La Castellamonte

Project # F24-364
Model: Round Stack
Type: Wood Fired Room Heater
Date: 4/15/2026

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

Contact: Sara Gris
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Prepared by: Aaron Kravitz, Laboratory Manager

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Revision Summary

Date: 4/15/2026 – Original Issue

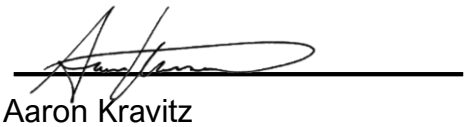
Contents

Affidavit

PFS-TECO was contracted by La Castellamonte to provide testing services for the Round Stack Wood-Fired Room Heater per EPA Method 28R, *Certification and Auditing of Wood Heaters* and an Alternate Test Method dates May 21, 2025 (see attached in Appendix A). All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory beginning on 6/10/2025 and ending on 6/12/2025. 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.



Aaron Kravitz
Laboratory Manager

Introduction

La Castellamonte contracted with PFS-TECO to perform EPA certification testing on the Round Stack 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 PFS TECO 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.
- Due to an unconventional firebox shape, the fuel load was developed and agreed on in an EPA Alternate Test Method dated May 21, 2025. This letter is attached in Appendix A.

Wood Heater Identification and Testing

- Appliance Tested: ***Round Stack***
- PFS Tracking Number: ***224***
- Manufacturer: ***La Castellamonte***
- Catalyst: ***Yes***
- Heat exchange blower: ***None***
- Type: ***Wood Stove***
- Style: ***Free Standing Wood Stove***
- Date Received: ***Thursday, December 26, 2024***
- Testing Period – Start: ***Tuesday, June 10, 2025***
  Finish: ***Thursday, June 12, 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
50	Digiweigh DWP12i Platform Scale
53	APEX XC-60-ED Digital Emissions Sampling Box A
54	APEX XC-60-ED Digital Emissions Sampling Box B
203	APEX XC-50-DIR Digital Emissions Sampling Box C
55	Apex Ambient Air Sample Box
57	California Analytical ZRE CO2/CO/O2 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
50	Digiweigh DWP12i Platform Scale
53	APEX XC-60-ED Digital Emissions Sampling Box A

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 where performed on the Round Stack. The weighted average emissions rate for the 4 run test series was measured to be **1.1 g/hr** with a Higher Heating Value efficiency of **74%.** The average CO emission rate for the 4 tests was **0.33 g/min.** The La Castellamonte Round Stack 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	6/10/2025	6/11/2025	6/12/2025	6/10/2025
Run Number	2	3	4	1
Emission Rate (g/hr)	0.80	0.68	1.13	2.19
Burn Rate (kg/hr)	0.96	1.18	1.43	2.76
Heat Output (Btu/hr)	13,728	16,347	18,701	34,685
Overall Efficiency (% HHV)	78%	76%	71%	69%
CO Emissions (g/MJ Output)	0.47	0.43	0.87	1.29
CO Emissions (g/kg Dry Fuel)	7.19	6.45	12.30	17.48
CO Emissions (g/min)	0.11	0.12	0.29	0.78
Emissions – 1st hr (g/hr)	2.60	1.28	2.49	2.48
Weighted particulate emission average of 4 test runs: 1.1 grams per hour.				
Weighted average HHV efficiency of 4 test runs: 74%.				
Average CO Emissions Rate: 0.33 g/min				

Test Run Narrative

Run 1

Run 1 was performed on 6/10/2025 as a category 4 test, per EPA Method 28R. The total test time was 79 minutes. The particulate emissions rate for the test was 2.19 g/hr, the burn rate was 2.76 kg/hr with an HHV efficiency of 68.6%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 2

Run 2 was performed on 6/10/2025 as an attempted category 1 test per EPA Method 28R. The total test time was 223 minutes. The particulate emissions rate for the test was 0.80 g/hr, the burn rate was 0.96 kg/hr with an HHV efficiency of 77.9%. 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 3

Run 3 was performed on 6/11/2025 as a category 2 test, per EPA Method 28R. The total test time was 187 minutes. The particulate emissions rate for the test was 0.68 g/hr, the burn rate was 1.18 kg/hr with an HHV efficiency of 75.8%. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 4

