39	-0.02	95	248	80	75
279	44.083	0.157	0.071	2.45	105	0.9	-	0.34	-0.05	95	248	80	76
280	44.242	0.159	0.070	2.44	105	0.9	102	0.33	-0.01	95	248	80	75
281	44.405	0.163	0.071	2.44	105	0.9	-	0.30	-0.03	95	248	80	75
282	44.563	0.158	0.070	2.44	105	0.9	-	0.29	-0.01	95	248	80	75
283	44.727	0.164	0.073	2.44	105	1.0	-	0.25	-0.04	95	247	80	75
284	44.884	0.157	0.074	2.45	105	0.9	-	0.24	-0.01	94	247	80	75
285	45.045	0.161	0.074	2.44	105	0.9	-	0.20	-0.04	95	247	80	75
286	45.206	0.161	0.074	2.45	105	0.9	-	0.18	-0.02	94	246	80	75
287	45.361	0.155	0.073	2.44	105	0.9	-	0.15	-0.03	94	247	80	75
288	45.527	0.166	0.073	2.47	105	0.9	-	0.14	-0.01	94	245	80	75
289	45.685	0.158	0.072	2.45	105	0.9	-	0.10	-0.04	94	245	80	76
290	45.846	0.161	0.072	2.45	105	0.9	101	0.08	-0.02	94	245	80	76
291	46.008	0.162	0.072	2.47	105	0.9	-	0.05	-0.03	94	245	80	75
292	46.166	0.158	0.073	2.46	105	0.9	-	0.03	-0.02	94	244	80	76
293	46.328	0.162	0.072	2.46	105	0.9	-	0.02	-0.01	94	243	80	76
294	46.484	0.156	0.075	2.46	105	0.9	99	0.00	-0.02	94	243	80	75
Avg/Tot	46.484	0.158	0.073	2.42	99.0	0.9	100			98.6	289.3	79.9	74.9

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
0	0.000		0.01	78	0.7		78	-0.070	6.41	0.091
1	0.138	0.138	2.48	78	1.6	-	80	-0.071	4.78	0.089
2	0.294	0.156	2.49	78	2.0	-	81	-0.071	6.89	0.054
3	0.450	0.156	2.50	78	1.5	-	81	-0.071	8.14	0.066
4	0.606	0.156	2.49	78	2.1	-	81	-0.072	8.58	0.061
5	0.762	0.156	2.49	78	1.6	-	82	-0.071	8.54	0.055
6	0.915	0.153	2.48	79	1.9	-	82	-0.066	8.46	0.059
7	1.074	0.159	2.50	79	1.5	-	82	-0.066	8.75	0.057
8	1.227	0.153	2.49	79	1.6	-	82	-0.067	10.18	0.063
9	1.384	0.157	2.49	79	2.0	-	82	-0.066	10.37	0.069
10	1.538	0.154	2.49	79	1.8	99	82	-0.067	9.94	0.065
11	1.695	0.157	2.50	79	1.9	-	82	-0.064	9.85	0.059
12	1.852	0.157	2.50	80	1.7	-	82	-0.065	9.47	0.061
13	2.005	0.153	2.49	80	2.1	-	82	-0.065	9.02	0.063
14	2.164	0.159	2.50	80	1.6	-	82	-0.064	8.78	0.061
15	2.318	0.154	2.50	80	1.6	-	82	-0.065	8.82	0.058
16	2.475	0.157	2.49	80	2.0	-	82	-0.064	9.09	0.059
17	2.631	0.156	2.50	81	1.7	-	82	-0.063	9.79	0.062
18	2.784	0.153	2.50	81	2.0	-	83	-0.063	9.92	0.062
19	2.944	0.160	2.50	81	1.6	-	83	-0.061	9.83	0.060
20	3.098	0.154	2.50	82	1.6	101	83	-0.062	9.13	0.062
21	3.258	0.160	2.50	82	1.8	-	83	-0.062	8.40	0.055
22	3.412	0.154	2.50	82	1.7	-	83	-0.060	7.67	0.052
23	3.569	0.157	2.50	82	1.6	-	83	-0.062	7.64	0.052
24	3.727	0.158	2.51	83	2.0	-	83	-0.063	9.16	0.049
25	3.882	0.155	2.51	83	2.1	-	83	-0.063	10.04	0.048
26	4.041	0.159	2.50	83	1.8	-	83	-0.061	10.41	0.054
27	4.196	0.155	2.51	84	1.9	-	83	-0.061	10.20	0.058
28	4.355	0.159	2.51	84	1.5	-	83	-0.061	10.11	0.056
29	4.510	0.155	2.51	84	1.5	-	83	-0.059	9.91	0.054
30	4.669	0.159	2.51	85	2.1	100	83	-0.061	9.72	0.049
31	4.827	0.158	2.51	85	1.6	-	83	-0.060	9.67	0.050
32	4.982	0.155	2.52	85	1.6	-	83	-0.060	9.64	0.052

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
33	5.143	0.161	2.52	86	1.8	-	83	-0.060	9.50	0.056
34	5.295	0.152	2.52	86	2.0	-	83	-0.062	9.47	0.047
35	5.457	0.162	2.52	86	1.6	-	83	-0.061	9.55	0.049
36	5.616	0.159	2.52	87	1.6	-	83	-0.059	9.67	0.046
37	5.771	0.155	2.51	87	1.9	-	83	-0.060	9.72	0.049
38	5.932	0.161	2.52	87	2.0	-	83	-0.057	9.87	0.050
39	6.063	0.131	2.52	87	2.1	-	83	-0.058	9.84	0.046
40	6.222	0.159	2.51	88	2.0	98	83	-0.059	10.11	0.047
41	6.382	0.160	2.52	88	2.0	-	83	-0.059	10.11	0.050
42	6.538	0.156	2.52	88	2.1	-	83	-0.058	10.04	0.048
43	6.699	0.161	2.52	89	2.1	-	83	-0.058	9.87	0.051
44	6.855	0.156	2.53	89	2.1	-	83	-0.058	9.69	0.051
45	7.014	0.159	2.51	89	2.0	-	83	-0.057	9.69	0.053
46	7.174	0.160	2.52	89	2.0	-	83	-0.058	9.78	0.048
47	7.331	0.157	2.53	90	1.6	-	83	-0.058	9.91	0.049
48	7.492	0.161	2.53	90	1.7	-	83	-0.056	9.83	0.047
49	7.649	0.157	2.53	90	1.9	-	83	-0.058	9.73	0.056
50	7.806	0.157	2.52	91	1.8	98	83	-0.060	9.74	0.050
51	7.966	0.160	2.53	91	2.1	-	83	-0.058	9.68	0.049
52	8.126	0.160	2.53	91	2.0	-	83	-0.057	9.80	0.046
53	8.288	0.162	2.53	91	1.6	-	83	-0.057	9.93	0.057
54	8.444	0.156	2.53	91	1.8	-	83	-0.060	9.95	0.058
55	8.605	0.161	2.53	92	2.1	-	83	-0.058	10.08	0.057
56	8.765	0.160	2.54	92	1.8	-	83	-0.057	10.66	0.206
57	8.922	0.157	2.53	92	1.7	-	83	-0.057	10.86	0.388
58	9.085	0.163	2.54	92	2.0	-	83	-0.060	10.95	0.439
59	9.242	0.157	2.54	93	1.6	-	83	-0.058	10.84	0.356
60	9.403	0.161	2.54	93	2.0	99	83	-0.058	10.77	0.253
61	9.563	0.160	2.54	93	1.9	-	83	-0.059	10.58	0.265
62	9.722	0.159	2.54	93	2.0	-	83	-0.060	10.51	0.259
63	9.883	0.161	2.54	94	2.0	-	83	-0.060	10.51	0.181
64	10.042	0.159	2.54	94	2.1	-	83	-0.060	10.46	0.181
65	10.202	0.160	2.55	94	1.6	-	83	-0.058	10.53	0.220

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
66	10.363	0.161	2.55	94	2.1	-	83	-0.059	10.56	0.257
67	10.522	0.159	2.55	94	1.6	-	83	-0.060	10.63	0.213
68	10.682	0.160	2.54	95	1.6	-	83	-0.059	10.41	0.126
69	10.844	0.162	2.55	95	1.8	-	83	-0.058	10.23	0.100
70	11.002	0.158	2.54	95	1.6	99	83	-0.060	10.14	0.082
71	11.165	0.163	2.55	95	1.8	-	83	-0.058	9.78	0.065
72	11.323	0.158	2.55	95	1.7	-	83	-0.058	9.45	0.059
73	11.485	0.162	2.54	95	1.8	-	83	-0.058	9.27	0.064
74	11.646	0.161	2.55	96	1.8	-	83	-0.061	9.21	0.063
75	11.802	0.156	2.54	96	2.0	-	83	-0.057	9.16	0.062
76	11.967	0.165	2.55	96	1.7	-	83	-0.059	9.14	0.062
77	12.127	0.160	2.55	96	1.5	-	83	-0.057	9.06	0.054
78	12.286	0.159	2.55	96	1.6	-	83	-0.058	8.99	0.057
79	12.450	0.164	2.55	96	1.6	-	83	-0.059	8.96	0.053
80	12.607	0.157	2.55	97	2.0	99	83	-0.058	8.88	0.055
81	12.770	0.163	2.55	97	1.9	-	83	-0.056	8.85	0.053
82	12.931	0.161	2.55	97	2.1	-	83	-0.059	8.90	0.054
83	13.090	0.159	2.55	97	1.5	-	83	-0.057	9.00	0.055
84	13.253	0.163	2.55	97	2.1	-	83	-0.058	8.93	0.057
85	13.413	0.160	2.55	97	1.7	-	83	-0.057	8.93	0.053
86	13.573	0.160	2.55	98	2.1	-	83	-0.055	8.92	0.049
87	13.736	0.163	2.55	98	1.6	-	83	-0.054	8.89	0.055
88	13.895	0.159	2.55	98	2.0	-	83	-0.055	8.86	0.051
89	14.057	0.162	2.55	98	2.1	-	83	-0.056	8.78	0.051
90	14.219	0.162	2.55	98	1.7	99	83	-0.055	8.73	0.050
91	14.378	0.159	2.55	98	1.7	-	83	-0.055	8.62	0.053
92	14.541	0.163	2.55	98	1.8	-	83	-0.056	8.56	0.052
93	14.697	0.156	2.54	98	2.0	-	83	-0.054	8.47	0.051
94	14.862	0.165	2.55	99	1.8	-	83	-0.059	8.33	0.048
95	15.025	0.163	2.55	99	1.9	-	83	-0.058	8.23	0.049
96	15.181	0.156	2.55	99	1.6	-	83	-0.055	8.18	0.049
97	15.346	0.165	2.55	99	1.9	-	83	-0.055	8.18	0.048
98	15.508	0.162	2.56	99	1.8	-	83	-0.054	8.04	0.045

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
99	15.667	0.159	2.54	99	1.9	-	83	-0.056	7.96	0.044
100	15.713	0.046	2.56	99	2.0	92	83	-0.055	7.96	0.048
101	15.873	0.160	2.56	100	1.7	-	83	-0.056	8.00	0.049
102	16.034	0.161	2.56	100	1.6	-	83	-0.057	8.05	0.045
103	16.197	0.163	2.55	100	1.8	-	83	-0.053	7.94	0.042
104	16.356	0.159	2.56	100	2.1	-	83	-0.054	7.89	0.044
105	16.519	0.163	2.55	100	1.5	-	83	-0.055	7.88	0.041
106	16.680	0.161	2.55	100	2.0	-	83	-0.052	7.92	0.045
107	16.840	0.160	2.56	100	1.9	-	83	-0.057	7.89	0.040
108	17.003	0.163	2.56	100	1.8	-	83	-0.053	7.96	0.046
109	17.165	0.162	2.55	100	1.6	-	83	-0.053	7.93	0.044
110	17.325	0.160	2.56	100	2.0	101	83	-0.054	7.98	0.045
111	17.489	0.164	2.56	100	2.0	-	83	-0.051	8.05	0.043
112	17.645	0.156	2.56	101	1.7	-	83	-0.054	8.07	0.046
113	17.811	0.166	2.56	101	1.7	-	83	-0.052	8.12	0.041
114	17.973	0.162	2.56	101	1.9	-	83	-0.053	8.12	0.043
115	18.133	0.160	2.55	101	1.7	-	83	-0.057	8.15	0.040
116	18.295	0.162	2.56	101	1.5	-	83	-0.053	8.17	0.039
117	18.458	0.163	2.56	101	1.9	-	83	-0.053	8.24	0.038
118	18.617	0.159	2.56	101	1.6	-	83	-0.051	8.32	0.047
119	18.782	0.165	2.56	101	1.7	-	83	-0.053	8.40	0.050
120	18.940	0.158	2.55	101	2.0	102	83	-0.054	8.48	0.044
121	19.104	0.164	2.56	101	1.6	-	83	-0.054	8.61	0.047
122	19.266	0.162	2.55	101	2.0	-	83	-0.053	8.75	0.043
123	19.426	0.160	2.56	101	1.6	-	83	-0.055	8.91	0.045
124	19.588	0.162	2.56	101	1.8	-	83	-0.055	8.99	0.046
125	19.751	0.163	2.57	101	1.5	-	83	-0.055	9.10	0.049
126	19.911	0.160	2.56	101	1.9	-	83	-0.056	9.25	0.050
127	20.075	0.164	2.56	102	1.7	-	83	-0.054	9.36	0.051
128	20.236	0.161	2.56	102	1.7	-	83	-0.055	9.48	0.052
129	20.397	0.161	2.56	102	1.6	-	83	-0.056	9.49	0.045
130	20.561	0.164	2.56	102	1.6	102	83	-0.056	9.52	0.055
131	20.720	0.159	2.56	102	2.0	-	83	-0.055	9.60	0.051

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
132	20.883	0.163	2.56	102	2.1	-	83	-0.055	9.63	0.052
133	21.046	0.163	2.56	102	1.6	-	83	-0.053	9.68	0.051
134	21.206	0.160	2.55	102	2.0	-	83	-0.056	9.67	0.051
135	21.369	0.163	2.56	102	1.6	-	83	-0.056	9.73	0.054
136	21.531	0.162	2.56	102	1.7	-	83	-0.054	9.71	0.053
137	21.691	0.160	2.55	102	1.8	-	83	-0.055	9.70	0.051
138	21.856	0.165	2.56	102	1.6	-	83	-0.057	9.73	0.049
139	22.014	0.158	2.56	102	1.6	-	83	-0.054	9.81	0.052
140	22.178	0.164	2.56	102	1.9	101	83	-0.056	9.85	0.054
141	22.340	0.162	2.56	102	1.9	-	83	-0.056	9.95	0.054
142	22.501	0.161	2.56	102	2.0	-	83	-0.053	9.96	0.050
143	22.664	0.163	2.56	103	1.9	-	83	-0.057	9.99	0.050
144	22.826	0.162	2.56	103	1.6	-	83	-0.057	9.95	0.052
145	22.986	0.160	2.55	103	1.9	-	83	-0.054	10.03	0.045
146	23.149	0.163	2.56	103	2.1	-	83	-0.056	9.95	0.046
147	23.311	0.162	2.55	103	2.0	-	83	-0.055	9.86	0.051
148	23.472	0.161	2.56	103	1.6	-	83	-0.053	9.72	0.053
149	23.636	0.164	2.56	103	2.1	-	83	-0.055	9.72	0.049
150	23.796	0.160	2.56	103	1.6	102	83	-0.053	9.61	0.051
151	23.959	0.163	2.55	103	1.5	-	83	-0.056	9.45	0.047
152	24.121	0.162	2.55	103	2.0	-	83	-0.056	9.31	0.044
153	24.283	0.162	2.56	103	1.7	-	83	-0.054	9.16	0.042
154	24.445	0.162	2.55	103	1.7	-	83	-0.057	9.01	0.045
155	24.605	0.160	2.56	103	1.6	-	83	-0.055	8.95	0.038
156	24.768	0.163	2.56	103	2.1	-	83	-0.057	8.92	0.043
157	24.932	0.164	2.56	103	2.1	-	83	-0.059	8.87	0.042
158	25.093	0.161	2.56	103	1.5	-	83	-0.061	8.90	0.041
159	25.254	0.161	2.56	103	1.8	-	83	-0.060	8.83	0.043
160	25.419	0.165	2.56	103	2.1	102	83	-0.058	8.87	0.042
161	25.579	0.160	2.56	103	1.7	-	83	-0.061	8.89	0.039
162	25.742	0.163	2.56	103	2.0	-	83	-0.059	8.97	0.043
163	25.905	0.163	2.56	103	2.1	-	83	-0.061	8.94	0.041
164	26.065	0.160	2.56	103	1.8	-	83	-0.058	9.02	0.039

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
165	26.228	0.163	2.55	103	1.8	-	83	-0.061	9.04	0.041
166	26.392	0.164	2.56	103	1.9	-	83	-0.059	9.06	0.039
167	26.551	0.159	2.56	103	2.1	-	83	-0.059	9.11	0.037
168	26.716	0.165	2.56	103	2.0	-	83	-0.058	9.35	0.038
169	26.873	0.157	2.56	103	1.8	-	83	-0.060	9.29	0.037
170	27.038	0.165	2.56	103	1.7	100	83	-0.057	9.32	0.042
171	27.203	0.165	2.56	103	1.6	-	83	-0.058	9.43	0.051
172	27.362	0.159	2.57	103	1.5	-	83	-0.060	9.57	0.083
173	27.526	0.164	2.56	103	1.8	-	83	-0.058	9.64	0.125
174	27.689	0.163	2.56	103	1.8	-	83	-0.058	9.66	0.130
175	27.849	0.160	2.56	103	1.6	-	83	-0.058	9.58	0.114
176	28.010	0.161	2.56	103	1.9	-	83	-0.057	9.47	0.076
177	28.176	0.166	2.56	104	2.0	-	83	-0.056	9.59	0.070
178	28.335	0.159	2.56	104	1.7	-	83	-0.057	9.28	0.037
179	28.501	0.166	2.56	104	2.0	-	83	-0.054	8.99	0.040
180	28.661	0.160	2.56	104	2.0	100	83	-0.053	9.02	0.039
181	28.823	0.162	2.56	104	2.1	-	83	-0.056	9.13	0.037
182	28.987	0.164	2.56	104	2.1	-	83	-0.057	9.12	0.038
183	29.144	0.157	2.56	104	1.6	-	83	-0.059	9.15	0.028
184	29.311	0.167	2.56	104	1.6	-	83	-0.059	9.21	0.036
185	29.473	0.162	2.57	104	1.5	-	83	-0.057	9.33	0.031
186	29.634	0.161	2.56	104	1.8	-	83	-0.056	9.44	0.030
187	29.797	0.163	2.56	104	1.7	-	83	-0.059	9.42	0.032
188	29.961	0.164	2.55	104	1.8	-	83	-0.057	9.21	0.030
189	30.120	0.159	2.55	104	1.9	-	83	-0.057	8.79	0.036
190	30.285	0.165	2.56	104	1.7	101	83	-0.058	8.63	0.028
191	30.446	0.161	2.55	104	1.9	-	83	-0.058	8.53	0.035
192	30.607	0.161	2.55	104	1.6	-	83	-0.060	8.40	0.030
193	30.771	0.164	2.56	104	1.6	-	83	-0.058	9.03	0.033
194	30.931	0.160	2.55	104	1.7	-	83	-0.061	9.06	0.031
195	31.095	0.164	2.55	104	2.0	-	83	-0.059	9.22	0.033
196	31.257	0.162	2.56	104	1.9	-	83	-0.062	9.29	0.029
197	31.418	0.161	2.55	104	1.6	-	83	-0.060	9.27	0.031

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
198	31.581	0.163	2.56	104	1.6	-	83	-0.059	9.27	0.030
199	31.744	0.163	2.56	104	1.6	-	83	-0.059	9.16	0.034
200	31.904	0.160	2.56	104	2.0	102	83	-0.061	9.06	0.032
201	32.069	0.165	2.56	104	1.9	-	83	-0.061	9.05	0.031
202	32.230	0.161	2.56	104	1.9	-	83	-0.062	9.03	0.034
203	32.391	0.161	2.56	104	1.6	-	83	-0.064	8.92	0.035
204	32.552	0.161	2.56	104	1.6	-	83	-0.060	8.93	0.032
205	32.715	0.163	2.56	104	1.7	-	83	-0.062	8.81	0.030
206	32.879	0.164	2.56	104	1.6	-	83	-0.063	8.81	0.034
207	33.042	0.163	2.56	104	1.6	-	83	-0.065	8.80	0.033
208	33.203	0.161	2.55	104	2.0	-	83	-0.065	8.79	0.035
209	33.366	0.163	2.56	104	2.1	-	83	-0.065	8.72	0.034
210	33.529	0.163	2.56	104	1.7	102	83	-0.064	8.65	0.035
211	33.689	0.160	2.56	104	2.1	-	83	-0.063	8.61	0.033
212	33.854	0.165	2.56	104	1.7	-	83	-0.064	8.57	0.036
213	34.015	0.161	2.56	104	1.6	-	83	-0.062	8.58	0.037
214	34.176	0.161	2.56	104	1.6	-	83	-0.065	8.55	0.039
215	34.341	0.165	2.56	104	1.7	-	83	-0.061	8.54	0.036
216	34.501	0.160	2.56	104	1.6	-	83	-0.065	8.52	0.038
217	34.664	0.163	2.56	104	1.7	-	83	-0.062	8.48	0.038
218	34.824	0.160	2.57	104	1.9	-	83	-0.060	8.46	0.036
219	34.988	0.164	2.56	104	1.6	-	83	-0.063	8.43	0.033
220	35.151	0.163	2.55	104	1.6	100	83	-0.062	8.39	0.040
221	35.315	0.164	2.56	104	2.0	-	83	-0.064	8.40	0.034
222	35.475	0.160	2.56	104	2.0	-	83	-0.063	8.38	0.037
223	35.639	0.164	2.56	104	2.0	-	83	-0.062	8.43	0.038
224	35.801	0.162	2.55	104	2.0	-	83	-0.063	8.42	0.038
225	35.960	0.159	2.56	104	1.9	-	83	-0.062	8.05	0.040
226	36.127	0.167	2.56	104	1.6	-	83	-0.063	7.95	0.042
227	36.287	0.160	2.56	104	1.8	-	83	-0.063	7.92	0.040
228	36.451	0.164	2.55	104	2.1	-	83	-0.062	7.94	0.044
229	36.613	0.162	2.56	104	1.8	-	83	-0.060	7.86	0.040
230	36.775	0.162	2.56	104	1.8	101	83	-0.062	7.87	0.042

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
231	36.937	0.162	2.56	104	1.9	-	83	-0.062	7.83	0.045
232	37.099	0.162	2.56	104	1.7	-	83	-0.060	7.78	0.044
233	37.261	0.162	2.56	104	2.0	-	83	-0.062	7.76	0.041
234	37.425	0.164	2.56	104	1.6	-	83	-0.060	7.65	0.044
235	37.588	0.163	2.56	104	2.1	-	83	-0.058	7.62	0.046
236	37.749	0.161	2.56	104	1.7	-	83	-0.061	7.64	0.047
237	37.914	0.165	2.56	104	2.1	-	83	-0.059	7.67	0.046
238	38.073	0.159	2.56	104	1.6	-	83	-0.061	7.68	0.044
239	38.238	0.165	2.56	104	1.7	-	83	-0.060	7.72	0.042
240	38.400	0.162	2.56	104	1.6	101	83	-0.061	7.73	0.039
241	38.561	0.161	2.56	104	2.1	-	83	-0.059	7.62	0.025
242	38.725	0.164	2.56	104	1.7	-	83	-0.059	7.60	0.044
243	38.887	0.162	2.56	104	2.1	-	83	-0.059	7.52	0.048
244	39.048	0.161	2.56	104	1.8	-	83	-0.058	7.51	0.043
245	39.212	0.164	2.56	104	2.0	-	83	-0.059	7.60	0.042
246	39.374	0.162	2.56	104	1.8	-	83	-0.058	7.51	0.042
247	39.535	0.161	2.56	104	1.6	-	83	-0.058	7.46	0.041
248	39.700	0.165	2.56	104	1.6	-	83	-0.057	7.38	0.036
249	39.860	0.160	2.55	104	1.6	-	83	-0.058	7.34	0.029
250	40.024	0.164	2.56	104	2.0	100	83	-0.056	7.32	0.034
251	40.187	0.163	2.56	104	1.8	-	83	-0.058	7.25	0.038
252	40.347	0.160	2.55	105	1.6	-	83	-0.057	7.25	0.038
253	40.511	0.164	2.56	105	1.8	-	83	-0.056	7.18	0.039
254	40.674	0.163	2.56	105	1.6	-	83	-0.058	7.18	0.038
255	40.835	0.161	2.56	105	2.1	-	83	-0.057	7.13	0.034
256	40.998	0.163	2.56	104	1.6	-	83	-0.057	7.17	0.031
257	41.161	0.163	2.56	105	1.7	-	83	-0.057	7.14	0.037
258	41.321	0.160	2.55	104	2.0	-	83	-0.057	7.18	0.035
259	41.487	0.166	2.56	105	1.9	-	83	-0.059	7.23	0.029
260	41.648	0.161	2.56	105	2.1	101	83	-0.055	7.44	0.038
261	41.810	0.162	2.56	105	1.6	-	83	-0.058	7.57	0.032
262	41.974	0.164	2.56	105	1.7	-	83	-0.054	7.66	0.029
263	42.134	0.160	2.56	105	1.8	-	83	-0.059	7.71	0.030

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Job #: 25-422

Model: 81C

Tracking #: 227

Run #: 4

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data							Flue Gas Data		
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H ₂ O)	CO ₂ (%)	CO (%)
264	42.298	0.164	2.55	105	1.9	-	83	-0.055	7.74	0.035
265	42.461	0.163	2.56	105	1.5	-	83	-0.056	7.76	0.033
266	42.622	0.161	2.56	105	2.1	-	83	-0.056	7.73	0.034
267	42.785	0.163	2.55	105	1.6	-	83	-0.054	7.77	0.032
268	42.949	0.164	2.56	105	1.7	-	83	-0.054	7.82	0.035
269	43.109	0.160	2.56	105	1.8	-	83	-0.056	7.83	0.036
270	43.273	0.164	2.56	105	1.9	102	83	-0.056	7.87	0.039
271	43.435	0.162	2.55	105	1.6	-	83	-0.056	7.85	0.036
272	43.596	0.161	2.56	105	1.8	-	83	-0.056	7.80	0.032
273	43.758	0.162	2.56	105	2.0	-	83	-0.052	7.82	0.032
274	43.921	0.163	2.56	105	1.7	-	83	-0.052	7.71	0.034
275	44.085	0.164	2.56	105	1.6	-	83	-0.055	7.69	0.033
276	44.247	0.162	2.56	105	2.1	-	83	-0.051	7.70	0.035
277	44.409	0.162	2.56	105	2.0	-	83	-0.053	7.69	0.037
278	44.572	0.163	2.56	105	2.0	-	83	-0.053	7.70	0.033
279	44.735	0.163	2.56	105	1.8	-	83	-0.052	7.68	0.033
280	44.892	0.157	2.55	105	1.7	102	83	-0.053	7.67	0.035
281	45.059	0.167	2.56	105	1.7	-	83	-0.050	7.59	0.032
282	45.222	0.163	2.56	105	1.9	-	83	-0.051	7.59	0.029
283	45.383	0.161	2.55	105	1.8	-	83	-0.052	7.47	0.036
284	45.548	0.165	2.55	105	1.6	-	83	-0.052	7.44	0.037
285	45.708	0.160	2.55	105	1.6	-	83	-0.051	7.40	0.035
286	45.872	0.164	2.56	105	2.1	-	83	-0.052	7.41	0.033
287	46.032	0.160	2.56	105	1.8	-	83	-0.054	7.42	0.029
288	46.196	0.164	2.56	105	2.1	-	83	-0.049	7.42	0.033
289	46.360	0.164	2.56	105	1.6	-	83	-0.051	7.42	0.033
290	46.522	0.162	2.57	105	2.0	101	83	-0.052	7.41	0.031
291	46.684	0.162	2.56	105	1.5	-	83	-0.052	7.46	0.031
292	46.847	0.163	2.56	105	2.0	-	83	-0.052	7.41	0.026
293	47.011	0.164	2.56	105	1.9	-	83	-0.050	7.39	0.032
294	47.168	0.157	2.56	105	1.7	98	83	-0.052	7.32	0.034
Avg/Tot	47.168	0.160	2.54	98.6	1.8	100	83.0	-0.058	8.77	0.055

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 4

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		0.95	84	1.5		75
1	0.178	0.178	0.95	83	1.6	-	75
2	0.318	0.140	0.97	84	1.5	-	76
3	0.456	0.138	0.96	84	1.6	-	76
4	0.594	0.138	0.97	84	1.6	-	76
5	0.734	0.140	0.98	84	1.5	-	76
6	0.874	0.140	0.97	84	1.4	-	76
7	1.014	0.140	0.99	84	1.4	-	76
8	1.155	0.141	0.99	84	1.6	-	76
9	1.294	0.139	0.98	84	1.6	-	76
10	1.433	0.139	0.99	84	1.4	100	76
11	1.574	0.141	0.98	85	1.4	-	76
12	1.716	0.142	0.99	85	1.6	-	76
13	1.858	0.142	1.00	85	1.6	-	76
14	1.999	0.141	1.00	85	1.6	-	76
15	2.140	0.141	0.99	85	1.6	-	76
16	2.282	0.142	1.01	85	1.6	-	76
17	2.424	0.142	1.01	86	1.6	-	76
18	2.566	0.142	1.00	86	1.6	-	76
19	2.707	0.141	1.01	86	1.5	-	76
20	2.851	0.144	1.02	86	1.5	100	76
21	2.994	0.143	1.02	86	1.6	-	76
22	3.137	0.143	1.02	87	1.5	-	76
23	3.279	0.142	1.01	87	1.5	-	77
24	3.424	0.145	1.03	87	1.6	-	77
25	3.568	0.144	1.03	87	1.6	-	76
26	3.711	0.143	1.02	88	1.5	-	77
27	3.855	0.144	1.02	88	1.6	-	77
28	3.999	0.144	1.04	88	1.6	-	77
29	4.144	0.145	1.04	89	1.5	-	77
30	4.289	0.145	1.04	89	1.6	101	76
31	4.433	0.144	1.04	89	1.5	-	76
32	4.578	0.145	1.04	90	1.6	-	77

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: Buck

Model: 81C

Run #: 4

Job #: 25-422

Tracking #: 227

Technician: AK

Date: 8/14/2025

Elapsed Time (min)	Particulate Sampling Data						
	Gas Meter (ft ³)	Sample Rate (cfm)	Orifice dH (in H ₂ O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
33	4.723	0.145	1.03	90	1.5	-	77
34	4.868	0.145	1.05	90	1.6	-	77
35	5.012	0.144	1.05	90	1.5	-	77
36	5.159	0.147	1.05	91	1.6	-	77
37	5.305	0.146	1.05	91	1.5	-	77
38	5.450	0.145	1.04	91	1.7	-	77
39	5.595	0.145	1.04	92	1.5	-	77
40	5.741	0.146	1.04	92	1.5	100	77
41	5.886	0.145	1.05	92	1.5	-	77
42	6.033	0.147	1.06	93	1.6	-	77
43	6.180	0.147	1.06	93	1.6	-	77
44	6.326	0.146	1.05	93	1.5	-	77
45	6.472	0.146	1.05	93	1.7	-	77
46	6.618	0.146	1.04	94	1.6	-	77
47	6.764	0.146	1.05	94	1.5	-	77
48	6.910	0.146	1.05	94	1.6	-	77
49	7.056	0.146	1.05	95	1.6	-	77
50	7.203	0.147	1.06	95	1.7	99	77
51	7.350	0.147	1.07	95	1.6	-	77
52	7.498	0.148	1.06	96	1.6	-	77
53	7.642	0.144	1.06	96	1.5	-	77
54	7.791	0.149	1.06	96	1.5	-	77
55	7.938	0.147	1.06	96	1.6	-	77
56	8.082	0.144	1.05	97	1.5	-	77
57	8.232	0.150	1.05	97	1.5	-	77
58	8.379	0.147	1.05	97	1.6	-	77
59	8.526	0.147	1.05	97	1.5	-	77
60	8.577	0.051	0.01	98	0.0	93	77
Avg/Tot	8.577	0.143	1.01	89.5	1.5	99	76.4

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 4Technician: AKDate: 8/14/2025Stove ΔT: 101

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
0	333	276	132	309	182	246.4	958.8
1	331	272	131	293	181	241.5	907.4
2	329	270	129	296	180	240.7	885.1
3	326	267	127	278	178	235.2	912.6
4	322	263	126	280	177	233.6	969.4
5	319	260	126	264	176	228.8	1011.9
6	315	255	125	265	175	226.9	1027.2
7	310	253	125	254	174	223.2	1026.7
8	307	249	123	252	172	220.8	1023.9
9	302	246	123	242	171	217.0	1030.0
10	297	241	121	244	170	214.7	1029.4
11	295	236	121	238	169	211.6	1016.4
12	291	234	120	239	168	210.3	1009.6
13	288	231	121	223	166	205.9	1006.3
14	284	227	119	219	165	202.7	1000.9
15	280	225	118	226	164	202.7	989.1
16	277	223	119	219	163	200.3	977.6
17	274	219	118	222	162	198.8	977.9
18	272	213	117	222	161	197.1	986.5
19	269	212	116	216	160	194.4	991.3
20	266	210	116	212	158	192.3	985.6
21	264	208	115	205	157	189.9	976.3
22	262	203	115	211	156	189.5	963.6
23	260	202	114	201	155	186.4	947.6
24	258	199	113	206	154	186.0	926.9
25	256	197	113	205	153	184.6	915.5
26	254	196	113	200	152	182.9	917.2
27	252	194	113	201	151	182.1	922.8
28	250	192	112	192	150	179.2	926.0
29	248	191	111	194	149	178.8	927.6
30	247	191	112	191	149	177.9	926.9
31	246	190	111	191	148	177.1	923.4
32	245	189	113	188	148	176.4	920.2
33	245	188	112	187	147	175.8	918.6
34	244	187	112	184	146	174.7	915.9
35	244	186	112	186	146	174.8	912.3
36	243	185	112	187	145	174.3	910.9
37	243	184	111	183	145	173.0	911.7
38	242	183	111	181	144	172.3	913.9
39	242	182	111	180	144	171.7	918.6
40	241	182	111	181	143	171.6	925.3
41	241	180	110	182	143	171.2	933.0
42	241	180	110	179	142	170.3	938.9
43	240	179	110	178	142	169.7	940.1
44	240	178	110	178	141	169.5	933.7
45	240	177	109	177	140	168.8	923.8
46	240	177	109	175	140	168.0	914.5
47	240	176	109	178	139	168.3	907.6
48	239	175	109	174	139	167.4	901.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 4Technician: AKDate: 8/14/2025Stove ΔT: 101

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
49	239	175	108	173	139	166.5	895.1
50	239	174	109	174	138	166.6	890.3
51	239	173	108	174	138	166.2	886.7
52	238	173	108	172	137	165.6	884.6
53	238	172	109	176	137	166.3	884.2
54	238	172	108	173	136	165.2	886.1
55	238	171	108	172	136	164.6	889.4
56	238	171	107	171	135	164.4	894.2
57	237	170	108	171	135	164.1	901.3
58	237	170	108	169	134	163.6	910.8
59	237	169	107	172	134	163.9	921.8
60	237	169	107	172	134	163.5	933.6
61	237	169	107	171	133	163.3	940.6
62	237	168	106	171	133	162.8	943.3
63	237	168	106	170	132	162.6	945.7
64	237	168	107	170	132	162.7	946.1
65	237	168	106	171	132	162.5	949.6
66	236	167	106	171	131	162.5	953.8
67	236	167	106	170	131	162.1	956.9
68	236	167	106	172	131	162.3	957.0
69	236	167	105	172	130	162.0	960.0
70	235	166	106	172	130	161.8	968.5
71	235	166	105	172	130	161.6	984.4
72	235	166	105	172	130	161.4	996.1
73	234	166	105	173	129	161.4	997.8
74	233	166	105	174	129	161.4	994.2
75	233	165	105	173	129	160.9	988.9
76	232	165	104	173	129	160.4	982.6
77	231	165	105	174	128	160.6	977.1
78	231	165	105	170	128	159.6	973.1
79	230	164	105	171	128	159.5	969.3
80	229	164	104	173	128	159.6	965.8
81	228	164	104	175	127	159.9	961.6
82	228	164	104	173	127	159.2	957.5
83	227	163	104	171	127	158.4	954.5
84	226	163	104	172	127	158.3	952.2
85	226	163	104	169	126	157.6	949.8
86	225	163	103	169	126	157.2	947.1
87	224	162	104	169	126	156.9	943.4
88	223	163	104	170	126	157.1	939.6
89	223	162	103	169	126	156.6	935.4
90	222	162	103	170	125	156.6	931.7
91	222	161	103	170	125	156.1	928.3
92	221	161	104	167	125	155.5	925.8
93	221	161	103	166	125	155.1	923.2
94	220	161	103	168	125	155.5	919.8
95	220	161	103	168	125	155.5	916.2
96	220	161	103	168	124	155.1	912.1
97	219	160	103	166	124	154.6	906.5

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 4Technician: AKDate: 8/14/2025Stove ΔT: 101

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
98	219	160	103	165	124	154.1	898.9
99	219	160	103	166	124	154.3	889.8
100	218	160	103	165	124	154.0	881.4
101	218	159	103	165	124	153.6	874.7
102	217	159	102	164	123	153.1	870.5
103	217	159	102	163	123	152.7	868.0
104	216	159	103	163	123	152.7	865.7
105	215	158	102	163	123	152.3	863.1
106	215	158	103	162	123	151.8	860.5
107	214	157	103	161	123	151.5	858.3
108	213	158	102	159	122	150.8	856.4
109	213	157	102	158	122	150.5	854.7
110	212	157	102	160	122	150.6	853.0
111	212	156	102	158	122	150.0	850.7
112	212	156	102	157	122	149.7	848.9
113	211	156	102	156	122	149.4	847.4
114	211	155	102	158	122	149.4	845.9
115	210	156	102	158	121	149.2	844.3
116	209	155	102	154	121	148.4	843.2
117	209	155	102	153	121	147.9	843.3
118	209	155	102	155	121	148.2	844.7
119	208	155	102	152	121	147.7	847.8
120	208	155	102	155	121	148.1	852.1
121	208	155	102	152	121	147.3	857.3
122	208	155	101	153	121	147.4	863.2
123	207	155	101	152	120	147.2	870.0
124	207	155	102	152	120	147.3	877.9
125	207	155	102	152	120	147.1	886.3
126	207	155	101	152	120	146.8	895.5
127	207	155	101	153	120	147.1	905.4
128	206	155	101	151	120	146.6	915.7
129	205	155	101	151	120	146.4	925.5
130	205	155	101	152	120	146.4	933.5
131	204	155	102	151	120	146.4	939.4
132	204	155	101	150	120	145.9	943.6
133	204	155	101	152	120	146.3	944.9
134	205	155	101	153	119	146.6	942.9
135	205	155	101	153	119	146.6	937.3
136	205	155	101	154	119	147.0	933.8
137	205	156	101	154	119	147.1	935.4
138	205	156	101	154	119	146.8	939.4
139	206	156	100	156	119	147.3	944.3
140	206	156	101	155	119	147.5	953.2
141	206	156	101	154	119	147.4	963.1
142	207	157	101	154	119	147.3	969.3
143	207	157	101	155	119	147.8	971.9
144	207	157	101	156	119	147.9	972.8
145	207	157	101	155	119	147.7	974.9
146	208	157	102	158	119	148.6	976.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: BuckJob #: 25-422Model: 81CTracking #: 227Run #: 4Technician: AKDate: 8/14/2025Stove ΔT: 101

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
147	208	158	102	156	119	148.5	976.4
148	208	158	101	158	119	148.8	976.7
149	208	159	101	158	119	149.0	979.1
150	209	159	101	160	119	149.5	981.8
151	210	158	101	156	119	148.9	980.9
152	210	159	102	158	119	149.5	976.3
153	211	159	102	160	119	150.1	969.6
154	212	159	102	159	119	150.1	962.9
155	212	160	102	160	119	150.3	957.1
156	213	160	101	160	119	150.3	953.0
157	213	160	101	160	119	150.4	947.8
158	213	160	101	160	119	150.4	941.1
159	213	160	102	158	119	150.3	936.6
160	213	159	102	160	119	150.7	935.7
161	214	160	102	160	119	150.6	936.6
162	214	160	102	160	119	150.8	936.0
163	214	161	102	157	119	150.3	933.2
164	214	161	102	161	118	151.2	930.5
165	214	161	101	161	118	151.0	929.3
166	214	161	101	161	118	151.1	929.3
167	214	161	101	160	118	151.1	930.2
168	214	162	101	159	118	150.9	933.1
169	214	162	102	159	118	151.1	941.6
170	214	162	101	158	118	150.7	956.1
171	214	163	102	158	118	151.0	971.7
172	214	163	102	160	118	151.4	986.1
173	214	164	101	158	118	150.9	997.7
174	214	164	102	157	118	151.0	1005.5
175	214	165	102	158	118	151.4	1008.7
176	214	165	102	159	118	151.6	1008.6
177	214	165	102	159	119	151.6	1001.1
178	214	165	102	159	119	151.7	986.2
179	214	166	101	159	119	151.7	964.1
180	214	166	101	159	119	151.5	941.1
181	214	166	101	159	119	151.7	923.4
182	214	167	102	158	119	151.6	912.1
183	213	167	102	161	119	152.4	905.8
184	213	167	101	158	119	151.8	901.0
185	213	168	102	159	119	152.2	894.9
186	213	169	102	157	119	151.8	889.0
187	213	169	102	160	119	152.4	885.0
188	212	170	101	157	119	151.9	882.2
189	212	171	102	160	119	152.7	878.9
190	212	171	101	156	119	151.8	875.0
191	212	172	102	159	119	152.6	870.2
192	211	172	101	158	119	152.4	865.2
193	211	173	101	155	119	152.1	863.3
194	211	174	101	155	120	152.1	863.3
195	210	174	101	156	120	152.3	865.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: Buck
 Model: 81C
 Run #: 4

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

Stove ΔT : 101

Elapsed Time (min)	Temperature Data (°F)						Catalyst Exit
	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	
196	210	175	101	156	120	152.5	869.3
197	210	175	101	156	120	152.3	873.1
198	210	175	101	157	120	152.5	875.7
199	210	176	101	156	120	152.4	877.1
200	209	176	101	155	120	152.3	877.8
201	209	176	101	154	120	152.1	877.3
202	209	177	101	159	120	153.1	874.8
Average	219.9	173.0	104.3	166.9	128.6	158.5	909.4

LAB SAMPLE DATA - ASTM E2515

Client: Buck
 Model: 81C
 Run #: 4

Job #: 25-422
 Tracking #: 227
 Technician: AK
 Date: 8/14/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	A	G01335	241.6	248.8	7.2
	B	G01336	242.1	249.0	6.9
	C - 1st Hour	G01337	243.8	245.1	1.3
	Amb	G01338	244.7	244.7	0.0
Probes	A	9A	116532.4	116532.7	0.3
	B	9B	117739.8	117739.9	0.1
	C - 1st Hour	9C	116604.0	116604.5	0.5
O-rings	A	9A	3578.4	3578.8	0.4
	B	9B	3521.5	3522.1	0.6
	C - 1st Hour	9C	3427.7	3428.4	0.7

Placed in Dessicator on: 8/14/2025

Balance Audit (mg):

200.0

200.0

		Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time
Filters	A	248.8	8/25 15:00	248.8	8/26 8:30				
	B	249.1	8/25 15:00	249.0	8/26 8:30				
	C - 1st Hour	245.3	8/25 15:00	245.1	8/26 8:30				
	Amb	244.8	8/25 15:00	244.7	8/26 8:30				
Probes	A	116532.9	8/25 15:00	116532.7	8/26 8:30				
	B	117740.1	8/25 15:00	117739.9	8/26 8:30				
	C - 1st Hour	116604.6	8/25 15:00	116604.5	8/26 8:30				
O-Rings	A	3579.0	8/25 15:00	3578.8	8/26 8:30				
	B	3522.0	8/25 15:00	3522.1	8/26 8:30				
	C - 1st Hour	3428.5	8/25 15:00	3428.4	8/26 8:30				

Train A Aggregate, mg:	7.9
Train B Aggregate, mg:	7.6
Train C Aggregate, mg:	2.5
Ambient, mg:	0.0

ASTM E2780 Wood Heater Run Sheets

Client: Buck Stove Job Number: 25-422 Tracking #: 227
Model: 81C Run Number: 4 Test Date: 8/14/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary open 7/32" (1.190"), secondary open 5/32" (1.520")
Targeted Burn Category: III

Preburn Notes

Time	Notes
31:00 71:00	+2.4 lb PB End

Test Notes

Test Burn Start Time: 11:13 Test Fuel Loaded by: 30 seconds
Door Closed: 40 seconds Air Control Set at: 300 seconds
Other Loading Notes: Bypass opened & closed with door, fan on auto high

Time	Notes
	-None-

Test Burn End Time: 16:07

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO₂ (%): 17.32 CO (%): 4.350
Mid Gas CO₂ (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	9:32	9:33	9:35	16:23	16:24	16:25
CO ₂	0.00	17.34	10.20	0.06	17.38	10.37
CO	0.000	4.351	2.506	0.015	4.395	2.540

Flue Gas Probe Leak Check: Initial: No Leakage

Final: No Leakage

Technician Signature: 

Date: 8/14/25

ASTM E2780 Wood Heater Run Sheets

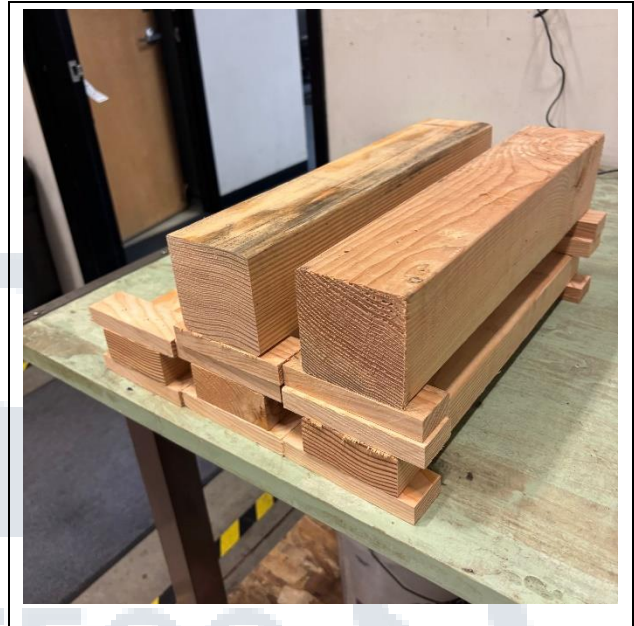
Client: Buck Stove
Model: 81C

Job Number: 25-422
Run Number: 4

Tracking #: 227
Test Date: 8/14/25



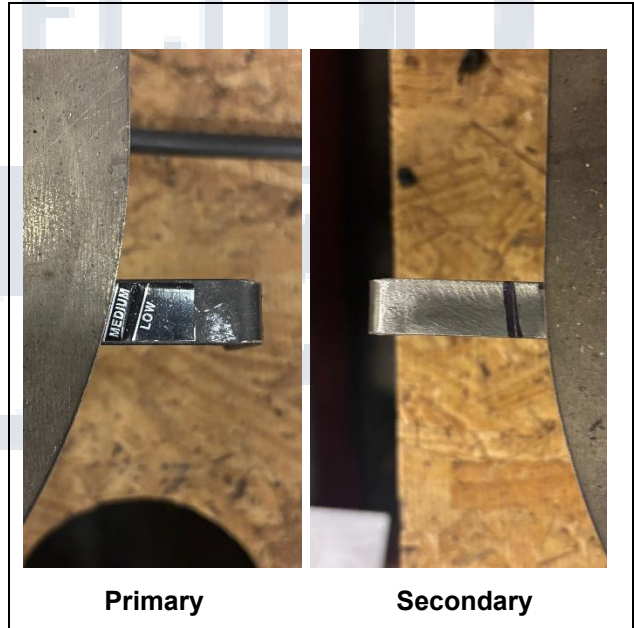
Test Fuel Front/Side View



Test Fuel Iso View



Test Fuel Loaded in Stove



Primary

Secondary

Air Settings

Technician Signature: _____

A handwritten signature in black ink, appearing to be "A. [unclear]".

Date: 8/14/25

ASTM E2515 - Glass Fiber Filters

Date:	6/25/25	7/1/25					
Time:	3:45 pm	10:30 am					
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G01317	236.6	236.4	-	-	A	22-791	Maple 3
G01318	242.5	242.5	-	-	A	↓	↓
G01319	244.3	244.4	-	-	A	25-420	#5
G01320	243.8	243.8	-	-	A	↓	↓
G01321	241.9	242.0	-	-	A	↓	↓
G01322	241.6	241.7	-	-	A	↓	↓
G01323	243.1	243.1	-	-	A	25-422	#1
G01324	243.6	243.8	-	-	A	↓	↓
G01325	241.7	241.6	-	-	A	↓	↓
G01326	247.3	247.3	-	-	A	↓	↓
G01327	243.5	243.5	-	-	A	↓	#2
G01328	244.5	244.5	-	-	A	↓	↓
G01329	243.1	243.0	-	-	A	↓	↓
G01330	243.3	243.4	-	-	A	↓	↓
G01331	242.9	242.7	-	-	A	↓	↓
G01332	236.4	236.3	-	-	A	↓	↓

Date:	7/23/25	7/28/25					
Time:	14:15	11:00					
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G01333	242.3	242.1	-	-	A	25-420	#1
G01334	241.6	241.4	-	-	A	↓	↓
G01335	247.9	247.7	-	-	A	↓	↓
G01336	243.1	243.2	-	-	A	↓	↓
G01337	242.6	242.4	-	-	A	↓	#2
G01338	243.7	243.5	-	-	A	↓	↓
G01339	241.4	241.3	-	-	A	↓	↓
G01340	241.8	241.8	-	-	A	↓	↓
G01341	243.0	242.9	-	-	A	↓	#3
G01342	242.1	242.0	-	-	A	↓	↓
G01343	243.8	243.6	-	-	A	↓	↓
G01344	242.5	242.4	-	-	A	↓	↓
G01345	242.3	242.2	-	-	A	↓	#4
G01346	244.1	244.0	-	-	A	↓	↓
G01347	242.4	242.5	-	-	A	↓	↓
G01348	242.3	242.4	-	-	A	↓	↓

ASTM E2515 - Glass Fiber Filters

Date:	7/23/25	7/28/25					
Time:	14:30	11:00					
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G01349	248.1	240.9	-	-	A	25-422	#3
G01350	243.2	243.1	-	-	A		
G01351	242.3	242.3	-	-	A		
G01352	243.2	243.3	-	-	A		
G01353	241.8	241.6	-	-	A		#4
G01354	242.0	242.1	-	-	A		
G01355	243.9	243.8	-	-	A		
G01356	244.6	244.7	-	-	A		
G01357	242.0	241.8	-	-	A		
G01358	243.3	243.3	-	-	A		
G01359	241.7	241.7	-	-	A		
G01360	243.0	242.8	-	-	A		
G01361	242.2	242.2	-	-	A		
G01362	243.3	243.4	-	-	A		
G01363	243.6	243.8	-	-	A		
G01364	244.0	244.0	-	-	A		

Date:							
Time:							
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
G01365							
G01366							
G01367							
G01368							
G01369							
G01370							
G01371							
G01372							
G01373							
G01374							
G01375							
G01376							
G01377							
G01378							
G01379							
G01380							

ASTM E2515 - Probe Samples 1-10

Date:	6/30/25	7/2/25	7/14/25	7/15/25			
Time:	4:30	0930	13:30	11:00			
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
1A	115629.1	115628.4	115628.3	-	A	22-791	Sample 3
1B	115903.8	115903.7	-	-	A		
1C	116434.5	116434.1	116434.0	-	A		
2A	116060.3	116059.9	116059.1	116059.3	A	24-282	#1
2B	116175.7	116175.9	-	-	A		
2C	116430.4	116430.4	-	-	A		
3A	115882.7	115882.1	115881.8	115882.0	A	24-282	#2
3B	116122.1	116122.2	-	-	A		
3C	116619.5	116619.7	-	-	A		
4A	116025.4	116024.9	116024.9	-	A	24-282	#3
4B	116183.9	116183.3	116183.5	-	A		
4C	116999.3	116999.1	-	-	A		
5A	116759.4	116758.8	116758.7	-	A	24-282	#4
5B	116877.5	116877.0	116876.8	-	A		
5C	115857.1	115856.9	-	-	A		

Date:	8/9/25	8/11/25	-	-			
Time:	10:30	0815	-	-			
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
6A	116383.8	116384.0	-	-	A	25-422	#1
6B	115956.0	115955.9	-	-	A		
6C	115129.4	115129.3	-	-	A		
7A	116559.8	116560.0	-	-	A	25-422	#2
7B	117130.2	117130.3	-	-	A		
7C	116551.4	116552.0	-	-	A		
8A	116635.1	116635.3	-	-	A	25-422	#3
8B	116667.2	116667.0	-	-	A		
8C	116663.9	116664.0	-	-	A		
9A	116532.4	116532.4	-	-	A	25-422	#4
9B	117739.7	117739.8	-	-	A		
9C	116603.9	116604.0	-	-	A		
10A	116647.9	116647.9	-	-	A		
10B	117755.1	117755.3	-	-	A		
10C	116729.6	116729.8	-	-	A		

ASTM E2515 - O-Ring Samples 1-10

Date:	6/30/25	7/2/25	7/14/25				
Time:	4:15	15:00	13:30				
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
1A	3566.2	3566.4	-	-	A	22-791	Maple3
1B	3554.8	3555.0	-	-	A		
1C	4165.87	4165.8	-	-	A		
2A	3551.3	3551.5	-	-	A	24-282	#1
2B	3570.8	3570.7	-	-	A		
2C	3388.6	3388.8	-	-	A		
3A	3577.4	3577.6	-	-	A	24-282	#2
3B	3565.9	3566.0	-	-	A		
3C	3620.6	3620.6	-	-	A		
4A	3376.2	3374.9	3374.8	-	A	24-282	#3
4B	3578.4	3577.9	3577.7	-	A		
4C	3372.0	3370.8	3370.6	-	A		
5A	3534.1	3534.5	3534.4	-	A	24-282	#4
5B	3530.3	3529.6	3529.4	-	A		
5C	3375.3	3373.9	3373.8	-	A		

Date:	8/9/25	8/11/25	-	-			
Time:	10:45	08:30	-	-			
	Weight 1	Weight 2	Weight 3	Weight 4	Initial	Project	Run
6A	3394.6	3394.7	-	-	A	25-422	#1
6B	3611.3	3611.4	-	-	A		
6C	3399.0	3399.1	-	-	A		
7A	3569.1	3569.1	-	-	A	25-422	#2
7B	3520.7	3520.6	-	-	A		
7C	3404.2	3404.2	-	-	A		
8A	3550.3	3550.7	-	-	A	25-422	#3
8B	3356.1	3356.2	-	-	A		
8C	3584.2	3584.1	-	-	A		
9A	3578.4	3578.4	-	-	A	25-422	#4
9B	3521.5	3521.5	-	-	A		
9C	3427.7	3427.7	-	-	A		
10A	3359.2	3359.4	-	-	A		
10B	3568.5	3568.6	-	-	A		
10C	3364.2	3364.3	-	-	A		



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Ken Morgan
Technical Services Director
OMNI-Test Laboratories, INC
Post Office Box 301367
Portland, Oregon, 97294

01/21/2025

Dear Mr. Morgan,

This letter is a modification of my original response letter dated December 13, 2024. This modification is made to include approval to use this alternative 40 CFR part 60, Subpart QQQQ - Standards of Performance for New Residential Hydronic Heaters and Forced-Air Furnaces (Subpart QQQQ). The approval to also use this alternative on central heaters under Subpart QQQQ should have been included in the original response letter. These letters are written in response to your emails and letter dated November 20, 2023, requesting that the Environmental Protection Agency approve for use an alternative test method (ATM) for demonstrating compliance with New Source Performance Standard (NSPS) Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA). Specifically, the filter weighing procedures as outlined in ASTM E2515-11 to determine compliance for wood heaters under 40 CFR Part 60. The Office of Air Quality Planning and Standards, as the delegated authority, must make the determination on any major alternatives to test methods and procedures required under 40 CFR parts 59, 60, 61, 63, and 65. Your proposed alternative test method and our approval decisions are discussed below.