Run 4 was performed on 6/12/2025 as a category 3 test, per EPA Method 28R. The total test time was 150 minutes. The particulate emissions rate for the test was 1.13 g/hr, the burn rate was 1.43 kg/hr with an HHV efficiency of 71.3%. 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	72	75	26.2	23.9	29.79	12.23	9.62	23.2	79
2	76	74	23.9	28.7	29.76	7.98	9.42	22.6	223
3	72	73	33.6	30.1	29.87	8.88	9.74	23.6	3
4	68	69	36.6	20.9	29.91	10.65	9.49	23.4	150

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 open Secondary air control fully open	Primary air control fully open Secondary air control fully open
Run 2	Primary air control fully closed Secondary air control fully closed	Primary air control fully closed Secondary air control fully closed
Run 3	Primary air control open 2mm from closed Secondary air control open 5mm from closed	Primary air control open 2mm from closed Secondary air control open 5mm from closed
Run 4	Primary air control open 8mm from closed Secondary air control open 15mm from closed	Primary air control open 8mm from closed Secondary air control open 15mm from closed

Appliance Description

Model(s): Round Stack

Appliance Type: Catalytic Wood-Fired Stove

Total/Usable Firebox Volume: Total firebox volume is 1.780 ft^3. Usable firebox volume is 1.367 ft^3.

Air Introduction System: Primary air is regulated by an air slide at the bottom of the unit and routed to an air wash above the loading door. Secondary air is regulated by a second, independent air slide also located at the bottom of the unit. Secondary air is routed behind the firebox to the secondary air manifold.

Baffles: A secondary air manifold is located at the top of the firebox. It is constructed of refractory material and includes an array of 6mm holes for the introduction of secondary air.

Catalytic Combustor: A 4” thick, 6” diameter round metal catalyst is located in the flue collar of the unit. No catalyst bypass is provided.

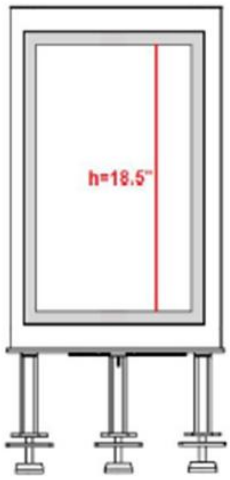
Refractory Insulation: The exterior of the appliance is clad in custom-molded refractory panels. The firebox is lined with 1.25” thick firebrick.

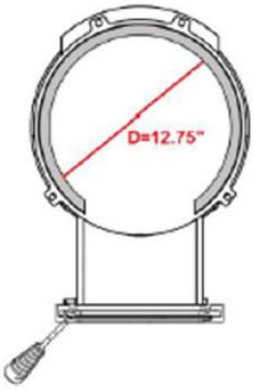
Flue Outlet: 6-inch exhaust outlet located on the top of the appliance.

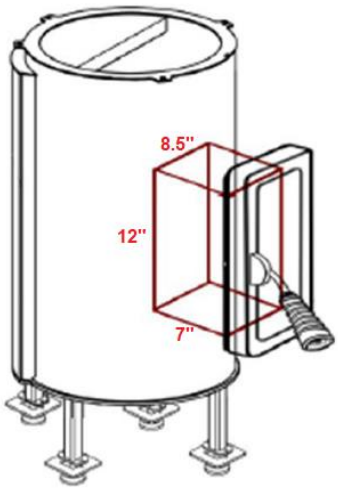
Fan: None

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

Firebox Volume Dimension







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$$V_{usable} = \pi \left(\frac{D}{2}\right)^2 h$$

$$V_{usable} = \pi \left(\frac{12.75"}{2}\right)^2 * 18.5"$$

$$V_{usable} = 2362.0\ in^3 = \mathbf{1.367\ ft^3}$$

$$V_{ash\ lip} = l * w * h$$

$$V_{ash\ lip} = 8.5" * 7" * 12"$$

$$V_{ash\ lip} = 714\ in^3 = 0.413\ ft^3$$

$$V_{total} = V_{usable} + V_{ash\ lip}$$

$$V_{total} = 1.367 + 0.413 = \mathbf{1.780\ ft^3}$$

Appliance Front

Appliance Left

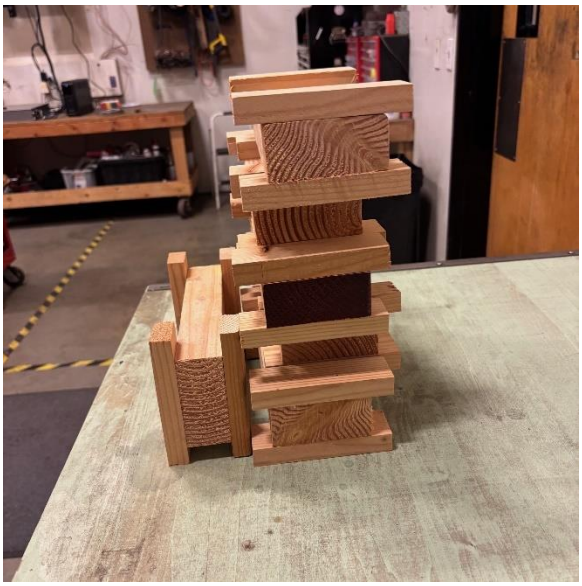
Appliance Right

Appliance Rear

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 or 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.

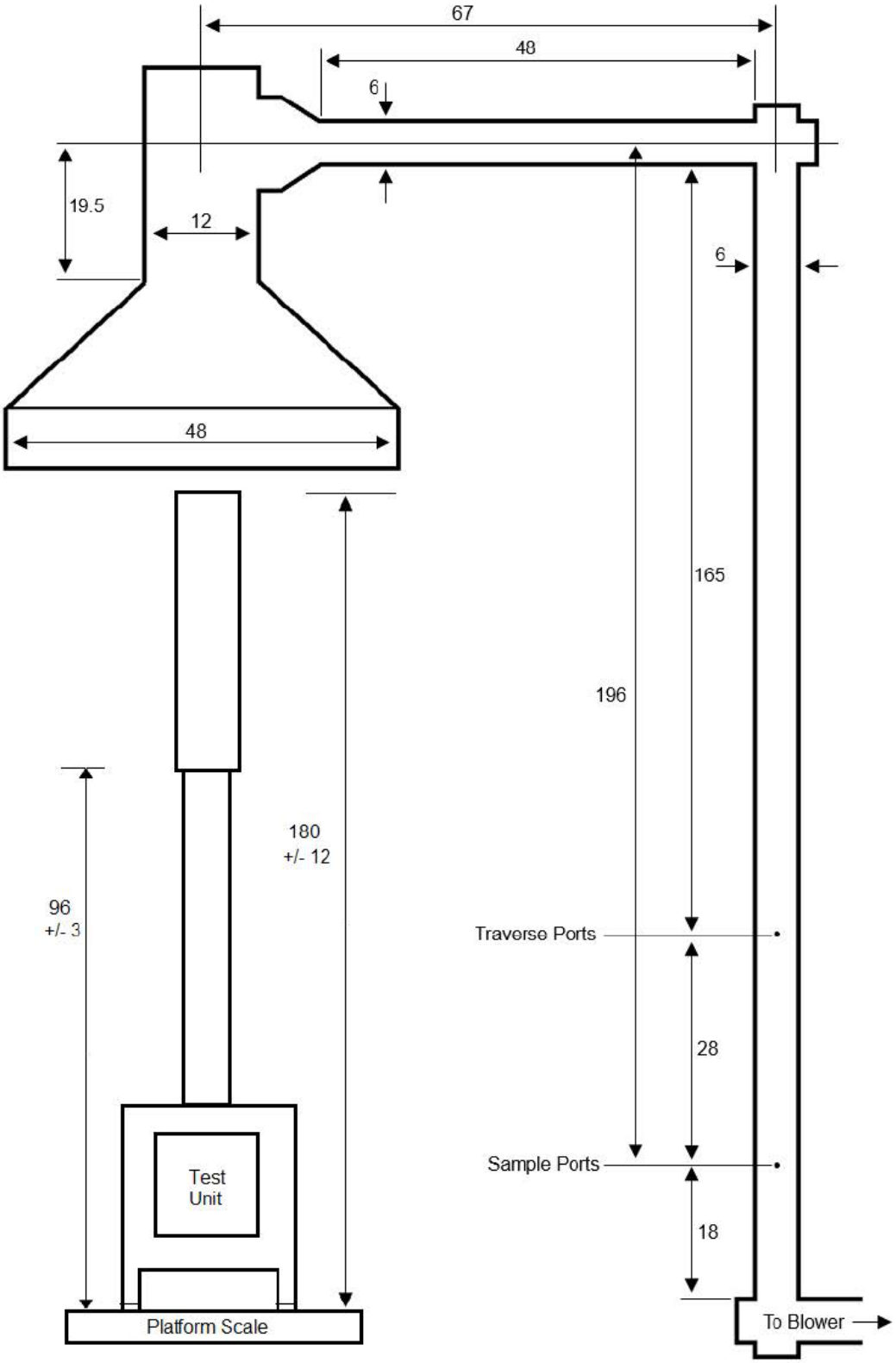
Barometric pressure data was taken from local National Weather Service station KPDX. As PFS and KPDX are at the same altitude, the correction for altitude per ASTM E2515-11 6.1.2 is 1:1.