Your letter outlines concerns with the gravimetric analysis of the pair of filters used to capture particulate during each compliance test. Specifically, you state that the method suggests that weighing filters and filter assemblies in pairs will reduce measurement error, but that the method provides direction inconsistent with achieving error reduction.

As detailed in your letter ASTM E2515-11 section 9.4.4 states:

"9.4.4 Desiccate the filters, filter gaskets, and the probe assemblies at 20 +/- 5.6°C (68 +/- 10°F) and ambient pressure for at least 24 h. Weigh each component at intervals of not less than 6 h until a constant weight is achieved. Record results to the nearest 0.1 mg. During each weighing, the period for which the components are exposed to the laboratory environment shall be less than 2 min. The filter gaskets can be weighed in sets to be used in each filter holder and kept in an identified container at all times except during sampling and weighing. The filter holder assembly after the front filter need not

be desiccated or weighed.”

As shown above, section 9.4.4 states that “...the filter gaskets may be weighed in pairs”, however it does not say that you may do so for the filter tares.

In contrast, section 10.2.1 of ASTM E2515-11 states:

“10.2.1 Desiccate the filters and filter gaskets at 20 +/- 5.6°C (68 +/-10°F) and ambient pressure for at least 24 h. Weigh each component at intervals of at least 6 h until a constant weight is achieved. Report the results to the nearest 0.1 mg. Filters and filter gaskets may be weighed directly without a Petri dish. They may be weighed in pairs (front and back filters and front and back filter gaskets from same filter train) to reduce handling and weighing errors. During each weighing, the components shall not be exposed to the laboratory atmosphere for longer than 2 min. For the room air background sample filter and filter gasket, treat negative particulate catch weights as “zero” when determining total room air particulate weight in accordance with 10.2.”

Additionally, you point out that section 10.2.1 allows, during post-test analysis, the filters to be weighed in pairs. You also assert that not only does this section state that filters may be weighed in pairs, but it also expresses that it is advantageous to do in order to reduce handling and weighing errors.

Furthermore, during our recent discussions of this issue, you pointed out that since ASTM E2515-11 does not specify that filters may be weighed in pairs during pre-test processing, doing so would likely lead to concerns regarding whether proper procedures were being followed. Also, in response to our inquiry of whether ASTM E2515-11 could be followed as written, where one would weigh both filters independently during pre-test processing (clause 9.4.4) and in pairs during post-test processing (section 10.2.1), you point out that this defeats the intent of section 10.2.1 in that more measurements are being performed than necessary and this goes against the stated intent of reducing handling and weighing errors.

It is your opinion, given the language in ASTM E2515-11 discussed above, that the authors originally intended that both filter gaskets and filters should be weighed in pairs during both pre-test and post-test procedures in order to reduce such errors (as evidenced by the language in section 10.2.1). Based on this, you are asking for consideration and approval of an alternative test method that would allow pre-test processing (taring) of filters in pairs as is currently allowed for filter gaskets in section 9.4.4. As you state, you seek this alternative because the errors imposed by the extra weighing of independent filters can account for a very high degree of error on today’s cleaner stoves where a ± 0.1 mg of measured catch can mean ± 0.2 grams of emissions under ordinary conditions. In light of these circumstances, we agree that appropriate paired weighings must be done during both pre and post test weighings.

We have reviewed your request to perform the pre-test processing (taring) of filters in pairs as is currently allowed for filter gaskets in section 9.4.4 when conducting testing of wood heaters under Subpart AAA. Because of the similarities in the requirements, we are also approving this alternative for use on central heaters under Subpart QQQQ. This approval is contingent on the following conditions:

- All of the pieces of the filter and filter assemblies that are tared together during pre-test assessment must also be weighed together when the post-test gravimetric assessment is made and the results of these assessments must be recorded to the nearest 0.1 mg. Please note that this alternative method approval is valid until such time that Subpart AAA and QQQQ are revised or replaced to require a different certification method, and at such time, this alternative will be reconsidered and possibly withdrawn. A copy of this letter must be included in each certification test report where this alternative test method is utilized.

Since this alternative test method may be of interest to others performing testing as described in ASTM2515-11 on wood heaters subject to 40 CFR 60, Subpart AAA or central heaters subject to Subpart QQQQ, we believe it is reasonable to make it broadly applicable. Therefore, we will post this letter as ALT-154 on the EPA website at <https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods> for use by other interested parties.

If you have additional questions regarding this approval, please contact Michael Toney of my staff at 919-541-5247 or toney.mike@epa.gov.

Sincerely,

Steffan M. Johnson, Group Leader
Measurement Technology Group

cc: Shannon Banner, EPA/OAQPS/SPPD
Lessard, Patrick, EPA/OAQPS/SPPD
Rafael Sanchez, EPA/OECA
Robert Scinta, EPA/OECA
Michael Toney, EPA/OAQPS/AQAD
Mark Turner, EPA/OAQPS/SPPD
Richard Wayland, EPA/OAQPS/AQAD

Sample Calculations – ASTM E2780 & E2515

Client: Buck
 Model: 81C
 Run: 1

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

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

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

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft³

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

BR – Dry burn rate, kg/hr

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

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

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

m_n – Total particulate matter collected, mg

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

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_R – Particulate emissions for test run, g/hr

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

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

ASTM E2780 equation (1)

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

Where,

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

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

Sample Calculation:

$$FM_S = 14.3 \%$$

$$M_{Swb} = 1.8 \text{ lbs}$$

0.4536 = Conversion factor from lbs to kg

$$M_{Sdb} = [(1.8 \times 0.4536) (100/(100 + 14.3))]$$

$$M_{Sdb} = \mathbf{0.70 \text{ kg}}$$

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

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

Where,

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

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

Sample Calculation (test fuel piece 1):

$$M_{CPnwb} = 1.9$$

$$FM_{CPn} = 22.1$$

$$= 1.9 (100/(100 + 22.1))$$

$$= 1.6 \text{ lbs}$$

Total dry crib weight, excluding spacers = 12.53 lbs

$$M_{Cdb} = \mathbf{5.68 \text{ kg}}$$

D_{Cdb} - Density of fuel crib, excluding spacers and nails, dry basis, lbs/ft³
ASTM E2780 equation (3)

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

Where,

$$V_C = \text{Volume of fuel crib, ft}^3$$

Sample calculation:

$$V_C = 684.3 \text{ in}^3$$

$$1728 = \text{conversion from in}^3 \text{ to ft}^3$$

$$D_{Cdb} = 12.53 / 684.3 * 1728$$

$$= \mathbf{31.65 \text{ lbs/ft}^3}$$

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

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

Sample calculation:

$$M_{\text{FTAdb}} = 0.7 + 5.68$$

$$= \mathbf{6.39 \text{ kg}}$$

BR – dry burn rate, kg/hr

ASTM E2780 equation (5)

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

Where,

θ = Total length of test run, min

Sample Calculation:

$$M_{Bdb} = 6.39 \quad \text{kg}$$

$$\theta = 437 \quad \text{min}$$

$$BR = \frac{60 \times 6.39}{437}$$

$$BR = \mathbf{0.88} \quad \text{kg/hr}$$

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

ASTM E2515 equations (9)

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

Where:

- F_p = Adjustment factor for pitot tube center point reading = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)
 V_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec
 V_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec
 k_p = Pitot tube constant, 85.49
 C_p = Pitot tube coefficient: 0.99, unitless
 ΔP^* = Velocity pressure in the dilution tunnel, in H₂O
 T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
 P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg
 P_{bar} = Barometric pressure at test site, in. Hg
 P_g = Static pressure of tunnel, in. H₂O; (in Hg = in H₂O/13.6)
 M_s =

**The dilution tunnel wet molecular weight; $M_s = 28.78$ assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$F_p = \frac{16.98}{19.85} = 0.855$$

$$V_s = 0.855 \times 85.49 \times 0.99 \times 0.296 \times \left(\left(\frac{94.5}{29.77} + \frac{460}{-0.12} \right) \times \frac{1}{13.6} \right)^{1/2}$$

$$V_s = 17.22 \text{ ft/s}$$

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

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

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

ASTM E2515 equation (3)

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

Where:

- 3600 = Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
- B_{ws} = Water vapor in gas stream, proportion by volume; assume 2%
- A = Cross sectional area of dilution tunnel, ft²
- T_{std} = Standard absolute temperature, 528 °R
- P_s = Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g, in Hg
- T_{s(avg)} = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
- P_{std} = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 17.22 \times 0.1963 \times \frac{528}{94.5 + 460} \times \frac{29.77 + \frac{-0.12}{13.6}}{29.92}$$

$$Q_{sd} = \mathbf{11298.5} \quad \text{dscf/hr}$$

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

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

Where:

- K_1 = 17.64 °R/in. Hg
 V_m = Volume of gas sample measured at the dry gas meter, dcf
 Y = Dry gas meter calibration factor, dimensionless
 P_{bar} = Barometric pressure at the testing site, in. Hg
 ΔH = Average pressure differential across the orifice meter, in. H₂O
 T_m = Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train A:

$$V_{m(std)} = 17.64 \times 71.904 \times 1.019 \times \frac{\left(29.77 + \frac{2.60}{13.6} \right)}{\left(103.9 + 460 \right)}$$

$$V_{m(std)} = \mathbf{68.675} \text{ dscf}$$

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 70.810 \times 1.005 \times \frac{\left(29.77 + \frac{2.53}{13.6} \right)}{\left(104.5 + 460 \right)}$$

$$V_{m(std)} = \mathbf{66.612} \text{ dscf}$$

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 101.13 \times 1.012 \times \frac{\left(\underline{29.77} + \frac{0.00}{13.6} \right)}{\left(76.7 + 460 \right)}$$

$$V_{m(std)} = \mathbf{100.141} \text{ dscf}$$

m_n – Total Particulate Matter Collected, mg

ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A:

$$m_n = 0.0 + 6.4 + 0.1$$

$$m_n = \mathbf{6.5} \text{ mg}$$

Using equation for Train B:

$$m_n = 0.1 + 6.3 + 0$$

$$m_n = \mathbf{6.4} \text{ mg}$$

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

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

Where:

- K₂ = Constant, 0.001 g/mg
 m_n = Total mass of particulate matter collected in the sampling train, mg
 V_{m(std)} = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train A:

$$C_s = 0.001 \times \frac{6.5}{68.68}$$

$$C_s = \mathbf{0.00009} \text{ g/dscf}$$

For Train B

$$C_s = 0.001 \times \frac{6.4}{66.61}$$

$$C_s = \mathbf{0.00010} \text{ g/dscf}$$

For Ambient Train

$$C_r = 0.001 \times \frac{0.4}{100.14}$$

$$C_r = \mathbf{0.000004} \text{ g/dscf}$$

E_T – Total Particulate Emissions, g

ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

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

Sample calculation:

For Train A

$$E_T = (0.000095 - 0.000004) \times 11298.5 \times 437 / 60$$

$$E_T = 7.46 \text{ g}$$

For Train B

$$E_T = (0.000096 - 0.000004) \times 11298.5 \times 437 / 60$$

$$E_T = 7.58 \text{ g}$$

Average

$$E = 7.52 \text{ g}$$

PR - Proportional Rate Variation

ASTM E2515 equation (16)

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

Where:

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

Sample calculation (for the first 10-min interval of Train 1):

$$PR = \left(\frac{437 \times 1.515 \times 17.22 \times (99.3 + 460) \times (103.9 + 460)}{10 \times 71.904 \times 16.55 \times (94.5 + 460) \times (85.2 + 460)} \right) \times 100$$

$$PR = 100 \%$$

PM_R – Particulate emissions for test run, g/hr

ASTM E2780 equation (6)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

$$E_T (\text{Dual train average}) = 7.52 \text{ g}$$

$$\theta = 437 \text{ min}$$

$$PM_R = 60 \times (7.52 / 437)$$

$$PM_R = 1.03 \text{ g/hr}$$

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

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

Sample Calculation:

$$E_T (\text{Dual train average}) = 7.52 \text{ g}$$

$$M_{Bdb} = 6.39 \text{ kg}$$

$$PM_F = 7.52 / 6.39$$

$$PM_F = 1.18 \text{ g/kg}$$

Stack Loss Efficiency and CO emissions calculations are done in accordance with CSA B415.1, using the password protected excel spreadsheet provided with the test standard. No alterations or alternative calculations are used for determining efficiency or CO emissions. The following pages are a sample of the calculations page from the B415.1 Spreadsheet (V2_4 - Dated April 15, 2010).

Manufacturer: Buck
Model: 81C
Date: 08/11/25
Run: 1
Control #: 25-422
Test Duration: 437 min

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Air Fuel
Overall Heating Efficiency: 81.49% Dry Molecular W
Combustion Efficiency: 99.38% Dry Moles Exhau:
Heat Transfer Efficiency: 82.00% Air Fuel Rati

Heat Output: 13,290 Btu/h 14,010 kJ/h
Heat Input: 16,309 Btu/h 17,192 kJ/h

Ultimate CO₂
CO_{2-ult} 19.64
F₀
1.061

Burn Duration: 7.28 h

Burn Rate: 1.91 lb/h 0.868 kg/h

Stack Temp: 236.0 Deg. F 113.3 Deg. C

	HHV	LHV
Eff	81.49%	88.07%
Comb Eff	99.38%	99.38%
HT Eff	82.00%	88.62%
Output	14,010	kJ/h
Burn Rate	0.87	kg/h
Grams CO	89	g
Input	17,192	kJ/h
MC wet	17.86	
Averages	0.08	8.13

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO ₂ [d]	Excess Air EA	Total O ₂	Calc. % O ₂ [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt
0	7.70	0.04	5.92	229.6%	20.55	14.61	159.0	24.5	100.1%	74.7%	74.7%	19.9	7.70
1	7.69	0.04	5.94	228.4%	20.55	14.58	170.7	24.5	100.2%	73.4%	73.5%	19.8	7.69
2	7.64	0.04	6.02	224.2%	20.54	14.50	168.8	24.6	100.1%	73.8%	73.9%	19.6	7.64
3	7.60	0.04	6.74	189.9%	20.49	13.73	168.5	24.4	100.1%	75.4%	75.5%	17.5	7.60
4	7.55	0.04	7.29	168.2%	20.46	13.15	170.7	24.5	100.1%	76.1%	76.2%	16.2	7.55
5	7.50	0.04	8.47	130.8%	20.38	11.89	173.6	24.6	100.0%	77.5%	77.6%	14.0	7.50
6	7.47	0.04	9.30	110.4%	20.32	11.01	160.6	24.5	100.0%	79.5%	79.5%	12.7	7.47
7	7.44	0.02	6.03	224.7%	20.54	14.50	149.5	24.4	100.4%	76.0%	76.3%	19.6	7.44
8	7.43	0.02	5.49	256.3%	20.58	15.07	141.4	24.3	100.5%	75.7%	76.1%	21.5	7.43
9	7.40	0.02	5.49	256.3%	20.58	15.07	137.6	24.4	100.5%	76.2%	76.6%	21.5	7.40
10	7.39	0.02	5.71	243.1%	20.56	14.85	135.1	24.3	100.5%	76.9%	77.3%	20.7	7.39
11	7.36	0.02	5.99	227.3%	20.54	14.55	131.7	24.4	100.5%	77.9%	78.3%	19.8	7.36
12	7.34	0.02	6.27	212.6%	20.53	14.25	130.3	24.3	100.4%	78.5%	78.8%	18.9	7.34
13	7.31	0.02	6.51	200.9%	20.51	13.99	130.2	24.4	100.4%	78.9%	79.2%	18.2	7.31
14	7.30	0.02	6.75	190.3%	20.49	13.74	128.5	24.2	100.4%	79.4%	79.7%	17.5	7.30
15	7.28	0.02	6.72	191.7%	20.50	13.77	127.2	24.1	100.4%	79.5%	79.8%	17.6	7.28
16	7.25	0.02	6.78	189.2%	20.49	13.71	126.5	24.1	100.4%	79.6%	79.9%	17.5	7.25
17	7.23	0.02	6.96	181.6%	20.48	13.51	126.8	24.1	100.3%	79.8%	80.1%	17.0	7.23
18	7.20	0.02	7.22	171.5%	20.46	13.23	127.5	24.2	100.4%	80.1%	80.4%	16.4	7.20
19	7.17	0.02	7.45	163.2%	20.45	12.99	126.3	24.1	100.3%	80.4%	80.7%	15.9	7.17
20	7.14	0.02	8.11	141.5%	20.40	12.28	126.6	24.1	100.2%	81.1%	81.3%	14.6	7.14
21	7.11	0.02	8.24	138.0%	20.40	12.15	126.7	24.1	100.2%	81.2%	81.4%	14.4	7.11
22	7.08	0.02	8.09	142.1%	20.40	12.30	126.6	24.1	100.2%	81.0%	81.2%	14.6	7.08
23	7.05	0.02	8.19	139.3%	20.40	12.20	126.8	24.1	100.2%	81.1%	81.3%	14.5	7.05
24	7.02	0.02	8.33	135.3%	20.39	12.05	126.8	24.1	100.2%	81.2%	81.4%	14.2	7.02
25	6.99	0.02	8.31	136.0%	20.39	12.07	126.6	24.1	100.2%	81.2%	81.4%	14.3	6.99
26	6.96	0.03	8.07	142.6%	20.41	12.32	126.4	24.1	100.2%	81.0%	81.2%	14.7	6.96
27	6.93	0.02	8.17	139.6%	20.40	12.21	125.4	24.1	100.2%	81.2%	81.4%	14.5	6.93
28	6.91	0.02	8.05	143.2%	20.41	12.34	124.2	24.1	100.2%	81.2%	81.4%	14.7	6.91
29	6.88	0.02	8.03	144.1%	20.41	12.37	123.5	24.1	100.3%	81.3%	81.5%	14.8	6.88
30	6.85	0.02	7.91	147.9%	20.42	12.50	123.6	24.2	100.3%	81.1%	81.3%	15.0	6.85
31	6.83	0.03	7.86	149.1%	20.42	12.55	123.9	24.2	100.2%	81.1%	81.2%	15.1	6.83
32	6.80	0.02	7.76	152.4%	20.43	12.65	123.4	24.1	100.3%	81.0%	81.2%	15.3	6.80
33	6.77	0.02	7.76	152.3%	20.43	12.65	123.1	24.1	100.2%	81.0%	81.2%	15.3	6.77
34	6.74	0.02	7.69	154.5%	20.43	12.73	122.1	24.1	100.2%	81.0%	81.2%	15.4	6.74
35	6.72	0.02	7.66	155.9%	20.43	12.77	121.9	24.1	100.3%	81.0%	81.3%	15.5	6.72
36	6.69	0.02	7.61	157.3%	20.44	12.81	121.2	24.1	100.2%	81.1%	81.2%	15.6	6.69
37	6.67	0.03	7.63	156.6%	20.43	12.79	120.4	24.0	100.2%	81.1%	81.3%	15.5	6.67

Ratio (A/F)	
Weight (M _d)	29.79
st Gas (N _r):	517.27
o (A/F)	14.90

%HC
0.88

Combustion Efficiency: 99.38%
 Total Input (kJ): 125,218 118,763 (Btu)
 Total Output (kJ): 102,037 96,777 (Btu)
 Efficiency: 81.49%
 Total CO (g): 88.80

Moisture of Wood (wet basis): 17.8577
 Initial Dry Weight Wt_{do} (kg): 6.32
 Moisture Content Dry 21.74

Load Weight (kg): 7.70
 Fuel Heating Value in kJ/kg - CV: **HHV 19,810** **LHV 18,329** **HHV 8522.5** **LHV 7885.2**
 Btu/lb

57.47	2.88	54.41	125260	4.06	6.87	2.74	19810.00	17.86	79.56	21.10	2.02	6.96	-0.01	0.20	40.56	63.42
% Wet Consumed	Dry Wt. Now	% Dry Comsumed	Total Input	Fuel Properties				Mw Moisture Fuel Burnt	Mass Balance (moles/100 mole dry flue gas)					kg Wood per 100 mole dfp	M	
x	Wt _{dn}	y	Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value		[h]	[u]	[w]	[j]	[k]	Nk	CO ₂	O ₂
0.00	6.32	0.00	0	4.06	6.87	2.74	19810.00	17.86	79.43	21.07	1.46	5.06	-0.02	0.15	40.63	100.35
0.12	6.31	0.12	517	4.06	6.87	2.74	19810.00	17.86	79.44	21.07	1.47	5.08	-0.02	0.15	40.67	99.81
0.71	6.28	0.71	738	4.06	6.87	2.74	19810.00	17.86	79.44	21.07	1.49	5.15	-0.02	0.15	40.64	97.96
1.30	6.24	1.30	701	4.06	6.87	2.74	19810.00	17.86	79.49	21.08	1.66	5.75	-0.02	0.17	40.70	82.93
1.83	6.21	1.83	775	4.06	6.87	2.74	19810.00	17.86	79.53	21.09	1.80	6.21	-0.02	0.18	40.69	73.42
2.54	6.16	2.54	701	4.06	6.87	2.74	19810.00	17.86	79.60	21.11	2.09	7.21	-0.01	0.21	40.68	57.11
2.95	6.13	2.95	480	4.06	6.87	2.74	19810.00	17.86	79.66	21.13	2.30	7.91	-0.01	0.23	40.71	48.17
3.30	6.11	3.30	332	4.06	6.87	2.74	19810.00	17.86	79.45	21.07	1.48	5.14	-0.02	0.15	40.82	98.17
3.48	6.10	3.48	295	4.06	6.87	2.74	19810.00	17.86	79.41	21.06	1.35	4.69	-0.02	0.13	40.83	112.02
3.77	6.08	3.77	295	4.06	6.87	2.74	19810.00	17.86	79.41	21.06	1.35	4.69	-0.02	0.13	40.82	112.02
3.95	6.07	3.95	332	4.06	6.87	2.74	19810.00	17.86	79.43	21.07	1.40	4.87	-0.02	0.14	40.83	106.23
4.30	6.05	4.30	443	4.06	6.87	2.74	19810.00	17.86	79.45	21.07	1.47	5.10	-0.02	0.15	40.85	99.31
4.66	6.03	4.66	406	4.06	6.87	2.74	19810.00	17.86	79.47	21.08	1.54	5.34	-0.02	0.15	40.82	92.85
4.95	6.01	4.95	332	4.06	6.87	2.74	19810.00	17.86	79.48	21.08	1.60	5.55	-0.02	0.16	40.83	87.71
5.19	5.99	5.19	295	4.06	6.87	2.74	19810.00	17.86	79.50	21.09	1.66	5.75	-0.02	0.17	40.82	83.08
5.42	5.98	5.42	406	4.06	6.87	2.74	19810.00	17.86	79.50	21.09	1.65	5.72	-0.02	0.16	40.83	83.72
5.84	5.95	5.84	406	4.06	6.87	2.74	19810.00	17.86	79.50	21.09	1.67	5.77	-0.02	0.17	40.83	82.59
6.07	5.94	6.07	406	4.06	6.87	2.74	19810.00	17.86	79.51	21.09	1.71	5.92	-0.02	0.17	40.81	79.27
6.49	5.91	6.49	480	4.06	6.87	2.74	19810.00	17.86	79.53	21.10	1.78	6.14	-0.02	0.18	40.84	74.84
6.84	5.89	6.84	480	4.06	6.87	2.74	19810.00	17.86	79.55	21.10	1.83	6.33	-0.02	0.18	40.83	71.23
7.25	5.86	7.25	443	4.06	6.87	2.74	19810.00	17.86	79.59	21.11	2.00	6.90	-0.02	0.20	40.79	61.73
7.55	5.84	7.55	480	4.06	6.87	2.74	19810.00	17.86	79.60	21.11	2.03	7.00	-0.02	0.20	40.81	60.21
8.02	5.81	8.02	554	4.06	6.87	2.74	19810.00	17.86	79.58	21.11	1.99	6.88	-0.02	0.20	40.78	62.03
8.43	5.79	8.43	443	4.06	6.87	2.74	19810.00	17.86	79.59	21.11	2.02	6.96	-0.02	0.20	40.80	60.77
8.73	5.77	8.73	443	4.06	6.87	2.74	19810.00	17.86	79.60	21.11	2.05	7.08	-0.02	0.20	40.80	59.02
9.14	5.74	9.14	517	4.06	6.87	2.74	19810.00	17.86	79.60	21.11	2.05	7.06	-0.02	0.20	40.81	59.31
9.55	5.72	9.55	517	4.06	6.87	2.74	19810.00	17.86	79.58	21.11	1.99	6.87	-0.02	0.20	40.77	62.21
9.96	5.69	9.96	443	4.06	6.87	2.74	19810.00	17.86	79.59	21.11	2.01	6.95	-0.02	0.20	40.78	60.93
10.26	5.67	10.26	406	4.06	6.87	2.74	19810.00	17.86	79.58	21.11	1.98	6.85	-0.02	0.20	40.78	62.50
10.61	5.65	10.61	480	4.06	6.87	2.74	19810.00	17.86	79.58	21.11	1.98	6.83	-0.02	0.20	40.80	62.86
11.03	5.62	11.03	406	4.06	6.87	2.74	19810.00	17.86	79.57	21.11	1.95	6.72	-0.02	0.19	40.80	64.52
11.26	5.61	11.26	406	4.06	6.87	2.74	19810.00	17.86	79.57	21.11	1.94	6.69	-0.02	0.19	40.77	65.08
11.67	5.58	11.67	480	4.06	6.87	2.74	19810.00	17.86	79.56	21.10	1.91	6.60	-0.02	0.19	40.79	66.50
12.03	5.56	12.03	480	4.06	6.87	2.74	19810.00	17.86	79.56	21.10	1.91	6.61	-0.02	0.19	40.78	66.46
12.44	5.53	12.44	443	4.06	6.87	2.74	19810.00	17.86	79.56	21.10	1.90	6.55	-0.02	0.19	40.78	67.45
12.74	5.52	12.74	406	4.06	6.87	2.74	19810.00	17.86	79.56	21.10	1.89	6.51	-0.02	0.19	40.81	68.03
13.09	5.49	13.09	369	4.06	6.87	2.74	19810.00	17.86	79.55	21.10	1.88	6.48	-0.02	0.19	40.78	68.66
13.33	5.48	13.33	369	4.06	6.87	2.74	19810.00	17.86	79.55	21.10	1.88	6.49	-0.02	0.19	40.76	68.35

Moisture Content M_{Cwb}: 17.85773

Dry kg : 6.32
CA: 49
HY: 7
OX: 43.9

0.31	-0.06	405.89	34.64	12.08	386.60	3500.51	2647.63	2577.88	2548.63	3340.77	3085.88	297.96	62098.15	72589.65	38591.08
loles per kg of Dry Wood					Stack Temp K	Heat Content Change - Ambient to Stack Temperature						Room Temp K	Energy Loss		
						Flue Gas Constituent							Flue Gas		
CO	HC	N ₂	H ₂ O	Moisture Present		CO ₂	O ₂	CO	N ₂	CH ₄	H ₂ O		CO ₂	O ₂	CO
0.30	-0.12	545.58	34.76	12.08	432.15	5396.42	4043.89	3928.13	3885.49	5232.78	4699.29	297.65	219.24	405.79	86.70
0.26	-0.12	543.67	34.77	12.08	443.82	5889.24	4402.34	4273.64	4227.80	5734.42	5111.77	297.65	239.54	439.39	74.71
0.28	-0.12	536.61	34.76	12.08	441.98	5809.42	4344.29	4217.69	4172.37	5653.13	5044.98	297.71	236.12	425.57	81.48
0.22	-0.10	479.96	34.73	12.08	441.65	5801.66	4338.95	4212.62	4167.33	5644.59	5038.94	297.54	236.11	359.83	62.43
0.21	-0.09	444.04	34.70	12.08	443.87	5891.60	4404.05	4275.28	4229.44	5736.83	5113.73	297.65	239.75	323.36	59.35
0.19	-0.06	382.40	34.65	12.08	446.76	6012.12	4491.36	4359.35	4312.75	5860.28	5214.07	297.71	244.60	256.52	55.22
0.15	-0.06	348.70	34.63	12.08	433.71	5461.90	4091.61	3974.15	3931.08	5299.22	4754.24	297.65	222.38	197.11	43.97
0.14	-0.14	537.86	34.80	12.08	422.65	5000.16	3754.56	3648.96	3608.95	4831.88	4365.90	297.59	204.08	368.60	38.81
0.14	-0.16	590.20	34.84	12.08	414.59	4668.65	3511.73	3414.47	3376.72	4498.14	4085.82	297.48	190.62	393.37	40.44
0.15	-0.16	590.18	34.84	12.08	410.76	4507.42	3393.20	3299.89	3263.26	4336.80	3948.93	297.54	184.00	380.10	42.55
0.14	-0.15	568.33	34.82	12.08	408.26	4406.00	3318.66	3227.85	3191.93	4235.24	3862.86	297.48	179.89	352.54	38.91
0.11	-0.14	542.23	34.81	12.08	404.82	4261.52	3212.18	3124.85	3089.95	4091.25	3739.78	297.54	174.07	318.99	31.24
0.12	-0.13	517.76	34.79	12.08	403.48	4208.63	3173.25	3087.22	3052.69	4038.40	3694.82	297.48	171.80	294.64	35.42
0.11	-0.13	498.37	34.77	12.08	403.32	4197.51	3164.91	3079.11	3044.68	4027.65	3685.12	297.59	171.39	277.59	30.49
0.11	-0.12	480.84	34.76	12.08	401.65	4139.43	3122.42	3038.09	3004.05	3969.06	3636.13	297.32	168.98	259.40	31.14
0.10	-0.12	483.28	34.76	12.08	400.32	4086.66	3083.54	3000.48	2966.81	3916.44	3591.19	297.26	166.85	258.15	29.56
0.10	-0.12	479.02	34.76	12.08	399.65	4059.23	3063.28	2980.88	2947.41	3889.19	3567.76	297.26	165.73	253.00	29.29
0.12	-0.11	466.43	34.74	12.08	399.98	4072.94	3073.41	2990.68	2957.11	3902.81	3579.47	297.26	166.20	243.64	33.55
0.08	-0.11	449.75	34.74	12.08	400.65	4098.25	3092.03	3008.69	2974.94	3928.12	3600.98	297.32	167.35	231.40	24.26
0.08	-0.10	436.10	34.73	12.08	399.48	4052.37	3058.22	2975.98	2942.56	3882.38	3561.90	297.26	165.47	217.82	23.52
0.11	-0.08	400.10	34.69	12.08	399.71	4061.51	3064.97	2982.52	2949.03	3891.46	3569.71	297.26	165.67	189.19	30.19
0.09	-0.08	394.42	34.69	12.08	399.87	4070.49	3071.67	2989.02	2955.46	3900.22	3577.49	297.21	166.10	184.95	25.51
0.12	-0.08	401.21	34.69	12.08	399.76	4065.92	3068.29	2985.75	2952.23	3895.68	3573.58	297.21	165.81	190.32	33.16
0.09	-0.08	396.52	34.69	12.08	399.98	4072.94	3073.41	2990.68	2957.11	3902.81	3579.47	297.26	166.18	186.78	27.07
0.10	-0.08	389.88	34.68	12.08	399.93	4072.78	3073.36	2990.65	2957.08	3902.49	3579.44	297.21	166.15	181.39	28.01
0.09	-0.08	391.02	34.69	12.08	399.71	4061.51	3064.97	2982.52	2949.03	3891.46	3569.71	297.26	165.74	181.79	25.29
0.13	-0.08	401.88	34.69	12.08	399.59	4059.06	3063.23	2980.85	2947.37	3888.87	3567.73	297.21	165.48	190.58	36.10
0.11	-0.08	397.06	34.69	12.08	398.59	4015.83	3031.22	2949.85	2916.69	3846.10	3530.68	297.26	163.76	184.69	32.81
0.12	-0.08	402.99	34.69	12.08	397.32	3965.46	2994.06	2913.90	2881.10	3795.98	3487.71	297.21	161.71	187.13	33.30
0.10	-0.09	404.43	34.70	12.08	396.65	3938.09	2973.82	2894.31	2861.71	3768.84	3464.30	297.21	160.69	186.95	27.60
0.10	-0.09	410.68	34.70	12.08	396.71	3936.13	2972.23	2892.74	2860.16	3767.20	3462.41	297.32	160.59	191.77	29.51
0.13	-0.09	412.71	34.69	12.08	397.09	3952.09	2984.04	2904.17	2871.47	3783.03	3476.07	297.32	161.12	194.20	37.07
0.11	-0.09	418.14	34.70	12.08	396.59	3933.69	2970.50	2891.08	2858.51	3764.63	3460.42	297.26	160.47	197.54	31.55
0.12	-0.09	417.96	34.70	12.08	396.26	3920.01	2960.38	2881.28	2848.82	3751.07	3448.72	297.26	159.86	196.75	34.54
0.13	-0.09	421.68	34.70	12.08	395.26	3881.11	2931.67	2853.51	2821.32	3712.39	3415.52	297.21	158.25	197.74	36.36
0.10	-0.10	423.99	34.71	12.08	395.09	3874.28	2926.62	2848.61	2816.47	3705.62	3409.67	297.21	158.12	199.11	27.42
0.12	-0.09	426.26	34.71	12.08	394.32	3842.40	2903.02	2825.76	2793.86	3674.07	3382.36	297.21	156.70	199.31	35.22
0.14	-0.09	425.05	34.70	12.08	393.59	3814.94	2882.76	2806.16	2774.45	3646.74	3358.93	297.15	155.49	197.05	41.23

SUMS				AVERAGE	SUMS						
449473.97	-22340.30	713843.81	248925.47	3568.91	23177.99	774.39	22403.60	102082.36	777.12	88.80	-2.21
Losses (kJ/kg of Dry Fuel) Exhaust Gas Constituent				Total Loss Rate							
					Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
N ₂	CH ₄	H ₂ O Comb	H ₂ O Fuel MC							CO	HC
2119.85	-105.11	1691.58	587.81	5005.86	0.00	0	0.00	0	0	0.00	0.00
2298.55	-109.90	1706.44	592.79	5241.53	136.74	-1	137.67	380	-1	0.19	-0.05
2238.95	-104.14	1703.49	591.98	5173.46	192.81	-1	193.68	545	-1	0.30	-0.07
2000.17	-91.14	1701.85	591.91	4861.17	172.12	-1	173.14	529	-1	0.22	-0.06
1878.05	-78.85	1703.10	592.82	4717.58	184.61	-1	185.39	591	-1	0.23	-0.06
1649.19	-57.24	1704.21	594.03	4446.52	157.43	0	157.52	544	0	0.19	-0.04
1370.77	-49.40	1687.43	588.47	4060.72	98.37	0	98.51	382	0	0.10	-0.02
1941.10	-123.70	1682.01	583.78	4694.68	78.74	-1	80.16	254	-1	0.06	-0.04
1992.94	-142.82	1674.32	580.40	4729.28	70.50	-2	72.03	225	-2	0.06	-0.04
1925.91	-141.83	1669.45	578.75	4638.94	69.16	-1	70.63	226	-1	0.06	-0.04
1814.06	-135.14	1665.73	577.71	4493.70	75.37	-2	76.98	257	-2	0.06	-0.04
1675.46	-128.64	1660.76	576.22	4308.10	96.34	-2	98.51	347	-2	0.07	-0.05
1580.57	-117.44	1658.00	575.68	4198.65	86.07	-2	87.74	320	-2	0.07	-0.04
1517.37	-112.29	1657.11	575.56	4117.24	69.05	-1	70.42	263	-1	0.05	-0.03
1444.47	-105.32	1654.67	574.97	4028.31	60.05	-1	61.16	235	-1	0.05	-0.03
1433.81	-106.95	1653.28	574.43	4009.12	82.18	-2	83.76	324	-2	0.06	-0.04
1411.86	-105.45	1652.31	574.14	3980.88	81.60	-2	83.16	324	-2	0.06	-0.04
1379.28	-98.74	1652.00	574.28	3950.21	80.97	-1	82.31	325	-1	0.07	-0.04
1337.99	-96.60	1652.52	574.54	3891.47	94.27	-2	96.02	386	-2	0.06	-0.04
1283.24	-91.73	1650.64	574.07	3823.04	92.61	-2	94.26	387	-2	0.06	-0.04
1179.90	-75.03	1649.14	574.17	3713.23	83.03	-1	84.04	360	-1	0.07	-0.03
1165.70	-74.99	1649.40	574.26	3690.95	89.41	-1	90.61	390	-1	0.06	-0.03
1184.46	-74.11	1649.18	574.21	3723.03	104.07	-1	105.21	450	-1	0.09	-0.04
1172.56	-75.08	1649.48	574.28	3701.28	82.77	-1	83.84	360	-1	0.06	-0.03
1152.92	-72.13	1649.17	574.28	3679.79	82.29	-1	83.27	361	-1	0.06	-0.03
1153.14	-73.79	1649.01	574.17	3675.33	95.88	-1	97.15	421	-1	0.06	-0.03
1184.50	-73.04	1648.86	574.14	3726.62	97.22	-1	98.19	420	-1	0.09	-0.03
1158.11	-72.68	1647.54	573.70	3687.92	82.47	-1	83.36	361	-1	0.07	-0.03
1161.06	-74.71	1646.26	573.18	3687.93	75.60	-1	76.45	330	-1	0.07	-0.03
1157.36	-77.83	1645.78	572.89	3673.44	88.99	-1	90.21	391	-1	0.07	-0.03
1174.61	-79.35	1645.88	572.87	3695.88	75.76	-1	76.78	330	-1	0.06	-0.03
1185.08	-76.70	1646.07	573.04	3719.87	76.25	-1	77.06	330	-1	0.07	-0.03
1195.27	-81.26	1646.01	572.85	3722.42	90.18	-1	91.38	390	-1	0.07	-0.04
1190.69	-79.84	1645.45	572.71	3720.17	90.12	-1	91.22	390	-1	0.08	-0.03
1189.69	-80.42	1644.36	572.30	3718.29	83.15	-1	84.13	360	-1	0.08	-0.03
1194.15	-85.34	1644.68	572.23	3710.38	76.06	-1	77.24	330	-1	0.06	-0.03
1190.92	-82.68	1643.45	571.90	3714.84	69.23	-1	70.11	300	-1	0.06	-0.03
1179.29	-79.50	1642.30	571.62	3707.48	69.09	-1	69.80	300	-1	0.08	-0.03

Pre-Conditioning Data

Client: BUCK STOVE

Job #:

Model: MODEL 81C/ CAROLINA 82

Tracking #:

Date(s): 6/25/2025

Technician: B. SCHWOCK

Elapsed Time (hrs)	Flue (°F)	Catalyst Exit (°F)	Notes: Indicate initial air setting and any changes in in setting during conditioning, as well as weight and average moisture content of all fuel additions.
0	443	759	+13.1 lbs, DOUGLAS FIR 20.3 %, air medium
1	417	1238	
2	459	1026	+17.1 lbs, DOUGLAS FIR 23.1 %, air medium
3	419	1300	
4	395	999	
5	338	834	
6	417	1182	+12.9 lbs, DOUGLAS FIR 20.4 %, air medium
7	389	1321	
8	422	909	+17.2 lbs, DOUGLAS FIR 22 %, air medium
9	365	1308	
10	359	1168	
11	328	863	
12	306	840	
13	486	1347	+13.5 lbs, DOUGLAS FIR 20.4 %, air medium
14	372	1254	
15	370	853	+13.5 lbs, DOUGLAS FIR 20 %, air medium
16	353	1253	
17	377	1192	
18	334	850	
19	304	791	
20	554	902	+12.2 lbs, DOUGLAS FIR 20 %, air medium
21	435	1321	
22	513	1038	+17.7 lbs, DOUGLAS FIR 22 %, air medium
23	388	1153	
24	429	1162	
25	379	1021	
26	356	866	
27	414	1059	+14.9 lbs, DOUGLAS FIR 21 %, air medium
28	375	1254	
29	385	1069	+17.9 lbs, DOUGLAS FIR 21 %, air medium
30	346	1110	
31	379	1219	
32	352	1076	
33	306	768	
34	293	715	
35	284	703	
36	452	1091	+12.2 lbs, DOUGLAS FIR 22 %, air medium low
37	293	1218	
38	274	1169	
39	409	839	+17.7 lbs, DOUGLAS FIR 21 %, air medium low
40	260	1152	
41	325	1302	
42	308	1139	
43	274	928	
44	255	910	
45	244	828	
46	236	857	
47	423	971	+17 lbs, DOUGLAS FIR 22 %, air medium low
48	338	1303	
49	308	1246	
50	262	929	

Appendix B: Labels & Manuals

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT
RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA

MASONRY FIREPLACE ACCESSORY/INSERT ROOM HEATERS. SOLID FUEL TYPE. ALSO
SUITABLE FOR PERMANENTLY LOCATED MANUFACTURED HOME INSTALLATION PURSU-
ANT TO (HUD 24CFR 3280.709)



Manufactured by
NEW BUCK/CAROLINA
P.O. BOX 69
Spruce Pine, NC 29777

SERIAL NO.
MODEL: 81C
TESTED TO: UL 1482-2022
REPORT NO: F21-738
TYPE OF FUEL: Solid Wood Only

NOTE: This unit should not be installed as
an insert to a factory-built fireplace.

OPTIONAL COMPONENTS: Side shields
Rear shield and pipe deflector.

ELECTRICAL RATING:
115 VAC 1.2 amps 60Hz
Motor: PE910714.

Components required for mobile home
installation: Outside Air Kit Part# FAP81BOA

DANGER: Risk of electrical shock.

Disconnect power before servicing unit.

Do not route power cord beneath heater.

"Do not Use Grate or Elevate Fire- Build

PREVENT HOUSE FIRES

Install and use only in accordance with
Manufacturer's installation and operating
instructions and your local building codes.

CAUTION: Special methods are required when
passing chimney through a wall or ceiling, refer
to local building codes. Do not pass chimney
connector through a combustible surface. Do not
connect this unit to a chimney flue serving
another appliance.

**WARNING: (PERMANENTLY LOCATED
MANUFACTURED HOME)** An outside air inlet
must be provided for combustion, and be
unrestricted while unit is in use. Do not install
appliance in a sleeping room. The structural
integrity of the mobile home floor, walls and
ceiling/roof must be maintained.

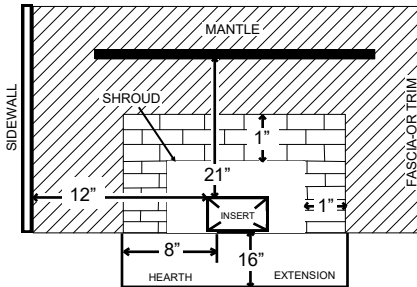
Note: Replace glass only with Part#PG2124GL.
Use only a lined masonry chimney.

"Do Not Overfire- If Heater or Chimney
Connector Glows, You Are Overfiring."

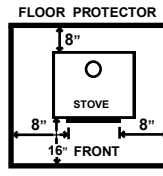
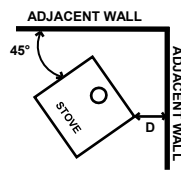
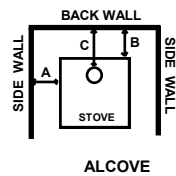
Install insert with a minimum of 12" clearance to
combustible sidewall, 1" shroud to side trim and
1" shroud to top trim, 21" from top of insert to
mantel or mantel supports. Floor protector must
have a R-Value of 1.1 non-combustible material
or equivalent, extending 16" in front of fuel door
and 8" from each side of fuel door when used in a
masonry fireplace. Install only in a masonry
fireplace, built to UBC Chapter 37. Not to be
installed in any factory-built fireplace. See owners
manual for installation instructions. Do not
remove brick or mortar from masonry fireplace to
accommodate insert. See instruction manual for
masonry insert flue connection options. Remove
and clean behind unit frequently, as creosote
buildup may occur rapidly.

"Inspect and Clean Chimney Frequently-Under
Certain Conditions of Use, Creosote Buildup may
Occur Rapidly.

Minimum clearances to
Combustible Materials (in inches)



MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS (in inches)



For freestanding installa-
tion, non-combustible
floor protection must be
used under the appli-
ance. Extending 16"
beyond the front of the
fuel door and 8" to each
side of the fuel door.
With an insulation R-
Value of 1.1.

Chimney connector should be 6" diameter minimum 24 gauge blue or black steel and UL 103 HT
type chimney system. See instruction manual for further information.

Residential installation, single wall chimney connector no optional shields.

Unit to Sidewall (A)	23"	Unit corner to diagonal wall (D)	16"
Unit to backwall (B)	23"	Chimney connector to ceiling	18"
Flue collar to backwall (C)	25"		

Mobile home and alcove installation - single wall chimney connector and optional shields.

Unit to sidewall (A)	12"	Unit corner to diagonal wall (D)	12"
Unit to backwall (B)	16"	Chimney connector to ceiling	6"
Flue collar to backwall (C)	12.5"	Unit top to ceiling	53"

Fireplace insert installation (tested without direct connection to fireplace flue.)

Unit to Sidewall	12"	Unit to top mantle (9" depth)	21"
Shroud to side trim	1"	Shroud to top trim	1"

PL 81C

MODEL 81C

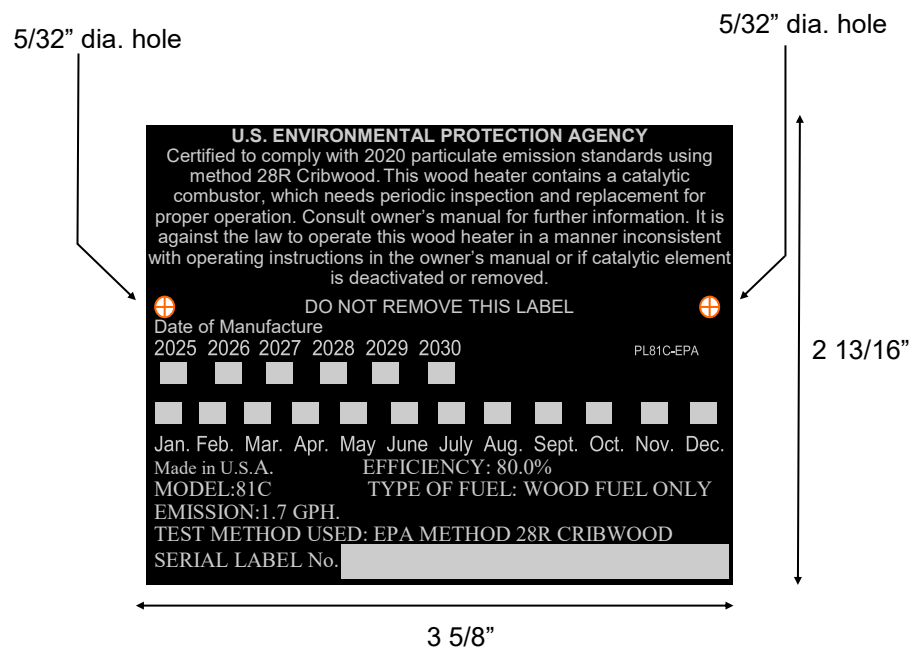
SEPTEMBER 2025

ADHESIVE LABEL

SILVER LETTERING ON BLACK

LEFT HEARTH SUPPORT

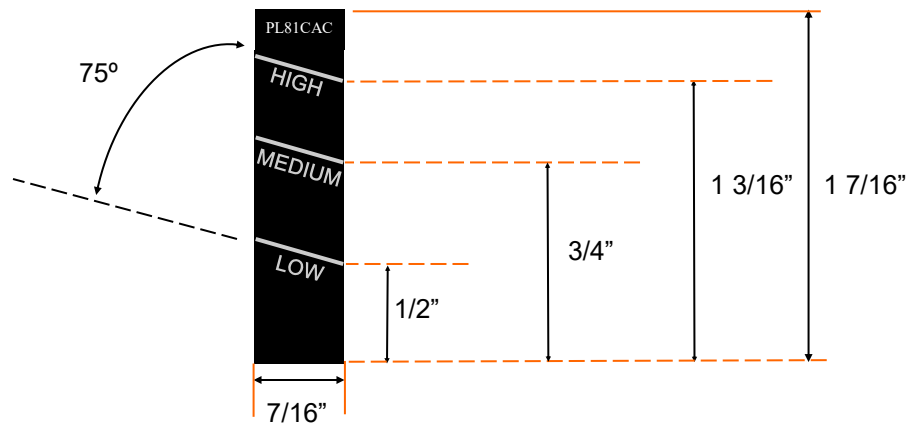
EPA LABEL



ADHESIVE BACKING

SILVER LETTERING ON BLACK– (3)SILVER LINES

81C PRIMARY AIR CONTROL ROD DRAFT INDICATOR



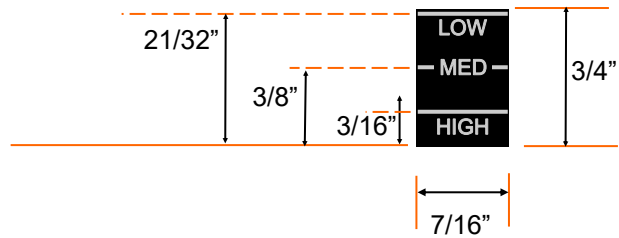
PULL AIR CONTROL ROD ALL WAY OUT. **LOOKING DOWN** PLACE INDICATOR LABEL WITH WORDING "**HIGH**" UP TO EDGE HEARTH TRIM.



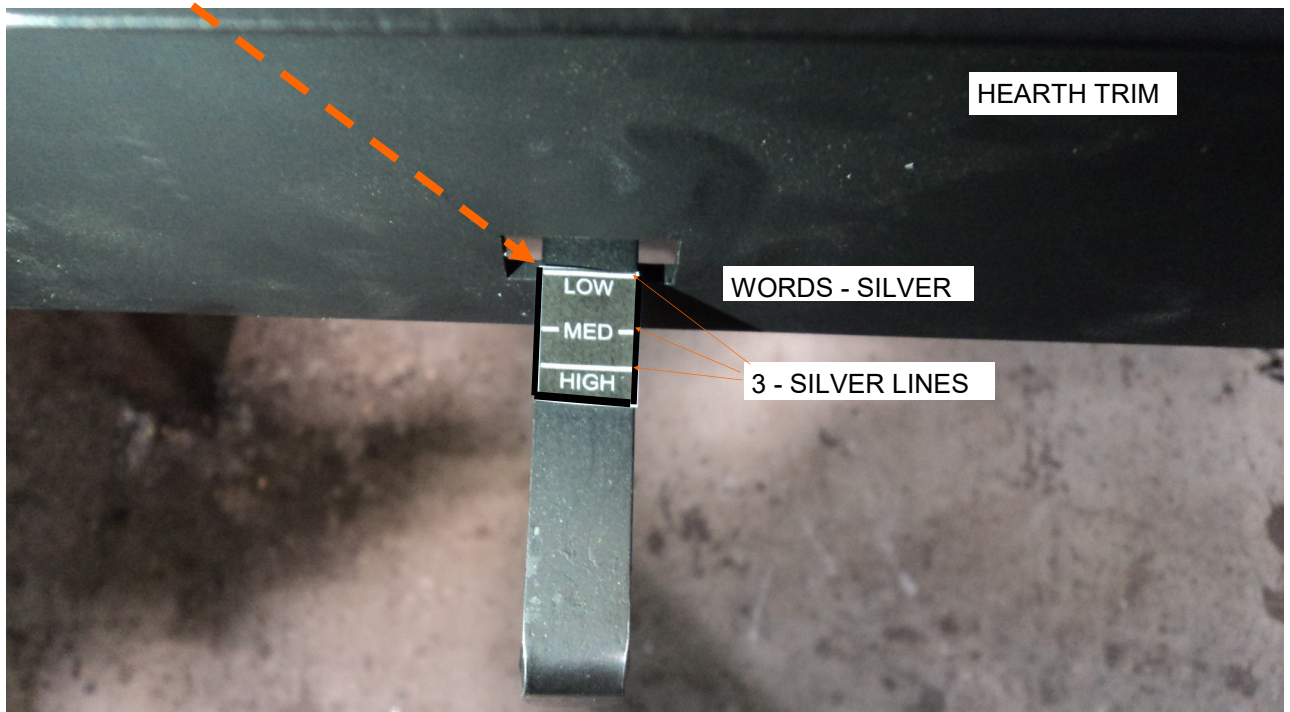
ADHESIVE BACKING

SILVER LETTERING ON BLACK- (3)SILVER LINES

81C SECONDARY AIR CONTROL ROD DRAFT INDICATOR



PULL AIR CONTROL ROD ALL WAY OUT. **LOOKING DOWN** PLACE INDICATOR LABEL WITH WORDING "**LOW**" EVEN WITH OUTSIDE HEARTH TRIM.