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.

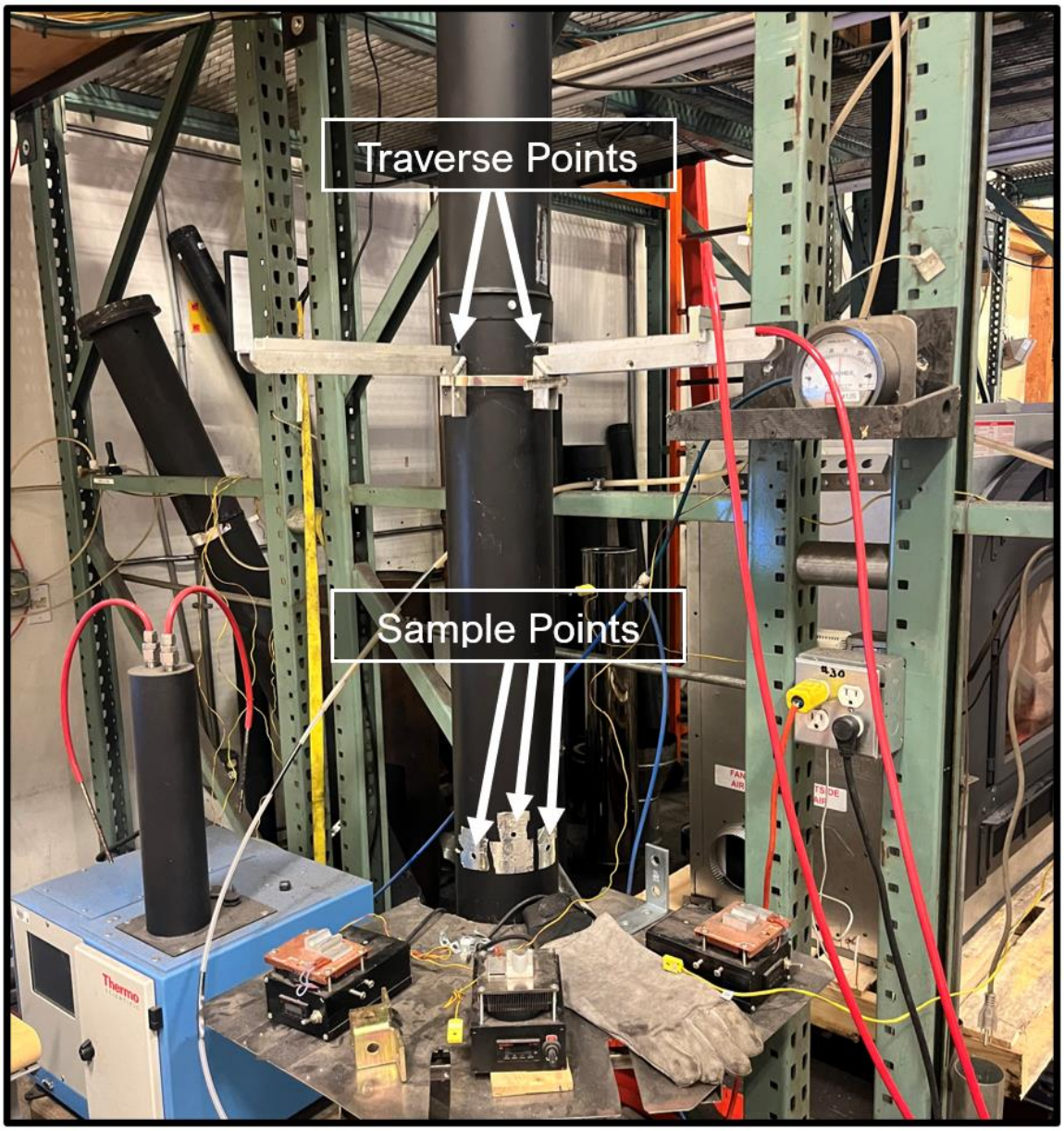
The dilution tunnel is constructed in accordance with the requirements of ASTM E2515-11, as shown below:



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 90^0 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: Via Casari 13, 10081 Castellamonte, (TO) Italy, 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

OFFICE OF AIR QUALITY PLANNING AND STANDARDS
RESEARCH TRIANGLE PARK, NC 27711

May 21, 2025

Mr. John Steinert
Vice-President – Hearth Products
PFS-TECO Laboratories
11785 SE Hwy. 212, Ste. 305
Clackamas, OR 97015

Dear Mr. Steinert,

I am writing in response to your letter dated May 07, 2025, in which you request approval of an alternative test method for demonstrating compliance with 40 CFR part 60, Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA). The U.S. Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards is the delegated authority for approval/disapproval determinations on any major alternatives to test methods and other compliance determination procedures required under 40 CFR parts 59, 60, 61, 63, and 65.

According to the information provided in your letter, you are conducting testing on the La Castellamonte Round Stack wood heater to demonstrate compliance with Subpart AAA using EPA test Method 28R (40 CFR part 60, Appendix A) and its associated references to ASTM E2780-10, "Standard Test Method for Determining Particulate Matter Emissions from Wood Heater". You are requesting an alternative certification testing procedure for the La Castellamonte Round Stack wood heater because it has an unconventional firebox configuration which presents significant challenges to the method prescribed crib design requirements in ASTM E2780-10, Section 9.4.1.5 and 9.4.1.6 (see Figure 1, firebox configuration) and requires a non-conventional crib design in order to meet the loading density requirements listed in section 9.4.1.5 of that method.

You state that the firebox length, according to ASTM E2780-11, would be measured from the surface of the glass to the rear of cylinder. Calculating firebox volume conventionally, using this length, makes loading nearly impossible, as fuel pieces must intrude into the ash lip, but its cross section is too small to fit all pieces. Loading pieces vertically is similarly challenging due to the curved sides of the firebox, and the difficulty of pivoting fuel pieces vertically through the narrow opening.