MODEL 81

ADHESIVE LABEL

ON BACK RIGHT SIDE OF COVER
DOOR FACING UNIT

BLACK ON SILVER

ALL WOOD STOVES

CAUTION: MOVING PARTS MAY CAUSE INJURY. DO
NOT OPERATE WITH MOTOR GUARD REMOVED

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

PL MTRGRD-CAUT

1 1/4"

4 1/2"

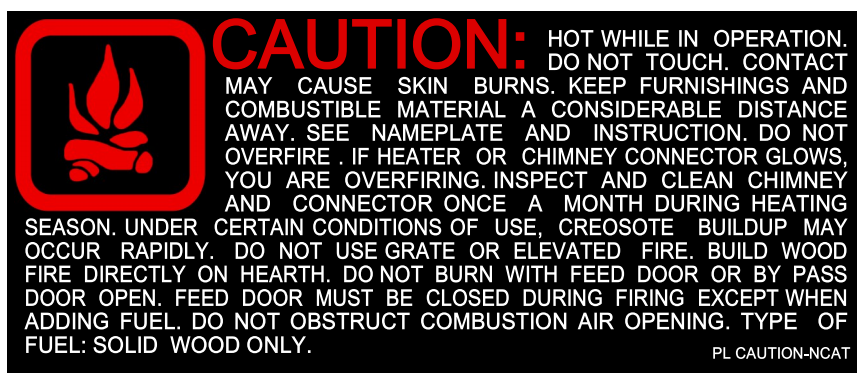
MODEL 81

ADHESIVE LABEL

LEFT SIDE OF HEARTH FACING UNIT

RED AND SILVER ON BLACK ON

ALL WOOD STOVES



1 15/16"

4 1/2"

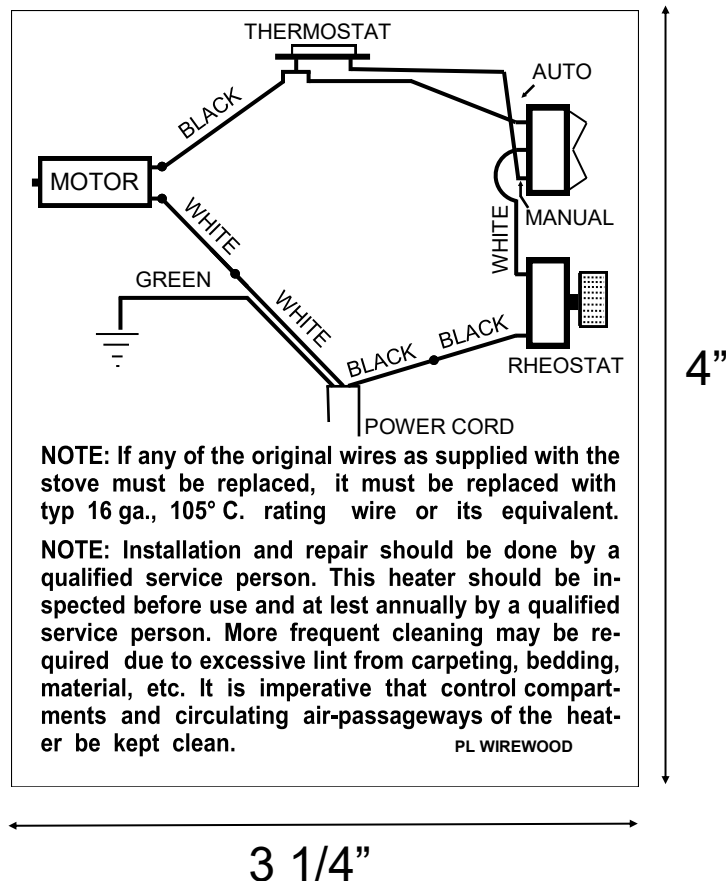
MODEL 81

ADHESIVE LABEL
NEXT TO MOTOR
BEHIND SCREEN GUARD

BLACK ON SILVER

NATALIE - 80, 91, NC94

DEAN - 81, 85

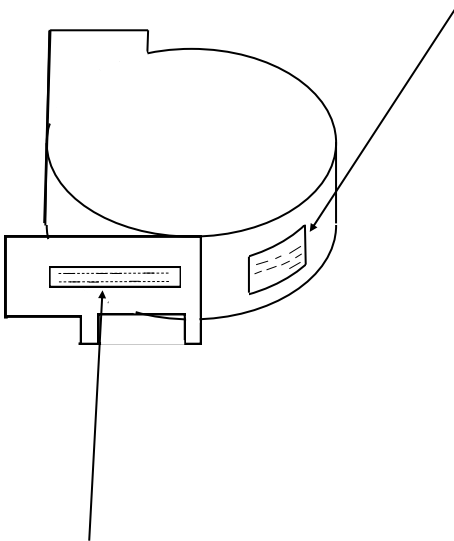


MODEL 81

PAPER PEEL AND STICK **PLACE ON BLOWER**

MOTOR ROOM

WARNING:” This electric blower motor is not to be lubricated with any type of lubricant.”
NOTE: This Electrical Motor Is Impedance Protected.
Blower Assembly Part Number: PE910714



PAPER PEEL AND STICK **PLACE ON BLOWER**

FINISH LINE

Note: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with type 16GA,105 degree C. rating wire or its equitant.
Caution: Label all wires prior to isconnection when servicing controls. Wiring can cause improper and dangerous operation. Verify proper operation after servicing.

ADHESIVE LABEL FOR ALL POWER CORDS
NEXT TO PLUG END RED ON WHITE

FINISH LINE

Warning: Electrical Grounding Instructions. This heater is equipped with a three prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. **DO NOT** cut or remove the grounding from this plug.

15/16"

4 1/2"

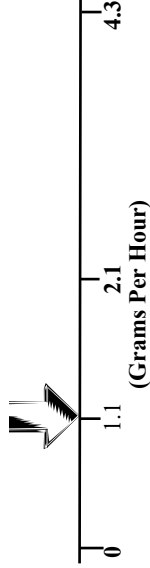
U. S. ENVIRONMENTAL PROTECTION AGENCY

NON-CATALYST

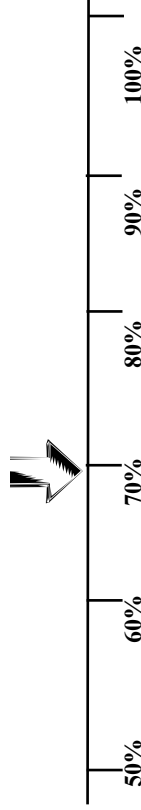
MEETS EPA PARTICULATE MATTER (Smoke) CONTROL REQUIREMENTS FOR NON-CATALYTIC WOOD HEATERS BUILT ON OR AFTER May 15, 2020. SEE OWNERS MANUAL FOR OPERATION AND MAINTENANCE.

SMOKE

This Model



EFFICIENCY



Wood heaters with higher efficiencies cost less to operate.

HEAT OUTPUT
13,800 TO 59,500 BTU/HR

Use this to choose the right size appliance for your needs.

ASK DEALER FOR HELP.

This wood heater will achieve low smoke output and high efficiency if properly operated and maintained. See owners manual.

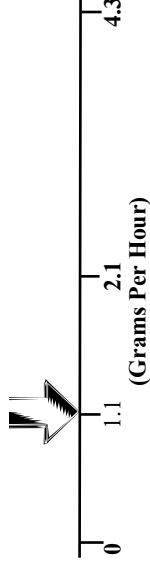
U. S. ENVIRONMENTAL PROTECTION AGENCY

NON-CATALYST

MEETS EPA PARTICULATE MATTER (Smoke) CONTROL REQUIREMENTS FOR NON-CATALYTIC WOOD HEATERS BUILT ON OR AFTER May 15, 2020. SEE OWNERS MANUAL FOR OPERATION AND MAINTENANCE.

SMOKE

This Model



EFFICIENCY



Wood heaters with higher efficiencies cost less to operate.

HEAT OUTPUT
13,800 TO 59,500 BTU/HR

Use this to choose the right size appliance for your needs.

ASK DEALER FOR HELP.

This wood heater will achieve low smoke output and high efficiency if properly operated and maintained. See owners manual.

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT
RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA

MASONRY FIREPLACE ACCESSORY/INSERT ROOM HEATERS. SOLID FUEL TYPE. ALSO
SUITABLE FOR PERMANENTLY LOCATED MANUFACTURED HOME INSTALLATION PURSU-
ANT TO (HUD 24CFR 3280.709)



Manufactured by
NEW BUCK/CAROLINA
P.O. BOX 69
Spruce Pine, NC 29777

SERIAL NO.
MODEL: Carolina 82C
TESTED TO: UL 1482-2022
REPORT NO: F21-738
TYPE OF FUEL: Solid Wood Only

NOTE: This unit should not be installed as
an insert to a factory-built fireplace.

OPTIONAL COMPONENTS: Side shields
Rear shield and pipe deflector.

ELECTRICAL RATING:
115 VAC 1.2 amps 60Hz
Motor: PE910714.

Components required for mobile home
installation: Outside Air Kit Part# FAP81BOA

DANGER: Risk of electrical shock.

Disconnect power before servicing unit.

Do not route power cord beneath heater.

"Do not Use Grate or Elevate Fire- Build

PREVENT HOUSE FIRES

Install and use only in accordance with
Manufacturer's installation and operating
instructions and your local building codes.

CAUTION: Special methods are required when
passing chimney through a wall or ceiling, refer
to local building codes. Do not pass chimney
connector through a combustible surface. Do not
connect this unit to a chimney flue serving
another appliance.

**WARNING: (PERMANENTLY LOCATED
MANUFACTURED HOME)** An outside air inlet
must be provided for combustion, and be
unrestricted while unit is in use. Do not install
appliance in a sleeping room. The structural
integrity of the mobile home floor, walls and
ceiling/roof must be maintained.

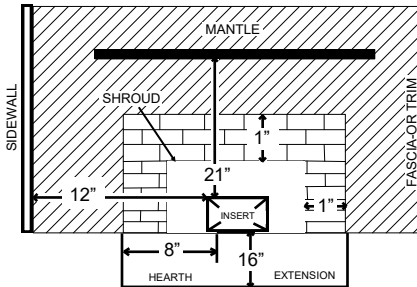
Note: Replace glass only with Part#PG2124GL.
Use only a lined masonry chimney.

"Do Not Overfire- If Heater or Chimney
Connector Glows, You Are Overfiring."

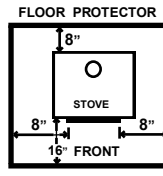
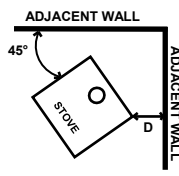
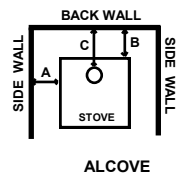
Install insert with a minimum of 12" clearance to
combustible sidewall, 1" shroud to side trim and
1" shroud to top trim, 21" from top of insert to
mantel or mantel supports. Floor protector must
have a R-Value of 1.1 non-combustible material
or equivalent, extending 16" in front of fuel door
and 8" from each side of fuel door when used in a
masonry fireplace. Install only in a masonry
fireplace, built to UBC Chapter 37. Not to be
installed in any factory-built fireplace. See owners
manual for installation instructions. Do not
remove brick or mortar from masonry fireplace to
accommodate insert. See instruction manual for
masonry insert flue connection options. Remove
and clean behind unit frequently, as creosote
buildup may occur rapidly.

"Inspect and Clean Chimney Frequently-Under
Certain Conditions of Use, Creosote Buildup may
Occur Rapidly."

Minimum clearances to
Combustible Materials (in inches)



MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS (in inches)



For freestanding installa-
tion, non-combustible
floor protection must be
used under the appli-
ance. Extending 16"
beyond the front of the
fuel door and 8" to each
side of the fuel door.
With an insulation R-
Value of 1.1.

Chimney connector should be 6" diameter minimum 24 gauge blue or black steel and UL 103 HT
type chimney system. See instruction manual for further information.

Residential installation, single wall chimney connector no optional shields.

Unit to Sidewall (A)	23"	Unit corner to diagonal wall (D)	16"
Unit to backwall (B)	23"	Chimney connector to ceiling	18"
Flue collar to backwall (C)	25"		

Mobile home and alcove installation - single wall chimney connector and optional shields.

Unit to sidewall (A)	12"	Unit corner to diagonal wall (D)	12"
Unit to backwall (B)	16"	Chimney connector to ceiling	6"
Flue collar to backwall (C)	12.5"	Unit top to ceiling	53"

Fireplace insert installation (tested without direct connection to fireplace flue.)

Unit to Sidewall	12"	Unit to top mantle (9" depth)	21"
Shroud to side trim	1"	Shroud to top trim	1"

PL 81C

MODEL 81C

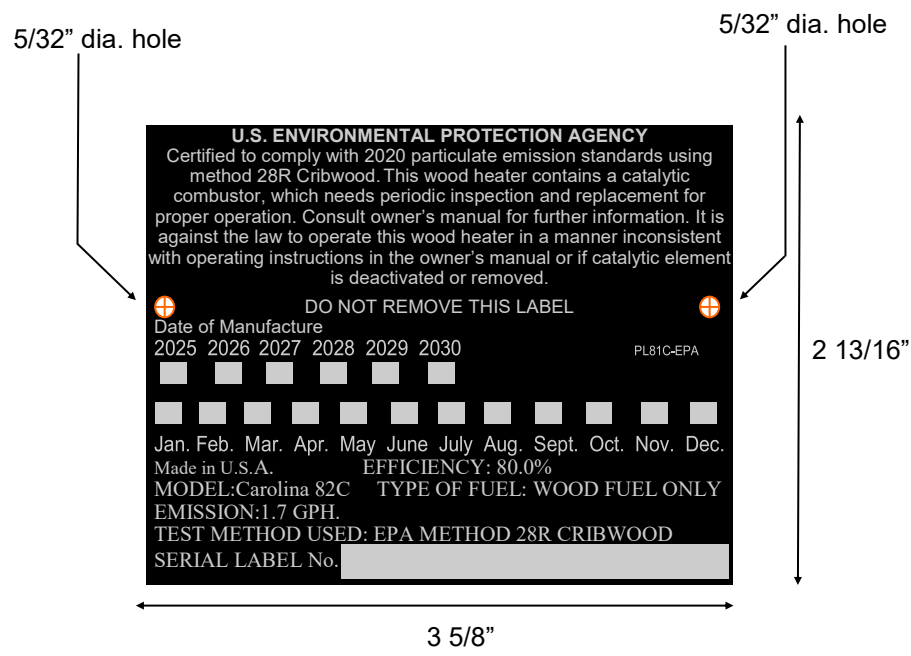
SEPTEMBER 2025

ADHESIVE LABEL

SILVER LETTERING ON BLACK

LEFT HEARTH SUPPORT

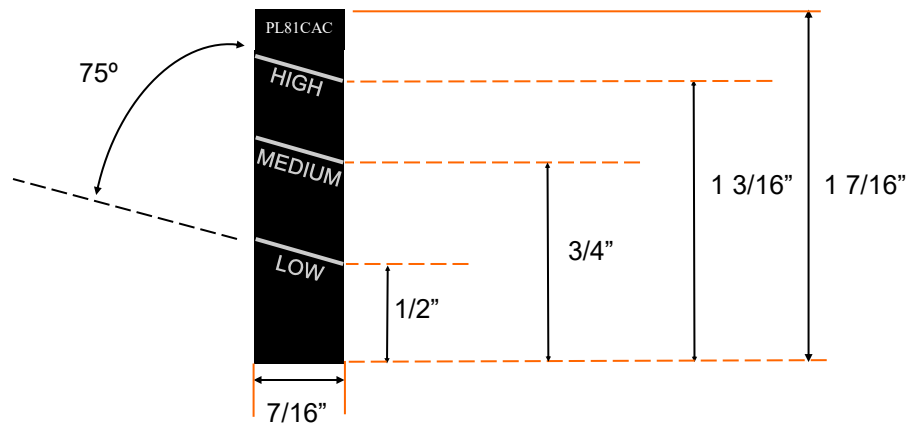
EPA LABEL



ADHESIVE BACKING

SILVER LETTERING ON BLACK– (3)SILVER LINES

81C PRIMARY AIR CONTROL ROD DRAFT INDICATOR



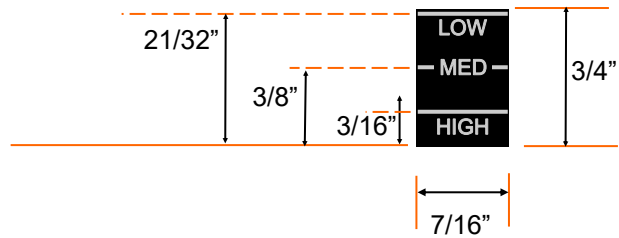
PULL AIR CONTROL ROD ALL WAY OUT. **LOOKING DOWN** PLACE INDICATOR LABEL WITH WORDING "**HIGH**" UP TO EDGE HEARTH TRIM.



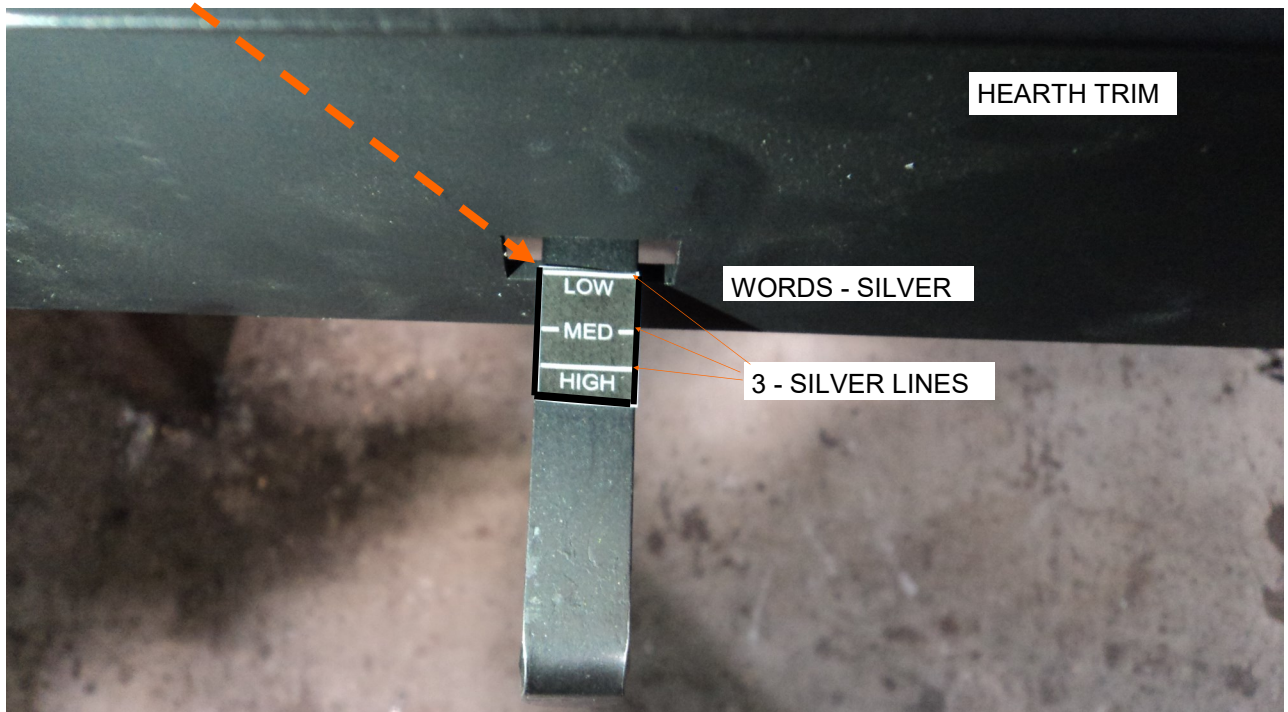
ADHESIVE BACKING

SILVER LETTERING ON BLACK- (3)SILVER LINES

81C SECONDARY AIR CONTROL ROD DRAFT INDICATOR



PULL AIR CONTROL ROD ALL WAY OUT. **LOOKING DOWN** PLACE INDICATOR LABEL WITH WORDING "**LOW**" EVEN WITH OUTSIDE HEARTH TRIM.



MODEL 81

ADHESIVE LABEL

ON BACK RIGHT SIDE OF COVER
DOOR FACING UNIT

BLACK ON SILVER

ALL WOOD STOVES

CAUTION: MOVING PARTS MAY CAUSE INJURY. DO
NOT OPERATE WITH MOTOR GUARD REMOVED

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

PL MTRGRD-CAUT

1 1/4"

4 1/2"

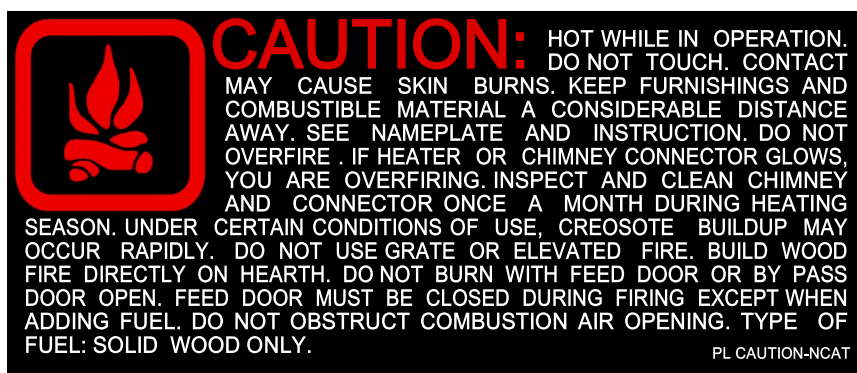
MODEL 81

ADHESIVE LABEL

LEFT SIDE OF HEARTH FACING UNIT

RED AND SILVER ON BLACK ON

ALL WOOD STOVES



1 15/16"

4 1/2"

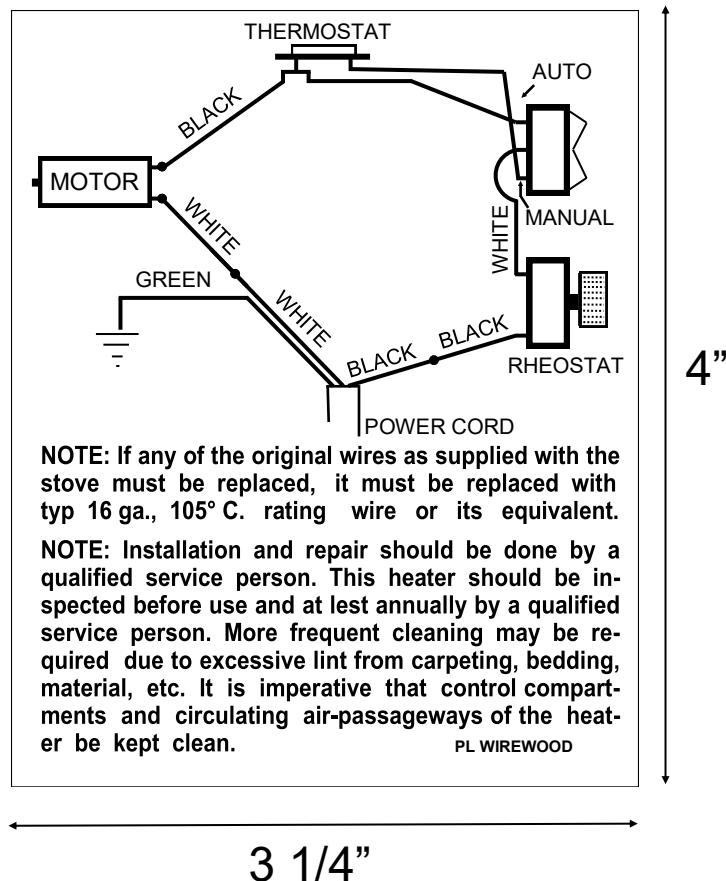
MODEL 81

ADHESIVE LABEL
NEXT TO MOTOR
BEHIND SCREEN GUARD

BLACK ON SILVER

NATALIE - 80, 91, NC94

DEAN - 81, 85



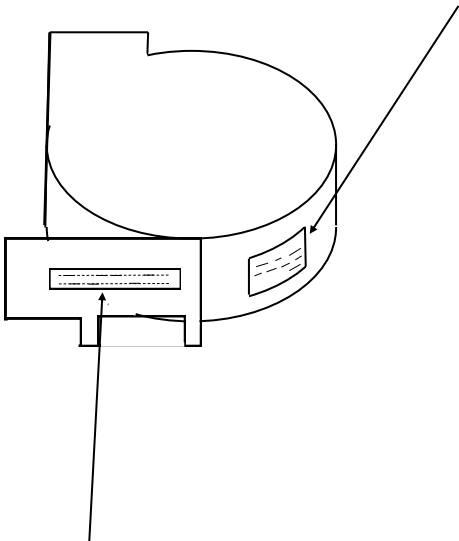
MODEL 81

PAPER PEEL AND STICK **PLACE ON BLOWER**

MOTOR ROOM

WARNING:” This electric blower motor is not to be lubricated with any type of lubricant.”

NOTE: This Electrical Motor Is Impedance Protected.
Blower Assembly Part Number: PE910714



PAPER PEEL AND STICK **PLACE ON BLOWER**

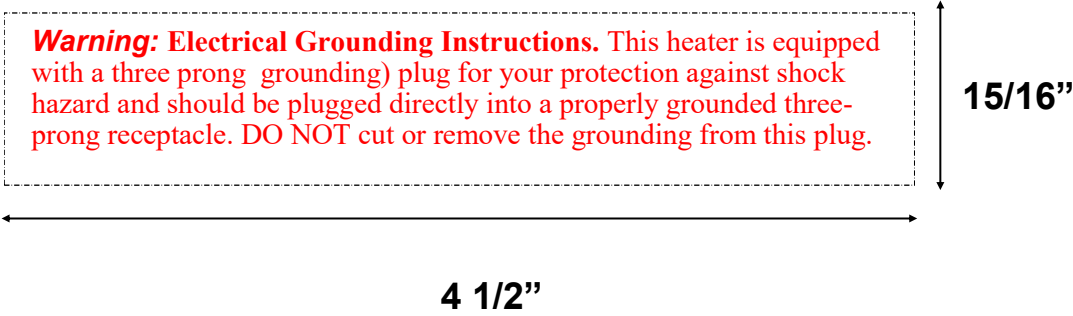
FINISH LINE

Note: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with type 16GA,105 degree C. rating wire or its equitant.

Caution: Label all wires prior to isconnection when servicing controls. Wiring can cause improper and dangerous operation. Verify proper operation after servicing.

ADHESIVE LABEL FOR ALL POWER CORDS
NEXT TO PLUG END RED ON WHITE

FINISH LINE



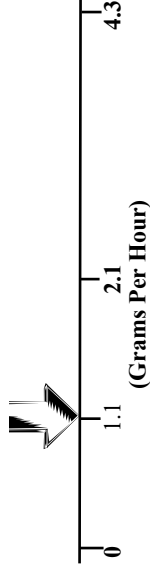
U. S. ENVIRONMENTAL PROTECTION AGENCY

NON-CATALYST

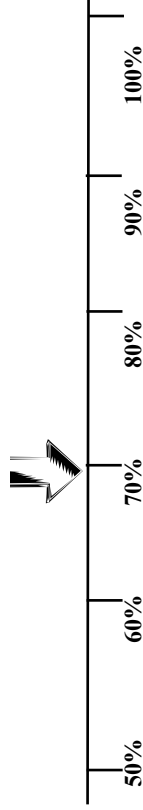
MEETS EPA PARTICULATE MATTER (Smoke) CONTROL REQUIREMENTS FOR NON-CATALYTIC WOOD HEATERS BUILT ON OR AFTER May 15, 2020. SEE OWNERS MANUAL FOR OPERATION AND MAINTENANCE.

SMOKE

This Model



EFFICIENCY



Wood heaters with higher efficiencies cost less to operate.

HEAT OUTPUT
13,800 TO 59,500 BTU/HR

Use this to choose the right size appliance for your needs.

ASK DEALER FOR HELP.

This wood heater will achieve low smoke output and high efficiency if properly operated and maintained. See owners manual.

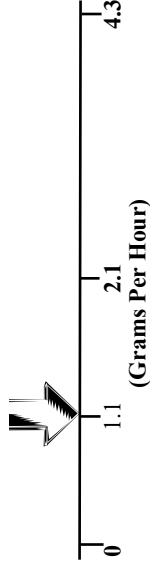
U. S. ENVIRONMENTAL PROTECTION AGENCY

NON-CATALYST

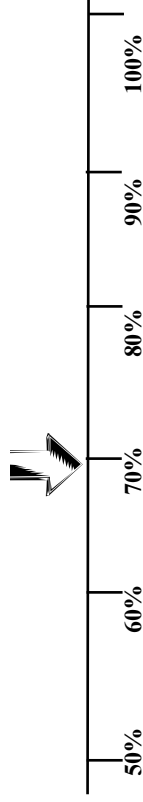
MEETS EPA PARTICULATE MATTER (Smoke) CONTROL REQUIREMENTS FOR NON-CATALYTIC WOOD HEATERS BUILT ON OR AFTER May 15, 2020. SEE OWNERS MANUAL FOR OPERATION AND MAINTENANCE.

SMOKE

This Model



EFFICIENCY



Wood heaters with higher efficiencies cost less to operate.

HEAT OUTPUT
13,800 TO 59,500 BTU/HR

Use this to choose the right size appliance for your needs.

ASK DEALER FOR HELP.

This wood heater will achieve low smoke output and high efficiency if properly operated and maintained. See owners manual.

MODEL 81C CATALYTIC UNIT



DISCLAIMER ⚠
PEDESTALS, LEGS & COLLARS NOT INCLUDED | SOLD SEPARATE

FIREPLACE FREESTANDING FEATURES

PREPARATIONS INSTALLATION
OPERATION MAINTENANCE SAFETY

SAFETY NOTICE ⚠

IF THIS HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. FOR YOUR SAFETY, FOLLOW THE INSTALLATION INSTRUCTIONS. CONTACT THE AUTHORITY HAVING JURISDICTION (SUCH AS MUNICIPAL BUILDING DEPARTMENT, FIRE DEPARTMENT, FIRE PREVENTION BUREAU, etc.) CONSULT BEFORE INSTALLATION TO DETERMINE THE NEED TO OBTAIN A PERMIT. KEEP THESE INSTRUCTIONS FOR FUTURE USE.

TESTED AND LISTED BY:



PFS/TECO, COTTAGE GROVE, WI

**MANUFACTURED BY NEW BUCK CORPORATION
200 ETHAN ALLEN DRIVE
P.O. BOX 69
SPRUCE PINE, N.C. 28777
www.buckstove.com**

Revised June 2026 / UL 1482

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SECTION I

When installed and operated as specified in these instructions, and as stipulated on operation and installation labels affixed to unit, **The New Buck Corporation** room heater Model 81C is one of the safest and most efficient heating systems available. The unit is designed to burn wood fuel only.

Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury or even death.

- **NOTE: When burning any unit or appliance that combusts fuel for heat, we highly recommend use of smoke and carbon monoxide detectors in your home.**

Early signs of carbon monoxide poisoning resemble flu, with headaches, dizziness and/or nausea. If you have these signs, heater may not be working properly. Get fresh air at once!

Throughout manual, you will see this  symbol. This indicates areas of importance regarding safety. Please make a special note of these areas.



Warning: PAINT. This product can expose you to chemicals including ethyl benzene, which is known to the state of California to cause Cancer. For more information, go to www.P65Warnings.ca.gov

Install and use only in accordance with manufacturer's installation and operating instructions. Do not connect this unit to a chimney flue serving another appliance.

ROOM HEATER FEATURES

Before attempting to install or operate your heater, it is a good idea to familiarize yourself with features and operating controls of unit. (See page 3 for reference).

OPERATING CONTROLS

WARNING: Model 81C was not designed for fire grates.

NOTE: Do not use grate, or elevate fire. Build fire directly on firebrick.

1. **Bypass Damper:** The bypass damper control is located in top center of heater front just under top. It is operated by pushing or pulling rod. The damper is fully open when handle is pulled out and fully closed when it is pushed in. The damper must be **OPEN** before door is opened.
2. **Blower Control:** The blower control (Rheostat) is located on side of the unit. The rheostat is used to vary speed of blower. It can be set at any position. It must be turned on to activate automatic thermostat on stove.
3. **Primary Air Controls:** The primary air control (4) is located at right bottom side of hearth. It is operated by moving handle **out** to open (to allow air into the firebox) or **in** (to control or close off) air into firebox. Shotgun air control (4A) is located at left bottom side of hearth. It is operated by moving handle **in** to open (to allow air to center of firebox) or **out** (to control or close off).
4. **Warm Air Outlets:** Provides heat extraction from top of firebox.
5. **Baffles:** Directs air flow around unit for maximum heat transfer.
6. **Air Inlet:** Allows cool air near floor to be circulated through blower and back into warm air chamber of heater.
7. **Door:** Provides an "airtight" feature. The door allows a much higher burning efficiency than can be obtained with an open firebox.
8. **Hearth Extension:** Offers protection from spilled ashes and cinders.
9. **Power Cord:** Provides electrical power to operate blower.
10. **Catalyst:** Enables Unit to burn cleanly and efficiently.
11. **Catalyst Probe:** Probe is located right of the bypass damper rod. It is used to determine (catalyst) temperature.
12. **Automatic/Off/Manual Switch:** Located behind right cover door under hearth. In the "Manual" position, the blower operates continuously. In "Automatic" position, blower is controlled by internal thermostat which reacts to temperature of air between the stove walls. (Not same as the temperature showing on the Catalyst Probe.)

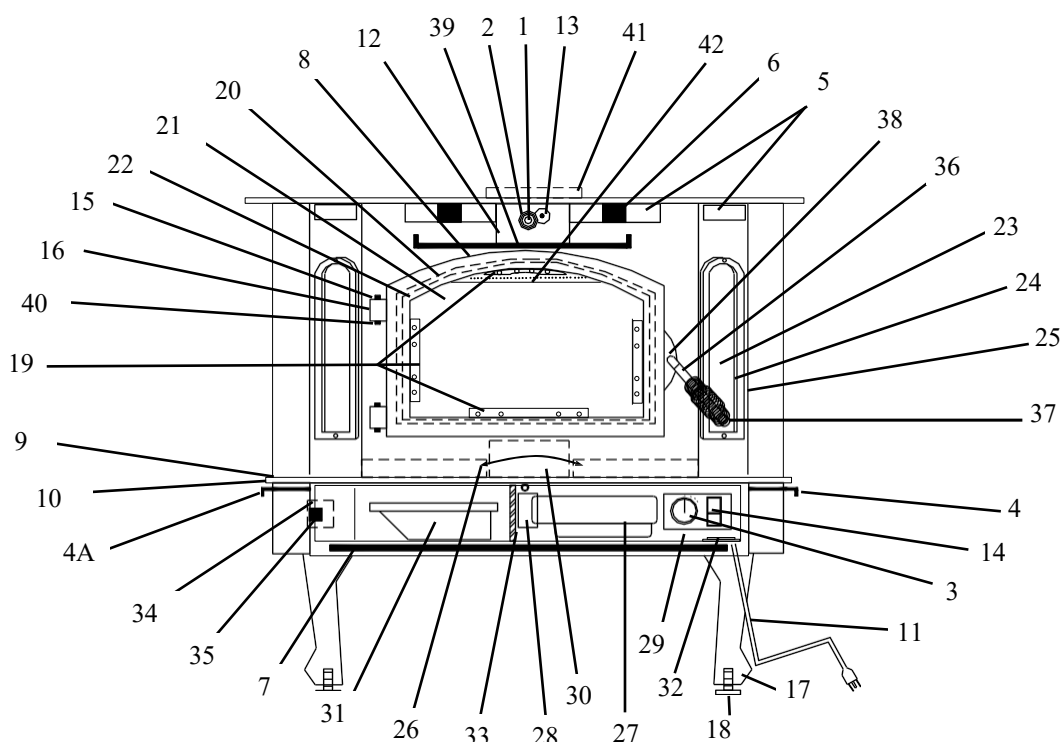
SAFETY STANDARD COMPLIANCE

The Model 81C catalytic solid fuel (wood) burning combination room heater/fireplace stove manufactured by New Buck Corporation complies with UL 1482 for residential freestanding (wood) fireplaces when constructed and installed in accordance with **PFS** approved documentation.

EPA COMPLIANCE STATUS

This manual describes installation and operation of the **New Buck Corporation Model 81C** wood heater. This heater meets the U.S. Environmental Protection Agency's Emission limits for wood heaters sold after May 15th 2020. Under specific test conditions, this heater has been shown to deliver heat at rates ranging from approximately 13,300 to 27,700 BTU/hr for the Model 81C. A weighted average was used to calculate the overall efficiency across all of the burn rate categories using the higher heating value (HHV 80.0%).

MODEL 81C WOOD STOVE IDENTIFICATION



- | | |
|--|------------------------------------|
| 1. Bypass Damper | 24. Side Glass Gasket |
| 2. Bypass Damper Spring Handle | 25. Overlays |
| 3. Blower Control (Rheostat) | 26. Firebrick |
| 4. Primary Air Control Air Wash Rod for Both Sides | 27. Motor |
| 4a. Shot Gun Air Control | 28. Motor Mount Bracket |
| 5. Warm Air Outlets | 29. Cover Door |
| 6. Baffles (Interior of Stove) | 30. Shot Gun Air Box |
| 7. Air Inlet | 31. Ash Pan |
| 8. Door | 32. Disc Thermostat |
| 9. Hearth Extension | 33. Cover Door Hinge |
| 10. Hearth Trim | 34. Magnet Holder |
| 11. Power Cord | 35. Cover Door Magnet |
| 12. Catalyst (Interior Firebox) | 36. Door Handle |
| 13. Catalyst Probe | 37. Spring Handle |
| 14. Automatic / Off / Manual Switch | 38. -Door Latch |
| 15. Door Hinge Cap | -Door Latch Screw |
| 16. Hinge Block | -Door Handle Bushing |
| 17. Legs | -Door Handle Spacer |
| 18. Leveling Screws | -Door Latch Flat Washer |
| 19. Glass Clips/Small; Side, Top, Bottom | -Door Latch Screws (Phillips Head) |
| 20. Door Gasket | -Door Latch Screws (Allen Head) |
| 21. Door Glass | 39. Lower Heat Shield |
| 22. Door Glass Gasket | 40. Hinge Pins |
| 23. Side Glass | 41. 6" Flue Exit |
| | 42. Air Wash Screen |

FEDERAL COMPLIANCE WARNING

This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

CATALYST EQUIPPED

"This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation.



Warning: INTERAM GASKET. This product can expose you to chemicals including aluminosilicate, which is known to the state of California to cause Cancer. For more information, go to www.P65Warnings.ca.gov

"Combustors should be visually inspected at least three times during the heating season to determine if physical degradation has occurred. Actual removal of the combustor is not recommended unless more detailed inspection is warranted because of decreased performance. If any of these conditions exists, refer to Catalyst Troubleshooting section of this owner's manual."

CATALYST WARRANTY

The combustor supplied with this heater is a set of (2) (2" x 3-1/2" x 6" x 25" cells). A catalytic combustor that fails due to a defect in function, workmanship, or materials is covered under a 1-year warranty period. Contact any Authorized Buck Stove Dealer who will instruct you on the proper procedure.

New Buck Corporation does not handle catalyst replacements. Customer can order directly from Applied Ceramics.

Applied Ceramics
Customer Service Department
P.O. Box 29664
Atlanta, GA 30359
770-448-6888

**DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS."**

PROPER FUEL SELECTION

For best results, this heater is designed to burn (dry), natural seasoned hardwood. Higher efficiencies and lower emissions generally result when burning air dried natural seasoned hardwoods, as compared to softwoods or freshly cut hardwoods. Green or freshly cut hardwoods (wood with high moisture content) will not produce the BTU's needed to heat your home. The result will be low temperature reading on the catalyst probe, thus low BTU output.

DO NOT BURN:

Treated or painted wood, coal, garbage, cardboard, solvents, colored paper, or trash. Coal and artificial logs burn much hotter than wood and could cause damage, through overheating. Burning treated wood, garbage, solvents, colored paper or trash may result in the release of toxic fumes and may poison or otherwise render the catalytic combustor ineffective. Burning cardboard, loose paper, and trash will add significantly to ash and soot build-up, and it will not produce much heat. Fly ash from improper fuel can also coat or plug the combustor, causing smoke spillage into the room.

- UNSEASONED WOOD
- TREATED/PAINTED WOOD
- GARBAGE
- CARDBOARD
- SOLVENTS
- COLORED PAPER
- TRASH
- LAWN CLIPPINGS
- RUBBER PRODUCTS
- CONSTRUCTION OR DEMOLITION DEBRIS



DO NOT BURN!

- PLASTICS
- PETROLEUM PRODUCTS
- PAINT/PAINT THINNERS
- MATERIALS CONTAINING ASBESTOS
- DRIFTWOOD
- ASPHALT PRODUCTS
- RAILROAD TIES
- MANURE/ANIMAL REMAINS
- PLYWOOD/PARTICLE BOARD

ACHIEVING CATALYTIC LIGHT-OFF

The temperature in stove and gases entering combustor must be raised to between 700 ° F to 900° F for catalytic activity to be initiated. The temperature can be determined by the Catalyst Monitor Probe. During start up of a cold stove a medium to high firing rate must be maintained for about 15-20 minutes before pushing in the damper. This can be achieved by starting fire with dry kindling, paper and small split wood. Have the Bypass Damper fully open (pulled out). This ensures that the stove, catalyst and fuel are all stabilized at proper operating temperatures. Even though it is possible (and likely) to have gas temperatures reach 600 ° F within two to three minutes after a fire is started, if the fire is allowed to die down immediately it may go out or the combustor may stop working. Once the combustor starts working, heat generated in it by burning smoke will keep it working.

ACHIEVING CATALYTIC LIGHT-OFF WHEN REFUELING

During refueling and rekindling of a cool fire, or a fire that has burned down to charcoal phase, operate stove at a medium to high firing rate for about 15 minutes to ensure that catalyst reaches approximately 800° F.

CATALYST MONITORING

It is important to periodically monitor operation of catalytic combustor to ensure that it is functioning properly, and to determine when it needs to be replaced. A non-functioning combustor will result in a loss of heating efficiency and an increase in creosote and emissions. See Troubleshooting section for detailed instructions **BEFORE** attempting to remove catalyst.

This catalytic heater is equipped with means to monitor catalyst operation. Properly functioning combustors typically maintain temperatures in excess of 1000 ° F. If catalyst temperatures are not in excess of 500 ° F, refer to Catalyst Troubleshooting section of this owner's manual.



CAUTION AGAINST OVER-FIRING

Do not over-fire this heater.

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to heater and to catalytic combustor.

ASH REMOVAL



CAUTION: Never remove ashes from heater with blower running. Be sure to turn room air blower off before removing ashes

Whenever ashes build up in firebox and when fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on firebox bottom to help maintain a hot charcoal bed. To remove ashes the dump is located at left inner bottom. By lifting dump door, place ashes through the dump opening. The ashes fall directly into ash pan. The ash pan is located at left side under the hearth behind cover door.

NOTE: Be sure to turn room air blower off before removing ashes. Open cover door and slide ash pan out.

NOTE: Fueling and ash removal door (s) must remain closed when in operation.

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on ground, away from all combustible materials, pending final disposal. The ashes should be retained in the closed container until all cinders have thoroughly cooled.

NOTE: Be sure to turn room air blower back on when job is completed.

NOTE: The room heater is not to be connected to any air distribution duct.

CREOSOTE - FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapor, which combined with expelled moisture forms creosote. The creosote vapors condense in a relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on flue lining. When ignited, this creosote makes an extremely hot fire.

Select an installation location that will give best airflow from front of heater to remainder of home.

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS MODEL 81C

BEFORE INSTALLING YOUR NEW BUCK STOVE,
READ THE ENTIRE INSTRUCTION MANUAL

IMPORTANT INSTRUCTIONS WARNING

THIS UNIT GENERATES HIGH HEAT, SO TREAT IT WITH CARE. **HOT WHILE IN OPERATION.** KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS. DO NOT CONNECT TO ANY DISTRIBUTION DUCT OR SYSTEM. READ ALL INSTRUCTIONS BEFORE INSTALLING AND USING THE APPLIANCE. FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCES.

- The New Buck Corp. Model 81C has been tested to UL 1482 Standards and listed by PFS/TECO. Standard for Room Heaters, Solid Fuel Type.
- Install and operate your unit according to instructions provided in this manual. Local building codes may apply; therefore, contact your local building inspector for necessary installation requirements and permits which may go beyond these instructions. Contact your insurance company for coverage and installation inspection.
- **DO NOT INSTALL IN SLEEPING ROOMS.**
- **NOTE: When burning any unit or appliance that combusts fuel for heat, such as coal, oil, wood or natural and (L.P.) liquid petroleum gas. Correctly place monitors in those areas that are expected to produce Carbon Monoxide (CO). Consult with your local fire safety officials to learn more**
- Examine the masonry fireplace and chimney prior to installation of fireplace accessory to determine that construction meets the minimum fireplace construction requirements illustrated in the instructions. Make sure that it is free from cracks, loose mortar, creosote deposits and other blockage, or other signs of deterioration.

CAUTION

DO NOT USE MORE THAN ONE STOVE TO A CHIMNEY. DO NOT USE A FLUE INTENDED FOR A GAS APPLIANCE. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE. DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

CAUTION

YOUR CHIMNEY MUST BE CORRECTLY SIZED. A CHIMNEY THAT IS TOO SMALL OR LARGE IN DIAMETER, OR TOO SHORT, CAN CAUSE YOUR STOVE TO SPILL SMOKE WHEN THE DOOR IS OPENED.

INTRODUCTION

Your new MODEL 81C is a catalytic unit designed to meet the most stringent emissions standards with the use of a catalytic combustor.

For peak performance, we suggest the use of natural seasoned hard wood, loading wood from front to rear.

NOTE: Soft woods such as pine, create more creosote, clogging of chimney and produce a less efficient burn performance.

You should not burn trash or garbage, artificial or paper logs, gift wrapping, treated or painted wood or any type of coal or flammable fluids.

**DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS.”**

This heater is equipped with a standard room air blower. For operation and use of these electrical assemblies, see instructions provided in this manual starting on page 37.

*Model 81C: Motor Assembly—MA 910714

CHIMNEY HEIGHTS

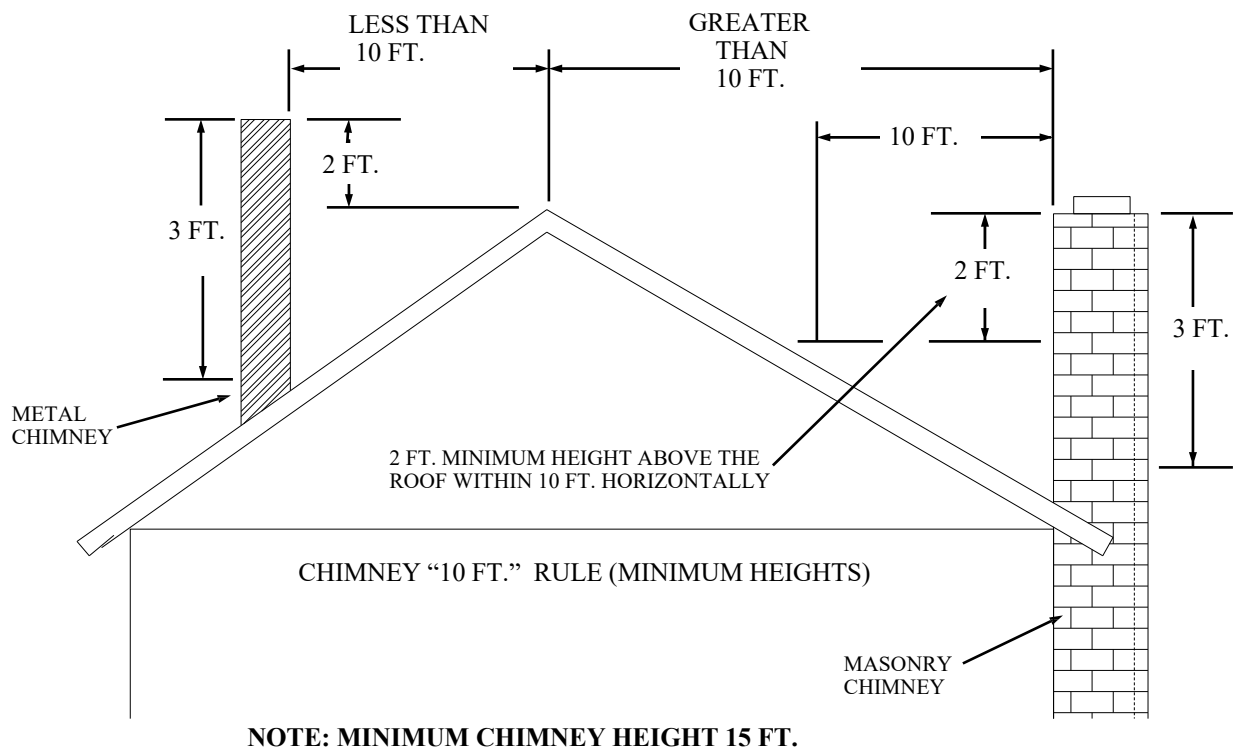
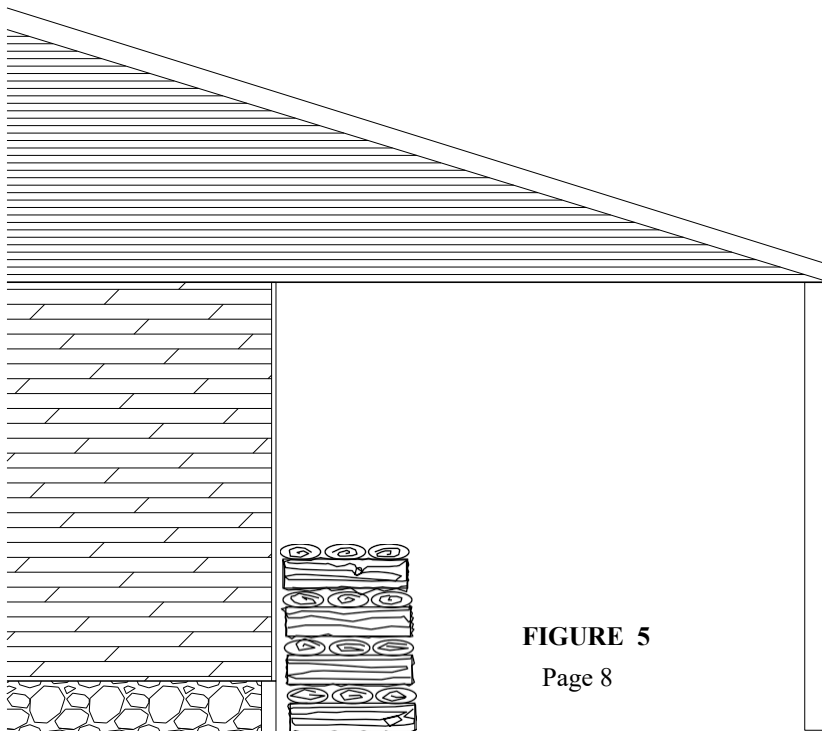


FIGURE 4

HOW TO STACK WOOD



Stack wood in crisscross pattern under a shelter to allow air flow to dry wood and to keep wood from rain. Green wood may have 50-60% moisture content. Wood seasoned outside uncovered may have 40% moisture content. Wood properly seasoned in a covered environment will have less than 20% moisture content

FIGURE 5

CAUTION

THE UNIT IS PAINTED WITH A SPECIALLY FORMULATED HIGH TEMPERATURE PAINT THAT CURES DURING THE FIRST TWO OR THREE FIRINGS. YOU MAY NOTICE A SLIGHT SMOKING EFFECT AND AN ODOR OF BURNING PAINT WHEN YOU BUILD THE FIRST FIRES. THIS IS NORMAL AND IS NOT A CAUSE FOR ALARM. IN SOME CASES, THESE FUMES WILL ACTIVATE A SMOKE ALARM. OPENING A WINDOW NEAR THE UNIT WILL ALLOW THESE FUMES TO ESCAPE. DO NOT BUILD A LARGE, ROARING FIRE UNTIL THIS CURING IS COMPLETE OR HEATER FINISH MAY BE DAMAGED.

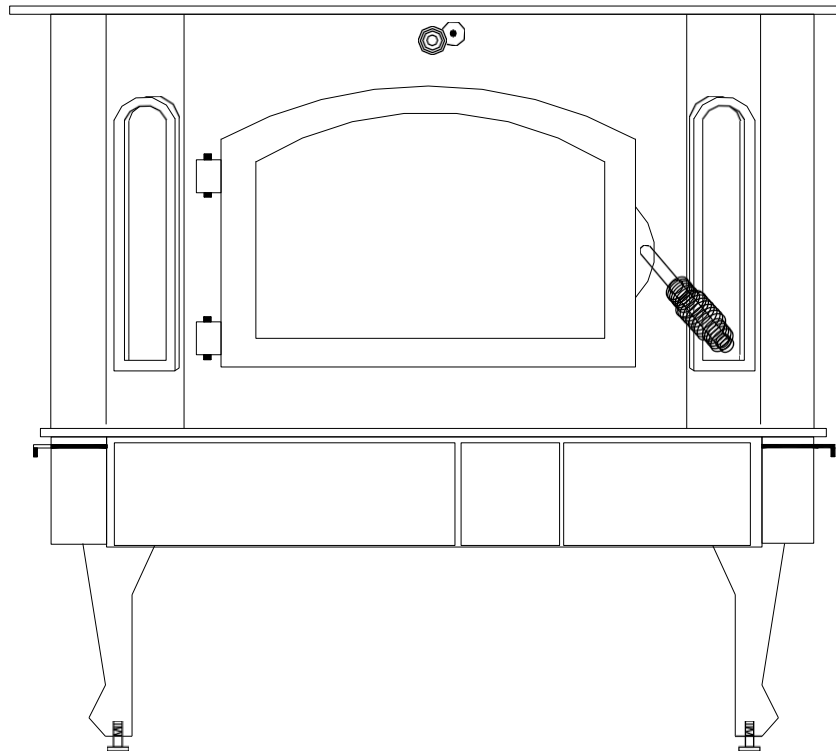
The connector and/or chimney should be inspected at least once a month during heating season to determine if a creosote buildup has occurred.

CAUTION

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THE HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE STOVE WHEN IT IS IN USE. ALL FLUIDS OF THIS TYPE GIVE OFF VOLATILE FUMES AND CAN AND WILL EXPLODE! DON'T TAKE A CHANCE WITH THE SAFETY OF YOUR HOME AND FAMILY.

SECTION III

RESIDENTIAL FREESTANDING INSTALLATION



INSTALLATION PRECAUTION

Select an installation location that will give best airflow from front of heater to remainder of home.

Extensive field and laboratory testing has shown that catalytic stoves perform best as freestanding stoves when:

1. A rain cap is installed on the chimney.
2. Height of chimney is at least 15 feet high.
3. Location of chimney is on interior. (Not on an outside wall)
4. To be installed as a freestanding room heater with the clearances in the manufacturer's installation instructions. Not be installed in any factory-built fireplace.

Satisfactory results have been reported with installations other than listed above. However, draft problems are possible if a hot chimney is not maintained.

CAUTION: Do not connect this unit to a chimney flue serving another appliance.

PREPARING STOVE FOR INSTALLATION

1. Inspect unit for any obvious physical damage.
2. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
3. Check primary air control and shotgun air control to ensure that they both slide freely.
4. Remove the manual bag and items from within firebox. Spread a dropcloth on floor behind heater. Next, tilt heater so that back is on drop cloth.
5. **(Leg Kit):** If legs are to be used, obtain four legs, attach legs to holes in bottom of unit with bolts and washers supplied with leg kit. (See Figure 12).
6. **(Pedestal Kit):** If pedestal kit is being used an outside air is required for residential freestanding installation (page 34 Out Side Air Installation). Place pedestal against bottom of heater (angle side to heater). Center pedestal front to rear and also center left and right. Mark screw locations with pen or pencil on bottom of stove through outer holes of stand mounting angles. Set stand aside and drill four 7/32" holes in heater bottom. Then mount pedestal to bottom of heater with screws provided. (See Figure 13).
7. Obtain four (4) 3/16" self-tapping screws and secure pedestal to heater.
8. Reposition heater to upright position.

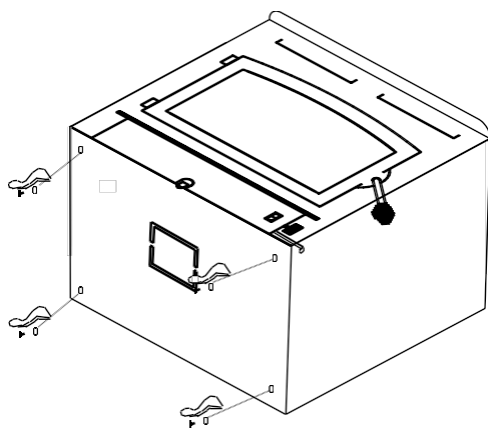


FIGURE 12

HOLES FOR MOUNTING PEDESTAL

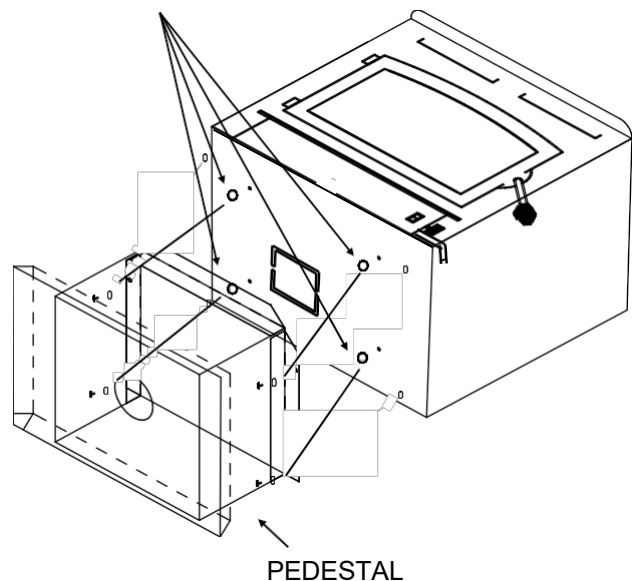


FIGURE 13

MINIMUM CLEARANCES

Floor Protection:

When installing a heater, a floor protector must be used. Floor protector must have a minimum of 1.1 R-Value non-combustible material.

How to use alternate materials and how to calculate equivalent thickness

Most people have heard of R-Values, which are used for rating common building materials such as fiberglass insulation and glass. However, many texts which cover stoves and fireplaces use K-Values instead of R-Values. Although the two are somewhat related, there are differences.

R-Value: The higher the R-Value, the better the insulating properties of the subject materials. R-Values are most often used to express the thermal resistance (ability to stop heat flow) of a building wall, ceiling or floor. Because of this, most R-Values are calculated at normal temperatures of approx. 75 F. R-Values are easy to add together so calculating the total R-Value of a wall is simply done by adding the values for the sheetrock, insulation, sheathing and siding.

K-value is a measure of heat conductivity of a particular material. Specifically, it is the measure of the amount of heat, in BTUs per hour, that will be transmitted through one square foot of material that is one inch thick to cause a temperature change of one degree Fahrenheit from one side of the material to the other. The lower the K-value for a material, the better it insulates. If the K-value of the material is known, the R-value per inch can be determined by dividing 1 by the K-value (R-value per inch = $1/K$ value). The LOWER a K-Value, the better its performance as an insulator.

R or K values have nothing to do with whether a material is flame proof, flame resistant or combustible. Styrofoam, cork, wood and polyester are just some examples of materials which are good insulators but will burn or smoke dangerously when exposed to excess heat.

Technical - For those who desire to calculate their own K or R values, please use the following formulas:

1. R value can be calculated by dividing the thickness by the K value.

For US calculations, we use inches as the unit of measurement.

“In the inch-pound units, thermal resistance is measured in degrees F times square feet of area times hours of time per Btus of heat flow.”

$R\text{-value} = \text{thickness} / K\text{-value}$

2. K value is the inverse of the R-Value. If one is known, the other can be calculated.

“units of Btu-inch/hour per square foot per degree F”

$\text{Thickness}/k \text{ value} = R \text{ value}$

or:

Divide the inches of thickness by R.

$k = \text{inches of thickness} / R$

Common K and R Values Chart				
Material	K value	R Value	inches-K value .84	inches-R value of 1
per inch				
Micore 300*	0.43	2.33	0.5	0.43
Wonderboard (ce	1.92	0.52	2.3	1.92
Common Brick	5	0.2	6	5
Cement Mortar	5	0.2	6	5
Ceramic Tile	12.5	0.08	14.9	12.5
Marble	11	0.09	13.1	11
Air Space (ventila	0.7	1.43	0.8	0.7
sand and gravel	1.7	0.59	2	1.7
Drywall (gypsum)	1	1	1.2	1
Rockwool or Fiber	0.3	3.33	0.4	0.3
Units	K per unit	R per unit		
per unit				
8" Concrete Block	1	1		
Glass Block - 4"	2	0.5		
* These materials or equiv are some of the best to use for relatively thin hearth protection				

K-Value Example: A wood stove may call for a floor which has a K factor of 1 or less. A product such as Micore 300 Board from USG has a K-Value of approx .43 per inch. Therefore a 1/2" thickness of this board would have a K-Value of .86, which meets the requirement of our example stove.

R-Value Example: A stove or fireplace may call for a floor with an R-Value of 1.5. The same board above is rated as having an R-Value of 2.33 for a one inch thickness. Therefore, 3/4" of the Micore 300 Board would meet the specifications for this stove.

Summary: R and K values are related, but K is the value commonly used for specifying materials for use with stoves and fireplaces. Be sure that your choice of insulating material for high temperature applications is noncombustible.

With K values, the lower value is a better insulator. With R Values, the highest number is better.

For low profile hearths, it is best to use manufactured materials such as Micore and Cement Board (Durock, Wonderboard, etc.) as these will allow hearth thicknesses of from 1/4" to 2" with most stoves and fireplaces. Most other common building materials will require at least 3" of thickness and usually much more.

Example of Hearth Calculations - this is for a Hearth requirement of approx $R=1.15$ (figures taken from Ceramic Tile manufacturers trade association)

The assembly that we will evaluate is a $3/8$ " layer of Micore 230 and a layer of $1/2$ " Util-A-Crete. The first step is to convert the k values of the materials in question into R so that we may add them up and determine if they will provide the necessary insulation value required by the manufacturer.

Micore 230 has a k value of .43 so –

$1 \text{ divided by } k = 2.32 \text{ times the thickness } .375 (3/8") = 0.87$

Util-A-Crete (cement tile backer board) has a k value of 1.6 so – $1 \text{ divided by } k = .625 \text{ times the thickness } .5 (1/2") = 0.3125$

Add the values together $0.87 \text{ plus } 0.3125 = 1.1825$ This R- value is an acceptable assembly.

What if we decide to use only one material? In this example, only Util-A-Crete cement board?

We could use the published R-Value of Util-A-Crete which is .31 in the $1/2$ " material and add them up to the value of the minimum required which is $R=1.16$

$1.16 \text{ divided by } .31 = 3.74$ This assembly would require 3.74 layers of $1/2$ " Util-A-Crete to reach the necessary R-value required. Obviously, you would have to round up to the next layer, which would mean that you would have two inches of Util-A-Crete.

Chimney

This model is designed for connection to any listed 2100° UL103 HT chimneys and parts. Follow chimney's manufacturer's instructions carefully.

NOTE: This Room Heater must be connected to:

1. A code approved masonry chimney with a flue liner.

CAUTION

SPECIAL METHODS ARE REQUIRED WHEN PASSING THROUGH A WALL OR CEILING. SEE INSTRUCTIONS AND BUILDING CODES. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

DETERMINING CHIMNEY LOCATION

A. Ceiling Exits: (Using 6" Single Wall Pipe and UL 103 HT type chimney system listed with manufacturer in this section of manual).

1. Suspend a plumb bob from ceiling above unit so weight is hanging in center of flue exit. (A small weight on a string will serve as a plumb bob). Mark ceiling where string is suspended to locate center of chimney. (See Figure 14).
2. After locating center of hole, install ceiling support box, chimney, flashing and rain cap, per chimney manufacturer's instructions.
3. Now connect stove and ceiling support box using #24 ga. minimum blue or black steel connector pipe. **(DO NOT USE GALVANIZED PIPE)**. Connect each section so crimped end faces downward and secure each section to each other using at least three (3) sheet metal screws or rivets.

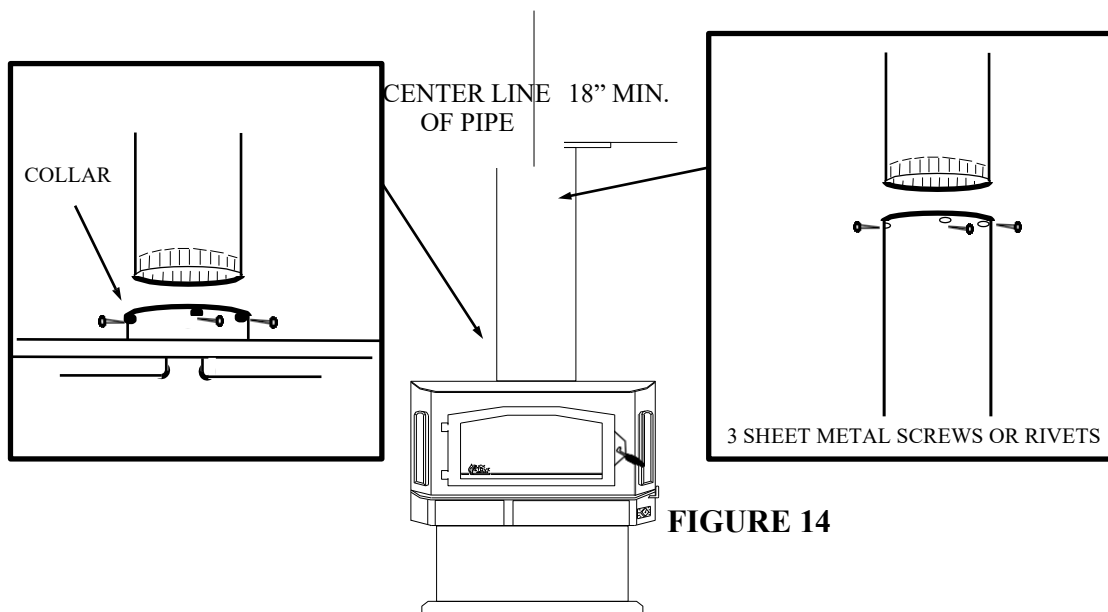
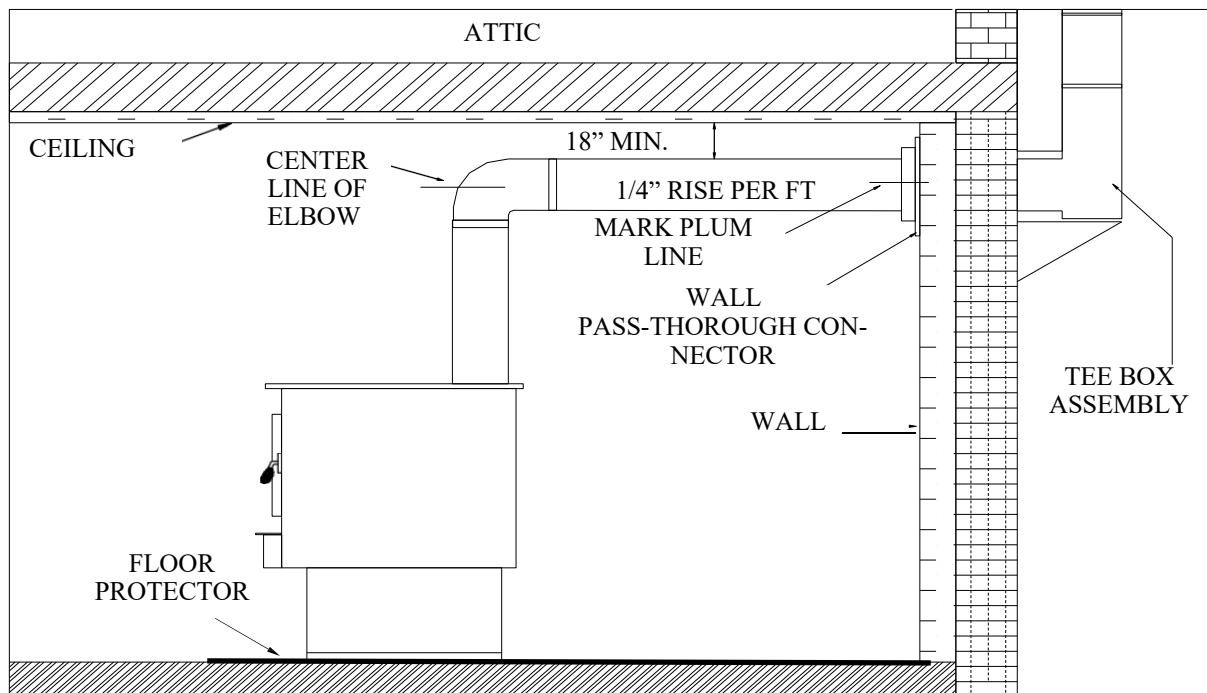


FIGURE 14

B. Wall Exit Into Metal Tee-Box

1. Mark the plumb line on wall directly behind center of heater. (See Figure 15). Floor protector must be under horizontal pipe exit.
2. Place vertical portion of heater pipe and elbow in position and project a point onto plumb line level with center of the elbow. (See Figure 15).
3. Measure up so there will be at least 1/4" rise per foot of horizontal connector pipe. When using #24 ga. minimum blue or black steel pipe maintain 18" between pipe and ceiling (See Figure 15). This will give you center of hole for chimney penetration.
4. After locating center of penetration, install tee box and chimney, per chimney manufacturer's specifications.
5. Connect chimney collar to tee-box using #24 ga. minimum blued or black steel connector pipe. **(DO NOT USE GALVANIZED PIPE)**. Connect each section so crimped end faces downward and secure each section to each other using three (3) sheet metal screws or rivets. (See Figure 14, Page 23).
6. For closer clearances to the ceiling use double wall or triple wall type A or 2100 HT pipe and follow those manufactures clearance instructions.



Wall Exit Into Metal Tee-Box

FIGURE 15

C. Wall Exit Into Masonry (Using Single Wall Pipe)

1. Before connecting this unit to a masonry chimney, determine that masonry fireplace wall pass through connector thimble meets **NFPA-211** Code and local building codes and is a minimum of 18" from ceiling. If connector thimble does not meet these codes, the pass through connector must be modified. (See Figure 16).

Connectors may pass through walls or partitions constructed of combustible material if connector is:

- (a) Either listed for wall pass through or is routed through a device listed for wall pass through and is installed in accordance with conditions of listing.
- (a) Selected or fabricated in accordance with conditions and clearances as stated in **NFPA-211** Code. Any unexposed metal that is used as part of a wall pass through system and is exposed to flue gases shall be constructed of stainless steel or other equivalent material that will resist corrosion, softening, or cracking from flue gases at temperatures up to 1800° F.

NOTE: In addition, a connector to a masonry chimney shall extend through wall to inner face or liner but not beyond and shall be firmly cemented to masonry.

EXCEPTION: A thimble may be used to facilitate removal of chimney connector for cleaning, in which case, thimble shall be permanently cemented in place with high-temperature cement.

2. Once through-the-wall thimble codes are met, simply connect chimney collar to wall pass through connector using #24 ga. minimum, blued or black steel connector pipe as follows:
 - (a) Maintain 1/4" rise per foot (horizontal length) from appliance to chimney.
 - (b) Connect each section so crimped end faces downward or back toward unit.
 - (c) Secure each section to each other using at least three (3) sheet metal screws or rivets. (See Page 23, Figure 14).
 - (d) Use three (3) sheet metal screws to fasten pipe to connector collar on heater. (See Page 23, Figure 14).
 - (e) For closer clearances to the ceiling use double wall or triple wall type A or 2100 HT pipe and follow those manufactures clearance instructions.

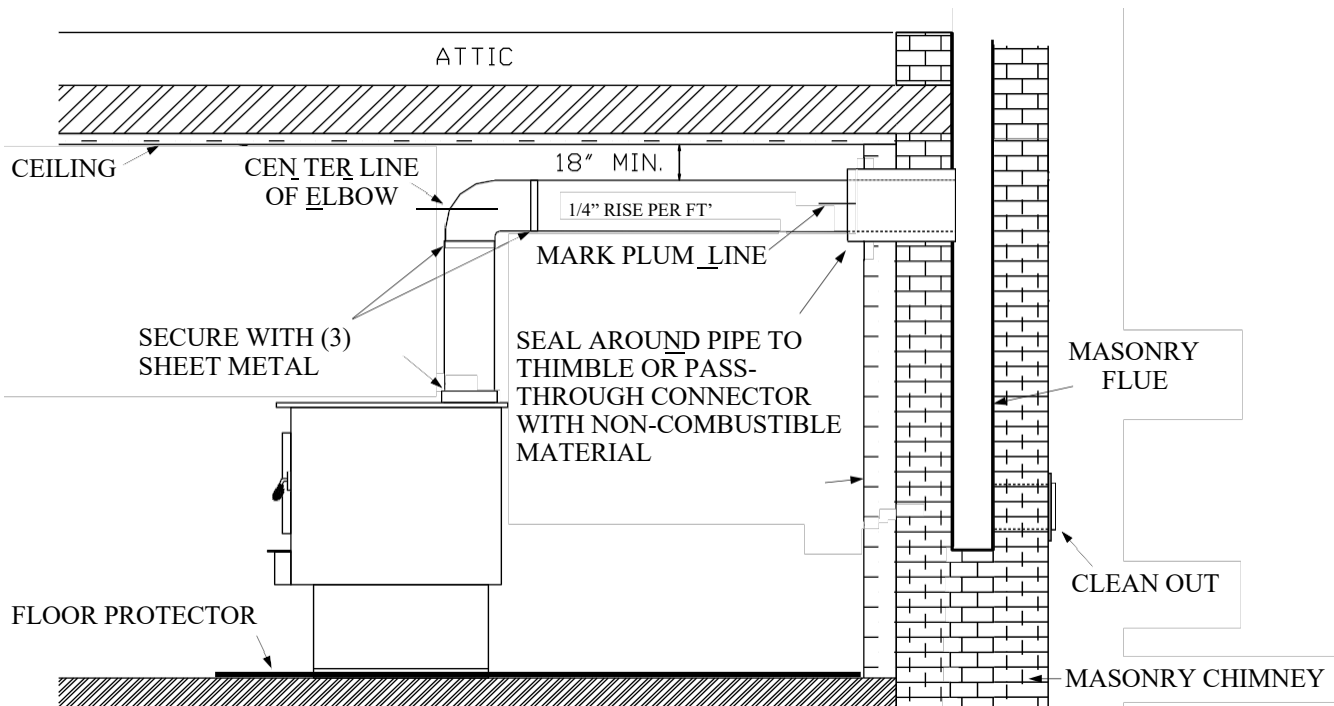


Figure 16

FINAL CHECK

1. Recheck specified clearances. (See Page 27)
2. Remove all foreign material from firebox area.
3. Open primary air draft, shotgun air draft, and damper bypass make sure ash pan drawer is sealed properly.
4. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
4. Place crumpled pieces of newspaper in stove. Light it and close door. Ensure that stove draws properly through primary draft.
5. Check for smoke leaks around door.

CAUTION

Open door and check for smoke escaping from front of stove. Smoking usually indicates a defective or poorly positioned chimney. Some chimneys with a marginal draft can be preheated by lighting newspaper and holding it near open damper with a poker or fire tong. Once the chimney heats up, a proper draft can usually be obtained.

CAUTION

The unit is painted with a specially formulated high temperature paint that cures during the first two or three firings. You may notice a slight smoking effect and an odor of burning paint when you build first fires. This is normal and is not a cause for alarm. In some cases, these fumes will activate a smoke alarm. Opening a window near unit will allow these fumes to escape. DO NOT build a large, roaring fire until this curing is complete or heater finish may be damaged.

CLEARANCES FOR MODEL 81C

MINIMUM CLEARANCES TO COMBUSTIBLES

FREESTANDING

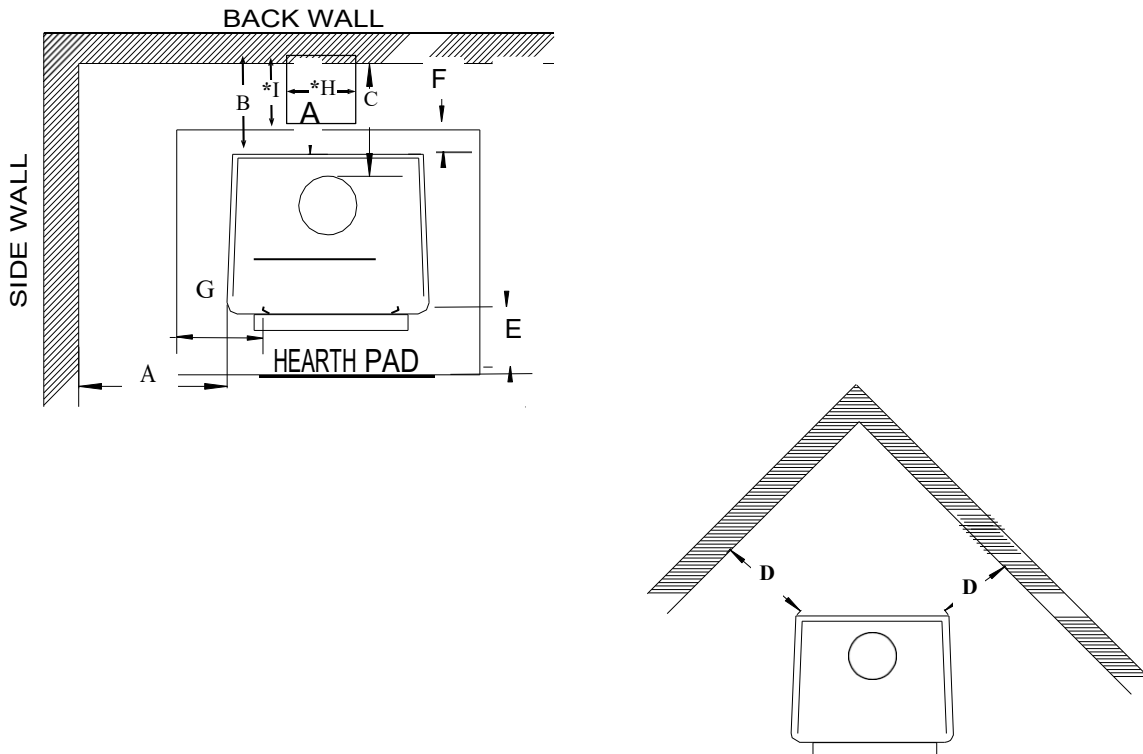


FIGURE 18

	A	B	C	D	E	F	G	*H	*I
MODEL 81C	23"	23"	25"	16"	16"	8"	8"	10"	FULL LENGTH PIPE TO WALL

NOTE: All clearances are to combustibles without low clearance shields and using single wall pipe and minimum floor protector. Clearances above may be reduced by using close clearance shields. Follow **NFPA-211** codes if available or follow instructions on next page.

* For wall exit, floor protector must be under horizontal pipe full length of pipe. There must be 2" on each side of pipe. Maintain 18" between pipe and ceiling.

CLEARANCES FOR MODEL 81C

MINIMUM CLEARANCES TO COMBUSTIBLES USING SINGLE WALL CHIMNEY CONNECTOR AND OPTIONAL SHIELDS, PERMANENTLY LOCATED MANUFACTURED HOME AND ALCOVE INSTALLATIONS

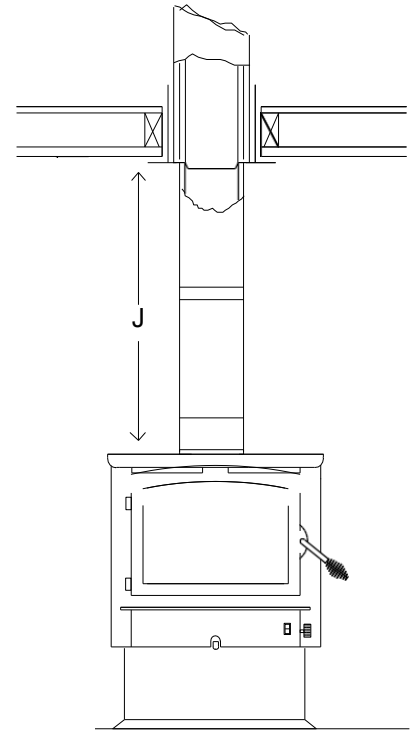
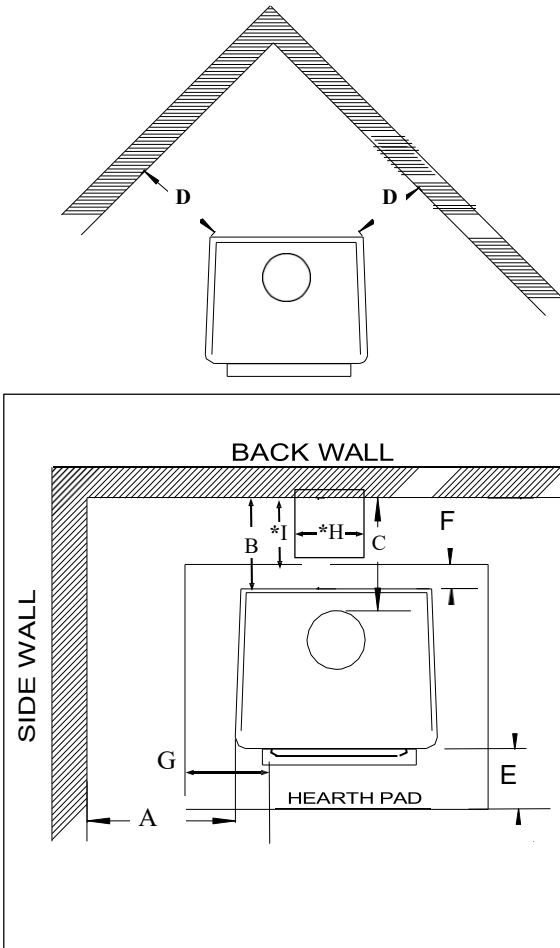


FIGURE 19

	A	B	C	D	E	F	G	*H	*I	J
MODEL 81C	12"	16"	16.5"	12"	16'	8"	8"	10"	FULL LENGTH PIPE TO WALL	53"

NOTE: All clearances are to combustibles using single wall pipe and all close clearance shields and minimum floor protector.

* For wall exit, floor protector must be under horizontal pipe full length of pipe. There must be 2" on each side of pipe. Maintain 18" between pipe and ceiling.

INSTALLATION OF (OPTIONAL) CLOSE CLEARANCE SHIELDS

1. Center rear close clearance shield with back of stove. Mark back of stove, using holes in rear shield as reference. Drill pilot holes using a 1/8 drill bit. Using self-tapping screws, secure back shield to back of stove (See figure 20).
2. Insert front end of side shield behind front of stove. Align top of side shield with top of back shield. Mark holes on back shield through holes in back of side shield. Using four self tapping screws, drill four holes in the locations marked. Tighten bottom screws and leave top screws loose for step 3. Use same step to install side shield on opposite side of stove. (See figure 21).
3. Insert pipe shield where back shield and top back side shield meets. Tighten screws. (See figure 22).

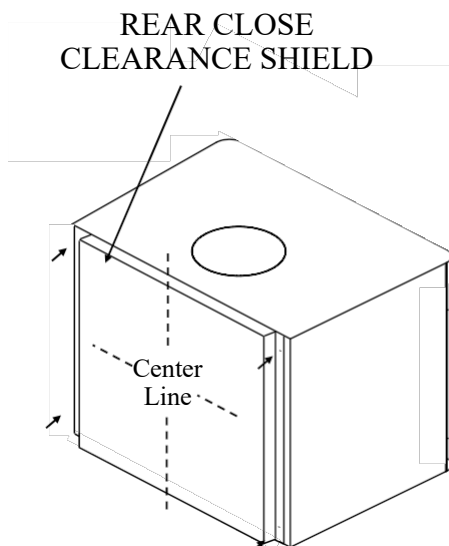


FIGURE 20

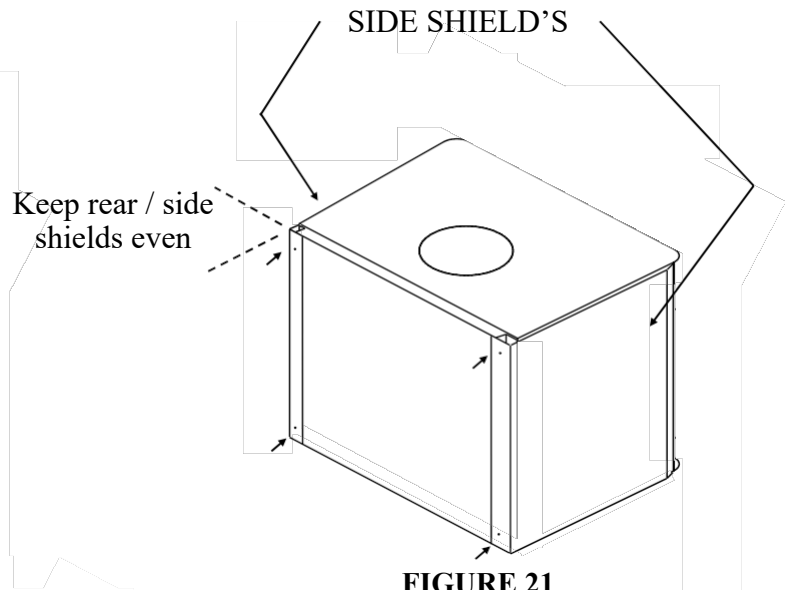


FIGURE 21

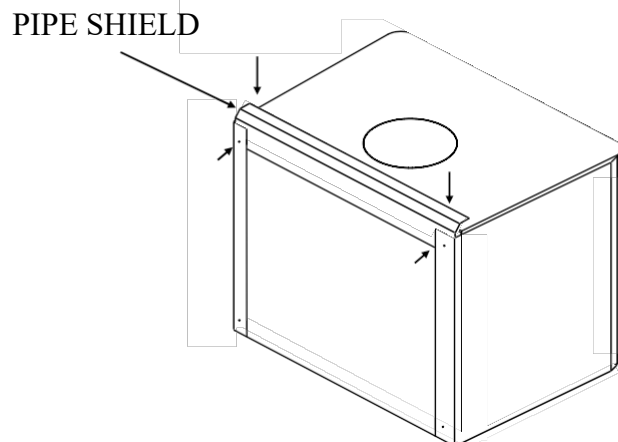


FIGURE 22

SECTION IV

FREESTANDING PERMANENTLY LOCATED MANUFACTURED HOME INSTALLATION

FOR MINIMUM CLEARANCES SEE PAGE 28.

Floor Protection:

When installing a heater, a floor protector must be used. Floor protector must have a minimum of 1.1 R-Value non-combustible material.

How to use alternate materials and how to calculate equivalent thickness

Most people have heard of R-Values, which are used for rating common building materials such as fiberglass insulation and glass. However, many texts which cover stoves and fireplaces use K-Values instead of R-Values. Although the two are somewhat related, there are differences.

R-Value: The higher the R-Value, the better the insulating properties of the subject materials. R-Values are most often used to express the thermal resistance (ability to stop heat flow) of a building wall, ceiling or floor. Because of this, most R-Values are calculated at normal temperatures of approx. 75 F. R-Values are easy to add together so calculating the total R-Value of a wall is simply done by adding the values for the sheetrock, insulation, sheathing and siding.

K-value is a measure of heat conductivity of a particular material. Specifically, it is the measure of the amount of heat, in BTUs per hour, that will be transmitted through one square foot of material that is one inch thick to cause a temperature change of one degree Fahrenheit from one side of the material to the other. The lower the K-value for a material, the better it insulates. If the K-value of the material is known, the R-value per inch can be determined by dividing 1 by the K-value ($R\text{-value per inch} = 1/K \text{ value}$). The LOWER a K-Value, the better its performance as an insulator.

R or K values have nothing to do with whether a material is flame proof, flame resistant or combustible. Styrofoam, cork, wood and polyester are just some examples of materials which are good insulators but will burn or smoke dangerously when exposed to excess heat.

Technical - For those who desire to calculate their own K or R values, please use the following formulas:

1. R value can be calculated by dividing the thickness by the K value.

For US calculations, we use inches as the unit of measurement.

“In the inch-pound units, thermal resistance is measured in degrees F times square feet of area times hours of time per Btus of heat flow.”

$R\text{-value} = \text{thickness} / K\text{-value}$

2. K value is the inverse of the R-Value. If one is known, the other can be calculated.

“units of Btu-inch/hour per square foot per degree F”

$\text{Thickness}/k \text{ value} = R \text{ value}$

or:

Divide the inches of thickness by R.

$k = \text{inches of thickness} / R$

Common K and R Values Chart				
Material	K value	R Value	inches-K value .84	inches-R value of 1
per inch				
Micore 300*	0.43	2.33	0.5	0.43
Wonderboard (ce	1.92	0.52	2.3	1.92
Common Brick	5	0.2	6	5
Cement Mortar	5	0.2	6	5
Ceramic Tile	12.5	0.08	14.9	12.5
Marble	11	0.09	13.1	11
Air Space (ventila	0.7	1.43	0.8	0.7
sand and gravel	1.7	0.59	2	1.7
Drywall (gypsum)	1	1	1.2	1
Rockwool or Fiber	0.3	3.33	0.4	0.3
Units	K per unit	R per unit		
per unit				
8" Concrete Block	1	1		
Glass Block - 4"	2	0.5		
* These materials or equiv are some of the best to use for relatively thin hearth protection				

K-Value Example: A wood stove may call for a floor which has a K factor of 1 or less. A product such as Micore 300 Board from USG has a K-Value of approx .43 per inch. Therefore a 1/2" thickness of this board would have a K-Value of .86, which meets the requirement of our example stove.

R-Value Example: A stove or fireplace may call for a floor with an R-Value of 1.5. The same board above is rated as having an R-Value of 2.33 for a one inch thickness. Therefore, 3/4" of the Micore 300 Board would meet the specifications for this stove.

Summary: R and K values are related, but K is the value commonly used for specifying materials for use with stoves and fireplaces. Be sure that your choice of insulating material for high temperature applications is noncombustible.

With K values, the lower value is a better insulator. With R Values, the highest number is better.

For low profile hearths, it is best to use manufactured materials such as Micore and Cement Board (Durock, Wonderboard, etc.) as these will allow hearth thicknesses of from 1/4" to 2" with most stoves and fireplaces. Most other common building materials will require at least 3" of thickness and usually much more.

Example of Hearth Calculations - this is for a Hearth requirement of approx $R=1.15$ (figures taken from Ceramic Tile manufacturers trade association)

The assembly that we will evaluate is a $3/8$ " layer of Micore 230 and a layer of $1/2$ " Util-A-Crete. The first step is to convert the k values of the materials in question into R so that we may add them up and determine if they will provide the necessary insulation value required by the manufacturer.

Micore 230 has a k value of .43 so –

$1 \text{ divided by } k = 2.32 \text{ times the thickness } .375 (3/8") = 0.87$

Util-A-Crete (cement tile backer board) has a k value of 1.6 so – $1 \text{ divided by } k = .625 \text{ times the thickness } .5 (1/2") = 0.3125$

Add the values together $0.87 \text{ plus } 0.3125 = 1.1825$ This R- value is an acceptable assembly.

What if we decide to use only one material? In this example, only Util-A-Crete cement board?

We could use the published R-Value of Util-A-Crete which is .31 in the $1/2$ " material and add them up to the value of the minimum required which is $R=1.16$

$1.16 \text{ divided by } .31 = 3.74$ This assembly would require 3.74 layers of $1/2$ " Util-A-Crete to reach the necessary R-value required. Obviously, you would have to round up to the next layer, which would mean that you would have two inches of Util-A-Crete.

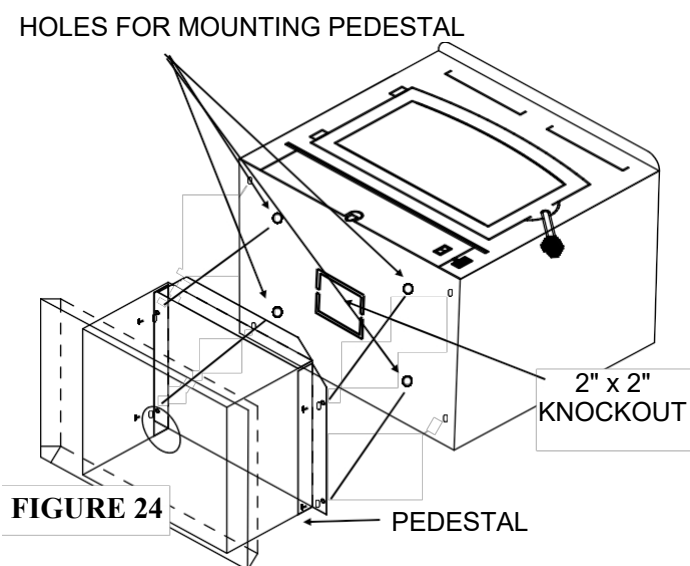
TOOLS FOR INSTALLATION

Drop cloth, 3/32" Metal drill bit, 5/16" magnetic socket chuck adapter, 5/16" wrench (box or socket) or adjustable wrench, Jigsaw with masonry, metal and wood blades

WARNING: DO NOT INSTALL IN A SLEEPING ROOM

PREPARING STOVE FOR INSTALLATION

1. Remove protective plastic wrapping from unit, inspect unit for any obvious physical damage.
2. Plug power cord into a 115V AC outlet. Set switch to "Manual" and rheostat to "High" position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
3. Check primary air control and shotgun air control to ensure that they both slide freely.
4. Remove any items from within firebox. Spread a dropcloth on floor behind heater. Next, tilt heater so that back is on drop cloth.
5. **Pedestal Kit: For Permanently Located Manufactured Home installation a pedestal kit is required and outside air is required, see *Out Side Air Installation* next page.**
 - Before attaching heater to stand, take a large flat screwdriver or pliers and remove the 2" x 2" knockout on bottom of unit. (See Figure 24).
 - Place pedestal against bottom of heater (angle side to heater). Center pedestal front to rear and also center left and right. Mark screw locations on bottom of stove through outer holes of stand mounting angles. Set pedestal aside and drill four 3/16" holes in heater bottom. Then mount pedestal to bottom of heater with screws provided 1/4"-14 x 1". (See Figure 24).
6. Remove screws and remove pedestal. Reposition heater to upright position.



Out Side Air Installation

CAUTION

THE STRUCTURAL INTEGRITY OF PERMANENTLY LOCATED MANUFACTURED HOME FLOOR MUST BE MAINTAINED. (MOVE OPENING AND/OR REPOSITION HEATER LOCATION IF NECESSARY).

1. Select an installation location that will give best airflow from front of heater to remainder of home making sure minimum clearance specifications are met. See minimum clearance to combustibles (See Page 28).
2. Place protective floor pad in position. For minimum floor protection (See Page 30).
3. Place pedestal on pad.
4. Mark on pad the outside air opening in bottom of pedestal stand.
5. Mark center line of outside air opening. Set pedestal aside for now.
6. **CAUTION! The structural integrity of home floor must be maintained.**
Cut a 4 1/4" diameter hole in pad and continue through floor.
(Move opening and/or reposition heater location if necessary).
7. Now, reposition pedestal stand and set on pad being sure to line stand up with outside air opening.
12. Obtain outside air duct from box in pedestal kit marked FA P81BOA.
13. Slip duct down through 4-1/4" hole until face of outside air duct with screen wire, contacts bottom of pedestal.
15. Set heater back onto pedestal and resecure using screws.
16. NOTE: If home is underpinned, you must duct through underpin as shown. (See Figure 26).

FIGURE 26

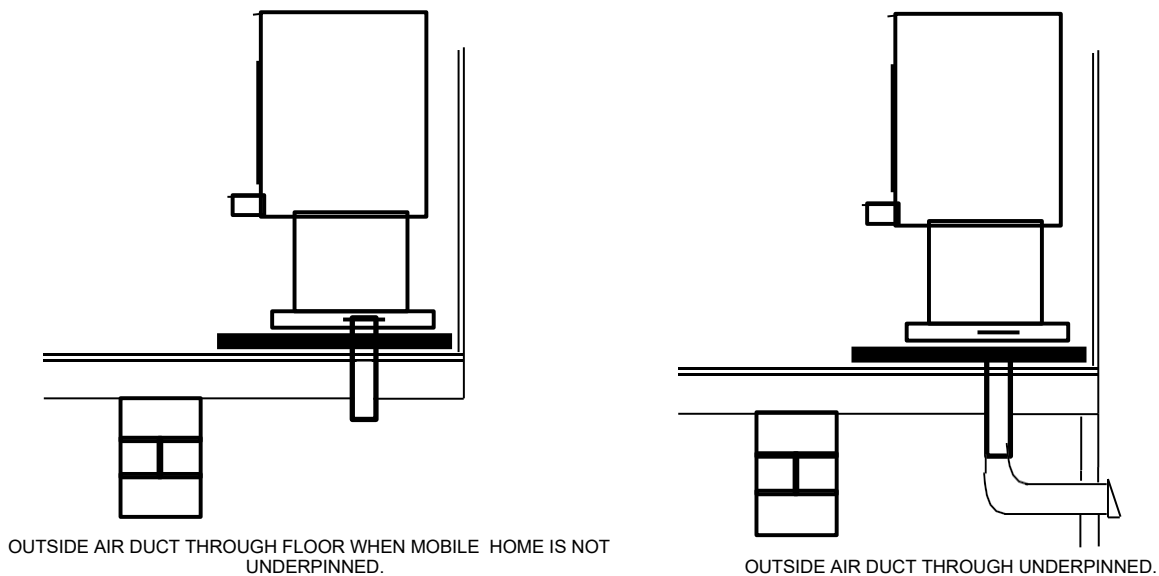
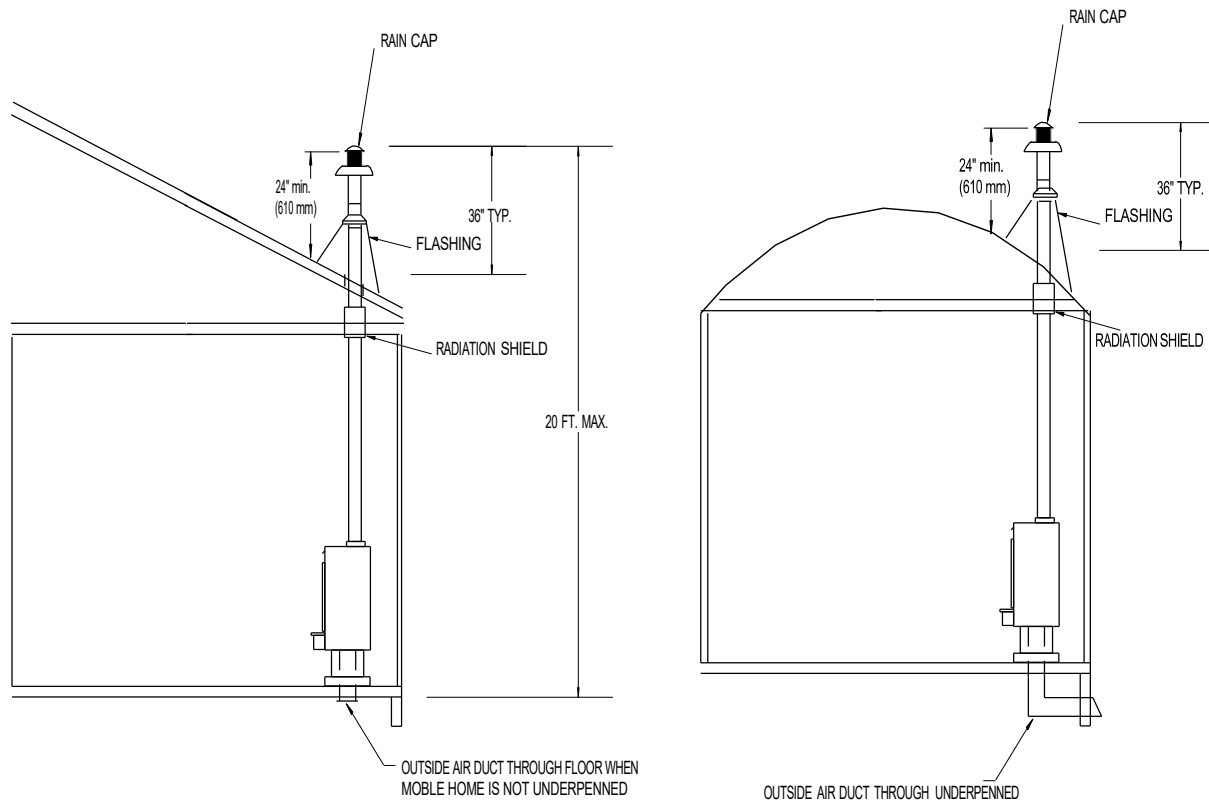


FIGURE 27



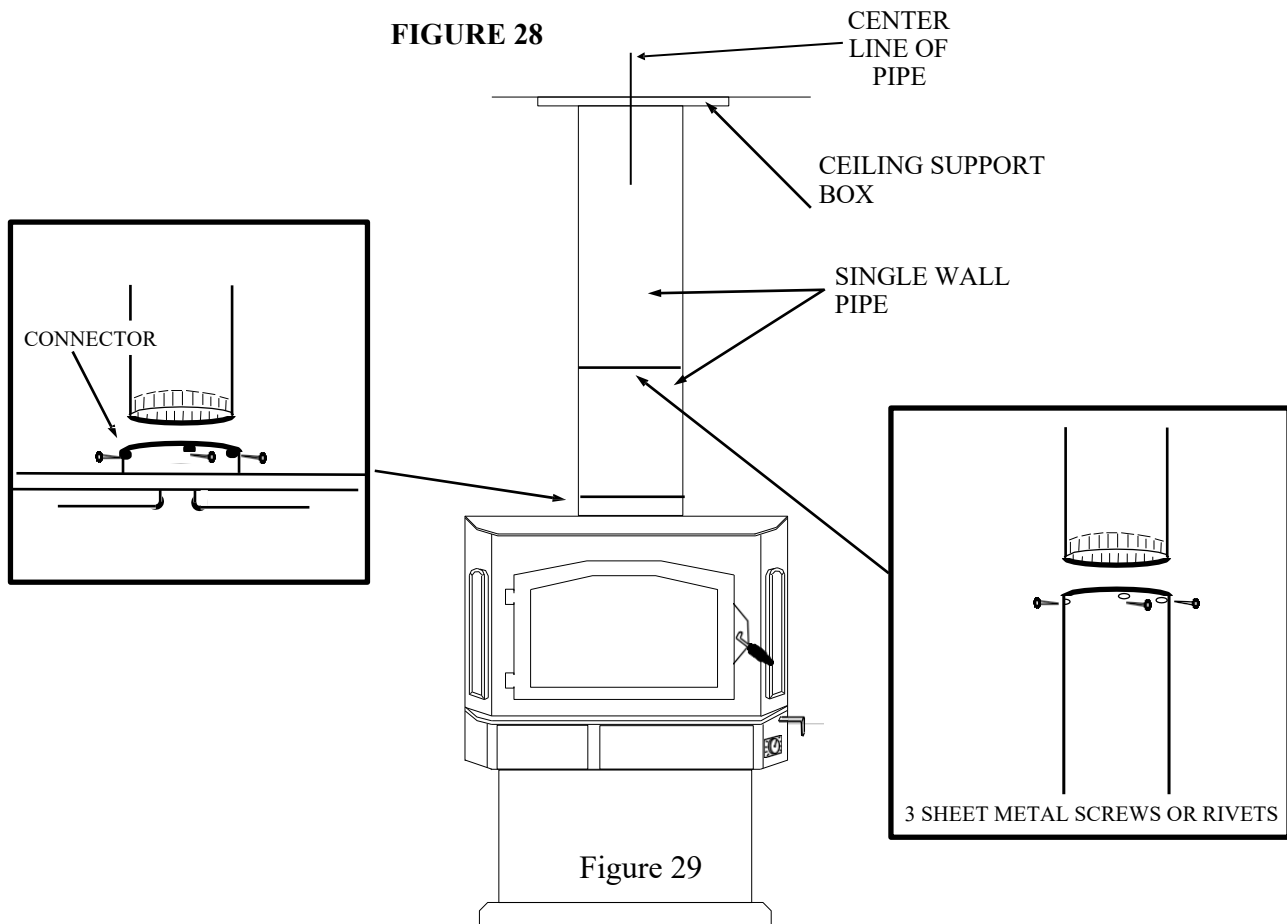
Ceiling Exit (Using Close Clearance Listed Chimney)

1. Suspend a plumb bob from ceiling above unit so that weight is hanging in center of flue exit. (A small weight on a string will serve as a plumb bob). Mark ceiling where string is suspended to locate center of chimney hole. (See Page 36, Figure 28).
2. After locating center of hole, install ceiling support box, chimney or chimney connector, flashing and rain cap using listed 2100° HT chimney only.

CAUTION

REFER TO CHIMNEY MANUFACTURERS INSTRUCTIONS FOR ASSEMBLY AND DISASSEMBLY OF CHIMNEY PARTS. BE SURE TO FOLLOW CHIMNEY INSTRUCTIONS FOR PROPER CLEARANCES TO COMBUSTIBLE AND PROPER AIR SPACING REQUIRED.

3. Add additional pipe until both of the following are met:
 - (a) Chimney pipe is 3' higher than roof at point where it penetrates roof.
 - (b) Chimney pipe height is at least 2' higher than any part of roof within 10' of chimney.
(See Figure 27).



FINAL CHECK

1. Recheck specified clearances.
2. Remove all foreign material from firebox area.
3. Open primary air draft, shotgun air draft, and damper bypass make sure ash pan drawer is sealed properly.
4. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.

4. Place crumpled pieces of newspaper in stove. Light it and close door. Ensure that stove draws properly through primary draft.
5. Check for smoke leaks around door.
6. Pull bypass door out and open door check for smoke escaping from front of stove. Smoking usually indicates a defective or poorly positioned chimney. Some chimneys with a marginal draft can be preheated by lighting newspaper and holding it near open damper with a poker or fire tong. Once chimney heats up, a proper draft can usually be obtained.

CAUTION

THE UNIT IS PAINTED WITH A SPECIALLY FORMULATED HIGH TEMPERATURE PAINT THAT CURES DURING FIRST TWO OR THREE FIRINGS. YOU MAY NOTICE A SLIGHT SMOKING EFFECT AND AN ODOR OF BURNING PAINT WHEN YOU BUILD THE FIRST FIRES. THIS IS NORMAL AND IS NOT A CAUSE FOR ALARM. IN SOME CASES, THESE FUMES WILL ACTIVATE A SMOKE ALARM. OPENING A WINDOW NEAR THE UNIT WILL ALLOW THESE FUMES TO ESCAPE. DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING PROCESS IS COMPLETE OR HEATER FINISH MAY BE DAMAGED.

SECTION V

WOOD HEATER SAFETY

Certain safety hazards are inherent in any wood heater installation. You should be aware of these so that a safe and proper installation can be made.

1. **FAULTY CHIMNEY:** An older masonry chimney should be thoroughly checked to be sure there are no holes or weak spots which could allow sparks or hot gases to escape.
2. **HEAT CONDUCTION:** Placing combustible materials too close to a heater or chimney can be a fire hazard.