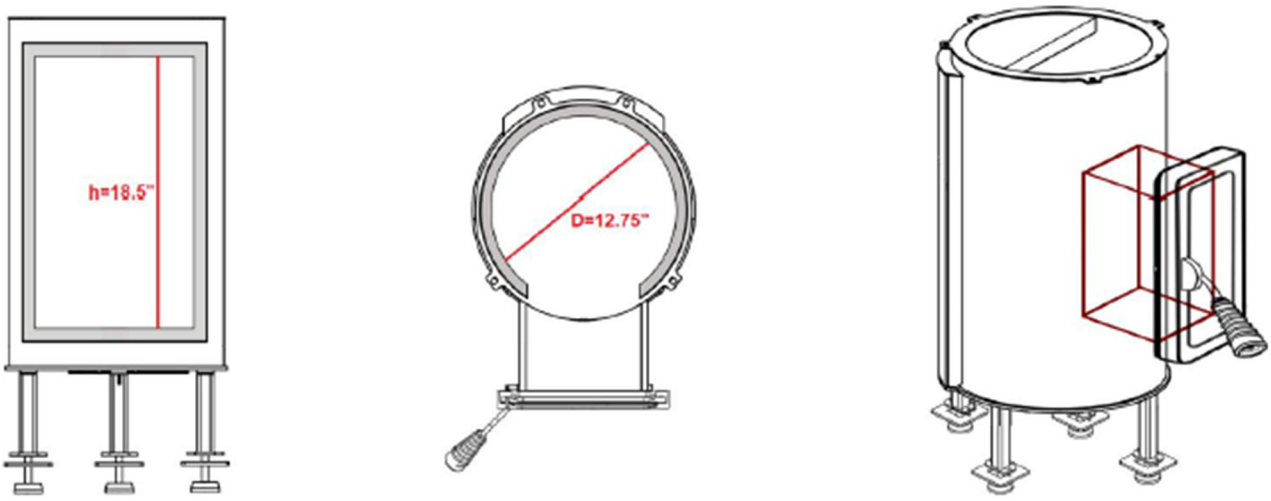


Fig. 1 – Firebox configuration of the La Castellamonte wood heater

You propose that the usable firebox volume be considered equal to the volume of the cylindrical area of the firebox, excluding the ash lip and would be calculated in the following manner:

$$V=\pi(D\ /\ 2)^2 h$$

$$V=\pi(12.75"\ /\ 2)^2 * 18.5"$$

$V=2362.0\ in^3=\mathbf{1.367\ ft^3}$

Where D = a diameter of 12.75” and

Where h = a height of 18.5”

Where V = the usable firebox volume.

You also request that fuel piece length be allowed to be reduced uniformly to 9.0” to avoid stacking difficulties, in accordance with ASTM E2780-10, Section 9.4.10 (see figure 2, Crib fuel configuration).

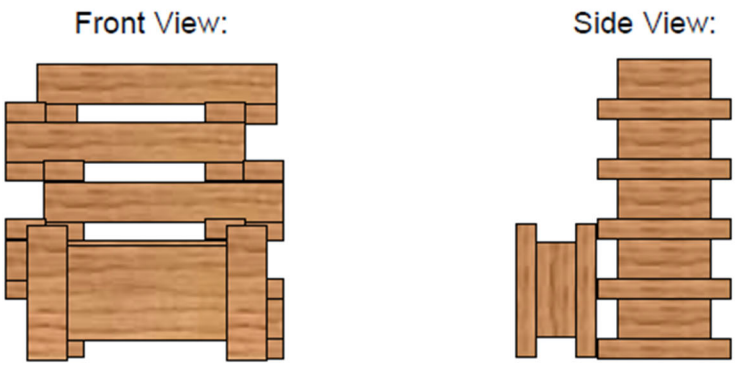


Fig. 2 – Crib fuel configuration

You further state that These modifications allow for a fuel load that may be consistently loaded in accordance with the manufacturer's instructions and all other requirements of EPA Method 28r and ASTM E2780.

NOTE: ASTM E2780-10, section 9.4.1.5 lists a fuel load density range from 6.3 to 7.7 lb/ft3 of firebox volume. For the purposes of this test method, we strongly suggest targeting a fuel load density of 7.5 or higher. If this is not attainable, please provide, in the test report, a detailed explanation of why a density in this range could not be obtained and a brief description of why the maximum attainable fuel loading density used for the testing was the arrived at crib mass.

With the caveats set forth below, we are approving your alternative method request for certification testing of the La Castellamonte Round Stack residential wood heater to use a crib configuration that departs from the method defined crib configuration.

As required in Subpart AAA, section 60.534(d), the manufacturer/approved test laboratory must also measure the first hour of particulate matter emissions for each test run using a separate set of filters in one of the two parallel sampling trains. These results must be reported separately and included in the total particulate matter emissions per run. Also, all requirements of Subpart AAA, section 60.534(a) through 60.534(h) must also be met.

For particulate matter emission concentrations, ASTM E2515-11 "Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel" must be used.