By keeping these particular hazards in mind as you install and use your room heater you can ensure a safe, reliable installation.

The chimney should be inspected once every two months. Any build-up of creosote should be removed to prevent risk of a chimney fire. To remove chimney, remove screws or fasteners, remove pipe and clean with steel brush. Replace chimney or and replace screws and/or fasteners.

CREOSOTE-FORMATION AND NEED FOR REMOVAL: When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in a relatively cool chimney flue of a slow burning fire. As a result, creosote residue accumulates on flue lining. When ignited, this creosote makes an extremely hot fire.



CAUTION

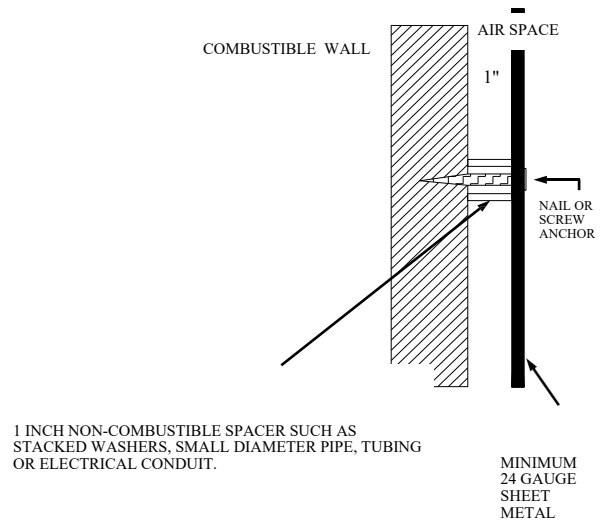
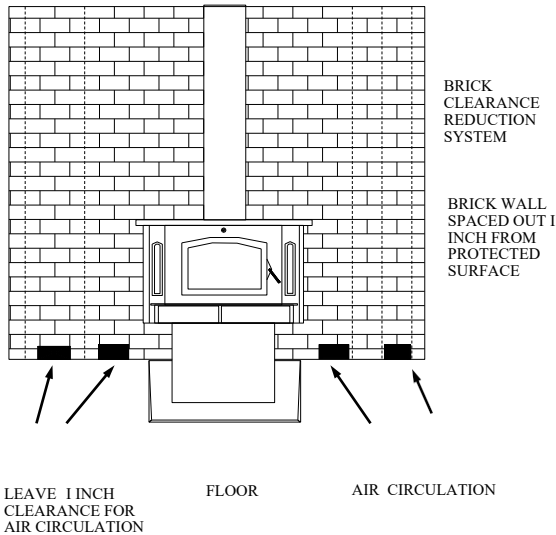
NEVER USE GASOLINE, GASOLINE TYPE LANTERN FUEL, KEROSENE, HARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THE HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE STOVE WHEN IT IS IN USE. ALL FLUIDS OF THIS TYPE GIVE OFF VOLATILE FUMES AND CAN AND WILL EXPLODE! DON'T TAKE A CHANCE WITH SAFETY OF YOUR HOME AND FAMILY.

CAUTION: Never remove ashes from your heater with blower running.

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

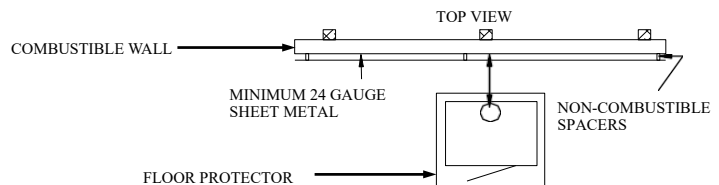
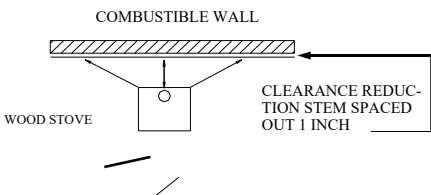
ALTERNATIVES FOR WALL PROTECTION

Example: The rear clearance for the Model 81C from page 27 is 23" (Letter B). This clearance may be reduced by 50% to 11.5" by using either of the wall protection devices mentioned below.



BRICK WALLS MAY BE ATTACHED TO COMBUSTIBLE WALLS USING WALL TIES IF BRICK IS USED. BE SURE FLOOR CAN WITHSTAND WEIGHT OF BRICK.

DO NOT USE FASTENERS DIRECTLY BEHIND CHIMNEY CONNECTOR OR STOVE.



Tested and Listed Wall Protector

Clearances to combustibles may be reduced if a tested and listed wall protector is installed over a combustible surface when the following conditions exist:

1. A dead air space of 1" separates listed and tested wall protector from combustible surface.
2. The tested and listed wall protector extends from floor to ceiling with a 1" clearance for air circulation at both floor and ceiling.
3. The 1" spacers (preferably ceramic rather than metal) must be located at corners rather than behind heater or chimney connector.

Unlisted and Untested Wall Protector

Wall protectors may be constructed of masonry, 24 gauge or thicker sheet metal, or non-combustible 1/2" thick insulation board. Conditions 2 and 3 above must be observed but, the air space in condition 1 must be increased to 1 1/2".

OPERATION

This section of the manual is to help you get maximum efficiency and maximum smoke (particulate) reduction from your Model 81C heater. If you should experience any difficulty or have questions concerning your heater, contact your Model 81C dealer for assistance.

1. To maximize the efficiency of your wood stove make sure it is sized properly for the space you plan to heat. Consult with your dealer for sizing your stove correctly.
2. Use dry, seasoned wood only. Using wet wood will greatly reduce your efficiency.
3. Consult with your installer/dealer to correctly place the stove in your home. An incorrectly placed stove can greatly reduce efficiency.

Maximizing the efficiency of your stove will heat your house quickly, burn cleaner and use less wood.

Dry your split wood and stacked crisscross to allow for proper seasoning for 6-12 months (See Page 9 Bottom Picture) when ready to burn place the wood from front to back position in heater.

"This wood heater has a manufacturer set closed burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instruction in this manual."

NOTE: Following all suggested operating and maintenance procedures will help minimize visual emissions.

GUIDE TO THE DIFFERENT BURNING QUALITIES OF WOOD

Type of Wood	Ease of Starting	Coal in Qualities	Amount of Sparks
Apple	Poor	Excellent	Few
Ash	Fair	Good	Few
Beech	Poor	Good	Few
Birch	Good	Excellent	Moderate
Cherry	Poor	Excellent	Few
Cedar	Excellent	Poor	Many
Elm	Fair	Good	Very Few
Hemlock	Good	Low	Many
Hickory	Fair	Excellent	Moderate
Locust	Poor	Excellent	Very Few
Maple	Poor	Excellent	Few
Oak	Poor	Excellent	Few
Pine	Excellent	Poor	Moderate

The National Audubon Society recently charted the heat produced by a wood fire. They noted that heat produced by a wood fire varies greatly with kind of wood burned. Beech is considered best wood for a fire. A cord of well-seasoned Beech will produce as much heat as 169 gallons of fuel oil; Sugar Maple and Red Oak produce as much heat as 166 gallons of fuel oil; followed by White Ash 154; American Elm 130; White Birch 124; and White Pine 94.

BUILDING A FIRE:

1. Place “Manual/Off/Automatic” switch in “Automatic” (bottom) position for thermostat control operation. Turn rheostat knob clockwise (it will click from “Off” position to “On”) so you can vary the speed of motor.
2. Open door.
3. While looking inside firebox, operate damper bypass plate in and out observing movement. This should operate freely and close completely. Open damper bypass. (Pull Out)
4. Open air controls on each side of stove (Pull Out Right Side, Push In Left Side)

The Model 81C is not designed for use with grates and irons or other methods of supporting the fuel.

NOTE: Do not use grate or elevate fire. Build wood fire directly on the firebrick of fire box

DO NOT BUILD A LARGE ROARING FIRE! Initially, build 2-3 small fires in order to cure the paint on your stove.

5. Lay several pieces of dry kindling on top of newspaper.
6. Load heater with 2 or 3 pieces of (naturally seasoned hard wood), 2"-3" in diameter **placing on top of Kindling**
7. Light newspaper, leave the door open around 2" inches for 1 1/2 to 2 1/2 minutes: Don't leave fire unattended with the door open! Shut the door.
8. After 15 to 20 minutes, close the by-pass damper completely (PUSH IN).
9. After embers and a coal bed have been established, load heater with natural seasoned hard wood, **placing it from front to rear.**
10. Remember on a new stove **DO NOT FILL** firebox during your first 2 to 3 fires! Build 2-3 small fires in order to cure the paint on your stove.

NOTE: THE FUELING DOOR MUST REMAIN CLOSED DURING OPERATION.

NOTE: Your stove is equipped with a automatic thermostat. When the stove gets hot enough, the thermostat will activate the room air blower. Set fan speed according to desired heat output.

NOTE: When refueling or removing ashes turn “OFF” room air blower. Be sure to turn room air blower back on when finished.

NOTE: Do not run power cord underneath heater, or in walk way or heavy traffic areas.

Wood Loading

During refueling, open (pull out) bypass damper to allow smoke in the firebox to escape - wait a few seconds. Open fuel door, if there happens to be any raw pieces left over place them in the rear East/West direction. Slowly add wood North/South direction, front to back. The door should be open less than one minute, close door and bypass damper. Open primary air control wide open for 5-10 minutes to charge wood, making sure the stove is burning clean and the catalyst is above 900° Fahrenheit before shutting down the burn setting.

- ♦ After most of wood has burned and if you are not planning on reloading immediately, it may be necessary to open damper bypass, then door, and rake wood and coals into a pile near front center of firebox. (Be certain wood chunks are pulled out of rear corners.) Close door and damper bypass. This step will assure continued combustion and thorough burning of wood.

Operating Burn Rates

You will have to experiment with burn rate until you find the particular setting for heating your home. Chimney drafts, tightness of house, doors, windows, insulation in house and atmospheric conditions all influence which setting you must have, so it may take several firings to learn setting necessary for your installation. Heating capacity is based on BTU output and conditions listed above. These conditions will affect heating capability of your heater.

Although catalytic stoves decrease ash residue, routine removal of excess ash is still necessary.

Low Burn Rate

For the cleanest operation and lowest emissions, operate the appliance with dry, seasoned cordwood and maintain an active flame whenever possible. When operating at low burn rates:

1. Allow the appliance and chimney system to reach normal operating temperature before reducing the air control to a low burn setting.
2. Load only seasoned cordwood with a moisture content of 20% or less.
3. Avoid placing excessively large pieces of wood into the firebox when operating at low burn settings. A mixture of small and medium sized splits generally provides more consistent combustion.
4. After reloading, operate the appliance with the air control open until the new fuel load is burning well and the catalyst is active before reducing the air supply.
5. If flames disappear completely for extended periods, visible smoke increases, or the glass darkens rapidly, increase the air setting slightly to maintain good combustion.

IMPORTANT: Do not immediately move the air control to the lowest setting after refueling. Allow the fuel load to become fully ignited and the catalyst to reach operating temperature before reducing the air control.

SECTION VII

PREVENTIVE MAINTENANCE / REPLACEMENT PARTS

THE CATALYSTS

Warning: This product can expose you to chemicals including aluminosilicate. Which is known to the state of California to cause Cancer. For more information, go to www.P65Warning.ca.gov

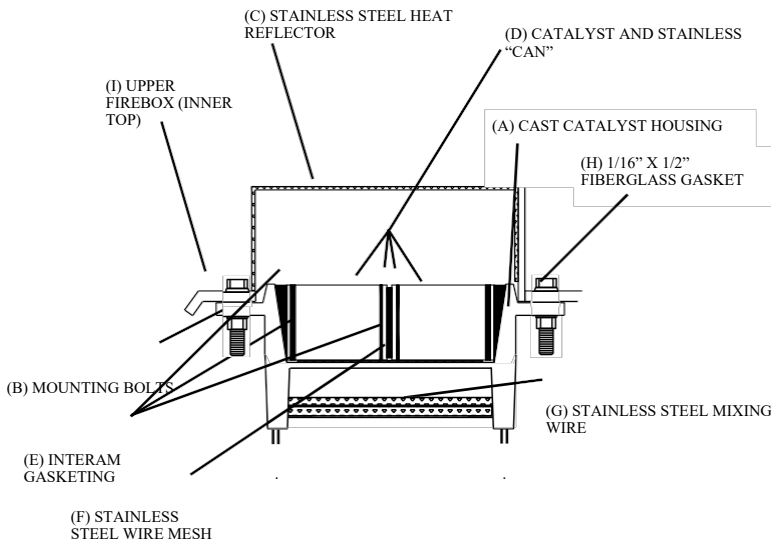
The catalysts in your stove are designed for many years of use. If after several years of use, the efficiency of stove decreases or if a notable amount of smoke is observed, catalysts may need to be replaced. See Catalyst Warranty prior to replacement. The following points are some general guidelines from catalyst manufacturer.

1. Do not “hot fire” stove. For many years retailers and installers have advised customers to build an extra hot fire to burn creosote deposits in fire system. This advice may be acceptable for non-cat stoves, but can be death to a catalyst. Why? Because the catalyst is reducing the particulate, or creosote buildup, therefore need to “hot fire” is eliminated. Proper chimney cleaning procedure should be followed.
2. Direct Flame contact is death to a catalyst. A catalyst burns by-products in the smoke. The gases such as CO, HC, and O₂ ignite with each other in a chemical reaction in presence of the catalyst (while passing through the honeycomb configuration). Direct flame inhibits this reaction by changing chemical make-up of catalyst breaking down substrate or ceramic. This problem is called **flame impingement**. Today’s modern stoves are designed so that flame impingement is unlikely. However, a strong, fast draft can pull flame into catalyst. Or, a hot fire, with all air controls and/or the ash door open can literally torch the catalyst. The remedy for hot fire related flame is to advise customers not to “hot fire” the stove. The customer will enjoy their catalysts longer and with better performance if these guidelines are followed. Fly ash problems also can be reduced by controlling draft.
3. The **“Glow” Misconception**: A catalyst can glow during certain stages of combustion. The determination that a catalyst is not working simply because it does not glow is inaccurate. During low burn cycle, when catalyst is doing the bulk of its work, it usually does not glow. Also, extremely dry wood (oak, ash, etc.) can burn clean enough not to produce a glow in converter. In most new stoves, you cannot see the catalyst.
4. **Light Off Temperature**: CO conversion in the Applied Ceramics catalyst begins at a very low temperature. Usually, a normal start up to produce a coal bed will produce more than sufficient temperatures to begin catalytic combustion.
5. The catalyst is not consumed or “used up”. The nature of a catalytic reaction is defined as follows, by the American Heritage Dictionary, Second College Edition: catalyst “1. Chem. A substance, usually present in small amounts relative to reactants, that modifies and especially increases rate of a chemical reaction without being consumed in process.” This means your catalyst is always there. This also means that gases that would normally go out flue system and pollute the environment are being burned to create more heat from less wood.
6. Why does a catalyst stop working? Most catalyst that are returned are either destroyed by flame impingement, broken due to accidents or mishandling or have nothing wrong with them but fly ash build-up. A catalyst can be “saturated” with by-products of wood burning such as potassium. This is chemical saturation. The prohibitive chemical will fill in the chemical “holes” that gases normally use for reaction. This process of saturation can be slowed by regular maintenance of catalyst. Saturation can take several years since there are units in use for over five years. Burning garbage, painted woods or large amounts of colored paper can poison your unit. Poisoning, however, is very difficult to do. Burning colored paper causes more of a fly ash problem than a risk of poisoning. **NEVER BURN RUBBER OR PLASTIC.**
7. Burn only dried natural seasoned hard wood. Wood should be dried for at least 12 months prior to burning. The wood should be FREE of any moisture such as RAIN or SNOW. Wet wood creates water vapor which can drop the temperature of catalyst. The results can be plugging, clogging and thermal shock to catalyst. When a catalyst has ceased to be effective, you will notice increased fuel usage and your chimney sweep will notice increased creosote in your system. Before you replace unit, review this section. If you find that your catalyst should be replaced, follow instructions for warranty replacement that were provided when your unit was purchased.
8. Cleaning catalyst with plain water can reduce build-up of catalyst-retarding chemicals. Nothing but a soft brush, low pressure air or plain water should be used to clean a catalyst. The ceramic unit is fragile in comparison to rest of the stove, so it should be handled with care. A soak in warm or hot (not boiling) water for 20 minutes is ideal. Then, allow unit to cool at room temperature and rinse under medium pressure under a faucet. Allow unit to thoroughly dry before reinstalling it or you will damage it. Finally, reinstall unit. A cleaning once every year is sufficient for most users. Clean it when you have your flue system cleaned.

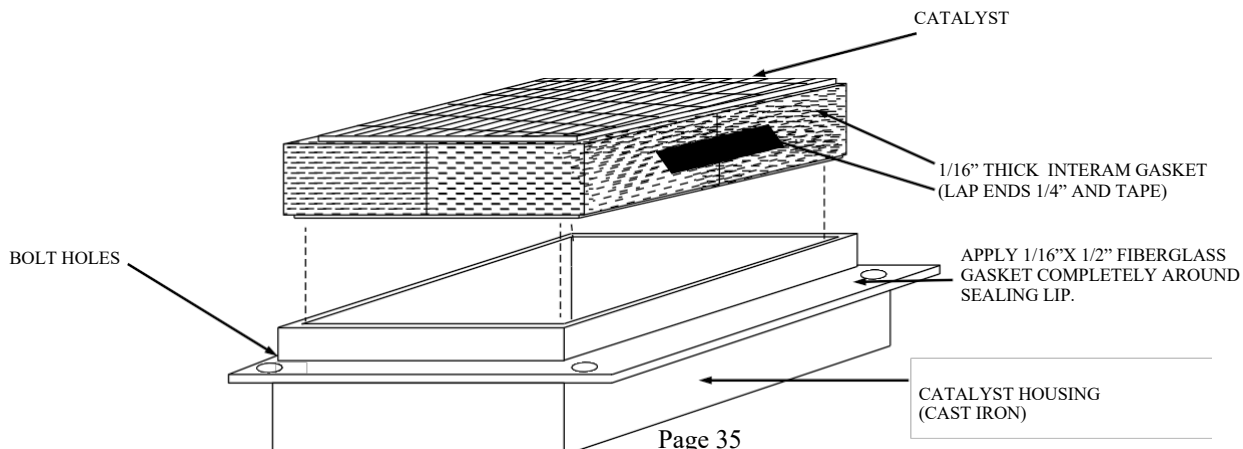
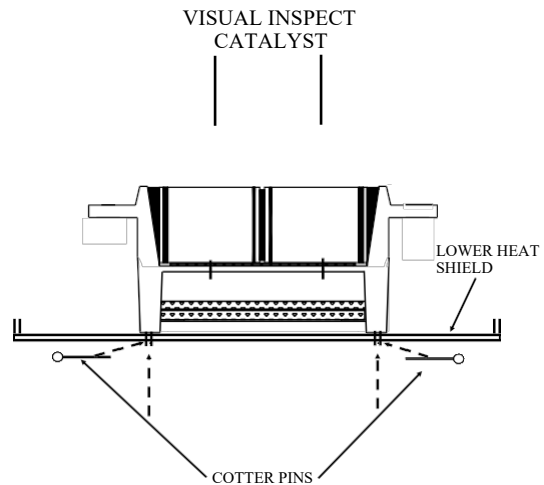
MAINTENANCE

CATALYST REPLACEMENT (Off-Season Replacement Recommended)

1. Spread a drop cloth in front of stove.
2. Open door and clean out any ash.
3. You will have to remove lower stainless steel heat shield. Remove the four cotter pins holding shield in place. Lay shield aside.
4. Using penetrating oil, generously lubricate four (4) bolt threads holding catalyst housing in place. Allow oil to penetrate.
5. **(A).** Using a 9/16" wrench or 9/16" socket, loosen four (4) nuts and remove catalyst housing (drop down) and place in a suitable work area. **(B).** Nuts holding catalyst are brass. If they strip you will have to order them from dealer. NOTE: DO NOT REPLACE WITH METAL NUTS.
6. Using needle nose pliers, grasp front edge of stainless steel "can" which houses catalytic element and pull upward. Reposition pliers to another position and pull upward. Repeat procedure until catalyst can be removed from housing.
7. Using a small putty knife or scraper, remove any gasket that may have adhered to catalyst housing.
8. Now, obtain new catalysts #PO800115C and wrap stainless steel "can" with interam gasket and tape ends together using scotch tape or masking tape. **IMPORTANT: BEFORE STARTING TO REPLACE CATALYST,** contact your dealer and order **INTERAM gasket** and **CATALYST HOUSING Gasket**. Gaskets not covered under warranty. It may take your dealer several days to receive the gaskets.
9. Insert new catalysts into catalytic housing and push down until they are seated on the top of stainless steel wire mesh supports.
10. Reinstall catalyst housing into stove and secure in place with brass nuts.
11. Reinstall lower heat shield with cotter pins.
12. The stove is now ready for use.



REMOVING/REPLACING LOWER HEAT SHIELD

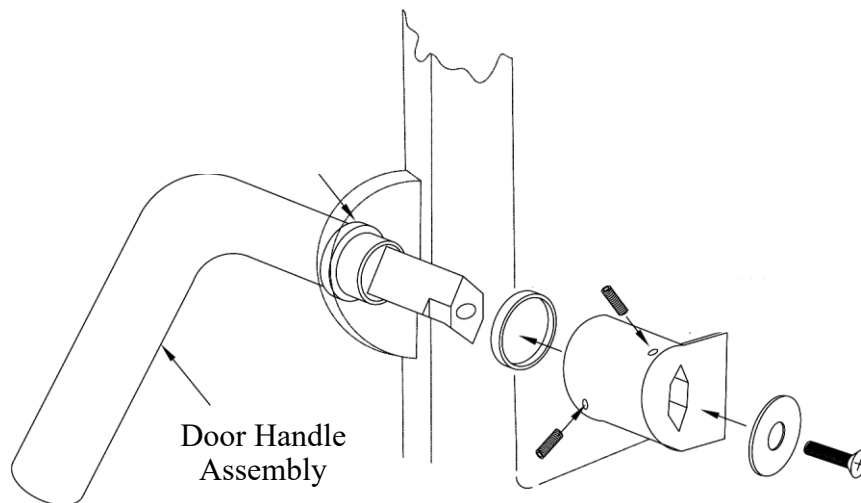
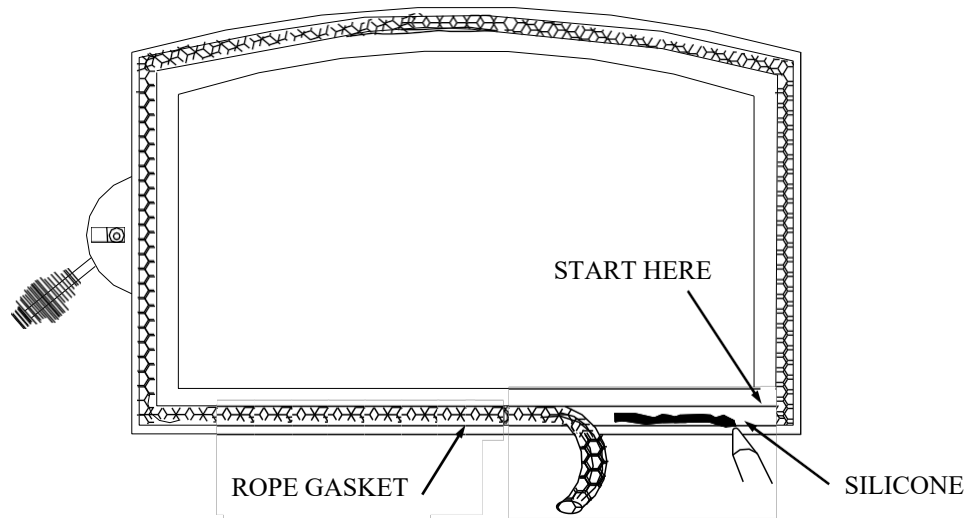


MAINTENANCE

DOOR GASKET REPLACEMENT (COLD HEATER)

To replace deteriorated gaskets, follow these steps to ensure proper installation of gaskets.

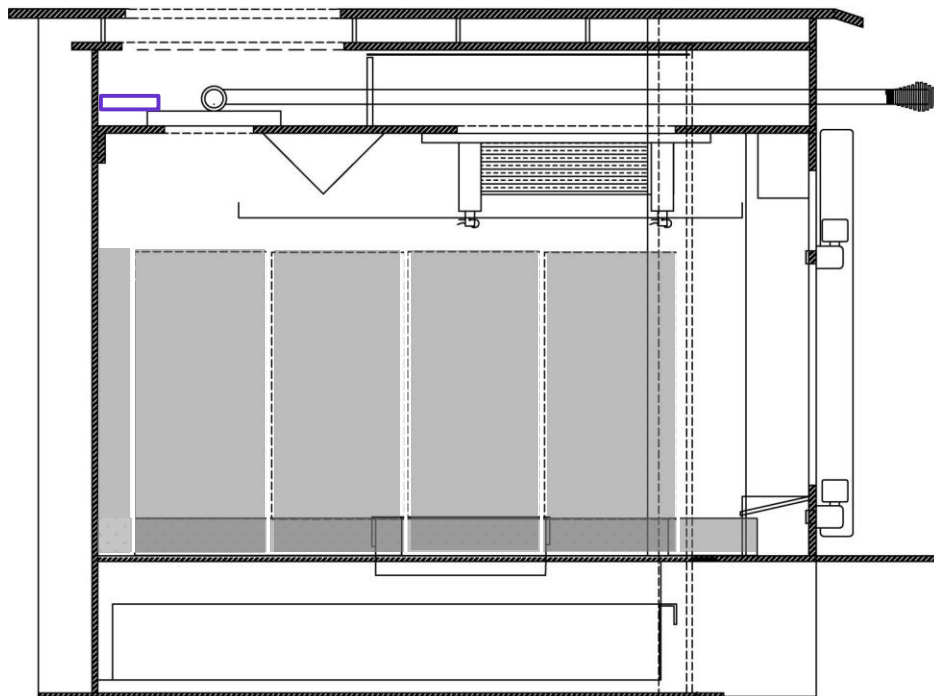
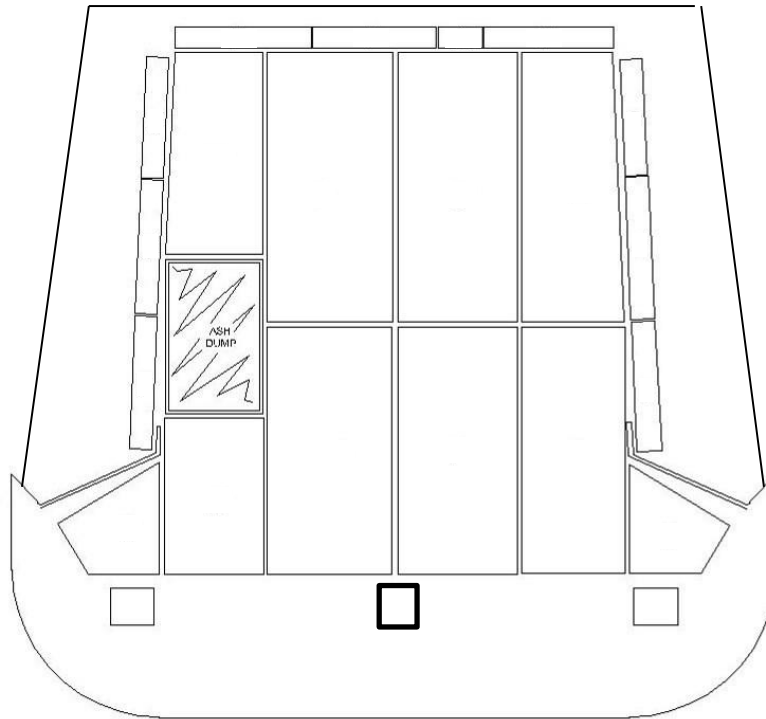
1. Obtain proper gaskets and silicone glue from your local dealer.
2. Using pliers, remove any worn and deteriorated gaskets.
3. Using a scraper, wire brush and sandpaper or steel wool, clean glue and gasket residue from door frame.
4. Measure and cut gaskets to length. Care should be taken not to stretch gaskets. What you want is a full and loose gasket weave after attachment to framing.
5. Obtain silicone glue and run a 3/16" bead inside door frame.
6. Obtain gasket and place in gasket channel areas starting at lower right corner, see below. Use a technique which assures that gasket is applied in a loose like manner. **DO NOT STRETCH GASKETS.**
7. After gasket is applied to glue, use your finger and go over all gasket gently pressing gasket to the channel. Use same pressure against gasket so that final result is an evenly applied gasket.
8. Leave door open and allow at least two (2) hours for glue to dry.
9. Once gaskets are checked, heater is ready for use.
10. This should be done annually. Allowing gaskets to deteriorate can cause over firing and shorten burn time.



PA 910096

MAINTENANCE BRICK LAYOUT

TOP VIEW



MAINTENANCE ELECTRICAL REPLACEMENT

MOTOR, THERMOSTAT, RHEOSTAT

1. **TO REPLACE MOTOR:**Unplug heater from 115V AC outlet.
 2. Remove bottom cover door removing (2) screws holding it in place. See Figure 33.
 3. To the right of ash pan you will find a wire cover screen protecting you from electrical components of this unit. See Figure 34. There are (3) screws holding wire cover screen. Remove (2) screws on left side of screen inward holding wire screen. Remove (1) right bottom screw holding right side of wire screen set aside. See Figure 34.
 4. Mark and unhook wire servicing motor. NOTE: You may remove thermostat to make it easier to work in area. Unscrew motor bracket with motor from unit. See Figures 34, 35. Gently slide motor bracket and motor out and while pulling it out move the back of the motor facing you from right to left in a clockwise motion.
 5. Place new motor over old motor and locate motor bracket in the same location as was on the old motor and mark holes on new motor. Remove motor bracket from old motor, line up with marks on new motor and secure bracket to new motor with screws form original motor assembly.
 6. To replace motor, turn motor so that 4"x4" air discharge opening is pointing toward back of stove. The flat part of motor housing turned up. With the air discharge opening pointing in the 2 o'clock position, start in toward unit. Rotating the back of motor counterclockwise. The air discharge opening of motor housing fits in a cavity in back of unit, that will direct air flow to proper location. Make sure air discharge opening is located firmly in opening. Reinstall motor bracket screws. If thermostat was removed, replace thermostat in bracket.
 7. Hook up wiring to all components, if you have replaced or unhooked them to rewire motor, rheostat or switch. If you need to see wiring diagram, See Page 42, Figure 36. If rheostat was removed, replace rheostat with the nut and replace control knob, reconnect wires to switch.
 8. Replace wire cage. Replace bottom cover door. Plug heater back into a 115V AC outlet.
1. **TO RPLACE THERMOSTAT:**Unplug heater from 115V AC outlet. Follow steps 2 through 3.
 2. Mark and unhook wires. Gently push thermostat up and out of thermostat bracket and replace with new thermostat. Reinstall wiring and cover screen. See Figure 35. If you need to see wiring diagram, See Page 37, Figure 36. Plug heater back into a 115V AC outlet.
1. **TO REPLACE RHEOSTAT:**Unplug heater from 115V AC outlet. Follow steps 2 through 3.
 2. Mark and unhook wires. Bottom under hearth is rheostat. Remove control knob and nut and replace with new rheostat installing with nut, then control knob. Reinstall wiring and cover screen. See Figure 35. If you need to see wiring diagram, See Page 37, Figure 36. Plug heater back into a 115V AC outlet.

Figure 33

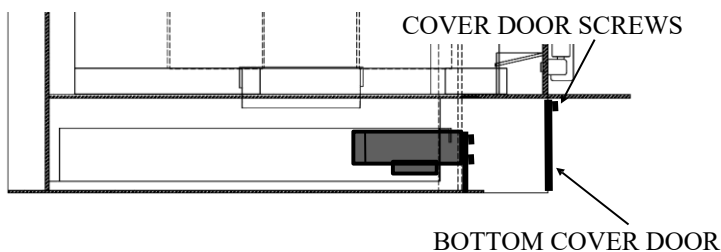


Figure 35

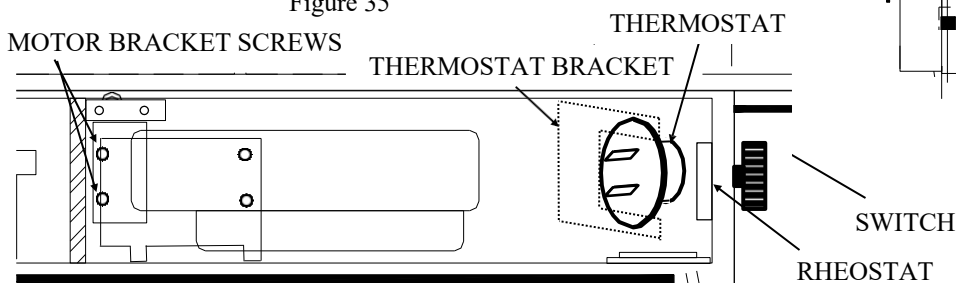
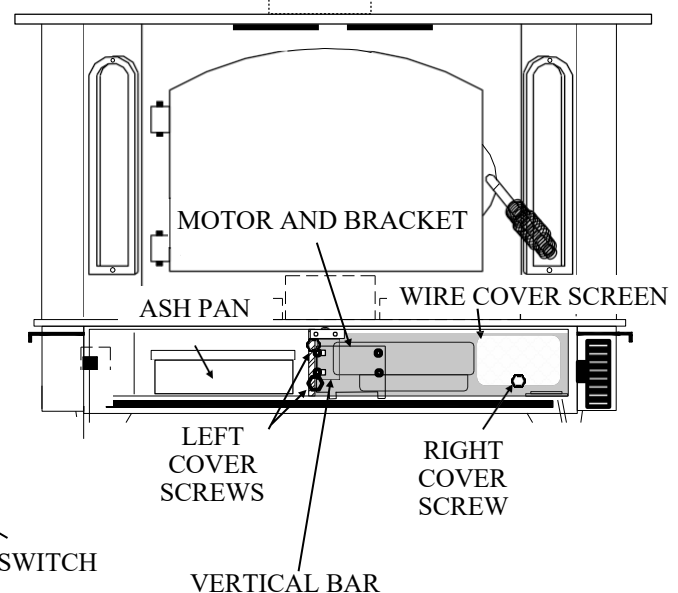


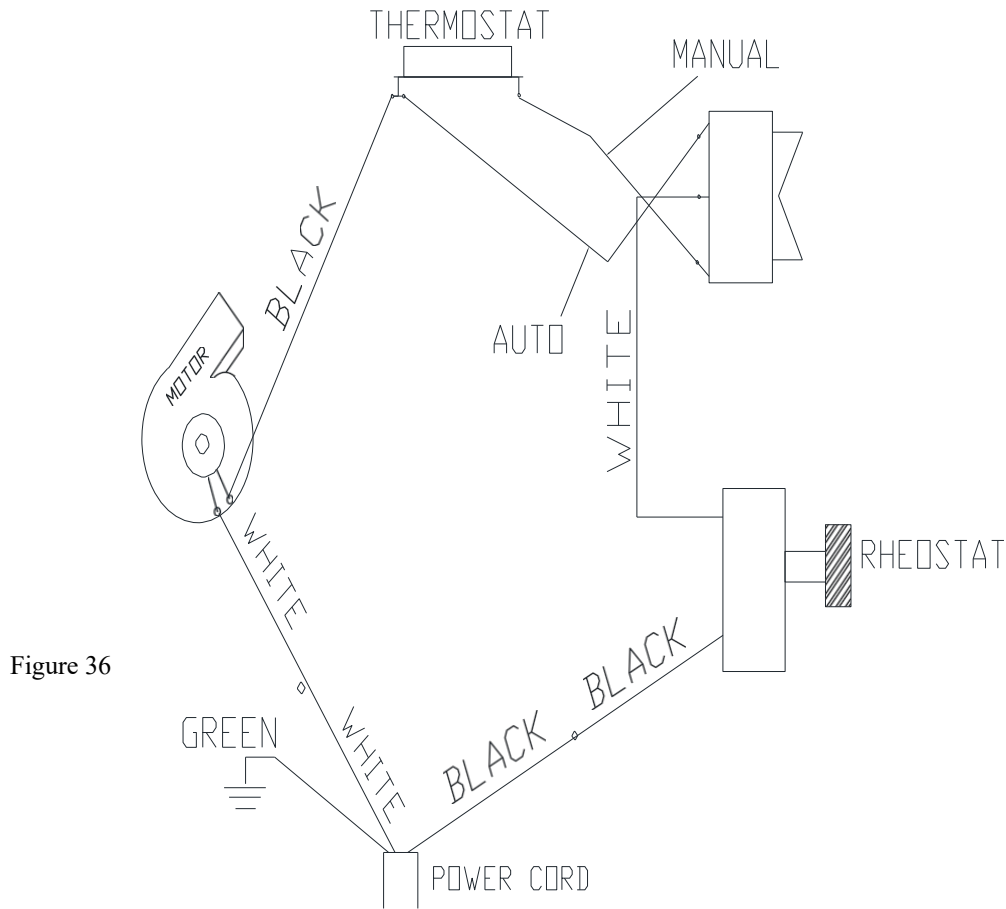
Figure 34



ROOM AIR BLOWER OPERATION

Your heater is equipped with a room air blower. For operation and wiring see figure below.

For your convenience, your heater is equipped with a rheostat with which you are able to select the air flow. The auto and manual switch will allow you to select the position at which thermostat will function.



Auto-position: After heater has warmed up and Auto-Manual switch is placed in “Auto” position and rheostat is in desired position, fan will automatically come on. When stove cools off, fan will automatically shut-off.

Manual position: You must turn room air blower on and off.

NOTE: Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.

NOTE: When refueling or removing ashes turn “OFF” room air blower. Be sure to turn room air blower back on when finished.

MAINTENANCE

CHECK CHIMNEY

- A. Chimney should be inspected once a year.
- B. The chimney should be cleaned as necessary to remove creosote, soot, leaves, birds' nests, etc.

NOTE: A chimney cap may be installed to prevent moisture from entering chimney, to prevent sparks and burning materials from escaping chimney and to keep birds and foreign materials from entering.

NOTE: Some areas may require an approved spark arrestor.

CLEANING THE HEATER

- A. The heater should not be cleaned with any type of detergent as most all detergents have an oil base and cannot be painted over.
- B. The heater should be lightly sanded with fine sandpaper or steel wool, then repainted or touched up with high temperature paint.
- C. If the heater is located in a moist or damp location, check thoroughly for signs of condensation during times when heater is not in use.
- D. When heating season is over, heater should be cleaned out completely with a wire brush or cloth to help eliminate ash and burned wood smell.

CARE OF GLASS DOOR

The glass door on your heater permits you to enjoy the beauty of the fire while retaining efficiency of your heater. Although the type of glass used in the stove door has well established and recognized heat resistant and strength characteristics, it can be broken through improper care. To achieve maximum utility and safety of your glass door, we advise that you observe following use and safety tips:

1. Inspect glass regularly for cracks or breaks. If you detect a crack or break extinguish fire immediately and return door to your dealer for glass replacement before further use.
2. Do not slam heater door or otherwise impact glass. When closing door, make sure that no logs or other objects protrude to impact against glass.
3. Do not clean glass with materials which may scratch it (such as steel wool) or otherwise damage glass. Scratches on the glass can develop into cracks or breaks.

The glass can be cleaned with a commercial oven cleaner, providing it does not contain abrasives. A build-up on glass that has been there for a considerable length of time can be burned off with a propane torch or straight razor blade. Use protective gloves when using razor.

SECTION VIII

TROUBLESHOOTING

Operation of any wood heater can create problems. While use of a catalytic-combustor equipped stove will substantially lessen some of these problems— such as creosote formation— other traditional wood heater problems may remain.

The following guidelines apply to operation of all wood heaters, with problems related to catalytic heater addressed where appropriate.

HEATER RELATED PROBLEMS

Problem	Possible Cause	Solution
1. Sluggish Heater Performance	1. Obstruction in flue liner 2. Closing catalyst bypass too soon 3. Poor Flue Draft 4. Combustor is plugged 5. Wet or unseasoned wood being burned	1. Check cap and chimney and remove obstruction. 2. Follow New Buck instructions for proper firing procedures 3. Flue may need extension 4. See section in “Combustor Related Problems” 5. Burn dry, natural seasoned hard wood
2. High Fuel Consumption	1. Inexperience in catalytic operation 2. Improper regulation of draft or inlet air 3. Air leaking around door frame and/or glass 4. Bypass damper open	1. Operate stove with desired heat output in mind. Do not be overly concerned with maintaining light-off temperatures 2. Close inlet air control as much as possible to maintain desired heat output. Check gaskets, reinstall fiberglass gasketing around doors and glass as necessary 3. Check door gasket. Check adjustment of door latch. 4. Close bypass damper

3. Backpuffing	1. Gusts of wind / windy day 2. Hot combustor. (Above 1400° F)	1. If flue cap not on chimney, install one. 2. Increase the amount of combustion air slowly
4. Smoke Rollout when Heater Door is Opened	1. Bypass damper is closed 2. Opened door too soon after opening bypass damper 3. Wind gusts blowing	1. Open bypass damper 2. Open bypass damper– wait 15 -30 seconds before slowly opening door 3. Install flue cap
5. Low Catalytic Temperature	1. Bypass is open 2. Light-off not obtained 3. Fuel charge is spent 4. Combustor coated with fly ash or soot 5. Heater damper down too much	1. Once light-off temperatures have been reached and unit is stabilized, close bypass 2. Follow manufacturer's operating instructions 3. Refuel as necessary for combustor operation 4. See Section VII "Preventive Maintenance" 5. Ensure that proper air mixture and draft are available for wood to burn proper
COMBUSTOR-RELATED PROBLEMS		
1. Plugging	1. Burning materials that produce a lot of char and fly ash 2. Burning wet, pitchy wood or burning large loads of small-diameter wood with the combustor in the operating position without light-off taking place	1. Do not burn materials such as garbage, gift wrap or cardboard 2. Burn dry, natural seasoned hard wood. Don't place the combustor in the operating position until high temperatures are high enough to initiate light-off
2. Catalyst Peeling	1. Extreme temperatures at combustor surface can cause the catalyst to peel. Over-firing and flame impingement are primary causes	1. If severe, remove and replace catalysts. See "Catalyst Replacement" Section VI. Avoid extreme temperatures
3. Catalyst Masking	1. Not maintaining light-off temperatures	1. See Section VI and review operating instruction.
COLORED-GLASS PROBLEMS		
1. Glass Darkens	1. Buildup Creosote on Glass	1. Cleaning Glass. The glass inside will become colored during use from creosote buildup. The best way to clean glass, COLD STOVE, is to let creosote buildup harden. Then use razor blade to scarp of buildup of creosote. Wash glass using soapy water or glass cleaner.

REPLACEMENT PARTS FOR THE MODEL 81C

1. Air Control Bar (Right Side)	MF 810084
2. Air Control Bar (Left Side)	MF 910088
3. Door Handle Assembly	PA 910096
4. Door Gold	PC 212400G
5. Door Black	PC 212400
6. Door Pewter	PC 212400P
7. Small Bottom Glass Clip	PO210767B
8. Small Side Glass Clip	PO21076S
9. Small Top Glass Clip	PO21076T
10. Off/Auto/Man Fan Switch	PE RC211RB
11. Thermostat 110 disc	PE 400132
12. Power Cord	PE 400240
13. Strain Relief	PE 400320
14. Motor	PE 910714
15. Motor Pad	PO188PAD
16. Rheostat	PE BC204
17. Rheostat knob	PE BC204A
18. Glass	PG 2124GL
19. Glass, Bay side	PG 810100
20. Spring Handle	PO 100150
21. Small Spring Handle For Damper	PO BC290B
22. Catalyst Damper Rod	PO 910012
23. Catalyst	PO 800115C
24. Catalyst Intergram Gasket	PO 910500
25. Cast Catalyst Housing	PC H8080
26. Catalyst Housing Gasket	PO 800500
27. Catalyst Mixing Wire	PO 800015
28. Bay Window Overlay	PO 810105
29. Primary Air Block x 2	MF 810081
30. Shotgun Air Block	MF81C105
31. 1" x 1" x 1/8" thick magnet	PO DM841
32. Firebrick	PR 900050
33. Cover Door Assembly	MA 81COVDOOR

NEW BUCK CORPORATION (NBC)
"LIMITED WARRANTY" FOR THE BUCK STOVE
PLEASE READ THIS WARRANTY CAREFULLY

PRODUCTS COVERED

This warranty covers the new Buck Stove heating unit, so long as it is owned by the original purchaser, including optional and standard accessories purchased at the same time, subject to terms, limitations, and conditions herein set out.

PRODUCTS NOT COVERED

This warranty does not cover the following:
Glass, Refractory Material, Firebrick or Gaskets.

This Warranty will not cover any damage and/or failure caused by abuse or improper installation of the products covered.

WARRANTY TIME PERIODS

(A) Period I

For one year from the date of purchase, NBC will replace or repair, at its option, any part defective in materials or workmanship. The costs of parts only are included. The customer pays any labor or transportation charges required.

Thereafter,

(B) Period II

For the period after the first year from the date of purchase and extending for five years as long as the Buck Stove is owned by the original purchaser, NBC will repair or replace, at its option, any part defective in materials or workmanship, with the exception of, electrical motors, wiring, switches, components, optional and standard accessories, and all parts not permanently attached to the heating unit. Parts not permanently attached to the heating unit are defined as those items designed to be removed from the stove, including those removable with common hand tools. The costs of parts only are included. The customer pays any labor or transportation charges required.

PROCEDURE

Should you feel that your BUCK STOVE is defective, you should contact any Buck Stove dealer for the name of your nearest authorized Buck Stove service representative, who will instruct you on the proper procedure, depending on which Warranty Time Period (Period I or Period II) applies.

If for any reason you are dissatisfied with the suggested procedures, you may contact us in writing at:

New Buck Corporation
Customer Service Department
P. O. Box 69
Spruce Pine, NC 28777
Email: info@buckstove.com

CONDITIONS AND EXCLUSIONS

- (A) Replacement of parts may be in the form of new or fully reconditioned parts, at NBC's option.
- (B) There is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of the Express Warranty.
- (C) New Buck Corporation is not liable for indirect, incidental, or consequential damages in connection with the use of the product including any cost or expense of providing substitute equipment or service during periods of malfunction or non-use.
Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.
- (D) All warranty repairs under this warranty must be performed by an authorized Buck Stove service representative. Repairs or attempted repairs by anyone other than an authorized service representative are not covered under this warranty. In addition, these unauthorized repairs may result in additional malfunctions, the correction of which is not covered by warranty.

OTHER RIGHTS

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

OWNER REGISTRATION CARD

The attached Owner Registration Card must be completed in its entirety and mailed within 30 days from the date of purchase or from the date of installation, if installed by a factory certified installer, to New Buck Corporation in order for warranty coverage to begin.

PLEASE NOTE: The Owner Registration Card must contain the Authorized Buck Stove Dealer Code Number and the Certified Installer's number (if applicable) for warranty coverage to begin.

To be completed by selling distributor/ dealer/ customer:

Name _____
(Last) (First)

Address _____

City _____ State _____ Zip _____

CUSTOMER EMAIL: _____

MODEL 81C - Serial Number _____

Date of Installation: Day _____ Month _____ Year _____

Installer's Name _____

Installer's Certification Number _____

Dealer's Name _____

City _____ State _____ Zip _____

MODEL CAROLINA 82C CATALYTIC UNIT



DISCLAIMER ⚠
TRIM KITS, PEDESTALS, LEGS & COLLARS NOT INCLUDED | SOLD SEPARATE

FIREPLACE INSERT & FREESTANDING

FEATURES

PREPARATIONS
OPERATION

INSTALLATION
MAINTENANCE

SAFETY

SAFETY NOTICE ⚠

IF THIS HEATER IS NOT PROPERLY INSTALLED, A HOUSE FIRE MAY RESULT. FOR YOUR SAFETY, FOLLOW THE INSTALLATION INSTRUCTIONS. CONTACT THE AUTHORITY HAVING JURISDICTION (SUCH AS MUNICIPAL BUILDING DEPARTMENT, FIRE DEPARTMENT, FIRE PREVENTION BUREAU, etc.) CONSULT BEFORE INSTALLATION TO DETERMINE THE NEED TO OBTAIN A PERMIT. KEEP THESE INSTRUCTIONS FOR FUTURE USE.

TESTED AND LISTED BY:



PFS/TECO, COTTAGE GROVE, WI

MANUFACTURED BY NEW BUCK CORPORATION
200 ETHAN ALLEN DRIVE
P.O. BOX 69
SPRUCE PINE, N.C. 28777
www.buckstove.com

Revised September 2025

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SECTION I

When installed and operated as specified in these instructions, and as stipulated on operation and installation labels affixed to unit, **The New Buck Corporation** room heater Model 81C is one of the safest and most efficient heating systems available. The unit is designed to burn wood fuel only.

Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury or even death.

- **NOTE: When burning any unit or appliance that combusts fuel for heat, we highly recommend use of smoke and carbon monoxide detectors in your home.**

Early signs of carbon monoxide poisoning resemble flu, with headaches, dizziness and/or nausea. If you have these signs, heater may not be working properly. Get fresh air at once!

Throughout manual, you will see this  symbol. This indicates areas of importance regarding safety. Please make a special note of these areas.



Warning: PAINT. This product can expose you to chemicals including ethyl benzene, which is known to the state of California to cause Cancer. For more information, go to www.P65Warnings.ca.gov

Install and use only in accordance with manufacturer's installation and operating instructions. Do not connect this unit to a chimney flue serving another appliance.

ROOM HEATER FEATURES

Before attempting to install or operate your heater, it is a good idea to familiarize yourself with features and operating controls of unit. (See page 3 for reference).

OPERATING CONTROLS

WARNING: Model 81C was not designed for fire grates.

NOTE: Do not use grate, or elevate fire. Build fire directly on firebrick.

1. **Bypass Damper:** The bypass damper control is located in top center of heater front just under top. It is operated by pushing or pulling rod. The damper is fully open when handle is pulled out and fully closed when it is pushed in. The damper must be **OPEN** before door is opened.
2. **Blower Control:** The blower control (Rheostat) is located on side of the unit. The rheostat is used to vary speed of blower. It can be set at any position. It must be turned on to activate automatic thermostat on stove.
3. **Primary Air Controls:** The primary air control (4) is located at right bottom side of hearth. It is operated by moving handle **out** to open (to allow air into the firebox) or **in** (to control or close off) air into firebox. Shotgun air control (4A) is located at left bottom side of hearth. It is operated by moving handle **in** to open (to allow air to center of firebox) or **out** (to control or close off).
4. **Warm Air Outlets:** Provides heat extraction from top of firebox.
5. **Baffles:** Directs air flow around unit for maximum heat transfer.
6. **Air Inlet:** Allows cool air near floor to be circulated through blower and back into warm air chamber of heater.
7. **Door:** Provides an "airtight" feature. The door allows a much higher burning efficiency than can be obtained with an open firebox.
8. **Hearth Extension:** Offers protection from spilled ashes and cinders.
9. **Power Cord:** Provides electrical power to operate blower.
10. **Catalyst:** Enables Unit to burn cleanly and efficiently.
11. **Catalyst Probe:** Probe is located right of the bypass damper rod. It is used to determine (catalyst) temperature.
12. **Automatic/Off/Manual Switch:** Located behind right cover door under hearth. In the "Manual" position, the blower operates continuously. In "Automatic" position, blower is controlled by internal thermostat which reacts to temperature of air between the stove walls. (Not same as the temperature showing on the Catalyst Probe.)

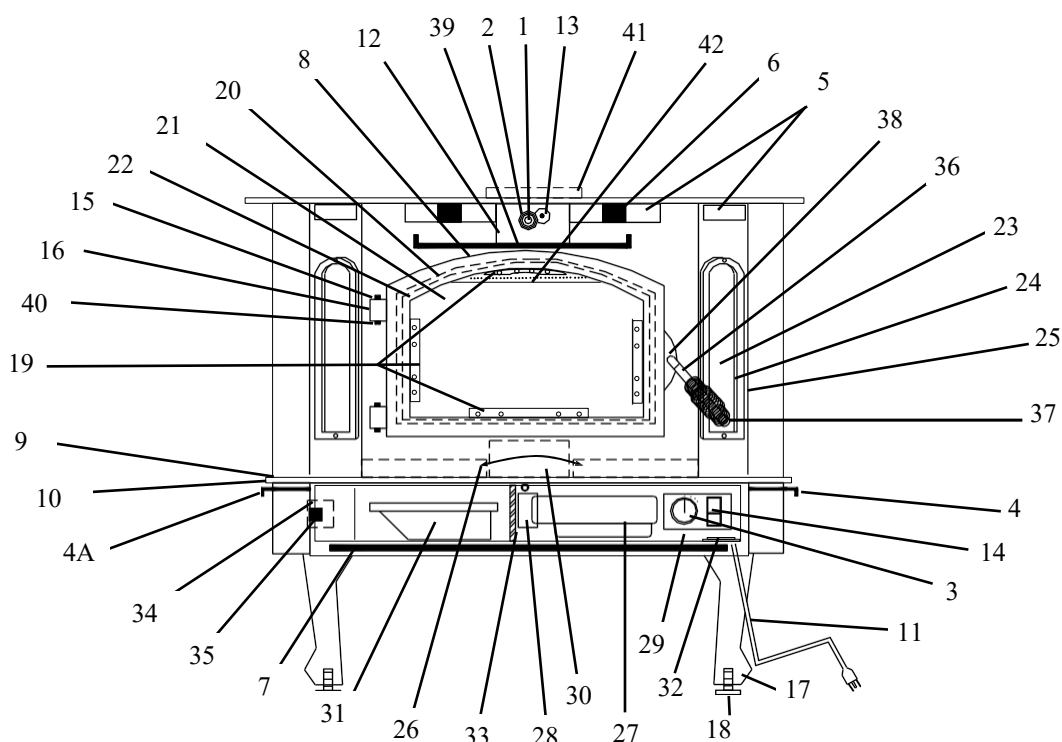
SAFETY STANDARD COMPLIANCE

The Model 81C catalytic solid fuel (wood) burning combination room heater/fireplace stove manufactured by New Buck Corporation complies with UL 1482 for residential freestanding (wood) fireplaces when constructed and installed in accordance with **PFS** approved documentation.

EPA COMPLIANCE STATUS

This manual describes installation and operation of the **New Buck Corporation Model 81C** wood heater. This heater meets the U.S. Environmental Protection Agency's Emission limits for wood heaters sold after May 15th 2020. Under specific test conditions, this heater has been shown to deliver heat at rates ranging from approximately 13,300 to 27,700 BTU/hr for the Model 81C. A weighted average was used to calculate the overall efficiency across all of the burn rate categories using the higher heating value (HHV 80.0%).

MODEL 81C WOOD STOVE IDENTIFICATION



- | | |
|--|------------------------------------|
| 1. Bypass Damper | 24. Side Glass Gasket |
| 2. Bypass Damper Spring Handle | 25. Overlays |
| 3. Blower Control (Rheostat) | 26. Firebrick |
| 4. Primary Air Control Air Wash Rod for Both Sides | 27. Motor |
| 4a. Shot Gun Air Control | 28. Motor Mount Bracket |
| 5. Warm Air Outlets | 29. Cover Door |
| 6. Baffles (Interior of Stove) | 30. Shot Gun Air Box |
| 7. Air Inlet | 31. Ash Pan |
| 8. Door | 32. Disc Thermostat |
| 9. Hearth Extension | 33. Cover Door Hinge |
| 10. Hearth Trim | 34. Magnet Holder |
| 11. Power Cord | 35. Cover Door Magnet |
| 12. Catalyst (Interior Firebox) | 36. Door Handle |
| 13. Catalyst Probe | 37. Spring Handle |
| 14. Automatic / Off / Manual Switch | 38. -Door Latch |
| 15. Door Hinge Cap | -Door Latch Screw |
| 16. Hinge Block | -Door Handle Bushing |
| 17. Legs | -Door Handle Spacer |
| 18. Leveling Screws | -Door Latch Flat Washer |
| 19. Glass Clips/Small; Side, Top, Bottom | -Door Latch Screws (Phillips Head) |
| 20. Door Gasket | -Door Latch Screws (Allen Head) |
| 21. Door Glass | 39. Lower Heat Shield |
| 22. Door Glass Gasket | 40. Hinge Pins |
| 23. Side Glass | 41. 6" Flue Exit |
| | 42. Air Wash Screen |

FEDERAL COMPLIANCE WARNING

This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

CATALYST EQUIPPED

"This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation.



Warning: INTERAM GASKET. This product can expose you to chemicals including aluminosilicate, which is known to the state of California to cause Cancer. For more information, go to www.P65Warnings.ca.gov

"Combustors should be visually inspected at least three times during the heating season to determine if physical degradation has occurred. Actual removal of the combustor is not recommended unless more detailed inspection is warranted because of decreased performance. If any of these conditions exists, refer to Catalyst Troubleshooting section of this owner's manual."

CATALYST WARRANTY

The combustor supplied with this heater is a set of (2) (2" x 3-1/2" x 6" x 25" cells). A catalytic combustor that fails due to a defect in function, workmanship, or materials is covered under a 1-year warranty period. Contact any Authorized Buck Stove Dealer who will instruct you on the proper procedure.

New Buck Corporation does not handle catalyst replacements. Customer can order directly from Applied Ceramics.

Applied Ceramics
Customer Service Department
P.O. Box 29664
Atlanta, GA 30359
770-448-6888

**DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS."**

PROPER FUEL SELECTION

For best results, this heater is designed to burn (dry), natural seasoned hardwood. Higher efficiencies and lower emissions generally result when burning air dried natural seasoned hardwoods, as compared to softwoods or freshly cut hardwoods. Green or freshly cut hardwoods (wood with high moisture content) will not produce the BTU's needed to heat your home. The result will be low temperature reading on the catalyst probe, thus low BTU output.

DO NOT BURN:

Treated or painted wood, coal, garbage, cardboard, solvents, colored paper, or trash. Coal and artificial logs burn much hotter than wood and could cause damage, through overheating. Burning treated wood, garbage, solvents, colored paper or trash may result in the release of toxic fumes and may poison or otherwise render the catalytic combustor ineffective. Burning cardboard, loose paper, and trash will add significantly to ash and soot build-up, and it will not produce much heat. Fly ash from improper fuel can also coat or plug the combustor, causing smoke spillage into the room.



DO NOT BURN!

- | | |
|------------------------|---------------------------------|
| • UNSEASONED WOOD | • PLASTICS |
| • TREATED/PAINTED WOOD | • PETROLEUM PRODUCTS |
| • GARBAGE | • PAINT/PAINT THINNER |
| • CARDBOARD | • MATERIALS CONTAINING ASBESTOS |
| • SOLVENTS | • DRIFTWOOD |
| • COLORED PAPER | • ASPHALT PRODUCTS |
| • TRASH | • RAILROAD TIES |
| • LAWN CLIPPING | • MANURE/ANIMAL REMAINS |
| • RUBBER PRODUCTS | • PLYWOOD/PARTICLE BOARD |

ACHIEVING CATALYTIC LIGHT-OFF

The temperature in stove and gases entering combustor must be raised to between 700 ° F to 900° F for catalytic activity to be initiated. The temperature can be determined by the Catalyst Monitor Probe. During start up of a cold stove a medium to high firing rate must be maintained for about 15-20 minutes before pushing in the damper. This can be achieved by starting fire with dry kindling, paper and small split wood. Have the Bypass Damper fully open (pulled out). This ensures that the stove, catalyst and fuel are all stabilized at proper operating temperatures. Even though it is possible (and likely) to have gas temperatures reach 600 ° F within two to three minutes after a fire is started, if the fire is allowed to die down immediately it may go out or the combustor may stop working. Once the combustor starts working, heat generated in it by burning smoke will keep it working.

ACHIEVING CATALYTIC LIGHT-OFF WHEN REFUELING

During refueling and rekindling of a cool fire, or a fire that has burned down to charcoal phase, operate stove at a medium to high firing rate for about 15 minutes to ensure that catalyst reaches approximately 800° F.

CATALYST MONITORING

It is important to periodically monitor operation of catalytic combustor to ensure that it is functioning properly, and to determine when it needs to be replaced. A non-functioning combustor will result in a loss of heating efficiency and an increase in creosote and emissions. See Troubleshooting section for detailed instructions **BEFORE** attempting to remove catalyst.

This catalytic heater is equipped with means to monitor catalyst operation. Properly functioning combustors typically maintain temperatures in excess of 1000 ° F. If catalyst temperatures are not in excess of 500 ° F, refer to Catalyst Troubleshooting section of this owner's manual.



CAUTION AGAINST OVER-FIRING

Do not over-fire this heater.

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to heater and to catalytic combustor.

ASH REMOVAL



CAUTION: Never remove ashes from heater with blower running. Be sure to turn room air blower off before removing ashes

Whenever ashes build up in firebox and when fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on firebox bottom to help maintain a hot charcoal bed. To remove ashes the dump is located at left inner bottom. By lifting dump door, place ashes through the dump opening. The ashes fall directly into ash pan. The ash pan is located at left side under the hearth behind cover door.

NOTE: Be sure to turn room air blower off before removing ashes. Open cover door and slide ash pan out.

NOTE: Fueling and ash removal door (s) must remain closed when in operation.

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on ground, away from all combustible materials, pending final disposal. The ashes should be retained in the closed container until all cinders have thoroughly cooled.

NOTE: Be sure to turn room air blower back on when job is completed.

NOTE: The room heater is not to be connected to any air distribution duct.

CREOSOTE - FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapor, which combined with expelled moisture forms creosote. The creosote vapors condense in a relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on flue lining. When ignited, this creosote makes an extremely hot fire.

Select an installation location that will give best airflow from front of heater to remainder of home.

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS MODEL 81C

BEFORE INSTALLING YOUR NEW BUCK STOVE,
READ THE ENTIRE INSTRUCTION MANUAL

IMPORTANT INSTRUCTIONS WARNING

THIS UNIT GENERATES HIGH HEAT, SO TREAT IT WITH CARE. **HOT WHILE IN OPERATION.** KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS. DO NOT CONNECT TO ANY DISTRIBUTION DUCT OR SYSTEM. READ ALL INSTRUCTIONS BEFORE INSTALLING AND USING THE APPLIANCE. FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCES.

- The New Buck Corp. Model 81C has been tested to UL 1482 Standards and listed by PFS/TECO. Standard for Room Heaters, Solid Fuel Type.
- Install and operate your unit according to instructions provided in this manual. Local building codes may apply; therefore, contact your local building inspector for necessary installation requirements and permits which may go beyond these instructions. Contact your insurance company for coverage and installation inspection.
- **DO NOT INSTALL IN SLEEPING ROOMS.**
- **NOTE: When burning any unit or appliance that combusts fuel for heat, such as coal, oil, wood or natural and (L.P.) liquid petroleum gas. Correctly place monitors in those areas that are expected to produce Carbon Monoxide (CO). Consult with your local fire safety officials to learn more**
- Examine the masonry fireplace and chimney prior to installation of fireplace accessory to determine that construction meets the minimum fireplace construction requirements illustrated in the instructions. Make sure that it is free from cracks, loose mortar, creosote deposits and other blockage, or other signs of deterioration.

CAUTION

DO NOT USE MORE THAN ONE STOVE TO A CHIMNEY. DO NOT USE A FLUE INTENDED FOR A GAS APPLIANCE. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE. DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

CAUTION

YOUR CHIMNEY MUST BE CORRECTLY SIZED. A CHIMNEY THAT IS TOO SMALL OR LARGE IN DIAMETER, OR TOO SHORT, CAN CAUSE YOUR STOVE TO SPILL SMOKE WHEN THE DOOR IS OPENED.

INTRODUCTION

Your new MODEL 81C is a catalytic unit designed to meet the most stringent emissions standards with the use of a catalytic combustor.

For peak performance, we suggest the use of natural seasoned hard wood, loading wood from front to rear.

NOTE: Soft woods such as pine, create more creosote, clogging of chimney and produce a less efficient burn performance.

You should not burn trash or garbage, artificial or paper logs, gift wrapping, treated or painted wood or any type of coal or flammable fluids.

**DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS.”**

This heater is equipped with a standard room air blower. For operation and use of these electrical assemblies, see instructions provided in this manual starting on page 37.

*Model 81C: Motor Assembly—MA 910714

CHIMNEY HEIGHTS

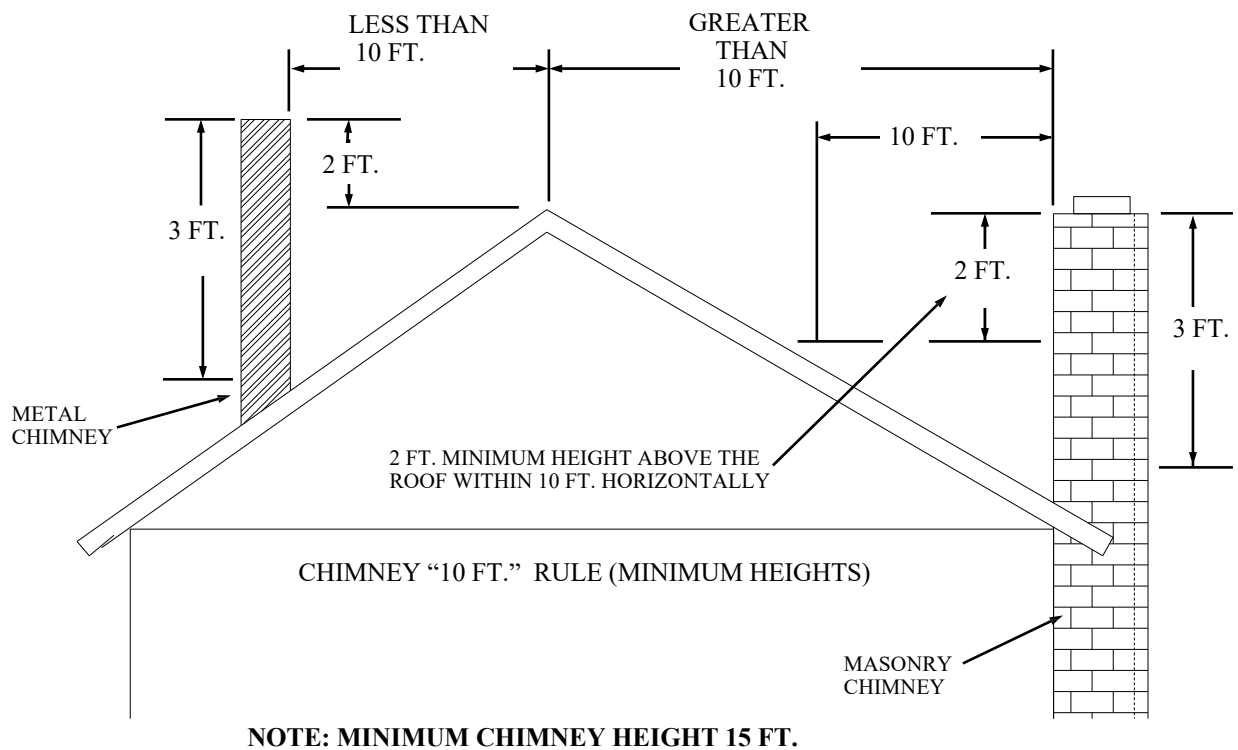
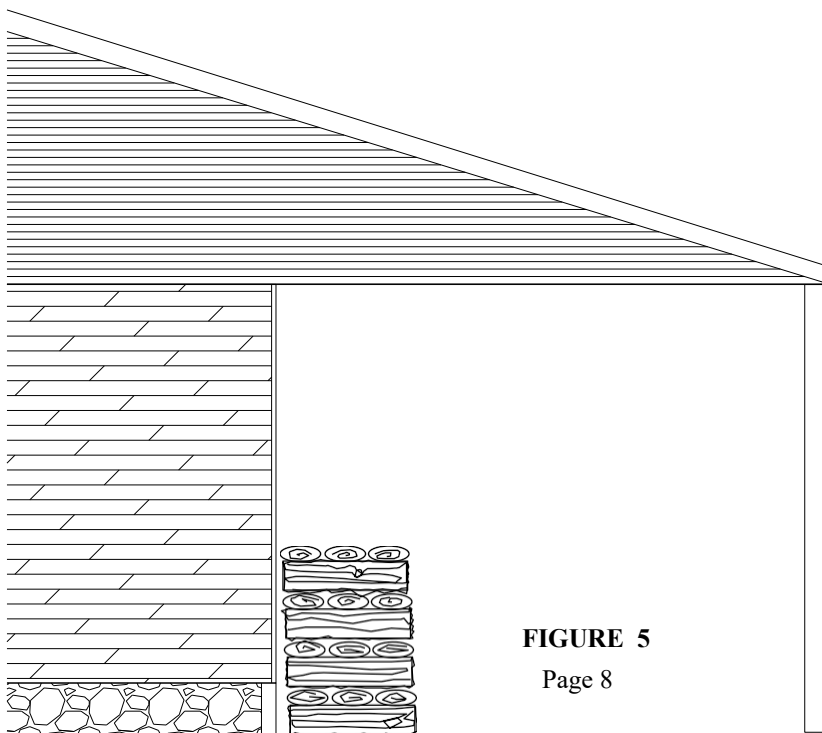


FIGURE 4

HOW TO STACK WOOD



Stack wood in crisscross pattern under a shelter to allow air flow to dry wood and to keep wood from rain. Green wood may have 50-60% moisture content. Wood seasoned outside uncovered may have 40% moisture content. Wood properly seasoned in a covered environment will have less than 20% moisture content

FIGURE 5

CAUTION

THE UNIT IS PAINTED WITH A SPECIALLY FORMULATED HIGH TEMPERATURE PAINT THAT CURES DURING THE FIRST TWO OR THREE FIRINGS. YOU MAY NOTICE A SLIGHT SMOKING EFFECT AND AN ODOR OF BURNING PAINT WHEN YOU BUILD THE FIRST FIRES. THIS IS NORMAL AND IS NOT A CAUSE FOR ALARM. IN SOME CASES, THESE FUMES WILL ACTIVATE A SMOKE ALARM. OPENING A WINDOW NEAR THE UNIT WILL ALLOW THESE FUMES TO ESCAPE. DO NOT BUILD A LARGE, ROARING FIRE UNTIL THIS CURING IS COMPLETE OR HEATER FINISH MAY BE DAMAGED.

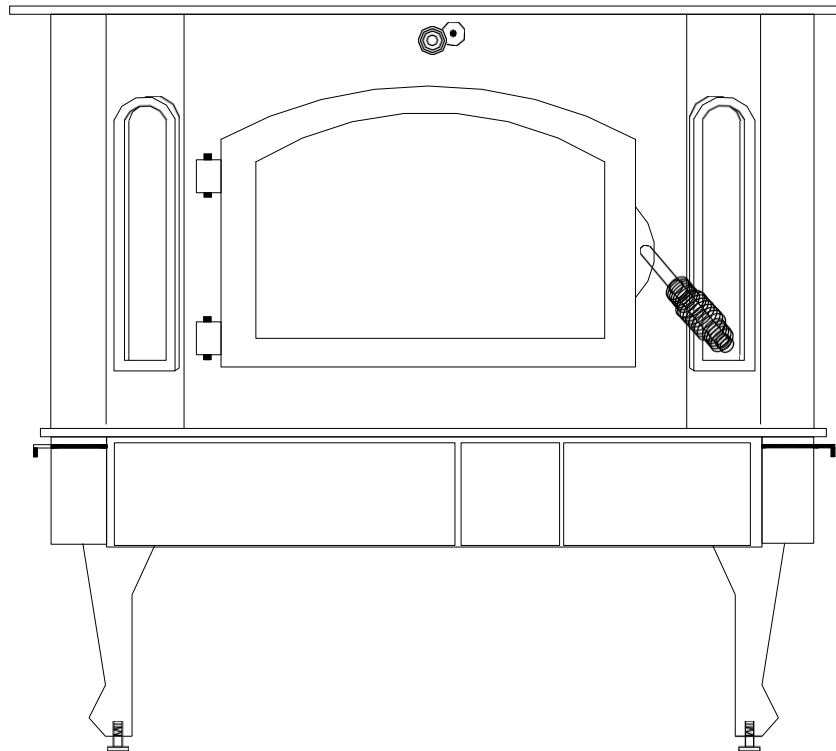
The connector and/or chimney should be inspected at least once a month during heating season to determine if a creosote buildup has occurred.

CAUTION

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THE HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE STOVE WHEN IT IS IN USE. ALL FLUIDS OF THIS TYPE GIVE OFF VOLATILE FUMES AND CAN AND WILL EXPLODE! DON'T TAKE A CHANCE WITH THE SAFETY OF YOUR HOME AND FAMILY.

SECTION III

RESIDENTIAL FREESTANDING INSTALLATION



INSTALLATION PRECAUTION

Select an installation location that will give best airflow from front of heater to remainder of home.

Extensive field and laboratory testing has shown that catalytic stoves perform best as freestanding stoves when:

1. A rain cap is installed on the chimney.
2. Height of chimney is at least 15 feet high.
3. Location of chimney is on interior. (Not on an outside wall)
4. To be installed as a freestanding room heater with the clearances in the manufacturer's installation instructions. Not be installed in any factory-built fireplace.

Satisfactory results have been reported with installations other than listed above. However, draft problems are possible if a hot chimney is not maintained.

CAUTION: Do not connect this unit to a chimney flue serving another appliance.

PREPARING STOVE FOR INSTALLATION

1. Inspect unit for any obvious physical damage.
2. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
3. Check primary air control and shotgun air control to ensure that they both slide freely.
4. Remove the manual bag and items from within firebox. Spread a dropcloth on floor behind heater. Next, tilt heater so that back is on drop cloth.
5. **(Leg Kit):** If legs are to be used, obtain four legs, attach legs to holes in bottom of unit with bolts and washers supplied with leg kit. (See Figure 12).
6. **(Pedestal Kit):** If pedestal kit is being used an outside air is required for residential freestanding installation (page 34 Out Side Air Installation). Place pedestal against bottom of heater (angle side to heater). Center pedestal front to rear and also center left and right. Mark screw locations with pen or pencil on bottom of stove through outer holes of stand mounting angles. Set stand aside and drill four 7/32" holes in heater bottom. Then mount pedestal to bottom of heater with screws provided. (See Figure 13).
7. Obtain four (4) 3/16" self-tapping screws and secure pedestal to heater.
8. Reposition heater to upright position.

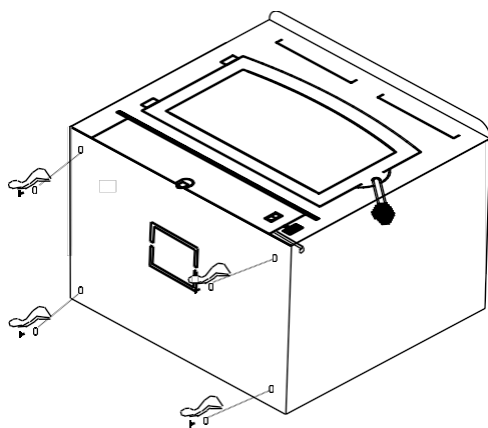


FIGURE 12

HOLES FOR MOUNTING PEDESTAL

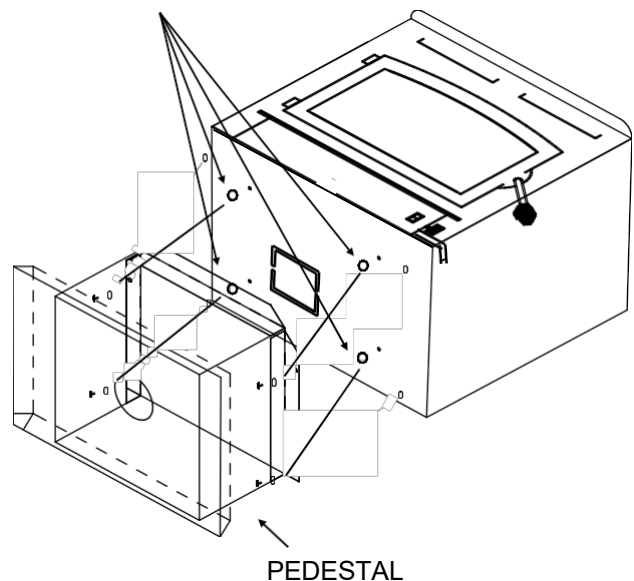


FIGURE 13

MINIMUM CLEARANCES

Floor Protection:

When installing a heater, a floor protector must be used. Floor protector must have a minimum of 1.1 R-Value non-combustible material.

How to use alternate materials and how to calculate equivalent thickness

Most people have heard of R-Values, which are used for rating common building materials such as fiberglass insulation and glass. However, many texts which cover stoves and fireplaces use K-Values instead of R-Values. Although the two are somewhat related, there are differences.

R-Value: The higher the R-Value, the better the insulating properties of the subject materials. R-Values are most often used to express the thermal resistance (ability to stop heat flow) of a building wall, ceiling or floor. Because of this, most R-Values are calculated at normal temperatures of approx. 75 F. R-Values are easy to add together so calculating the total R-Value of a wall is simply done by adding the values for the sheetrock, insulation, sheathing and siding.

K-value is a measure of heat conductivity of a particular material. Specifically, it is the measure of the amount of heat, in BTUs per hour, that will be transmitted through one square foot of material that is one inch thick to cause a temperature change of one degree Fahrenheit from one side of the material to the other. The lower the K-value for a material, the better it insulates. If the K-value of the material is known, the R-value per inch can be determined by dividing 1 by the K-value (R-value per inch = $1/K$ value). The LOWER a K-Value, the better its performance as an insulator.

R or K values have nothing to do with whether a material is flame proof, flame resistant or combustible. Styrofoam, cork, wood and polyester are just some examples of materials which are good insulators but will burn or smoke dangerously when exposed to excess heat.

Technical - For those who desire to calculate their own K or R values, please use the following formulas:

1. R value can be calculated by dividing the thickness by the K value.

For US calculations, we use inches as the unit of measurement.

“In the inch-pound units, thermal resistance is measured in degrees F times square feet of area times hours of time per Btus of heat flow.”

$R\text{-value} = \text{thickness} / K\text{-value}$

2. K value is the inverse of the R-Value. If one is known, the other can be calculated.

“units of Btu-inch/hour per square foot per degree F”

$\text{Thickness}/k \text{ value} = R \text{ value}$

or:

Divide the inches of thickness by R.

$k = \text{inches of thickness} / R$

Common K and R Values Chart				
Material	K value	R Value	inches-K value .84	inches-R value of 1
per inch				
Micore 300*	0.43	2.33	0.5	0.43
Wonderboard (ce	1.92	0.52	2.3	1.92
Common Brick	5	0.2	6	5
Cement Mortar	5	0.2	6	5
Ceramic Tile	12.5	0.08	14.9	12.5
Marble	11	0.09	13.1	11
Air Space (ventila	0.7	1.43	0.8	0.7
sand and gravel	1.7	0.59	2	1.7
Drywall (gypsum)	1	1	1.2	1
Rockwool or Fiber	0.3	3.33	0.4	0.3
Units	K per unit	R per unit		
per unit				
8" Concrete Block	1	1		
Glass Block - 4"	2	0.5		
* These materials or equiv are some of the best to use for relatively thin hearth protection				

K-Value Example: A wood stove may call for a floor which has a K factor of 1 or less. A product such as Micore 300 Board from USG has a K-Value of approx .43 per inch. Therefore a 1/2" thickness of this board would have a K-Value of .86, which meets the requirement of our example stove.

R-Value Example: A stove or fireplace may call for a floor with an R-Value of 1.5. The same board above is rated as having an R-Value of 2.33 for a one inch thickness. Therefore, 3/4" of the Micore 300 Board would meet the specifications for this stove.

Summary: R and K values are related, but K is the value commonly used for specifying materials for use with stoves and fireplaces. Be sure that your choice of insulating material for high temperature applications is noncombustible.

With K values, the lower value is a better insulator. With R Values, the highest number is better.

For low profile hearths, it is best to use manufactured materials such as Micore and Cement Board (Durock, Wonderboard, etc.) as these will allow hearth thicknesses of from 1/4" to 2" with most stoves and fireplaces. Most other common building materials will require at least 3" of thickness and usually much more.

Example of Hearth Calculations - this is for a Hearth requirement of approx $R=1.15$ (figures taken from Ceramic Tile manufacturers trade association)

The assembly that we will evaluate is a $\frac{3}{8}$ " layer of Micore 230 and a layer of $\frac{1}{2}$ " Util-A-Crete. The first step is to convert the k values of the materials in question into R so that we may add them up and determine if they will provide the necessary insulation value required by the manufacturer.

Micore 230 has a k value of .43 so –

$1 \text{ divided by } k = 2.32 \text{ times the thickness } .375 (\frac{3}{8}) = 0.87$

Util-A-Crete (cement tile backer board) has a k value of 1.6 so – $1 \text{ divided by } k = .625 \text{ times the thickness } .5 (\frac{1}{2}) = 0.3125$

Add the values together $0.87 \text{ plus } 0.3125 = 1.1825$ This R- value is an acceptable assembly.

What if we decide to use only one material? In this example, only Util-A-Crete cement board?

We could use the published R-Value of Util-A-Crete which is .31 in the $\frac{1}{2}$ " material and add them up to the value of the minimum required which is $R=1.16$

$1.16 \text{ divided by } .31 = 3.74$ This assembly would require 3.74 layers of $\frac{1}{2}$ " Util-A-Crete to reach the necessary R-value required. Obviously, you would have to round up to the next layer, which would mean that you would have two inches of Util-A-Crete.

Chimney

This model is designed for connection to any listed 2100° UL103 HT chimneys and parts. Follow chimney's manufacturer's instructions carefully.

NOTE: This Room Heater must be connected to:

1. A code approved masonry chimney with a flue liner.

CAUTION

SPECIAL METHODS ARE REQUIRED WHEN PASSING THROUGH A WALL OR CEILING. SEE INSTRUCTIONS AND BUILDING CODES. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.

DETERMINING CHIMNEY LOCATION

A. Ceiling Exits: (Using 6" Single Wall Pipe and UL 103 HT type chimney system listed with manufacturer in this section of manual).

1. Suspend a plumb bob from ceiling above unit so weight is hanging in center of flue exit. (A small weight on a string will serve as a plumb bob). Mark ceiling where string is suspended to locate center of chimney. (See Figure 14).
2. After locating center of hole, install ceiling support box, chimney, flashing and rain cap, per chimney manufacturer's instructions.
3. Now connect stove and ceiling support box using #24 ga. minimum blue or black steel connector pipe. **(DO NOT USE GALVANIZED PIPE)**. Connect each section so crimped end faces downward and secure each section to each other using at least three (3) sheet metal screws or rivets.

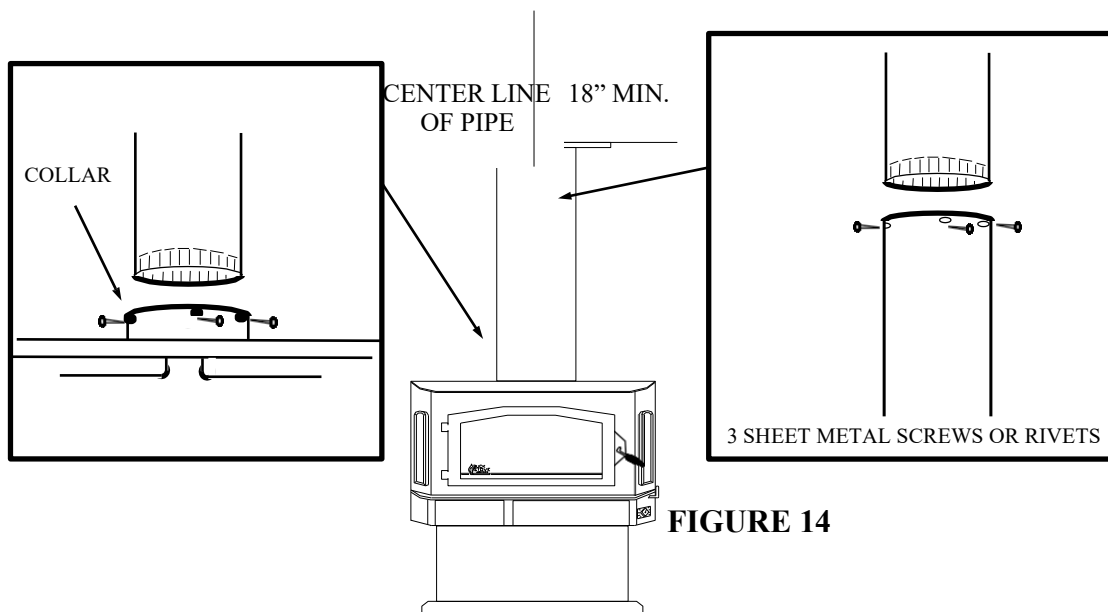
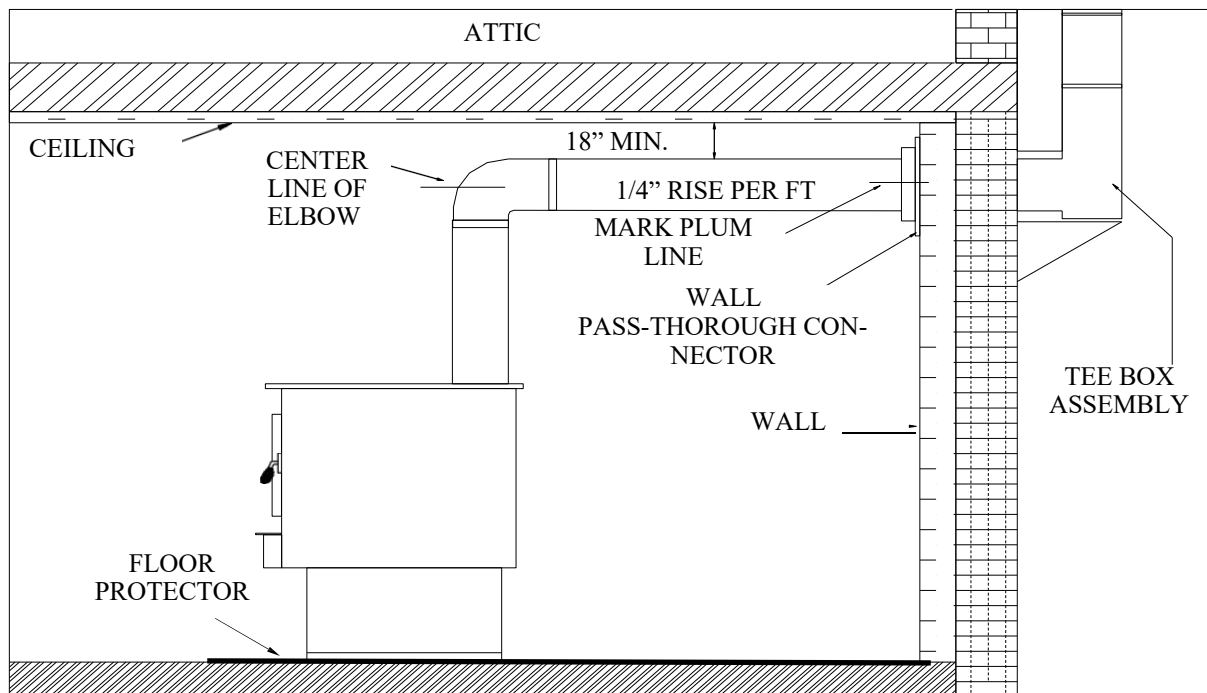


FIGURE 14

B. Wall Exit Into Metal Tee-Box

1. Mark the plumb line on wall directly behind center of heater. (See Figure 15). Floor protector must be under horizontal pipe exit.
2. Place vertical portion of heater pipe and elbow in position and project a point onto plumb line level with center of the elbow. (See Figure 15).
3. Measure up so there will be at least 1/4" rise per foot of horizontal connector pipe. When using #24 ga. minimum blue or black steel pipe maintain 18" between pipe and ceiling (See Figure 15). This will give you center of hole for chimney penetration.
4. After locating center of penetration, install tee box and chimney, per chimney manufacturer's specifications.
5. Connect chimney collar to tee-box using #24 ga. minimum blued or black steel connector pipe. (**DO NOT USE GALVANIZED PIPE**). Connect each section so crimped end faces downward and secure each section to each other using three (3) sheet metal screws or rivets. (See Figure 14, Page 23).
6. For closer clearances to the ceiling use double wall or triple wall type A or 2100 HT pipe and follow those manufactures clearance instructions.



Wall Exit Into Metal Tee-Box

FIGURE 15

C. Wall Exit Into Masonry (Using Single Wall Pipe)

1. Before connecting this unit to a masonry chimney, determine that masonry fireplace wall pass through connector thimble meets **NFPA-211** Code and local building codes and is a minimum of 18" from ceiling. If connector thimble does not meet these codes, the pass through connector must be modified. (See Figure 16).

Connectors may pass through walls or partitions constructed of combustible material if connector is:

- (a) Either listed for wall pass through or is routed through a device listed for wall pass through and is installed in accordance with conditions of listing.
- (a) Selected or fabricated in accordance with conditions and clearances as stated in **NFPA-211** Code. Any unexposed metal that is used as part of a wall pass through system and is exposed to flue gases shall be constructed of stainless steel or other equivalent material that will resist corrosion, softening, or cracking from flue gases at temperatures up to 1800° F.

NOTE: In addition, a connector to a masonry chimney shall extend through wall to inner face or liner but not beyond and shall be firmly cemented to masonry.

EXCEPTION: A thimble may be used to facilitate removal of chimney connector for cleaning, in which case, thimble shall be permanently cemented in place with high-temperature cement.

2. Once through-the-wall thimble codes are met, simply connect chimney collar to wall pass through connector using #24 ga. minimum, blued or black steel connector pipe as follows:
 - (a) Maintain 1/4" rise per foot (horizontal length) from appliance to chimney.
 - (b) Connect each section so crimped end faces downward or back toward unit.
 - (c) Secure each section to each other using at least three (3) sheet metal screws or rivets. (See Page 23, Figure 14).
 - (d) Use three (3) sheet metal screws to fasten pipe to connector collar on heater. (See Page 23, Figure 14).
 - (e) For closer clearances to the ceiling use double wall or triple wall type A or 2100 HT pipe and follow those manufactures clearance instructions.

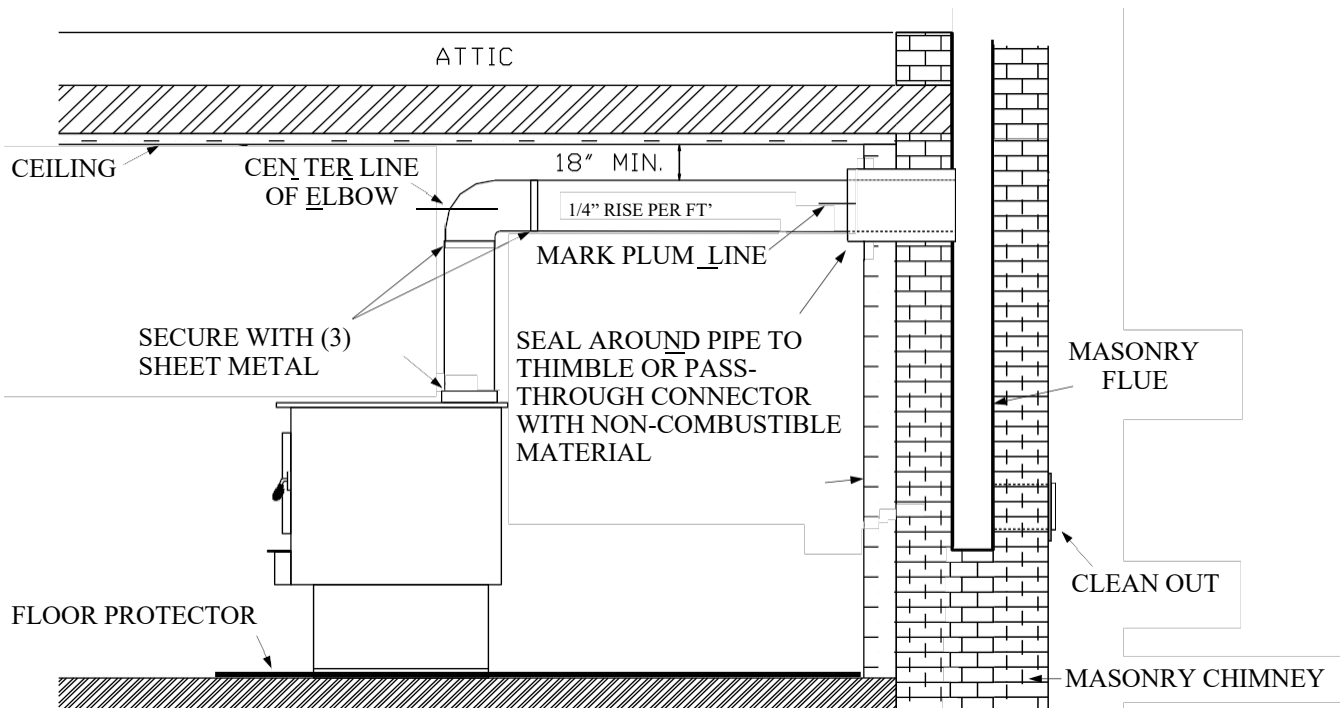


Figure 16

FINAL CHECK

1. Recheck specified clearances. (See Page 27)
2. Remove all foreign material from firebox area.
3. Open primary air draft, shotgun air draft, and damper bypass make sure ash pan drawer is sealed properly.
4. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
4. Place crumpled pieces of newspaper in stove. Light it and close door. Ensure that stove draws properly through primary draft.
5. Check for smoke leaks around door.

CAUTION

Open door and check for smoke escaping from front of stove. Smoking usually indicates a defective or poorly positioned chimney. Some chimneys with a marginal draft can be preheated by lighting newspaper and holding it near open damper with a poker or fire tong. Once the chimney heats up, a proper draft can usually be obtained.

CAUTION

The unit is painted with a specially formulated high temperature paint that cures during the first two or three firings. You may notice a slight smoking effect and an odor of burning paint when you build first fires. This is normal and is not a cause for alarm. In some cases, these fumes will activate a smoke alarm. Opening a window near unit will allow these fumes to escape. DO NOT build a large, roaring fire until this curing is complete or heater finish may be damaged.

CLEARANCES FOR MODEL 81C

MINIMUM CLEARANCES TO COMBUSTIBLES

FREESTANDING

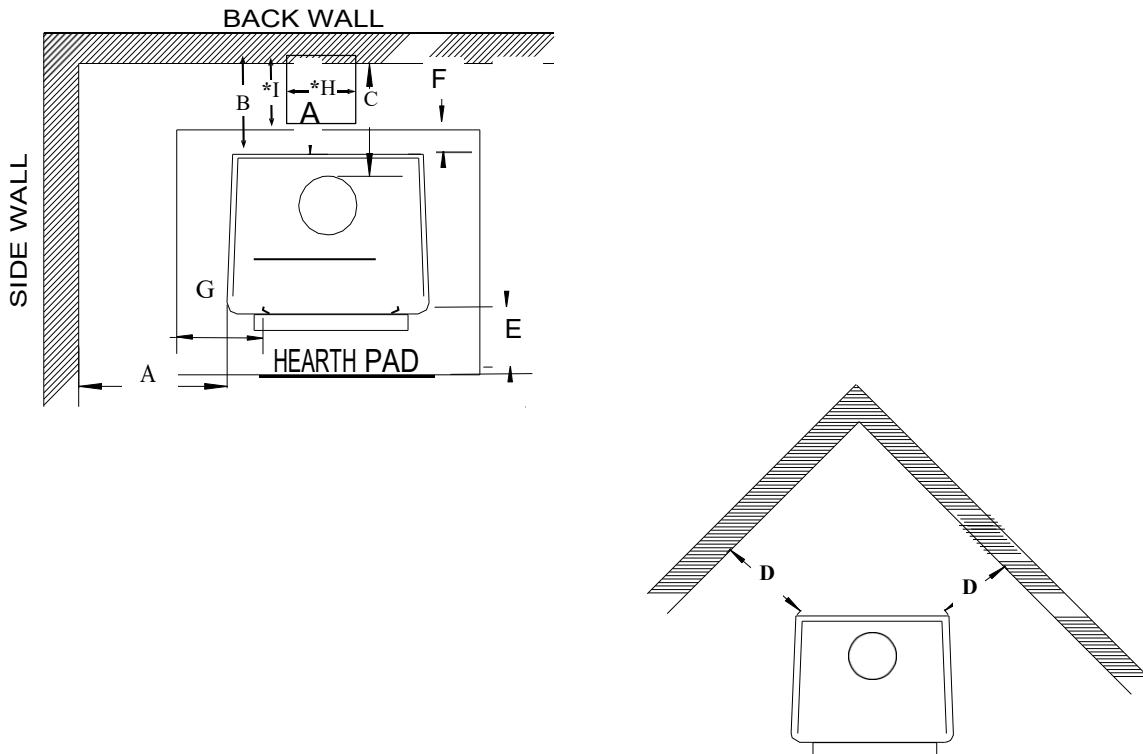


FIGURE 18

	A	B	C	D	E	F	G	*H	*I
MODEL 81C	23"	23"	25"	16"	16"	8"	8"	10"	FULL LENGTH PIPE TO WALL

NOTE: All clearances are to combustibles without low clearance shields and using single wall pipe and minimum floor protector. Clearances above may be reduced by using close clearance shields. Follow **NFPA-211** codes if available or follow instructions on next page.

* For wall exit, floor protector must be under horizontal pipe full length of pipe. There must be 2" on each side of pipe. Maintain 18" between pipe and ceiling.

CLEARANCES FOR MODEL 81C

MINIMUM CLEARANCES TO COMBUSTIBLES USING SINGLE WALL CHIMNEY CONNECTOR AND OPTIONAL SHIELDS, PERMANENTLY LOCATED MANUFACTURED HOME AND ALCOVE INSTALLATIONS

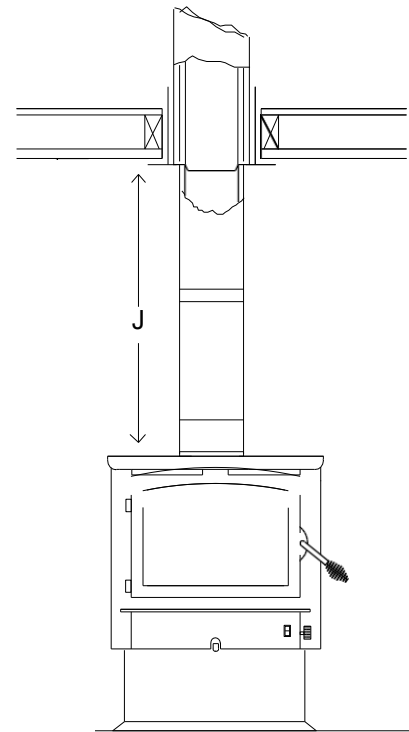
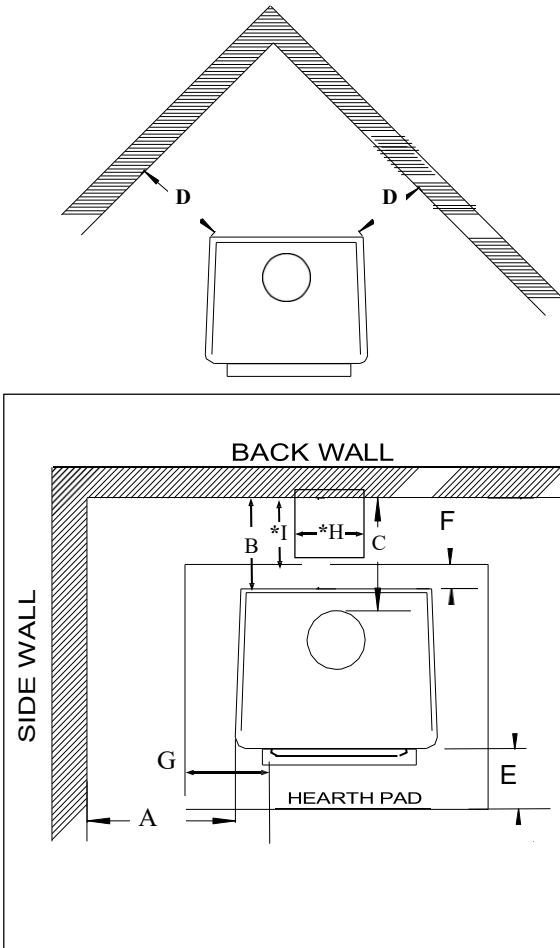


FIGURE 19

	A	B	C	D	E	F	G	*H	*I	J
MODEL 81C	12"	16"	16.5"	12"	16'	8"	8"	10"	FULL LENGTH PIPE TO WALL	53"

NOTE: All clearances are to combustibles using single wall pipe and all close clearance shields and minimum floor protector.

* For wall exit, floor protector must be under horizontal pipe full length of pipe. There must be 2" on each side of pipe. Maintain 18" between pipe and ceiling.

INSTALLATION OF (OPTIONAL) CLOSE CLEARANCE SHIELDS

1. Center rear close clearance shield with back of stove. Mark back of stove, using holes in rear shield as reference. Drill pilot holes using a 1/8 drill bit. Using self-tapping screws, secure back shield to back of stove (See figure 20).
2. Insert front end of side shield behind front of stove. Align top of side shield with top of back shield. Mark holes on back shield through holes in back of side shield. Using four self tapping screws, drill four holes in the locations marked. Tighten bottom screws and leave top screws loose for step 3. Use same step to install side shield on opposite side of stove. (See figure 21).
3. Insert pipe shield where back shield and top back side shield meets. Tighten screws. (See figure 22).

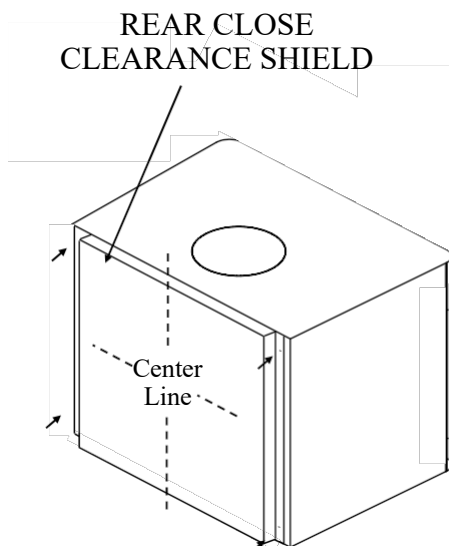


FIGURE 20

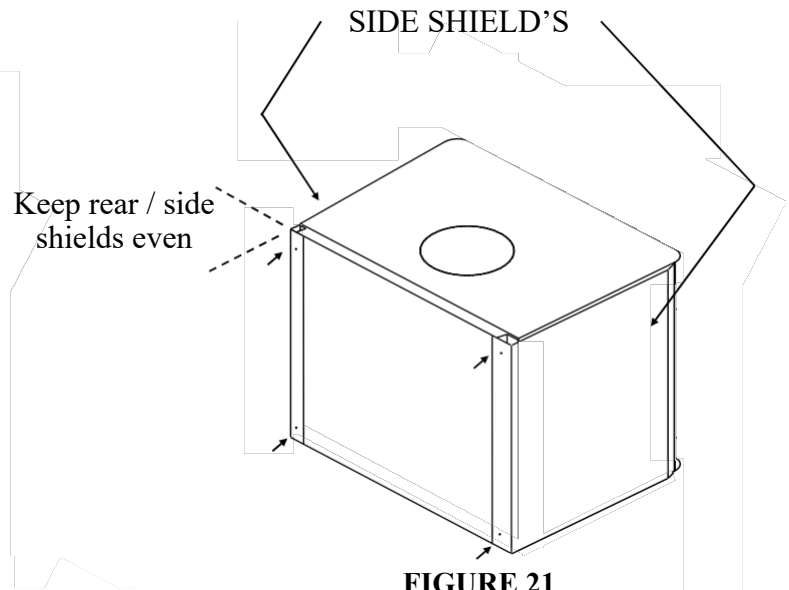


FIGURE 21

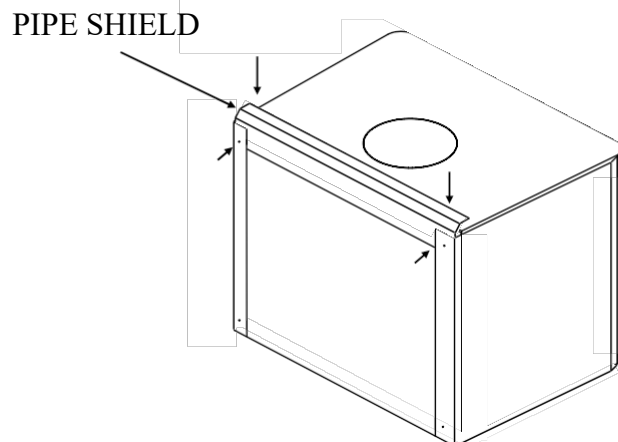


FIGURE 22

SECTION IV

FREESTANDING PERMANENTLY LOCATED MANUFACTURED HOME INSTALLATION

FOR MINIMUM CLEARANCES SEE PAGE 28.

Floor Protection:

When installing a heater, a floor protector must be used. Floor protector must have a minimum of 1.1 R-Value non-combustible material.

How to use alternate materials and how to calculate equivalent thickness

Most people have heard of R-Values, which are used for rating common building materials such as fiberglass insulation and glass. However, many texts which cover stoves and fireplaces use K-Values instead of R-Values. Although the two are somewhat related, there are differences.

R-Value: The higher the R-Value, the better the insulating properties of the subject materials. R-Values are most often used to express the thermal resistance (ability to stop heat flow) of a building wall, ceiling or floor. Because of this, most R-Values are calculated at normal temperatures of approx. 75 F. R-Values are easy to add together so calculating the total R-Value of a wall is simply done by adding the values for the sheetrock, insulation, sheathing and siding.

K-value is a measure of heat conductivity of a particular material. Specifically, it is the measure of the amount of heat, in BTUs per hour, that will be transmitted through one square foot of material that is one inch thick to cause a temperature change of one degree Fahrenheit from one side of the material to the other. The lower the K-value for a material, the better it insulates. If the K-value of the material is known, the R-value per inch can be determined by dividing 1 by the K-value ($R\text{-value per inch} = 1/K \text{ value}$). The LOWER a K-Value, the better its performance as an insulator.

R or K values have nothing to do with whether a material is flame proof, flame resistant or combustible. Styrofoam, cork, wood and polyester are just some examples of materials which are good insulators but will burn or smoke dangerously when exposed to excess heat.

Technical - For those who desire to calculate their own K or R values, please use the following formulas:

1. R value can be calculated by dividing the thickness by the K value.

For US calculations, we use inches as the unit of measurement.

“In the inch-pound units, thermal resistance is measured in degrees F times square feet of area times hours of time per Btus of heat flow.”

$R\text{-value} = \text{thickness} / K\text{-value}$

2. K value is the inverse of the R-Value. If one is known, the other can be calculated.

“units of Btu-inch/hour per square foot per degree F”

$\text{Thickness}/k \text{ value} = R \text{ value}$

or:

Divide the inches of thickness by R.

$k = \text{inches of thickness} / R$

Common K and R Values Chart				
Material	K value	R Value	inches-K value .84	inches-R value of 1
per inch				
Micore 300*	0.43	2.33	0.5	0.43
Wonderboard (ce	1.92	0.52	2.3	1.92
Common Brick	5	0.2	6	5
Cement Mortar	5	0.2	6	5
Ceramic Tile	12.5	0.08	14.9	12.5
Marble	11	0.09	13.1	11
Air Space (ventila	0.7	1.43	0.8	0.7
sand and gravel	1.7	0.59	2	1.7
Drywall (gypsum)	1	1	1.2	1
Rockwool or Fiber	0.3	3.33	0.4	0.3
Units	K per unit	R per unit		
per unit				
8" Concrete Block	1	1		
Glass Block - 4"	2	0.5		
* These materials or equiv are some of the best to use for relatively thin hearth protection				

K-Value Example: A wood stove may call for a floor which has a K factor of 1 or less. A product such as Micore 300 Board from USG has a K-Value of approx .43 per inch. Therefore a 1/2" thickness of this board would have a K-Value of .86, which meets the requirement of our example stove.