The following changes to ASTM E2515-11 must be followed for the certification testing:

1. The filter temperature must be maintained between 80 and 90 ^{o}F during testing.
2. Filters must be weighed in pairs to reduce weighing error propagation using EPA Alt-154.
3. Sample filters must be Pall TX-40 or equivalent-mesh organic binder free glass fiber filters, and may be 47 mm, 90 mm, 100 mm, or 110 mm in diameter.

A copy of this letter must be included in the certification test report where this alternative test method determination is utilized.

If you have additional questions regarding this approval, please contact me directly with your questions at 919-541-4790, or by e-mail to: johnson.steffan@epa.gov.

Sincerely,

Steffan M. Johnson
Group Leader
Measurement Technology Group

cc: Sara Ayres, EPA/OECA
Shannon Banner, EPA/OAQPS/SPPD
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Ryan Wolbert, EPA/OAQPS/SPPD
Patrick Yellin, EPA/OAQPS/SPPD

EPA Method 28R Weighted Average Emissions

Client: La Castellamonte
Stove Model: Round Stack
Test Dates: 6/10/25 - 6/12/25
Job Number: 24-364

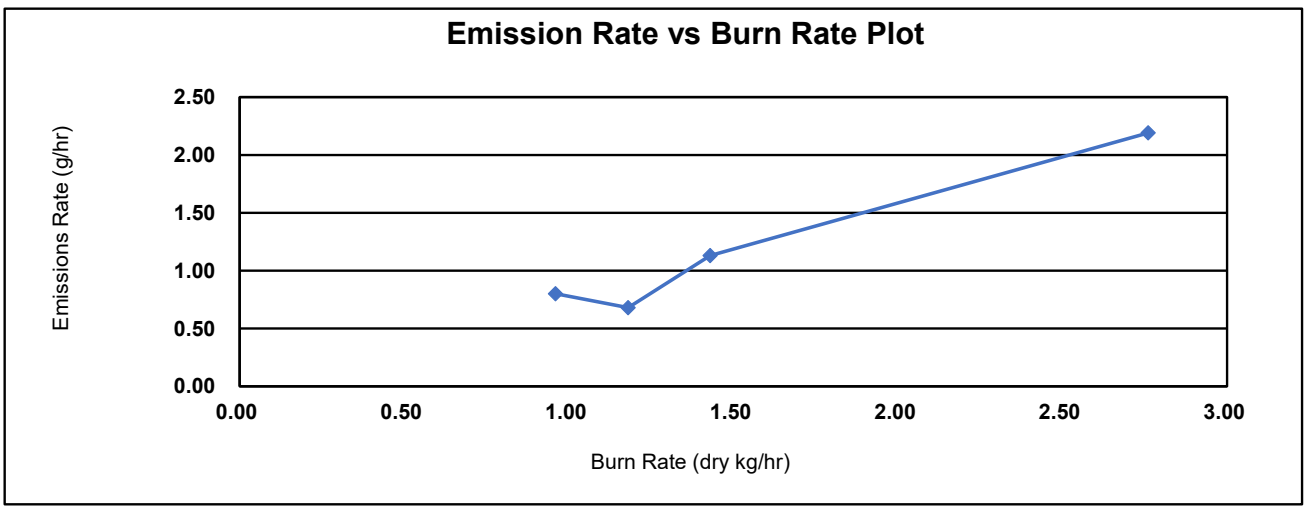
Signature/Date:

Weighted Average Particulate Emissions (g/hr):	**1.1**
Weighted Average HHV Efficiency (%):	**74.0%**
Weighted Average LHV Efficiency (%):	**80.0%**
Average CO Emissions (g/min):	**0.3**

Individual Run Summaries

Run Number:	2	Run Number:	3
Burn Rate (dry kg/hr):	0.96	Burn Rate (dry kg/hr):	1.18
Emissions Rate (g/hr):	0.80	Emissions Rate (g/hr):	0.68
HHV Efficiency (%):	77.9%	HHV Efficiency (%):	75.8%
LHV Efficiency (%):	84.2%	LHV Efficiency (%):	82.0%
Weighting Percentage (%):	32.06%	Weighting Percentage (%):	22.72%