R-Value Example: A stove or fireplace may call for a floor with an R-Value of 1.5. The same board above is rated as having an R-Value of 2.33 for a one inch thickness. Therefore, 3/4" of the Micore 300 Board would meet the specifications for this stove.

Summary: R and K values are related, but K is the value commonly used for specifying materials for use with stoves and fireplaces. Be sure that your choice of insulating material for high temperature applications is noncombustible.

With K values, the lower value is a better insulator. With R Values, the highest number is better.

For low profile hearths, it is best to use manufactured materials such as Micore and Cement Board (Durock, Wonderboard, etc.) as these will allow hearth thicknesses of from 1/4" to 2" with most stoves and fireplaces. Most other common building materials will require at least 3" of thickness and usually much more.

Example of Hearth Calculations - this is for a Hearth requirement of approx $R=1.15$ (figures taken from Ceramic Tile manufacturers trade association)

The assembly that we will evaluate is a $\frac{3}{8}$ " layer of Micore 230 and a layer of $\frac{1}{2}$ " Util-A-Crete. The first step is to convert the k values of the materials in question into R so that we may add them up and determine if they will provide the necessary insulation value required by the manufacturer.

Micore 230 has a k value of .43 so –

$1 \text{ divided by } k = 2.32 \text{ times the thickness } .375 (\frac{3}{8}) = 0.87$

Util-A-Crete (cement tile backer board) has a k value of 1.6 so – $1 \text{ divided by } k = .625 \text{ times the thickness } .5 (\frac{1}{2}) = 0.3125$

Add the values together $0.87 \text{ plus } 0.3125 = 1.1825$ This R- value is an acceptable assembly.

What if we decide to use only one material? In this example, only Util-A-Crete cement board?

We could use the published R-Value of Util-A-Crete which is .31 in the $\frac{1}{2}$ " material and add them up to the value of the minimum required which is $R=1.16$

$1.16 \text{ divided by } .31 = 3.74$ This assembly would require 3.74 layers of $\frac{1}{2}$ " Util-A-Crete to reach the necessary R-value required. Obviously, you would have to round up to the next layer, which would mean that you would have two inches of Util-A-Crete.

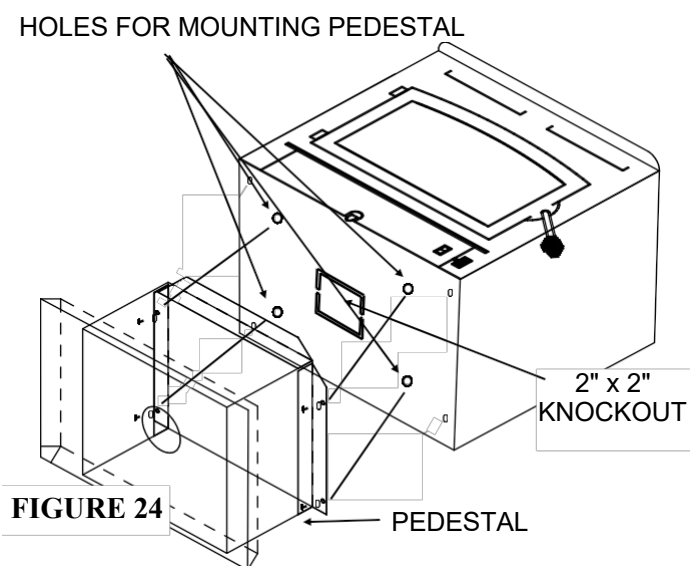
TOOLS FOR INSTALLATION

Drop cloth, 3/32" Metal drill bit, 5/16" magnetic socket chuck adapter, 5/16" wrench (box or socket) or adjustable wrench, Jigsaw with masonry, metal and wood blades

WARNING: DO NOT INSTALL IN A SLEEPING ROOM

PREPARING STOVE FOR INSTALLATION

1. Remove protective plastic wrapping from unit, inspect unit for any obvious physical damage.
2. Plug power cord into a 115V AC outlet. Set switch to "Manual" and rheostat to "High" position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.
3. Check primary air control and shotgun air control to ensure that they both slide freely.
4. Remove any items from within firebox. Spread a dropcloth on floor behind heater. Next, tilt heater so that back is on drop cloth.
5. **Pedestal Kit: For Permanently Located Manufactured Home installation a pedestal kit is required and outside air is required, see *Out Side Air Installation* next page.**
 - Before attaching heater to stand, take a large flat screwdriver or pliers and remove the 2" x 2" knockout on bottom of unit. (See Figure 24).
 - Place pedestal against bottom of heater (angle side to heater). Center pedestal front to rear and also center left and right. Mark screw locations on bottom of stove through outer holes of stand mounting angles. Set pedestal aside and drill four 3/16" holes in heater bottom. Then mount pedestal to bottom of heater with screws provided 1/4"-14 x 1". (See Figure 24).
6. Remove screws and remove pedestal. Reposition heater to upright position.



Out Side Air Installation

CAUTION

THE STRUCTURAL INTEGRITY OF PERMANENTLY LOCATED MANUFACTURED HOME FLOOR MUST BE MAINTAINED. (MOVE OPENING AND/OR REPOSITION HEATER LOCATION IF NECESSARY).

1. Select an installation location that will give best airflow from front of heater to remainder of home making sure minimum clearance specifications are met. See minimum clearance to combustibles (See Page 28).
2. Place protective floor pad in position. For minimum floor protection (See Page 30).
3. Place pedestal on pad.
4. Mark on pad the outside air opening in bottom of pedestal stand.
5. Mark center line of outside air opening. Set pedestal aside for now.
6. **CAUTION! The structural integrity of home floor must be maintained.**
Cut a 4 1/4" diameter hole in pad and continue through floor.
(Move opening and/or reposition heater location if necessary).
7. Now, reposition pedestal stand and set on pad being sure to line stand up with outside air opening.
12. Obtain outside air duct from box in pedestal kit marked FA P81BOA.
13. Slip duct down through 4-1/4" hole until face of outside air duct with screen wire, contacts bottom of pedestal.
15. Set heater back onto pedestal and resecure using screws.
16. NOTE: If home is underpinned, you must duct through underpin as shown. (See Figure 26).

FIGURE 26

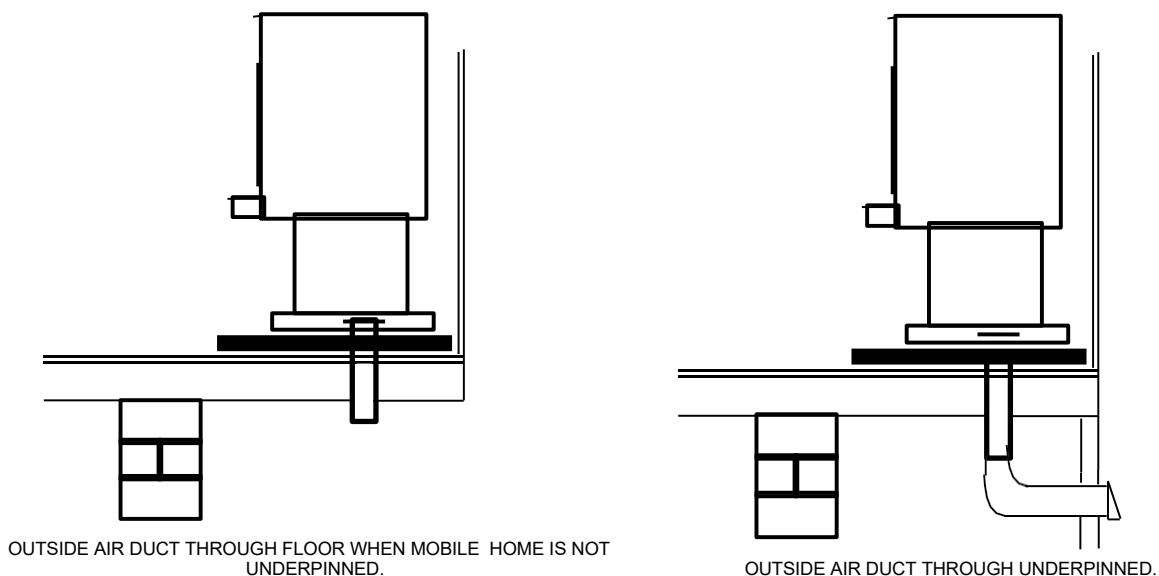
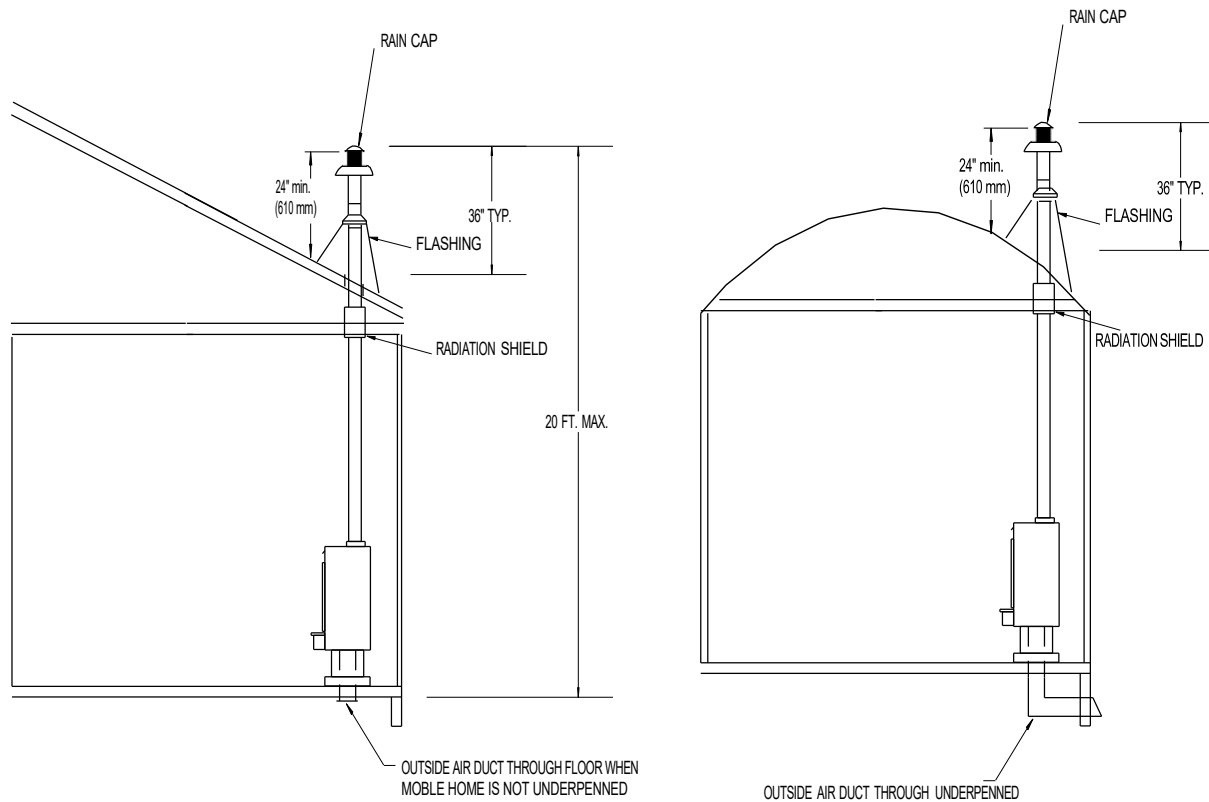


FIGURE 27



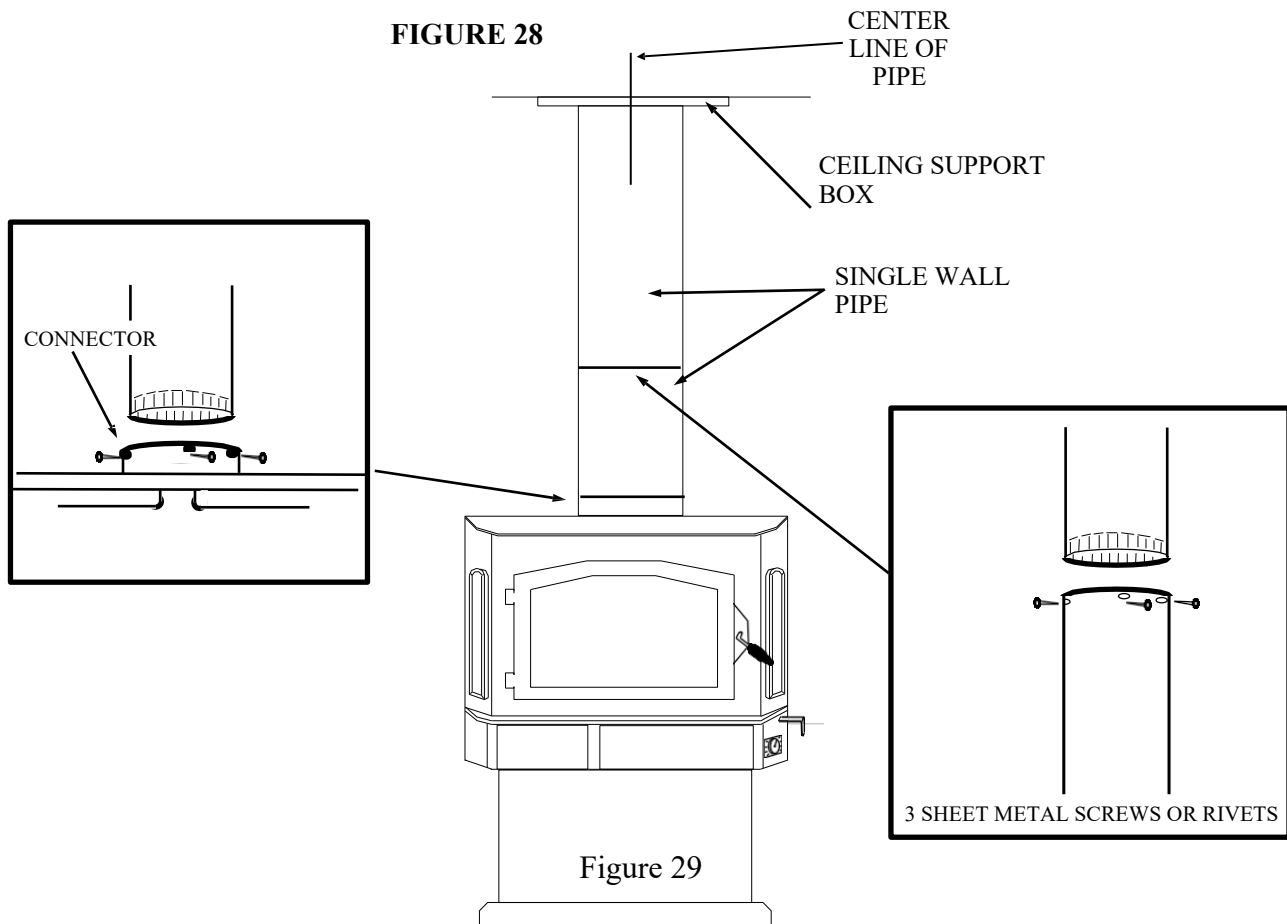
Ceiling Exit (Using Close Clearance Listed Chimney)

1. Suspend a plumb bob from ceiling above unit so that weight is hanging in center of flue exit. (A small weight on a string will serve as a plumb bob). Mark ceiling where string is suspended to locate center of chimney hole. (See Page 36, Figure 28).
2. After locating center of hole, install ceiling support box, chimney or chimney connector, flashing and rain cap using listed 2100° HT chimney only.

CAUTION

REFER TO CHIMNEY MANUFACTURERS INSTRUCTIONS FOR ASSEMBLY AND DISASSEMBLY OF CHIMNEY PARTS. BE SURE TO FOLLOW CHIMNEY INSTRUCTIONS FOR PROPER CLEARANCES TO COMBUSTIBLE AND PROPER AIR SPACING REQUIRED.

3. Add additional pipe until both of the following are met:
 - (a) Chimney pipe is 3' higher than roof at point where it penetrates roof.
 - (b) Chimney pipe height is at least 2' higher than any part of roof within 10' of chimney.
(See Figure 27).



FINAL CHECK

1. Recheck specified clearances.
2. Remove all foreign material from firebox area.
3. Open primary air draft, shotgun air draft, and damper bypass make sure ash pan drawer is sealed properly.
4. Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route power cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.

4. Place crumpled pieces of newspaper in stove. Light it and close door. Ensure that stove draws properly through primary draft.
5. Check for smoke leaks around door.
6. Pull bypass door out and open door check for smoke escaping from front of stove. Smoking usually indicates a defective or poorly positioned chimney. Some chimneys with a marginal draft can be preheated by lighting newspaper and holding it near open damper with a poker or fire tong. Once chimney heats up, a proper draft can usually be obtained.

CAUTION

THE UNIT IS PAINTED WITH A SPECIALLY FORMULATED HIGH TEMPERATURE PAINT THAT CURES DURING FIRST TWO OR THREE FIRINGS. YOU MAY NOTICE A SLIGHT SMOKING EFFECT AND AN ODOR OF BURNING PAINT WHEN YOU BUILD THE FIRST FIRES. THIS IS NORMAL AND IS NOT A CAUSE FOR ALARM. IN SOME CASES, THESE FUMES WILL ACTIVATE A SMOKE ALARM. OPENING A WINDOW NEAR THE UNIT WILL ALLOW THESE FUMES TO ESCAPE. DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING PROCESS IS COMPLETE OR HEATER FINISH MAY BE DAMAGED.

SECTION V

WOOD HEATER SAFETY

Certain safety hazards are inherent in any wood heater installation. You should be aware of these so that a safe and proper installation can be made.

1. **FAULTY CHIMNEY:** An older masonry chimney should be thoroughly checked to be sure there are no holes or weak spots which could allow sparks or hot gases to escape.
2. **HEAT CONDUCTION:** Placing combustible materials too close to a heater or chimney can be a fire hazard.

By keeping these particular hazards in mind as you install and use your room heater you can ensure a safe, reliable installation.

The chimney should be inspected once every two months. Any build-up of creosote should be removed to prevent risk of a chimney fire. To remove chimney, remove screws or fasteners, remove pipe and clean with steel brush. Replace chimney or and replace screws and/or fasteners.

CREOSOTE-FORMATION AND NEED FOR REMOVAL: When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in a relatively cool chimney flue of a slow burning fire. As a result, creosote residue accumulates on flue lining. When ignited, this creosote makes an extremely hot fire.



CAUTION

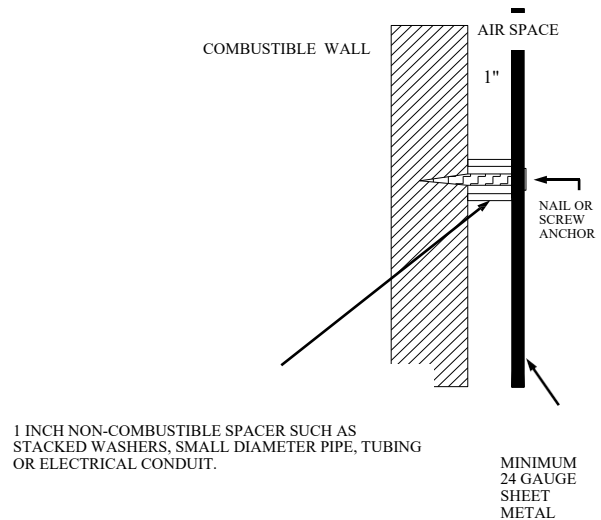
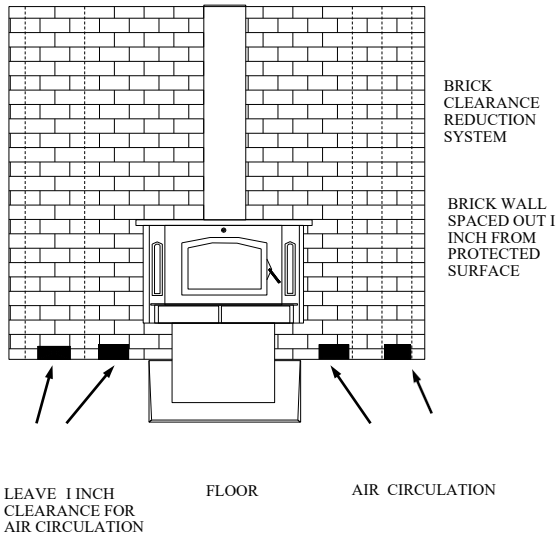
NEVER USE GASOLINE, GASOLINE TYPE LANTERN FUEL, KEROSENE, HARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THE HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE STOVE WHEN IT IS IN USE. ALL FLUIDS OF THIS TYPE GIVE OFF VOLATILE FUMES AND CAN AND WILL EXPLODE! DON'T TAKE A CHANCE WITH SAFETY OF YOUR HOME AND FAMILY.

CAUTION: Never remove ashes from your heater with blower running.

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

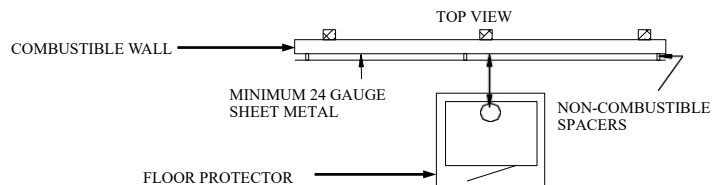
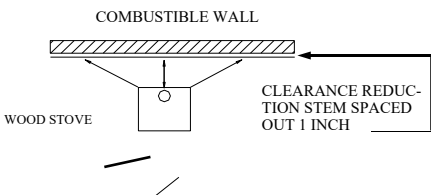
ALTERNATIVES FOR WALL PROTECTION

Example: The rear clearance for the Model 81C from page 27 is 23" (Letter B). This clearance may be reduced by 50% to 11.5" by using either of the wall protection devices mentioned below.



BRICK WALLS MAY BE ATTACHED TO COMBUSTIBLE WALLS USING WALL TIES IF BRICK IS USED. BE SURE FLOOR CAN WITHSTAND WEIGHT OF BRICK.

DO NOT USE FASTENERS DIRECTLY BEHIND CHIMNEY CONNECTOR OR STOVE.



Tested and Listed Wall Protector

Clearances to combustibles may be reduced if a tested and listed wall protector is installed over a combustible surface when the following conditions exist:

1. A dead air space of 1" separates listed and tested wall protector from combustible surface.
2. The tested and listed wall protector extends from floor to ceiling with a 1" clearance for air circulation at both floor and ceiling.
3. The 1" spacers (preferably ceramic rather than metal) must be located at corners rather than behind heater or chimney connector.

Unlisted and Untested Wall Protector

Wall protectors may be constructed of masonry, 24 gauge or thicker sheet metal, or non-combustible 1/2" thick insulation board. Conditions 2 and 3 above must be observed but, the air space in condition 1 must be increased to 1 1/2".

OPERATION

This section of the manual is to help you get maximum efficiency and maximum smoke (particulate) reduction from your Model 81C heater. If you should experience any difficulty or have questions concerning your heater, contact your Model 81C dealer for assistance.

1. To maximize the efficiency of your wood stove make sure it is sized properly for the space you plan to heat. Consult with your dealer for sizing your stove correctly.
2. Use dry, seasoned wood only. Using wet wood will greatly reduce your efficiency.
3. Consult with your installer/dealer to correctly place the stove in your home. An incorrectly placed stove can greatly reduce efficiency.

Maximizing the efficiency of your stove will heat your house quickly, burn cleaner and use less wood.

Dry your split wood and stacked crisscross to allow for proper seasoning for 6-12 months (See Page 9 Bottom Picture) when ready to burn place the wood from front to back position in heater.

"This wood heater has a manufacturer set closed burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instruction in this manual."

NOTE: Following all suggested operating and maintenance procedures will help minimize visual emissions.

GUIDE TO THE DIFFERENT BURNING QUALITIES OF WOOD

Type of Wood	Ease of Starting	Coal in Qualities	Amount of Sparks
Apple	Poor	Excellent	Few
Ash	Fair	Good	Few
Beech	Poor	Good	Few
Birch	Good	Excellent	Moderate
Cherry	Poor	Excellent	Few
Cedar	Excellent	Poor	Many
Elm	Fair	Good	Very Few
Hemlock	Good	Low	Many
Hickory	Fair	Excellent	Moderate
Locust	Poor	Excellent	Very Few
Maple	Poor	Excellent	Few
Oak	Poor	Excellent	Few
Pine	Excellent	Poor	Moderate

The National Audubon Society recently charted the heat produced by a wood fire. They noted that heat produced by a wood fire varies greatly with kind of wood burned. Beech is considered best wood for a fire. A cord of well-seasoned Beech will produce as much heat as 169 gallons of fuel oil; Sugar Maple and Red Oak produce as much heat as 166 gallons of fuel oil; followed by White Ash 154; American Elm 130; White Birch 124; and White Pine 94.

BUILDING A FIRE:

1. Place “Manual/Off/Automatic” switch in “Automatic” (bottom) position for thermostat control operation. Turn rheostat knob clockwise (it will click from “Off” position to “On”) so you can vary the speed of motor.
2. Open door.
3. While looking inside firebox, operate damper bypass plate in and out observing movement. This should operate freely and close completely. Open damper bypass. (Pull Out)
4. Open air controls on each side of stove (Pull Out Right Side, Push In Left Side)

The Model 81C is not designed for use with grates and irons or other methods of supporting the fuel.

NOTE: Do not use grate or elevate fire. Build wood fire directly on the firebrick of fire box

DO NOT BUILD A LARGE ROARING FIRE! Initially, build 2-3 small fires in order to cure the paint on your stove.

5. Lay several pieces of dry kindling on top of newspaper.
6. Load heater with 2 or 3 pieces of (naturally seasoned hard wood), 2"-3" in diameter **placing on top of Kindling**
7. Light newspaper, leave the door open around 2" inches for 1 1/2 to 2 1/2 minutes: Don't leave fire unattended with the door open! Shut the door.
8. After 15 to 20 minutes, close the by-pass damper completely (PUSH IN).
9. After embers and a coal bed have been established, load heater with natural seasoned hard wood, **placing it from front to rear.**
10. Remember on a new stove **DO NOT FILL** firebox during your first 2 to 3 fires! Build 2-3 small fires in order to cure the paint on your stove.

NOTE: THE FUELING DOOR MUST REMAIN CLOSED DURING OPERATION.

NOTE: Your stove is equipped with a automatic thermostat. When the stove gets hot enough, the thermostat will activate the room air blower. Set fan speed according to desired heat output.

NOTE: When refueling or removing ashes turn “OFF” room air blower. Be sure to turn room air blower back on when finished.

NOTE: Do not run power cord underneath heater, or in walk way or heavy traffic areas.

Wood Loading

During refueling, open (pull out) bypass damper to allow smoke in the firebox to escape - wait a few seconds. Open fuel door, if there happens to be any raw pieces left over place them in the rear East/West direction. Slowly add wood North/South direction, front to back. The door should be open less than one minute, close door and bypass damper. Open primary air control wide open for 5-10 minutes to charge wood, making sure the stove is burning clean and the catalyst is above 900° Fahrenheit before shutting down the burn setting.

- ♦ After most of wood has burned and if you are not planning on reloading immediately, it may be necessary to open damper bypass, then door, and rake wood and coals into a pile near front center of firebox. (Be certain wood chunks are pulled out of rear corners.) Close door and damper bypass. This step will assure continued combustion and thorough burning of wood.

Operating Burn Rates

You will have to experiment with burn rate until you find the particular setting for heating your home. Chimney drafts, tightness of house, doors, windows, insulation in house and atmospheric conditions all influence which setting you must have, so it may take several firings to learn setting necessary for your installation. Heating capacity is based on BTU output and conditions listed above. These conditions will affect heating capability of your heater.

Although catalytic stoves decrease ash residue, routine removal of excess ash is still necessary.

Low Burn Rate

For the cleanest operation and lowest emissions, operate the appliance with dry, seasoned cordwood and maintain an active flame whenever possible. When operating at low burn rates:

1. Allow the appliance and chimney system to reach normal operating temperature before reducing the air control to a low burn setting.
2. Load only seasoned cordwood with a moisture content of 20% or less.
3. Avoid placing excessively large pieces of wood into the firebox when operating at low burn settings. A mixture of small and medium sized splits generally provides more consistent combustion.
4. After reloading, operate the appliance with the air control open until the new fuel load is burning well and the catalyst is active before reducing the air supply.
5. If flames disappear completely for extended periods, visible smoke increases, or the glass darkens rapidly, increase the air setting slightly to maintain good combustion.

IMPORTANT: Do not immediately move the air control to the lowest setting after refueling. Allow the fuel load to become fully ignited and the catalyst to reach operating temperature before reducing the air control.

SECTION VII

PREVENTIVE MAINTENANCE / REPLACEMENT PARTS

THE CATALYSTS

Warning: This product can expose you to chemicals including aluminosilicate. Which is known to the state of California to cause Cancer. For more information, go to www.P65Warning.ca.gov

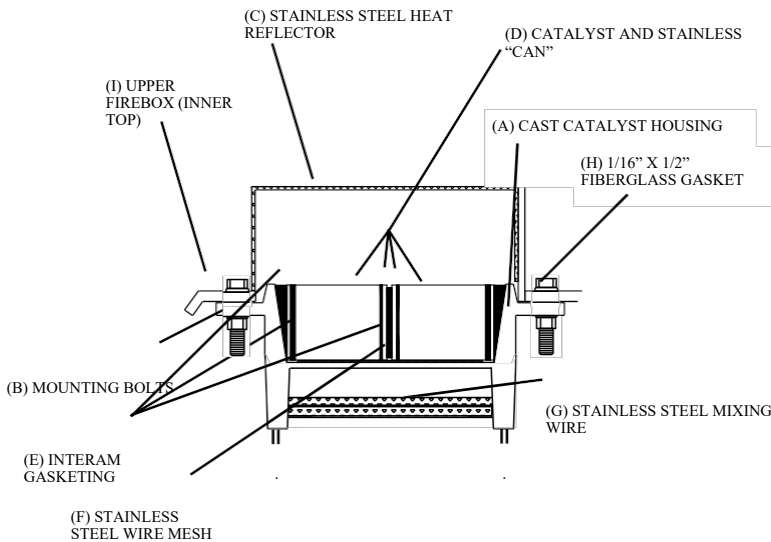
The catalysts in your stove are designed for many years of use. If after several years of use, the efficiency of stove decreases or if a notable amount of smoke is observed, catalysts may need to be replaced. See Catalyst Warranty prior to replacement. The following points are some general guidelines from catalyst manufacturer.

1. Do not “hot fire” stove. For many years retailers and installers have advised customers to build an extra hot fire to burn creosote deposits in fire system. This advice may be acceptable for non-cat stoves, but can be death to a catalyst. Why? Because the catalyst is reducing the particulate, or creosote buildup, therefore need to “hot fire” is eliminated. Proper chimney cleaning procedure should be followed.
2. Direct Flame contact is death to a catalyst. A catalyst burns by-products in the smoke. The gases such as CO, HC, and O₂ ignite with each other in a chemical reaction in presence of the catalyst (while passing through the honeycomb configuration). Direct flame inhibits this reaction by changing chemical make-up of catalyst breaking down substrate or ceramic. This problem is called **flame impingement**. Today’s modern stoves are designed so that flame impingement is unlikely. However, a strong, fast draft can pull flame into catalyst. Or, a hot fire, with all air controls and/or the ash door open can literally torch the catalyst. The remedy for hot fire related flame is to advise customers not to “hot fire” the stove. The customer will enjoy their catalysts longer and with better performance if these guidelines are followed. Fly ash problems also can be reduced by controlling draft.
3. The **“Glow” Misconception**: A catalyst can glow during certain stages of combustion. The determination that a catalyst is not working simply because it does not glow is inaccurate. During low burn cycle, when catalyst is doing the bulk of its work, it usually does not glow. Also, extremely dry wood (oak, ash, etc.) can burn clean enough not to produce a glow in converter. In most new stoves, you cannot see the catalyst.
4. **Light Off Temperature**: CO conversion in the Applied Ceramics catalyst begins at a very low temperature. Usually, a normal start up to produce a coal bed will produce more than sufficient temperatures to begin catalytic combustion.
5. The catalyst is not consumed or “used up”. The nature of a catalytic reaction is defined as follows, by the American Heritage Dictionary, Second College Edition: catalyst “1. Chem. A substance, usually present in small amounts relative to reactants, that modifies and especially increases rate of a chemical reaction without being consumed in process.” This means your catalyst is always there. This also means that gases that would normally go out flue system and pollute the environment are being burned to create more heat from less wood.
6. Why does a catalyst stop working? Most catalyst that are returned are either destroyed by flame impingement, broken due to accidents or mishandling or have nothing wrong with them but fly ash build-up. A catalyst can be “saturated” with by-products of wood burning such as potassium. This is chemical saturation. The prohibitive chemical will fill in the chemical “holes” that gases normally use for reaction. This process of saturation can be slowed by regular maintenance of catalyst. Saturation can take several years since there are units in use for over five years. Burning garbage, painted woods or large amounts of colored paper can poison your unit. Poisoning, however, is very difficult to do. Burning colored paper causes more of a fly ash problem than a risk of poisoning. **NEVER BURN RUBBER OR PLASTIC.**
7. Burn only dried natural seasoned hard wood. Wood should be dried for at least 12 months prior to burning. The wood should be FREE of any moisture such as RAIN or SNOW. Wet wood creates water vapor which can drop the temperature of catalyst. The results can be plugging, clogging and thermal shock to catalyst. When a catalyst has ceased to be effective, you will notice increased fuel usage and your chimney sweep will notice increased creosote in your system. Before you replace unit, review this section. If you find that your catalyst should be replaced, follow instructions for warranty replacement that were provided when your unit was purchased.
8. Cleaning catalyst with plain water can reduce build-up of catalyst-retarding chemicals. Nothing but a soft brush, low pressure air or plain water should be used to clean a catalyst. The ceramic unit is fragile in comparison to rest of the stove, so it should be handled with care. A soak in warm or hot (not boiling) water for 20 minutes is ideal. Then, allow unit to cool at room temperature and rinse under medium pressure under a faucet. Allow unit to thoroughly dry before reinstalling it or you will damage it. Finally, reinstall unit. A cleaning once every year is sufficient for most users. Clean it when you have your flue system cleaned.

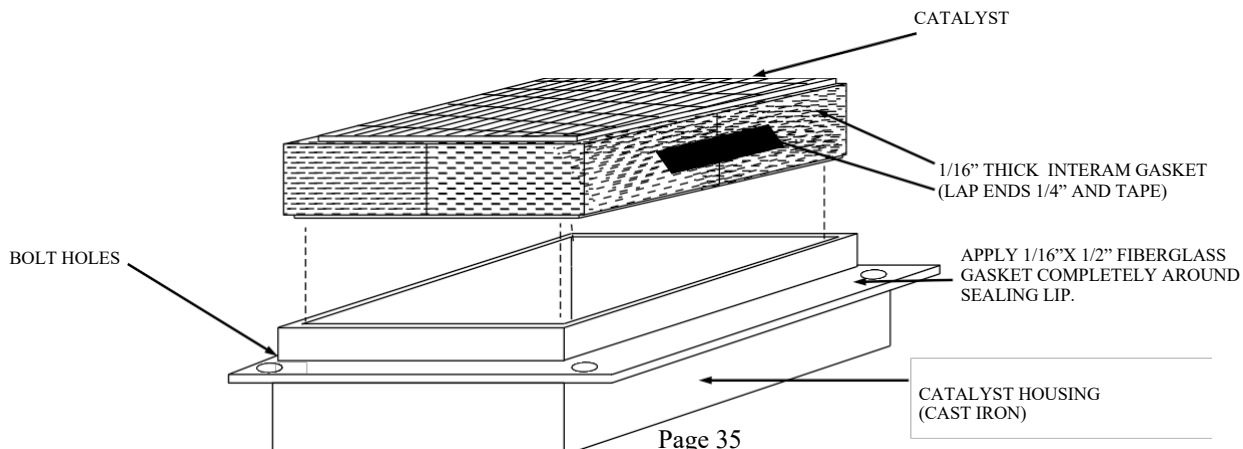
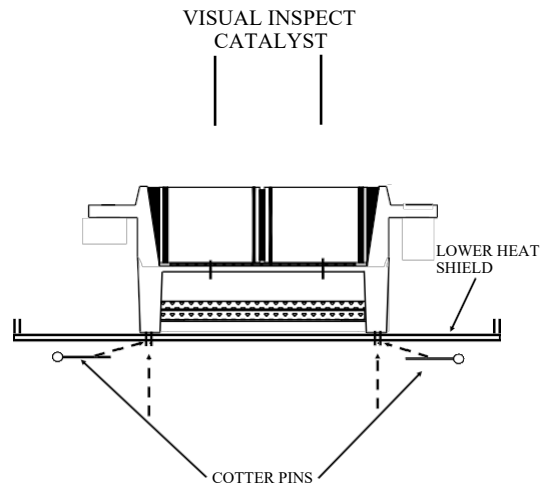
MAINTENANCE

CATALYST REPLACEMENT (Off-Season Replacement Recommended)

1. Spread a drop cloth in front of stove.
2. Open door and clean out any ash.
3. You will have to remove lower stainless steel heat shield. Remove the four cotter pins holding shield in place. Lay shield aside.
4. Using penetrating oil, generously lubricate four (4) bolt threads holding catalyst housing in place. Allow oil to penetrate.
5. **(A).** Using a 9/16" wrench or 9/16" socket, loosen four (4) nuts and remove catalyst housing (drop down) and place in a suitable work area. **(B).** Nuts holding catalyst are brass. If they strip you will have to order them from dealer. NOTE: DO NOT REPLACE WITH METAL NUTS.
6. Using needle nose pliers, grasp front edge of stainless steel "can" which houses catalytic element and pull upward. Reposition pliers to another position and pull upward. Repeat procedure until catalyst can be removed from housing.
7. Using a small putty knife or scraper, remove any gasket that may have adhered to catalyst housing.
8. Now, obtain new catalysts #PO800115C and wrap stainless steel "can" with interam gasket and tape ends together using scotch tape or masking tape. **IMPORTANT: BEFORE STARTING TO REPLACE CATALYST,** contact your dealer and order **INTERAM gasket** and **CATALYST HOUSING Gasket**. Gaskets not covered under warranty. It may take your dealer several days to receive the gaskets.
9. Insert new catalysts into catalytic housing and push down until they are seated on the top of stainless steel wire mesh supports.
10. Reinstall catalyst housing into stove and secure in place with brass nuts.
11. Reinstall lower heat shield with cotter pins.
12. The stove is now ready for use.



REMOVING/REPLACING LOWER HEAT SHIELD

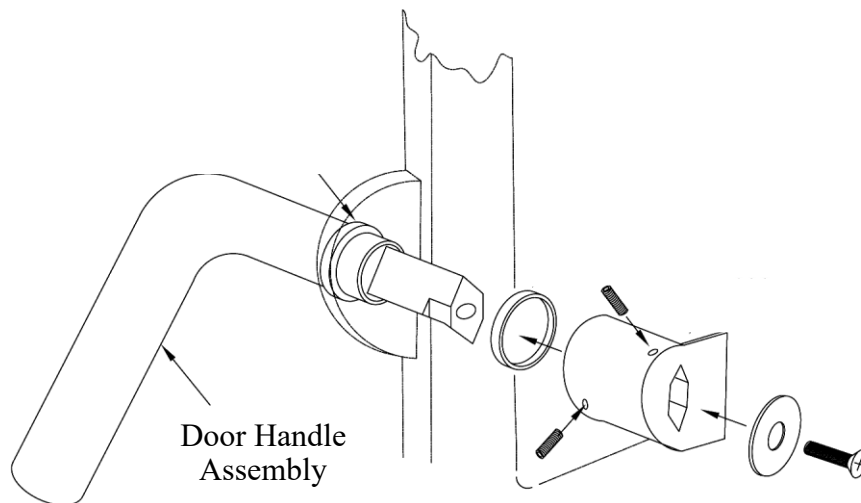
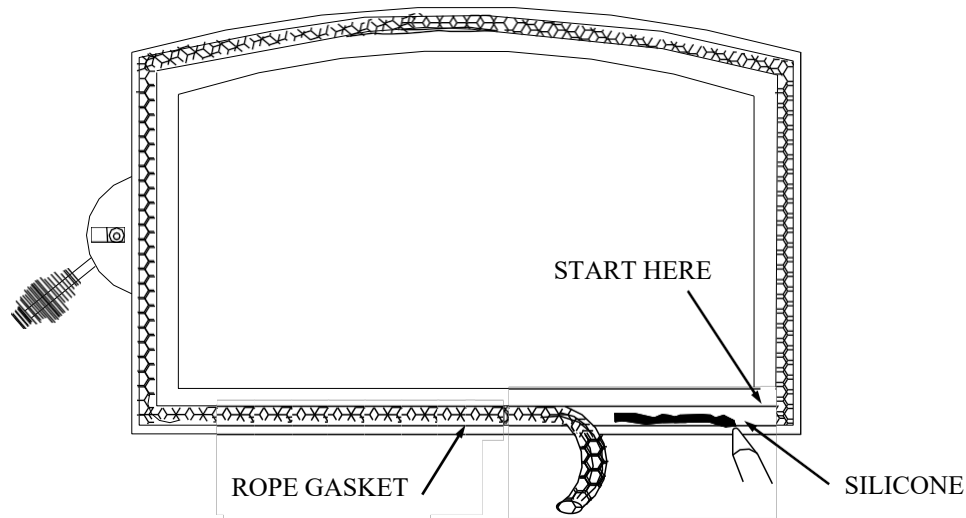


MAINTENANCE

DOOR GASKET REPLACEMENT (COLD HEATER)

To replace deteriorated gaskets, follow these steps to ensure proper installation of gaskets.

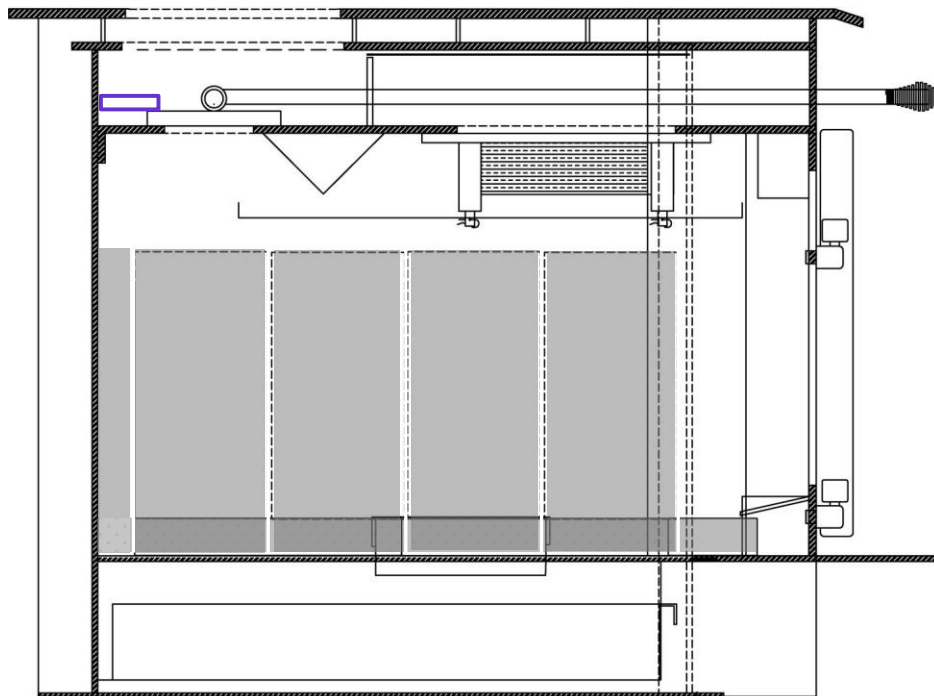
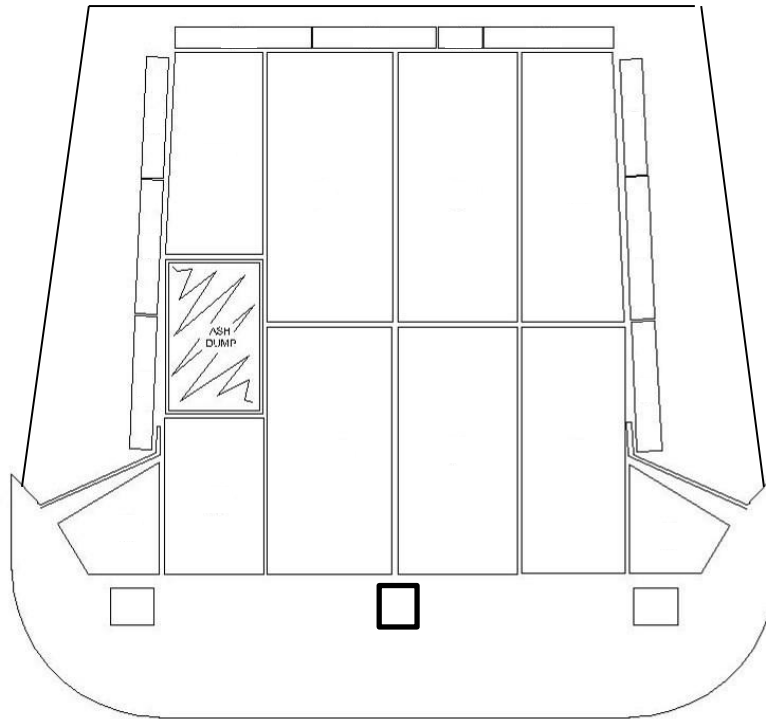
1. Obtain proper gaskets and silicone glue from your local dealer.
2. Using pliers, remove any worn and deteriorated gaskets.
3. Using a scraper, wire brush and sandpaper or steel wool, clean glue and gasket residue from door frame.
4. Measure and cut gaskets to length. Care should be taken not to stretch gaskets. What you want is a full and loose gasket weave after attachment to framing.
5. Obtain silicone glue and run a 3/16" bead inside door frame.
6. Obtain gasket and place in gasket channel areas starting at lower right corner, see below. Use a technique which assures that gasket is applied in a loose like manner. **DO NOT STRETCH GASKETS.**
7. After gasket is applied to glue, use your finger and go over all gasket gently pressing gasket to the channel. Use same pressure against gasket so that final result is an evenly applied gasket.
8. Leave door open and allow at least two (2) hours for glue to dry.
9. Once gaskets are checked, heater is ready for use.
10. This should be done annually. Allowing gaskets to deteriorate can cause over firing and shorten burn time.



PA 910096

MAINTENANCE BRICK LAYOUT

TOP VIEW



MAINTENANCE ELECTRICAL REPLACEMENT

MOTOR, THERMOSTAT, RHEOSTAT

1. **TO REPLACE MOTOR:**Unplug heater from 115V AC outlet.
 2. Remove bottom cover door removing (2) screws holding it in place. See Figure 33.
 3. To the right of ash pan you will find a wire cover screen protecting you from electrical components of this unit. See Figure 34. There are (3) screws holding wire cover screen. Remove (2) screws on left side of screen inward holding wire screen. Remove (1) right bottom screw holding right side of wire screen set aside. See Figure 34.
 4. Mark and unhook wire servicing motor. NOTE: You may remove thermostat to make it easier to work in area. Unscrew motor bracket with motor from unit. See Figures 34, 35. Gently slide motor bracket and motor out and while pulling it out move the back of the motor facing you from right to left in a clockwise motion.
 5. Place new motor over old motor and locate motor bracket in the same location as was on the old motor and mark holes on new motor. Remove motor bracket from old motor, line up with marks on new motor and secure bracket to new motor with screws form original motor assembly.
 6. To replace motor, turn motor so that 4"x4" air discharge opening is pointing toward back of stove. The flat part of motor housing turned up. With the air discharge opening pointing in the 2 o'clock position, start in toward unit. Rotating the back of motor counterclockwise. The air discharge opening of motor housing fits in a cavity in back of unit, that will direct air flow to proper location. Make sure air discharge opening is located firmly in opening. Reinstall motor bracket screws. If thermostat was removed, replace thermostat in bracket.
 7. Hook up wiring to all components, if you have replaced or unhooked them to rewire motor, rheostat or switch. If you need to see wiring diagram, See Page 42, Figure 36. If rheostat was removed, replace rheostat with the nut and replace control knob, reconnect wires to switch.
 8. Replace wire cage. Replace bottom cover door. Plug heater back into a 115V AC outlet.
1. **TO RPLACE THERMOSTAT:**Unplug heater from 115V AC outlet. Follow steps 2 through 3.
 2. Mark and unhook wires. Gently push thermostat up and out of thermostat bracket and replace with new thermostat. Reinstall wiring and cover screen. See Figure 35. If you need to see wiring diagram, See Page 37, Figure 36. Plug heater back into a 115V AC outlet.
1. **TO REPLACE RHEOSTAT:**Unplug heater from 115V AC outlet. Follow steps 2 through 3.
 2. Mark and unhook wires. Bottom under hearth is rheostat. Remove control knob and nut and replace with new rheostat installing with nut, then control knob. Reinstall wiring and cover screen. See Figure 35. If you need to see wiring diagram, See Page 37, Figure 36. Plug heater back into a 115V AC outlet.

Figure 33

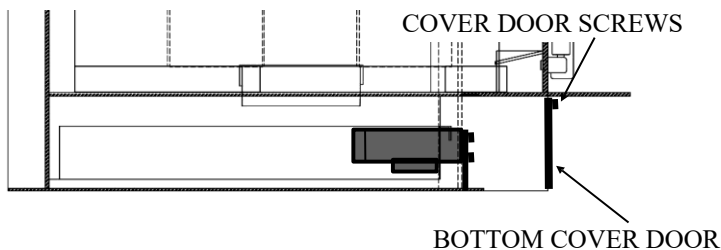


Figure 35

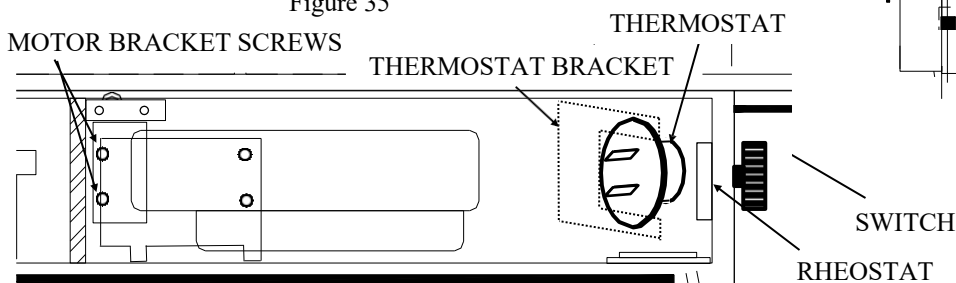
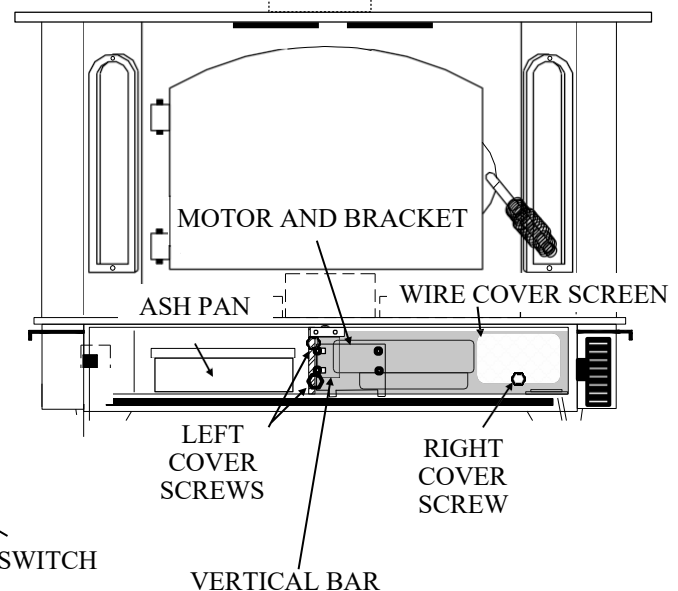


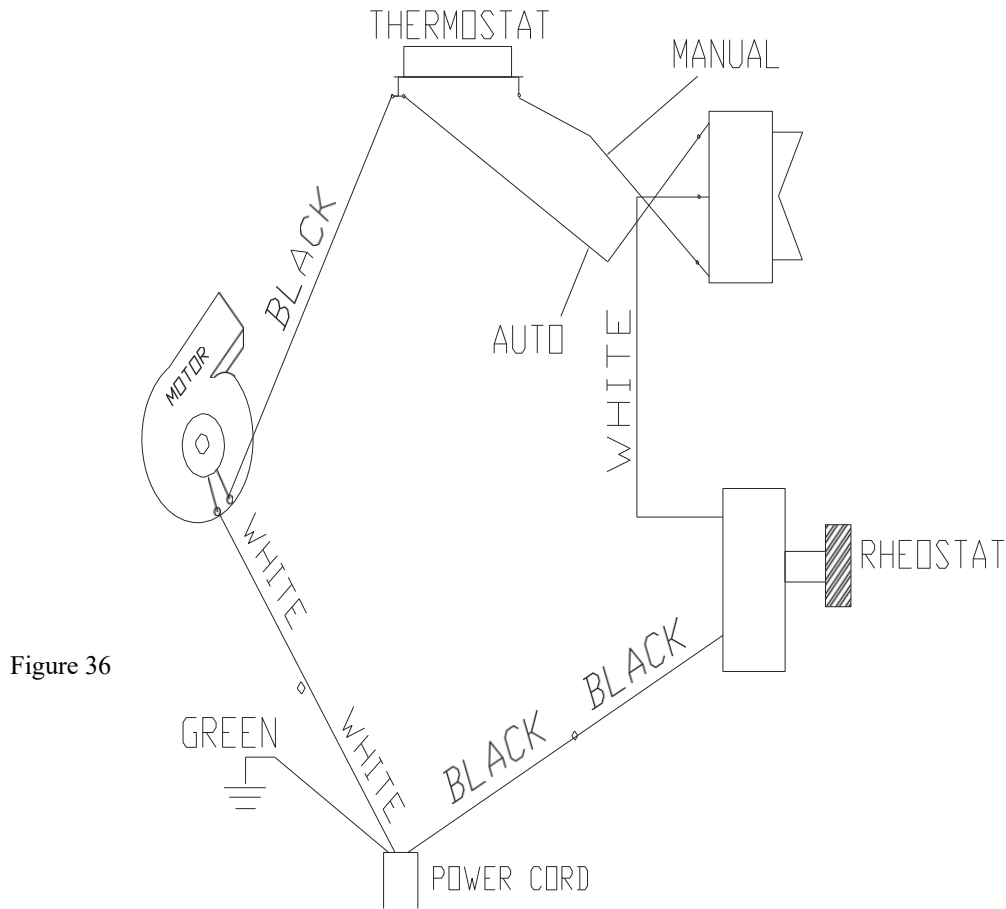
Figure 34



ROOM AIR BLOWER OPERATION

Your heater is equipped with a room air blower. For operation and wiring see figure below.

For your convenience, your heater is equipped with a rheostat with which you are able to select the air flow. The auto and manual switch will allow you to select the position at which thermostat will function.



Auto-position: After heater has warmed up and Auto-Manual switch is placed in “Auto” position and rheostat is in desired position, fan will automatically come on. When stove cools off, fan will automatically shut-off.

Manual position: You must turn room air blower on and off.

NOTE: Plug power cord into a 115V AC outlet. Set switch to “Manual” and rheostat to “High” position to ensure motor operates properly. Route cord to prevent damage to cord insulation from heat and sharp objects. Keep cord out of way of traffic to prevent damage caused by tripping, etc.

NOTE: When refueling or removing ashes turn “OFF” room air blower. Be sure to turn room air blower back on when finished.

MAINTENANCE

CHECK CHIMNEY

- A. Chimney should be inspected once a year.
- B. The chimney should be cleaned as necessary to remove creosote, soot, leaves, birds' nests, etc.

NOTE: A chimney cap may be installed to prevent moisture from entering chimney, to prevent sparks and burning materials from escaping chimney and to keep birds and foreign materials from entering.

NOTE: Some areas may require an approved spark arrestor.

CLEANING THE HEATER

- A. The heater should not be cleaned with any type of detergent as most all detergents have an oil base and cannot be painted over.
- B. The heater should be lightly sanded with fine sandpaper or steel wool, then repainted or touched up with high temperature paint.
- C. If the heater is located in a moist or damp location, check thoroughly for signs of condensation during times when heater is not in use.
- D. When heating season is over, heater should be cleaned out completely with a wire brush or cloth to help eliminate ash and burned wood smell.

CARE OF GLASS DOOR

The glass door on your heater permits you to enjoy the beauty of the fire while retaining efficiency of your heater. Although the type of glass used in the stove door has well established and recognized heat resistant and strength characteristics, it can be broken through improper care. To achieve maximum utility and safety of your glass door, we advise that you observe following use and safety tips:

1. Inspect glass regularly for cracks or breaks. If you detect a crack or break extinguish fire immediately and return door to your dealer for glass replacement before further use.
2. Do not slam heater door or otherwise impact glass. When closing door, make sure that no logs or other objects protrude to impact against glass.
3. Do not clean glass with materials which may scratch it (such as steel wool) or otherwise damage glass. Scratches on the glass can develop into cracks or breaks.

The glass can be cleaned with a commercial oven cleaner, providing it does not contain abrasives. A build-up on glass that has been there for a considerable length of time can be burned off with a propane torch or straight razor blade. Use protective gloves when using razor.

SECTION VIII

TROUBLESHOOTING

Operation of any wood heater can create problems. While use of a catalytic-combustor equipped stove will substantially lessen some of these problems— such as creosote formation— other traditional wood heater problems may remain.

The following guidelines apply to operation of all wood heaters, with problems related to catalytic heater addressed where appropriate.

HEATER RELATED PROBLEMS

Problem	Possible Cause	Solution
1. Sluggish Heater Performance	1. Obstruction in flue liner 2. Closing catalyst bypass too soon 3. Poor Flue Draft 4. Combustor is plugged 5. Wet or unseasoned wood being burned	1. Check cap and chimney and remove obstruction. 2. Follow New Buck instructions for proper firing procedures 3. Flue may need extension 4. See section in “Combustor Related Problems” 5. Burn dry, natural seasoned hard wood
2. High Fuel Consumption	1. Inexperience in catalytic operation 2. Improper regulation of draft or inlet air 3. Air leaking around door frame and/or glass 4. Bypass damper open	1. Operate stove with desired heat output in mind. Do not be overly concerned with maintaining light-off temperatures 2. Close inlet air control as much as possible to maintain desired heat output. Check gaskets, reinstall fiberglass gasketing around doors and glass as necessary 3. Check door gasket. Check adjustment of door latch. 4. Close bypass damper

3. Backpuffing	1. Gusts of wind / windy day 2. Hot combustor. (Above 1400° F)	1. If flue cap not on chimney, install one. 2. Increase the amount of combustion air slowly
4. Smoke Rollout when Heater Door is Opened	1. Bypass damper is closed 2. Opened door too soon after opening bypass damper 3. Wind gusts blowing	1. Open bypass damper 2. Open bypass damper– wait 15 -30 seconds before slowly opening door 3. Install flue cap
5. Low Catalytic Temperature	1. Bypass is open 2. Light-off not obtained 3. Fuel charge is spent 4. Combustor coated with fly ash or soot 5. Heater damper down too much	1. Once light-off temperatures have been reached and unit is stabilized, close bypass 2. Follow manufacturer's operating instructions 3. Refuel as necessary for combustor operation 4. See Section VII "Preventive Maintenance" 5. Ensure that proper air mixture and draft are available for wood to burn proper
COMBUSTOR-RELATED PROBLEMS		
1. Plugging	1. Burning materials that produce a lot of char and fly ash 2. Burning wet, pitchy wood or burning large loads of small-diameter wood with the combustor in the operating position without light-off taking place	1. Do not burn materials such as garbage, gift wrap or cardboard 2. Burn dry, natural seasoned hard wood. Don't place the combustor in the operating position until high temperatures are high enough to initiate light-off
2. Catalyst Peeling	1. Extreme temperatures at combustor surface can cause the catalyst to peel. Over-firing and flame impingement are primary causes	1. If severe, remove and replace catalysts. See "Catalyst Replacement" Section VI. Avoid extreme temperatures
3. Catalyst Masking	1. Not maintaining light-off temperatures	1. See Section VI and review operating instruction.
COLORED-GLASS PROBLEMS		
1. Glass Darkens	1. Buildup Creosote on Glass	1. Cleaning Glass. The glass inside will become colored during use from creosote buildup. The best way to clean glass, COLD STOVE, is to let creosote buildup harden. Then use razor blade to scarp of buildup of creosote. Wash glass using soapy water or glass cleaner.

REPLACEMENT PARTS FOR THE MODEL 81C

1. Air Control Bar (Right Side)	MF 810084
2. Air Control Bar (Left Side)	MF 910088
3. Door Handle Assembly	PA 910096
4. Door Gold	PC 212400G
5. Door Black	PC 212400
6. Door Pewter	PC 212400P
7. Small Bottom Glass Clip	PO210767B
8. Small Side Glass Clip	PO21076S
9. Small Top Glass Clip	PO21076T
10. Off/Auto/Man Fan Switch	PE RC211RB
11. Thermostat 110 disc	PE 400132
12. Power Cord	PE 400240
13. Strain Relief	PE 400320
14. Motor	PE 910714
15. Motor Pad	PO188PAD
16. Rheostat	PE BC204
17. Rheostat knob	PE BC204A
18. Glass	PG 2124GL
19. Glass, Bay side	PG 810100
20. Spring Handle	PO 100150
21. Small Spring Handle For Damper	PO BC290B
22. Catalyst Damper Rod	PO 910012
23. Catalyst	PO 800115C
24. Catalyst Intergram Gasket	PO 910500
25. Cast Catalyst Housing	PC H8080
26. Catalyst Housing Gasket	PO 800500
27. Catalyst Mixing Wire	PO 800015
28. Bay Window Overlay	PO 810105
29. Primary Air Block x 2	MF 810081
30. Shotgun Air Block	MF81C105
31. 1" x 1" x 1/8" thick magnet	PO DM841
32. Firebrick	PR 900050
33. Cover Door Assembly	MA 81COVDOOR

NEW BUCK CORPORATION (NBC)
"LIMITED WARRANTY" FOR THE BUCK STOVE
PLEASE READ THIS WARRANTY CAREFULLY

PRODUCTS COVERED

This warranty covers the new Buck Stove heating unit, so long as it is owned by the original purchaser, including optional and standard accessories purchased at the same time, subject to terms, limitations, and conditions herein set out.

PRODUCTS NOT COVERED

This warranty does not cover the following:
Glass, Refractory Material, Firebrick or Gaskets.

This Warranty will not cover any damage and/or failure caused by abuse or improper installation of the products covered.

WARRANTY TIME PERIODS

(A) Period I

For one year from the date of purchase, NBC will replace or repair, at its option, any part defective in materials or workmanship. The costs of parts only are included. The customer pays any labor or transportation charges required.

Thereafter,

(B) Period II

For the period after the first year from the date of purchase and extending for five years as long as the Buck Stove is owned by the original purchaser, NBC will repair or replace, at its option, any part defective in materials or workmanship, with the exception of, electrical motors, wiring, switches, components, optional and standard accessories, and all parts not permanently attached to the heating unit. Parts not permanently attached to the heating unit are defined as those items designed to be removed from the stove, including those removable with common hand tools. The costs of parts only are included. The customer pays any labor or transportation charges required.

PROCEDURE

Should you feel that your BUCK STOVE is defective, you should contact any Buck Stove dealer for the name of your nearest authorized Buck Stove service representative, who will instruct you on the proper procedure, depending on which Warranty Time Period (Period I or Period II) applies.

If for any reason you are dissatisfied with the suggested procedures, you may contact us in writing at:

New Buck Corporation
Customer Service Department
P. O. Box 69
Spruce Pine, NC 28777
Email: info@buckstove.com

CONDITIONS AND EXCLUSIONS

- (A) Replacement of parts may be in the form of new or fully reconditioned parts, at NBC's option.
- (B) There is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of the Express Warranty.
- (C) New Buck Corporation is not liable for indirect, incidental, or consequential damages in connection with the use of the product including any cost or expense of providing substitute equipment or service during periods of malfunction or non-use.
Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.
- (D) All warranty repairs under this warranty must be performed by an authorized Buck Stove service representative. Repairs or attempted repairs by anyone other than an authorized service representative are not covered under this warranty. In addition, these unauthorized repairs may result in additional malfunctions, the correction of which is not covered by warranty.

OTHER RIGHTS

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

OWNER REGISTRATION CARD

The attached Owner Registration Card must be completed in its entirety and mailed within 30 days from the date of purchase or from the date of installation, if installed by a factory certified installer, to New Buck Corporation in order for warranty coverage to begin.

PLEASE NOTE: The Owner Registration Card must contain the Authorized Buck Stove Dealer Code Number and the Certified Installer's number (if applicable) for warranty coverage to begin.

To be completed by selling distributor/ dealer/ customer:

Name _____
(Last) (First)

Address _____

City _____ State _____ Zip _____

CUSTOMER EMAIL: _____

MODEL 81C - Serial Number _____

Date of Installation: Day _____ Month _____ Year _____

Installer's Name _____

Installer's Certification Number _____

Dealer's Name _____

City _____ State _____ Zip _____

Appendix C: Calibrations



QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com



PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0182484A0912013i241204

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Digiweigh	DWP12i 300kg x 0.	82484A0912013i	#050	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
kg	0.01	QC033	12/4/24	12/28/23	12/2025

FUNCTIONAL CHECKS

SHIFT TEST		LINEARITY		REPEATABILITY		ENVIRONMENTAL CONDITIONS
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:	
100	0.05	HB44	HB44	100	0.01	
As-Found:		As-Found:		As-Found:		
Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	
As-Left:		As-Left:		As-Left:		☐ ☒ ☐ Good Fair Poor Temperature: 17.2°C
Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
400	399.98	399.98	0.006
200	200.00	200.00	0.005
100	100.00	100.00	0.005
75	75.00	75.00	0.005
50	50.00	50.00	0.005
25	25.00	25.00	0.005

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	7/26/24	7/2026	20221688

Permanent Information Concerning this Equipment:

12 month calibration cycle. Scale calibrates in kg only.

Comments/Information Concerning this Calibration

12/04/2024: RH-37%

Report prepared/reviewed by: TLP

Date: 12.04.2024

Technician: T. Peterson

Signature: [Signature]

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

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Member: National Conference of Standards Laboratories and Weights & Measures

Dry Gas Meter Calibration

DUT

Manufacturer: Apex
 Model: XC-60
 Lab ID #: 53
 Serial #: 1902130
 Calibration Date: 8/11/2025
 Calibration Expiration: 2/11/2026
 Barometric Pressure: 29.81 in. Hg



Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer: Apex		Fluke	Aquatech	
Model: SK25Da		52II	DBX2	
Lab ID#: 47		196	202	
Calibration Expiration Date: 6/30/2026		2/11/2026	7/1/2026	
Calibration γ Factor: 0.998				

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Calibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	122.491	76.363	62.504
Standard DGM Temperature (°F)	76.0	76.0	76.7
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	4.194	6.860
DGM Final Volume (ft ³)	4.194	6.860	9.075
DGM Temperature (°F)	77.0	86.6	90.9
DGM Pressure (in H ₂ O)	3.40	2.40	1.8
Net Volume for Standard DGM (ft ³)	4.326	2.697	2.207
Net Volume for DGM (ft ³)	4.194	2.666	2.215
Dry Gas Meter γ Factor	1.023	1.023	1.016
γ Factor Deviation From Average	1.023	1.023	1.016

Average Gas Meter γ Factor

1.021

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Report and Certificate of Calibration



www.Cal-Cert.com

Toll Free
800-356-4662

Address
5777 SE International Way
Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-203324-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 Compound Gauge Fluke SN: 4582643 Cal: 01/24/2025 Due: 01/31/2026 Vendor: Fluke Report #: EVL1027223
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	Reference:	ASME B40.100
Recommended Due Date:	February 27, 2026	Cal-Cert Procedure:	CP-003
Calibration Frequency:	12 Months	Indicating System:	Digital
Manufacturer:	Newport Industries	Temperature:	67 °F
Type:	Pressure Transducer	Humidity:	41% RH
Model Number:	Unknown	Cal Factor:	None
Serial #:	Unknown	Asset #:	53C
Capacity:	5 In H2O	Service Location:	Service Address
Tolerance:	± 1.00% of Span	As Found:	Pass
Gauge Class:	A	As Left:	Pass

Instrument Range: 5.00		Range Resolution: 0.01		Mode Verified: Pressure				
UUT Reading	Standard As Found	Standard Verification Reading #1	Error	Standard Verification Reading #2	Error	Tolerance	Expanded Uncertainty ±	
In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005	
0.50	0.4981	0.4981	0.00	0.5048	0.00	0.05	0.018	
1.25	1.2278	1.2278	-0.02	1.2351	-0.01	0.05	0.019	
2.50	2.4664	2.4664	-0.03	2.4746	-0.03	0.05	0.022	
3.75	3.7213	3.7213	-0.03	3.7158	-0.03	0.05	0.016	
5.00	4.9584	4.9584	-0.04	4.9521	-0.05	0.05	0.018	
3.75	3.7024	3.7024	-0.05	3.7233	-0.03	0.05	0.054	
2.50	2.4709	2.4709	-0.03	2.4769	-0.02	0.05	0.016	
1.25	1.2356	1.2356	-0.01	1.2386	-0.01	0.05	0.009	
0.50	0.4978	0.4978	0.00	0.5010	0.00	0.05	0.01	
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005	

Manufacturer: Newport Industries

Type: Pressure Transducer

Serial #: Unknown

Remarks:

--

**We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.**

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01. A2LA is recognized under the ILAC mutual recognition agreement (MRA).
--

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above. Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.

All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 27, 2025

Quality Manager: Tony Lewandowski

Signature:



Dry Gas Meter Calibration

DUT

Manufacturer: Apex
 Model: XC-60
 Lab ID #: 54
 Serial #: 1902133
 Calibration Date: 8/11/2025
 Calibration Expiration: 2/11/2026
 Barometric Pressure: 29.81 in. Hg



Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer: Apex		Fluke	Aquatech	
Model: SK25Da		52II	DBX2	
Lab ID#: 47		196	202	
Calibration Expiration Date: 6/30/2026		2/11/2026	7/1/2026	
Calibration γ Factor: 0.998				

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Calibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	111.016	90.681	65.623
Standard DGM Temperature (°F)	78.1	78.8	79.3
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	3.899	7.131
DGM Final Volume (ft ³)	3.899	7.131	9.497
DGM Temperature (°F)	82.4	88.7	93.2
DGM Pressure (in H ₂ O)	3.11	2.51	1.75
Net Volume for Standard DGM (ft ³)	3.920	3.202	2.317
Net Volume for DGM (ft ³)	3.899	3.232	2.366
Dry Gas Meter γ Factor	1.004	1.001	0.998
γ Factor Deviation From Average	0.003	0.000	0.003

Average Gas Meter γ Factor

1.001

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Technician:

Report and Certificate of Calibration



www.Cal-Cert.com

Toll Free
800-356-4662

Address
5777 SE International Way
Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-203325-21 **Customer PO#:** 1126
Customer Name: PFS TECO
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Calibration Standards

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14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	Reference:	ASME B40.100
Recommended Due Date:	February 27, 2026	Cal-Cert Procedure:	CP-003
Calibration Frequency:	12 Months	Indicating System:	Digital
Manufacturer:	Newport Industries	Temperature:	66 °F
Type:	Pressure Transducer	Humidity:	41% RH
Model Number:	Unknown	Cal Factor:	None
Serial #:	Unknown	Asset #:	54B
Capacity:	1 In H2O	Service Location:	Service Address
Tolerance:	± 1.00% of Span	As Found:	Pass
Gauge Class:	A	As Left:	Pass

Instrument Range:		Range Resolution:		Mode Verified:		Pressure		
UUT Reading	Standard As Found	Standard Verification Reading #1	Error	Standard Verification Reading #2	Error	Tolerance	Expanded Uncertainty ±	
In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	
0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.005	
0.10	0.1058	0.1058	0.01	0.1024	0.00	0.01	0.01	
0.25	0.2534	0.2534	0.00	0.2546	0.00	0.01	0.006	
0.50	0.5056	0.5056	0.01	0.5073	0.01	0.01	0.007	
0.75	0.7502	0.7502	0.00	0.7589	0.01	0.01	0.023	
1.00	1.0081	1.0081	0.01	1.0051	0.01	0.01	0.009	
0.75	0.7533	0.7533	0.00	0.7544	0.00	0.01	0.006	
0.50	0.5079	0.5079	0.01	0.5036	0.00	0.01	0.012	
0.25	0.2584	0.2584	0.01	0.2576	0.01	0.01	0.006	
0.10	0.1096	0.1096	0.01	0.1083	0.01	0.01	0.006	
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.01	0.005	

Manufacturer: Newport Industries

Type: Pressure Transducer

Serial #: Unknown

Remarks:

--

**We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.**

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01. A2LA is recognized under the ILAC mutual recognition agreement (MRA).
--

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All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 27, 2025

Quality Manager: Tony Lewandowski

Signature:



Report and Certificate of Calibration



www.Cal-Cert.com

Toll Free
800-356-4662

Address
5777 SE International Way
Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-203326-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 Compound Gauge Fluke SN: 4582643 Cal: 01/24/2025 Due: 01/31/2026 Vendor: Fluke Report #: EVL1027223
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	Reference:	ASME B40.100
Recommended Due Date:	February 27, 2026	Cal-Cert Procedure:	CP-003
Calibration Frequency:	12 Months	Indicating System:	Digital
Manufacturer:	Newport Industries	Temperature:	66 °F
Type:	Pressure Transducer	Humidity:	43% RH
Model Number:	Unknown	Cal Factor:	None
Serial #:	Unknown	Asset #:	54C
Capacity:	5 In H2O	Service Location:	Service Address
Tolerance:	± 1.00% of Span	As Found:	Pass
Gauge Class:	A	As Left:	Pass

Instrument Range:		Range Resolution:		Mode Verified:		Pressure		
UUT Reading	Standard As Found	Standard Verification Reading #1	Error	Standard Verification Reading #2	Error	Tolerance	Expanded Uncertainty ±	
In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005	
0.50	0.4690	0.4690	-0.03	0.5120	0.01	0.05	0.112	
1.25	1.2455	1.2455	0.00	1.2373	-0.01	0.05	0.022	
2.50	2.4891	2.4891	-0.01	2.4813	-0.02	0.05	0.021	
3.75	3.7327	3.7327	-0.02	3.7142	-0.04	0.05	0.048	
5.00	4.9519	4.9519	-0.05	4.9562	-0.04	0.05	0.013	
3.75	3.7261	3.7261	-0.02	3.7208	-0.03	0.05	0.015	
2.50	2.4775	2.4775	-0.02	2.4740	-0.03	0.05	0.011	
1.25	1.2316	1.2316	-0.02	1.2336	-0.02	0.05	0.007	
0.50	0.4971	0.4971	0.00	0.4990	0.00	0.05	0.007	
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005	

Manufacturer: Newport Industries

Type: Pressure Transducer

Serial #: Unknown

Remarks:

--

**We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.**

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01. A2LA is recognized under the ILAC mutual recognition agreement (MRA).
--

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All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 27, 2025

Quality Manager: Tony Lewandowski

Signature:



Dry Gas Meter Calibration

DUT

Manufacturer: Apex
 Model: XC-50-DIR
 Lab ID #: 203
 Serial #: A2204292
 Calibration Date: 8/11/2025
 Calibration Expiration: 2/11/2026
 Barometric Pressure: 30.02 in. Hg



Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer: Apex		Fluke	Aquatech	
Model: SK25Da		52II	DBX2	
Lab ID#: 47		196	202	
Calibration Expiration Date: 6/30/2026		2/11/2026	7/1/2026	
Calibration γ Factor: 0.998				

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Calibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	121.289	118.017	129.138
Standard DGM Temperature (°F)	78.0	77.5	77.9
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	0.000	0.000
DGM Final Volume (ft ³)	4.197	4.129	4.557
DGM Temperature (°F)	73.8	85.0	90.0
DGM Pressure (in H ₂ O)	2.03	2.76	3.5
Net Volume for Standard DGM (ft ³)	4.283	4.168	4.560
Net Volume for DGM (ft ³)	4.197	4.129	4.557
Dry Gas Meter γ Factor	1.006	1.015	1.013
γ Factor Deviation From Average	1.006	1.015	1.013

Average Gas Meter γ Factor

1.011

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (Y_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Report and Certificate of Calibration



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Toll Free
800-356-4662

Address
5777 SE International Way
Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-203319-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 Compound Gauge Fluke SN: 4582643 Cal: 01/24/2025 Due: 01/31/2026 Vendor: Fluke Report #: EVL1027223
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	Reference:	ASME B40.100
Recommended Due Date:	February 27, 2026	Cal-Cert Procedure:	CP-003
Calibration Frequency:	12 Months	Indicating System:	Digital
Manufacturer:	Red Lion	Temperature:	66 °F
Type:	Pressure Transducer	Humidity:	43% RH
Model Number:	Unknown	Cal Factor:	None
Serial #:	Unknown	Asset #:	203B
Capacity:	1 In H2O	Service Location:	Service Address
Tolerance:	± 1.00% of Span	As Found:	Pass
Gauge Class:	A	As Left:	Pass

Instrument Range: 1.00		Range Resolution: 0.001		Mode Verified: Pressure			
UUT Reading	Standard As Found	Standard Verification Reading #1	Error	Standard Verification Reading #2	Error	Tolerance	Expanded Uncertainty ±
In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O
0.000	0.00	0.00	0.00	0.00	0.00	0.01	0.0005
0.100	0.0929	0.0929	-0.01	0.0992	0.00	0.01	0.0164
0.250	0.2473	0.2473	0.00	0.2488	0.00	0.01	0.0039
0.500	0.4955	0.4955	0.00	0.4990	0.00	0.01	0.0091
0.750	0.7533	0.7533	0.00	0.7427	-0.01	0.01	0.0276
1.000	1.0045	1.0045	0.00	0.9909	-0.01	0.01	0.0354
0.750	0.7462	0.7462	0.00	0.7517	0.00	0.01	0.0143
0.500	0.4976	0.4976	0.00	0.4925	-0.01	0.01	0.0132
0.250	0.2431	0.2431	-0.01	0.2447	-0.01	0.01	0.0042
0.100	0.1020	0.1020	0.00	0.1008	0.00	0.01	0.0031
0.000	0.0000	0.0000	0.00	0.0000	0.00	0.01	0.0005

Manufacturer: Red Lion

Type: Pressure Transducer

Serial #: Unknown

Remarks:

**We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.**

**Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).**

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All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 27, 2025

Quality Manager: Tony Lewandowski

Signature: 

Report and Certificate of Calibration



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800-356-4662

Address
5777 SE International Way
Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-203320-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 Compound Gauge Fluke SN: 4582643 Cal: 01/24/2025 Due: 01/31/2026 Vendor: Fluke Report #: EVL1027223
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 27, 2025	Reference:	ASME B40.100
Recommended Due Date:	February 27, 2026	Cal-Cert Procedure:	CP-003
Calibration Frequency:	12 Months	Indicating System:	Digital
Manufacturer:	Red Lion	Temperature:	66 °F
Type:	Pressure Transducer	Humidity:	43% RH
Model Number:	Unknown	Cal Factor:	None
Serial #:	Unknown	Asset #:	203C
Capacity:	5 In H2O	Service Location:	Service Address
Tolerance:	± 1.00% of Span	As Found:	Pass
Gauge Class:	A	As Left:	Pass

Instrument Range:		Range Resolution:		Mode Verified:		Pressure		
UUT Reading	Standard As Found	Standard Verification Reading #1	Error	Standard Verification Reading #2	Error	Tolerance	Expanded Uncertainty ±	
In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	In H2O	
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005	
0.50	0.5048	0.5048	0.00	0.4973	0.00	0.05	0.02	
1.25	1.2453	1.2453	0.00	1.2210	-0.03	0.05	0.063	
2.50	2.4656	2.4656	-0.03	2.4846	-0.02	0.05	0.049	
3.75	3.7075	3.7075	-0.04	3.7111	-0.04	0.05	0.011	
4.20	4.1508	4.1508	-0.05	4.1511	-0.05	0.05	0.007	
3.75	3.7093	3.7093	-0.04	3.7095	-0.04	0.05	0.007	
2.50	2.4595	2.4595	-0.04	2.4755	-0.02	0.05	0.042	
1.25	1.2296	1.2296	-0.02	1.2305	-0.02	0.05	0.006	
0.50	0.4982	0.4982	0.00	0.5109	0.01	0.05	0.033	
0.00	0.0000	0.0000	0.00	0.0000	0.00	0.05	0.005	

Manufacturer: Red Lion

Type: Pressure Transducer

Serial #: Unknown

Remarks:

Device stopped reading at 4.27

**We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
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All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 27, 2025

Quality Manager: Tony Lewandowski

Signature:



Dry Gas Meter Calibration

DUT

Manufacturer: Apex
 Model: XC-60
 Lab ID #: 55
 Serial #: 810016
 Calibration Date: 8/11/2025
 Calibration Expiration: 2/11/2026
 Barometric Pressure: 30.02 in. Hg



Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer: Apex		Fluke	Aquatech	
Model: SK25Da		52II	DBX2	
Lab ID#: 47		196	202	
Calibration Expiration Date: 6/30/2026		2/11/2026	7/1/2026	
Calibration γ Factor: 0.998				

Use in accordance with EPA Method 5, sections 10.3 and 16.1. Use only calibrated, NIST traceable reference standard DGM. Calibrate over expected operating flow range of DUT.

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	111.833	85.340	79.311
Standard DGM Temperature (°F)	76.7	76.9	77.1
Standard DGM Pressure (in H ₂ O)	0.00	0.00	0.0
DGM Initial Volume (ft ³)	0.000	0.000	0.000
DGM Final Volume (ft ³)	3.988	3.043	2.850
DGM Temperature (°F)	83.4	84.1	84.4
DGM Pressure (in H ₂ O)	0.00	0.00	0.00
Net Volume for Standard DGM (ft ³)	3.949	3.014	2.801
Net Volume for DGM (ft ³)	3.988	3.043	2.850
Dry Gas Meter γ Factor	1.001	1.002	0.994
γ Factor Deviation From Average	1.001	1.002	0.994

Average Gas Meter γ Factor

0.999

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

- Deviation = |Average value for all runs - current run value|
- $\gamma = [V_{std} \times (\gamma_{std}) \times (P_{bar} + P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/13.6)]$

Technician:

Report and Certificate of Calibration



Portland Laboratory
5777 SE International Way
Milwaukie, OR 97222
800-356-4662
503-654-9620

Anaheim Laboratory
120 S. Chaparral Ct Suite 110
Anaheim Hills, CA 92808
888-700-4100
714-696-5300

www.Cal-Cert.com

Report #: 41210-28785-3646 **Customer PO#:** 1131
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

10-00391 | Thermo-Hygrometer | Comark | SN: 6217150001 | Cal: 04/09/2025 | Due: 04/30/2026 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 39951-30759-5013
LP-01158 | Electrical Meter | Keithley | SN: 1388607 | Cal: 07/24/2023 | Due: 07/31/2025 | Vendor: Techmaster Electronics | Report #: TSV-0-545118

Instrument Data

Calibration Date:	July 7, 2025	Reference:	Manufactures Tolerances
Recommended Due Date:	July 7, 2027	Cal-Cert Procedure:	CP-080
Calibration Frequency:	24 Months	Indicating System:	Digital
Manufacturer:	Delmhorst	Temperature:	81 °F
Type:	Resistivity Standard	Humidity:	40% RH
Model Number:	MCS-1	Asset #:	94
Serial #:	94	Service Location:	Cal-Cert Lab
Capacity:	120 Megaohms	As Found:	Pass
Tolerance:	1.00 % of indication	As Left:	Pass

Instrument Range:	120 Megaohms	Resolution:	0.001	Mode Verified:	Resistance
--------------------------	--------------	--------------------	-------	-----------------------	------------

Standard Reading	UUT As Found	UUT Reading #1	Error	UUT Reading #2	Error
0.000	0.000	0.000	0.000	0.000	0.000
1.100	1.095	1.095	-0.005	1.095	-0.005
120.000	120.450	120.450	0.450	120.450	0.450
0.000	0.000	0.000	0.000	0.000	0.000

Expanded Uncertainty± 2.50 Megaohms

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
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This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Brent Enbysk
Quality Manager: Tony Lewandowski

Date: July 7, 2025

Signature:

Resistivity Meter CF-080-01

Revision 7

7/24/2017



CERTIFICATE OF CALIBRATION

CUSTOMER: PFS-TECO : CLACKAMAS, OR
PO NUMBER: 1130
INST. MANUFACTURER: DWYER
INST. DESCRIPTION: VELOMETER
MODEL NUMBER: 471
SERIAL NUMBER: CP288559 ID# 095
RATED ACCURACY: SEE NOTES BELOW.
UNCERTAINTY GIVEN: $\pm 0.69\%$ RD ; k=2
NOTES: $\pm 3.0\%$ FS (0-500 / 0-1500) ** $\pm 4.0\%$ F.S. (0-5000) ** $\pm 5.0\%$ F.S. (0-15000) ** $\pm 2^\circ\text{F}$

CALIBRATION DATE: 07/01/2025
CALIBRATION DUE: 07/01/2026
PROCEDURE: T.O.33K6-4-1769-1
CALIBRATION FLUID: AIR @ 14.7 PSIA 70°F
RECEIVED CONDITION: WITHIN MFG. SPECS.
LEFT CONDITION: WITHIN MFG. SPECS.
AMBIENT CONDITIONS: 763mm HGA 45% RH 72°F
CERTIFICATE FILE #: 490265.2025

Q.MANUAL IM 2.0 REV 2020.2 DATED 7-27-2020

DECISION RULE: SIMPLE ACCEPTANCE. MEASUREMENT UNCERTAINTIES NOT TAKEN INTO CONSIDERATION WHEN DETERMINING PASS/FAIL

UUT INDICATED FT/MIN	DM.STD. ACTUAL FT/MIN	UUT INDICATED DEG. F	DM STD. ACTUAL DEG. F
65	68	0 TO 200°F	0 TO 200°F
149	154	42.8	44.3
280	289	70.6	72.1
491	504	97.5	99.0
543	557		
1017	1044		
1495	1535		
528	552		
3242	3327		
4990	5130		
6986	7220		
14859	15348		

STANDARDS USED:

A312 $\pm .02\%$ RD -140 TO 1372 DEG °C TRACE# DMCA1328	DUE	04/24/26
A69 12INCH AIR FLOW 50 - 8000FPM +/- 0.69 % RD TRACE#1649766843,06290041521,1616396227	DUE	03/31/26

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). Unless otherwise directed by the customer, Dick Munns uses a decision rule of Simple Acceptance as defined in ILAC G8 with a TUR of 1:1 or better. Calibration has been performed according to the shown procedure. The use of IAS/ILAC logo indicates calibrations are in accordance to ISO/IEC 17025:2017.

Dick Munns Company • 11133 Winners Circle, Los Alamitos, CA 90720
Phone: 714-827-1215 • www.dickmunns.com

This Calibration Certificate shall not be reproduced except, in full, without approval by Dick Munns Company. The data shown applies only to the instrument being calibrated and under the stated conditions of calibration.

Issuing Date:

Approved By:

Cal. Technician:

Calibrated at: ☒ Lab

☐ On-Site (Customer's)

Page 1 of 1

07/01/2025

[Signature]

A.V.

Certificate of Calibration

Certificate Number: 743892



JJ Calibrations, Inc.

7724 SE Aspen Summit Drive

Portland, OR 97266-9217

Phone 503.786.3005

FAX 503.786.2994

PFS TECO

11785 SE Hwy 212

Suite 305

Clackamas, OR 97015

PO: 1033

Order Date: 03/08/2021

Authorized By: N/A

Calibrated on: 03/18/2021

*Recommended Due: 03/18/2026

Environment: 19 °C 41 % RH

* As Received: Other - See Remarks

* As Returned: Other - See Remarks

Action Taken: Calibrated

Technician: 126



0723.01

Calibration

Property #: 097

User: N/A

Department: N/A

Make: Unknown

Model: 10 Lbs.

Serial #: 097

Description: Mass

Procedure: DCN 500901

Accuracy: Raw Data

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

Data is provided for your determination of acceptability. Received/returned without accessories.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
484A	Rice Lake	1kg-10kg (Class ASTM 1)	Mass Set,	05/28/2021	699197
503A	Rice Lake	1mg-200g (Class 0)	Mass Set,	09/11/2021	729241
550A	And (A&D) Co.	HP-30K	Balance 30 Kg	12/31/2021	739307
723A	Rice Lake	1mg-200g (Class 0)	Mass Set,	06/09/2021	723431

Parameter

Measurement Data

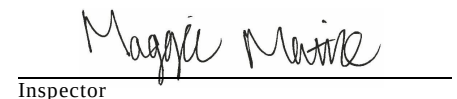
Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = $\bar{u}$
Mass								
Raw Data		g	4535.92370000	0.0000000	0.0000000	0.1785299	4536.1022299 g	3.5E-01 $\bar{u}$

This instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual and is traceable to either the SI or to National Institute of Standards and Technology (NIST). The quality system and this certificate are in compliance with ANSI/NCCL Z540-1-1994, ISO/IEC 17025-2017, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless stated in the comments, certificates reflect the "Simple Acceptance Rule" as specified by JCGM 106:2012. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without written approval of JJ Calibrations.


Reviewer

3 Issued 03/25/2021

Rev # 15


Inspector



QUALITY CONTROL SERVICES

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PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0134307497250605

A2LA ACCREDITED **CERTIFICATE OF CALIBRATION WITH DATA**

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Sartorius	ENTRIS224-1S	34307497	#107	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
g	0.0001	QC012	6/5/25	12/4/24	12/2025

FUNCTIONAL CHECKS

ECCENTRICITY		LINEARITY		STANDARD DEVIATION			ENVIRONMENTAL CONDITIONS		
Test Wt:	Tol:	Test Wt:	Tol:	Test Wt:	Tol:		☐	☒	☐
100	0.0003	50 x 4	0.0002	100	0.0001				
As-Found:		As-Found:		1. 100.0000	5. 100.0000	9. 99.9999	Good Fair Poor Temperature: 22.6°C		
Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	2. 99.9999	6. 100.0000	10. 99.9999			
As-Left:		As-Left:		3. 99.9999	7. 99.9999	<u>Result</u>			
Pass: ☒	Fail: ☐	Pass: ☒	Fail: ☐	4. 100.0000	8. 99.9999	0.00005			

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	199.9994	200.0000	0.00017
100	99.9998	100.0000	0.00016
50	49.9999	50.0001	0.00015
20	19.9999	19.9999	0.00015
0.1	0.1000	0.0999	0.00015
0.05	0.0500	0.0499	0.00015

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	10 kg to 1 mg	D123	7/1/24	7/2025	20241353

Permanent Information Concerning this Equipment:

6 month calibration cycle

Comments/Info Concerning this Calibration:

6/25 - Cleaned, leveled, & adjusted span. RH = 49%

Report prepared/reviewed by: 

Date: 6.5.25

Technician: D. Oudeans

Signature: 

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

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation and readability of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards. Results relate only to the item(s) tested. Unless otherwise noted, statements of conformity do not include measurement

Member: National Conference of Standards Laboratories and Weights & Measures

PT ID: DIRI01



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PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI01C101887027241204

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Scale	Mettler	IND570 - 1000lhx0.	C101887027	#189	Lab
Units	Readability	SOP	Cal Date	Last Cal Date	Cal Due Date
lbs	0.02	QC033	12/4/24	12/28/23	12/2025

FUNCTIONAL CHECKS

SHIFT TEST	LINEARITY	REPEATABILITY	ENVIRONMENTAL CONDITIONS
Test Wt: Tol: 400 0.10	Test Wt: Tol: HB44 HB44	Test Wt: Tol: 200 0.04	☐ ☒ ☐ Good Fair Poor
As-Found: Pass: ☒ Fail: ☐	As-Found: Pass: ☒ Fail: ☐	As-Found: Pass: ☒ Fail: ☐	Temperature: 16.1°C
As-Left: Pass: ☒ Fail: ☐	As-Left: Pass: ☒ Fail: ☐	As-Left: Pass: ☒ Fail: ☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
1000	1000.02	1000.02	0.012
600	599.92	599.92	0.011
400	399.94	399.94	0.011
200	199.94	199.94	0.011
100	99.98	99.98	0.011
50	49.98	49.98	0.011

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Avoirdupois Cast W	Rice Lake	25 and 50lb	PWO990-CA	7/26/24	7/2026	20221688

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

12/04/2024: RH = 38%

Report prepared/reviewed by: TUP

Date: 12-04-2024

Technician: E.J. Vasko

Signature: [Signature]

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

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

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PT ID: DIRI01

Report and Certificate of Calibration



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Milwaukie, OR 97222

Local
503-654-9620



Report #: 39356-1216144-4847 **Customer PO#:** 1128
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

10-00027 Gage Block Set Mitutoyo SN: 975536 Cal: 03/28/2023 Due: 03/31/2025 Vendor: Cal-Cert Report #: 28026-56355-5
10-00954 Gage Block Set Shars SN: 120018 Cal: 05/26/2023 Due: 05/26/2025 Vendor: American Gage Report #: 109141
LP-01346 Thermo-Hygrometer Comark SN: 06210350198 Cal: 03/08/2024 Due: 03/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 33563-67215-3616

Instrument Data

Calibration Date:	March 5, 2025	Reference:	Manufacturer's Spec
Calibration Due Date:	March 5, 2026	Cal-Cert Procedure:	CP-115
Calibration Frequency:	12 Months	Indicating System:	Scaling
Manufacturer:	Craftsman	Temperature:	66 °F
Type:	Tape Measure	Humidity:	40% RH
Model Number:	CMHT37365	Asset #:	209
Serial #:	Unknown	Service Location:	Cal-Cert Lab
Capacity:	25.00 Feet	As Found:	Pass
		As Left:	Pass

Instrument Range:		Range Resolution:		
25.000 Feet		0.06250 Feet		
Calibration Standard	As Found Reading	Verification Reading #1	Verification Reading #2	
0.0000	0.0000	0.0000	0.0000	
0.5000	0.5000	0.5000	0.5000	
0.1000	0.1000	0.1000	0.1000	
12.0000	12.0000	12.0000	12.0000	
48.0000	48.0000	48.0000	48.0000	
96.0000	96.0000	96.0000	96.0000	
192.0000	192.0000	192.0000	192.0000	

Expanded Uncertainty ± 0.07217 Feet

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NC SL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.

Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.

All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

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Service Engineer: Justin Roye **Date:** March 5, 2025

Quality Manager: Tony Lewandowski

Signature:

Report and Certificate of Calibration



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Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-206391-21 **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

14-00235 Thermocouple Meter Tegan SN: T-276988 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 2400 °F Report #: 36408-30865-3646
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 28, 2025	Reference:	Navair 17-20ST-95
Recommended Due Date:	February 28, 2026	Cal-Cert Procedure:	CP-013
Calibration Frequency:	12 Months	Indicating System:	Computer
Manufacturer:	National Instruments	Temperature:	61 °F
Type:	Data Logger	Humidity:	45% RH
Model Number:	NI 9213	Asset #:	215 Booth 1
Serial #:	1B182FB	Service Location:	Service Address
Resolution:	0.1 °F	As Found:	Pass
Capacity:	2,500 °F	As Left:	Pass
Tolerance:	± 3.0 °F		
Thermocouple Type:	K		

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Tunnel	0.00	0.40	0.40	0.50	0.45	0.784
	500.00	500.10	500.10	500.30	0.20	
	1000.00	1000.10	1000.10	1000.20	0.15	
	1500.00	1499.70	1499.70	1500.40	0.05	
	2000.00	2000.10	2000.10	2000.20	0.15	
	2400.00	2399.90	2399.90	2400.00	-0.05	
	0.00	0.50	0.50	0.40	0.45	

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Flue	0.00	0.30	0.30	0.40	0.35	0.511
	500.00	500.10	500.10	500.20	0.15	
	1000.00	1000.10	1000.10	1000.20	0.15	
	1500.00	1500.00	1500.00	1500.10	0.05	
	2000.00	1999.80	1999.80	1999.90	-0.15	
	2400.00	2399.80	2399.80	2399.80	-0.20	
	0.00	0.00	0.00	0.20	0.10	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Filter A	0.00	0.10	0.10	0.10	0.10	0.436
	500.00	500.00	500.00	500.00	0.00	
	1000.00	1000.00	1000.00	1000.00	0.00	
	1500.00	1500.10	1500.10	1500.00	0.05	
	2000.00	1999.80	1999.80	1999.80	-0.20	
	2400.00	2399.70	2399.70	2399.70	-0.30	
	0.00	0.10	0.10	0.00	0.05	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Back	0.00	0.00	0.00	0.00	0.00	0.511
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	999.90	999.90	999.90	-0.10	
	1500.00	1499.90	1499.90	1499.90	-0.10	
	2000.00	1999.70	1999.70	1999.60	-0.35	
	2400.00	2399.50	2399.50	2399.70	-0.40	
	0.00	0.00	0.00	0.00	0.00	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Catalyst	0.00	(0.30)	(0.30)	(0.30)	0.30	0.738
	500.00	499.70	499.70	499.70	-0.30	
	1000.00	999.60	999.60	999.70	-0.35	
	1500.00	1499.60	1499.60	1499.50	-0.45	
	2000.00	1999.40	1999.40	1999.40	-0.60	
	2400.00	2399.40	2399.40	2399.40	-0.60	
	0.00	(0.30)	(0.30)	0.30	0.00	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Meter A	0.00	-0.40	-0.40	-0.40	0.40	0.436
	500.00	499.50	499.50	499.50	-0.50	
	1000.00	999.50	999.50	999.50	-0.50	
	1500.00	1499.50	1499.50	1499.40	-0.55	
	2000.00	1999.30	1999.30	1999.40	-0.65	
	2400.00	2399.20	2399.20	2399.20	-0.80	
	0.00	0.00	0.00	0.00	0.00	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Left	0.00	-0.40	-0.40	-0.40	0.40	0.436
	500.00	499.50	499.50	499.50	-0.50	
	1000.00	999.50	999.50	999.50	-0.50	
	1500.00	1499.50	1499.50	1499.50	-0.50	
	2000.00	1999.20	1999.20	1999.30	-0.75	
	2400.00	2399.30	2399.30	2399.20	-0.75	
	0.00	-0.40	-0.40	-0.40	0.40	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Right	0.00	-0.50	-0.50	-0.50	0.50	0.436
	500.00	499.40	499.40	499.50	-0.55	
	1000.00	999.40	999.40	999.50	-0.55	
	1500.00	1499.30	1499.30	1499.30	-0.70	
	2000.00	1999.30	1999.30	1999.20	-0.75	
	2400.00	2399.10	2399.10	2399.10	-0.90	
	0.00	-0.50	-0.50	-0.40	0.45	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Filter B	0.00	0.00	0.00	0.00	0.00	0.436
	500.00	500.80	500.80	500.80	0.80	
	1000.00	1000.40	1000.40	1000.40	0.40	
	1500.00	1500.00	1500.00	1500.00	0.00	
	2000.00	1999.40	1999.40	1999.50	-0.55	
	2400.00	2399.10	2399.10	2399.10	-0.90	
	0.00	0.00	0.00	0.00	0.00	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Top	0.00	-0.50	-0.50	-0.50	0.50	0.511
	500.00	499.50	499.50	499.40	-0.55	
	1000.00	999.40	999.40	999.50	-0.55	
	1500.00	1499.40	1499.40	1499.40	-0.60	
	2000.00	1999.20	1999.20	1999.20	-0.80	
	2400.00	2399.10	2399.10	2398.90	-1.00	
	0.00	-0.50	-0.50	-0.50	0.50	

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCCL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.

Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.

All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer: Samuel Owens

Date: February 28, 2025

Quality Manager: Tony Lewandowski

Signature: 

Report and Certificate of Calibration



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Address
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Milwaukie, OR 97222

Local
503-654-9620



Report #: 38860-206391-21-B **Customer PO#:** 1126
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

14-00235 Thermocouple Meter Tegan SN: T-276988 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 2400 °F Report #: 36408-30865-3646
14-01349 Thermo-Hygrometer Comark SN: 06210350162 Cal: 08/23/2024 Due: 08/31/2025 Vendor: Cal-Cert Range: 122 °F 95 %RH Report #: 36408-71148-5

Instrument Data

Calibration Date:	February 28, 2025	Reference:	Navair 17-20ST-95
Recommended Due Date:	February 28, 2026	Cal-Cert Procedure:	CP-013
Calibration Frequency:	12 Months	Indicating System:	Computer
Manufacturer:	National Instruments	Temperature:	65 °F
Type:	Data Logger	Humidity:	40% RH
Model Number:	NI 9213	Asset #:	215 Booth 1
Serial #:	1B182FB	Service Location:	Service Address
Resolution:	0.1 °F	As Found:	Pass
Capacity:	2,400 °F	As Left:	Pass
Tolerance:	± 3.0 °F		
Thermocouple Type:	K		

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Bottom	0.00	-0.60	-0.60	-0.60	0.60	0.511
	500.00	499.30	499.30	499.50	-0.60	
	1000.00	999.40	999.40	999.40	-0.60	
	1500.00	1499.30	1499.30	1499.30	-0.70	
	2000.00	1999.10	1999.10	1999.20	-0.85	
	2400.00	2399.00	2399.00	2399.00	-1.00	
	0.00	-0.60	-0.60	-0.60	0.60	

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Meter B	0.00	-0.60	-0.60	-0.60	0.60	0.436
	500.00	499.50	499.50	499.50	-0.50	
	1000.00	999.40	999.40	999.50	-0.55	
	1500.00	1499.40	1499.40	1499.40	-0.60	
	2000.00	1999.20	1999.20	1999.30	-0.75	
	2400.00	2399.10	2399.10	2399.10	-0.90	
	0.00	-0.60	-0.60	-0.60	0.60	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Meter C	0.00	2.50	2.50	2.80	2.65	0.738
	500.00	502.40	502.40	502.60	2.50	
	1000.00	1002.30	1002.30	1002.60	2.45	
	1500.00	1502.70	1502.70	1502.70	2.70	
	2000.00	2002.70	2002.70	2002.30	2.50	
	2400.00	2402.80	2402.80	2403.40	3.10	
	0.00	2.80	2.80	2.80	2.80	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Filter C	0.00	-0.20	-0.20	-0.20	0.20	0.511
	500.80	499.80	499.80	499.60	-1.10	
	1000.40	999.70	999.70	999.60	-0.75	
	1500.00	1499.50	1499.50	1499.50	-0.50	
	1999.40	1999.40	1999.40	1999.40	0.00	
	2399.10	2399.20	2399.20	2399.20	0.10	
	0.00	-0.20	-0.20	-0.20	0.20	

Thermocouple LOGGING FUNCTION						
Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Ambient	0.00	0.00	0.00	0.00	0.00	0.436
	20.00	18.20	18.20	18.20	-1.80	
	40.00	38.20	38.20	38.20	-1.80	
	60.00	58.10	58.10	58.20	-1.85	
	80.00	78.40	78.40	78.40	-1.60	
	100.00	98.40	98.40	98.30	-1.65	
	0.00	0.00	0.00	0.00	0.00	

Remarks:

We sincerely thank you for your business. Please call us at 503-654-9620 for all your sales and calibration needs.
Cleaning and preventative maintenance were performed as part of this service.

Cal-Cert is accredited by A2LA under Calibration Laboratory Code #4986.01.
A2LA is recognized under the ILAC mutual recognition agreement (MRA).

This certificate is hereby issued that the above instrument was tested for accuracy with calibrated standards traceable to the National Institute of Standards and Technology (NIST). The information provided on this form complies with the data gathering and reporting requirements of ISO/IEC 17025 and ANSI/NCSL Z540.1, and meets the requirements of all applicable references and Cal-Cert procedures listed above.

Any stated measurement uncertainty includes the uncertainty of the Calibration standards used, combined with the uncertainty of the measurement process using the RSS method with a k=2 for an approximate 95% level of confidence. The calibration process meets or exceeds a ratio of 4:1 unless otherwise stated.

All tolerances were derived from the applicable standards and pass/fail determination is based on those tolerances. The customer determined any recommended due dates indicated on the certificate.

This report shall not be reproduced except in full, without written approval from Cal-Cert.

Service Engineer:

Samuel Owens

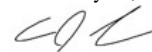
Date:

February 28, 2025

Quality Manager:

Tony Lewandowski

Signature:



Report #: 38860-206391-21-B

Data Logger 10 Channel 6 Point (PCC) CF-013-03

Revision 12 7/24/2017

IN CASE OF EMERGENCY: CALL 1-800-645-4633

SDS ID: P-18-0301-H

DO NOT REMOVE THIS LABEL

Lot No. 70086426104
Cylinder No. DT0042934
Part No. NI CD17CO8E-AS
Volume: 99 ft³
Fill Date: 09/17/2024
Expiration Date: 09/26/2032



ProSpec
By Linde



Linde Gas & Equipment Inc.
4760 S. Alameda
Los Angeles, CA 90008

UN1956

Compressed gas, n.o.s. (Nitrogen,
Oxygen)



EPA Protocol

Molar Concentration	Component	CAS
17.32 %	Carbon dioxide	124-38-9
4.35 %	Carbon monoxide	630-08-0
16.96 %	Oxygen	7782-44-7
Balance	Nitrogen	7727-37-9

Danger



CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO ORGANS THROUGH PROLONGED OR REPEATED EXPOSURE. MAY INCREASE RESPIRATION AND HEART RATE. ASPHYXIATING EVEN WITH ADEQUATE OXYGEN.

TLV:

Carbon dioxide 50 ppm
Carbon monoxide 25 ppm

Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Do not breathe gas/vapors; Vapor exposed skin thoroughly after handling; Do not eat, drink or smoke when using this product; Wear protective gloves/protective clothing/eye protection/face protection; IF EXPOSED OR CONCERNED: Get medical advice/attention; Get medical advice/attention; Contact supplier for any special requirements; Dispose of contents/container in accordance with local/regional/national/international regulations. Use only with equipment rated for cylinder pressure; Do not open valve until connected to equipment prepared for use; Close valve after each use and when empty; Protect from sunlight when ambient temperature exceeds 52°C (125°F); Avoid breathing gas, vapors; IF INHALED: Remove person to fresh air and keep comfortable for breathing; Call a POISON CENTER or doctor/physician.

FIRST AID

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.
IF IN EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are irrigated.



Compressed gas, n.o.s.
(Carbon Monoxide, Carbon Dioxide, Oxygen,
Nitrogen)

UN1956

SPG 5P10162.5VM2
Part Number

Primary Standard, +/- 0.02% Absolute

2.500 % Carbon Monoxide
10.00 % Carbon Dioxide
10.00 % Oxygen
Balance Nitrogen

CAS:	630-08-0
CAS:	124-38-9
CAS:	7782-44-7
CAS:	7727-37-9

DANGER: CAUSES DAMAGE TO ORGANS THROUGH PROLONGED OR REPEATED EXPOSURE. CONTAINS GAS UNDER PRESSURE; MAY EXPLODE WHEN HEATED. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. MAY INCREASE RESPIRATION AND HEARTRATE. Use only with equipment of compatible materials of construction and rated for cylinder pressure. Protect from sunlight when ambient temperature exceeds 52C (125F). Use a back flow preventive device in the piping. Close valve after each use and when empty. Do not open valve until connected to equipment prepared for use. Obtain special instructions before use. Protect from sunlight. Store in a well-ventilated place. IF exposed or concerned: Get medical advice. Store locked up. Dispose of contents/container in accordance with container/supplier owner instructions. Do not handle until all safety precautions have been read and understood. Do not breathe gas. Wash hands thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, protective clothing, eye protection, and/or face protection. Read and follow the Safety Data Sheet (SDS) before use.

FIRST AID: IF ON SKIN: wash with plenty of water. IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing. IF exposed or concerned: Get medical advice.



WARNING: This product can expose you to Carbon Monoxide which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Lot No: 1-053-122
Serial Number: CC341544
SPG 5P10162.5VM2
Part Number
PO #: 206483
Expires: 2-2024

NorLAB

To Order Call: 800-657-6672

In Emergency Call: 1-800-424-6300
Norco, Inc.
808 W. Cowen Road
Boise, Idaho 83705