Run Number:	4	Run Number:	1
Burn Rate (dry kg/hr):	1.43	Burn Rate (dry kg/hr):	2.76
Emissions Rate (g/hr):	1.13	Emissions Rate (g/hr):	2.19
HHV Efficiency (%):	71.3%	HHV Efficiency (%):	68.6%
LHV Efficiency (%):	77.1%	LHV Efficiency (%):	74.1%
Weighting Percentage (%):	27.62%	Weighting Percentage (%):	17.60%



WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 1 Data Summary

Client:	La Castellamonte
Model:	Round Stack
Job #:	24-364
Tracking #:	224
Test Date:	6/10/2025

Techician Signature

7/21/2025
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Burn Rate (kg/hr):	2.76

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	17.946	12.579	12.071	8.555
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.4			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10006.6			
Average Gas Meter Temperature (°F)	74.3	84.4	84.2	83.7
Total Sample Volume (dscf)	17.863	12.452	11.783	8.484
Average Tunnel Temperature (°F)	135.5			
Total Time of Test (min)	79			
Total Particulate Catch (mg)	0.0	2.8	2.5	2.1
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0002249	0.0002122	0.0002475
Total PM Emissions (g)	0.00	2.96	2.80	2.48
Particulate Emission Rate (g/hr)	0.00	2.25	2.12	2.48
Emissions Factor (g/kg)	-	0.81	0.77	-
Difference from Average Total Particulate Emissions (g)	-	0.08	0.08	-
Difference from Average Total Particulate Emissions (%)	-	2.9%	2.9%	
Difference from Average Emissions Factor (g/kg)	-	0.02	0.02	-

Final Average Results	
Total Particulate Emissions (g)	2.88
Particulate Emission Rate (g/hr)	2.19
Emissions Factor (g/kg)	0.79
HHV Efficiency (%)	68.6%
LHV Efficiency (%)	74.1%
CO Emissions (g/min)	0.78

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	87.6	OK
Face Velocity	< 30 ft/min	8.9	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	Min:71.7/Max:75.7	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	16.9	OK

B415.1 Efficiency Results

Manufacturer: La Castellamonte
Model: Round Stack
Date: 06/10/25
Run: 1
Control #: 24-364
Test Duration: 79
Output Category: 4

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	68.6%	74.1%
Combustion Efficiency	98.9%	98.9%
Heat Transfer Efficiency	69.3%	74.9%

Output Rate (kJ/h)	36,564	34,685	**(Btu/h)**
Burn Rate (kg/h)	2.69	5.93	**(lb/h)**
Input (kJ/h)	53,321	50,581	**(Btu/h)**

Test Load Weight (dry kg)	3.54	7.81	**dry lb**
MC wet (%)	18.81		
MC dry (%)	23.16		
Particulate (g)	2.88		
CO (g)	62		
Test Duration (h)	1.32		

Emissions	**Particulate**	**CO**
g/MJ Output	0.06	1.29
g/kg Dry Fuel	0.81	17.48
g/h	2.19	47.05
g/min	0.04	0.78
lb/MM Btu Output	0.14	2.99

Air/Fuel Ratio (A/F)	10.92

VERSION: **2.4** **4/15/2010**

WOODSTOVE FUEL DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	9.00	23.7	2x4	9.00	18.7
2x4	9.00	24.9	2x4	9.00	19.6
2x4	9.00	24.7	2x4	9.00	21.5
2x4	9.00	22.8	2x4	9.00	19.0
2x4	9.00	25.0			
2x4	9.00	21.7			
2x4	9.00	24.0			
2x4	9.00	21.7			
Total Fuel Weight (lbs):		12.23	Average Moisture (%DB):		22.3

Firebox Volume (ft^3):	1.37
Total 2x4 Crib Weight, with spacers (lbs):	9.62
Total 4x4 Crib Weight, with spacers (lbs):	0.00
Total Wet Fuel Weight, with spacers (lbs):	9.62

Coal Bed Range (20-25%):
Min (lbs): 1.92
Max (lbs): 2.41

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	9.00	1.22	23.8	23.8	24.6	0.98
2x4	9.00	1.16	24.4	23.1	24.3	0.94
2x4	9.00	1.10	24.9	21.6	24.8	0.89
2x4	9.00	1.22	22.0	25.0	24.7	0.98
2x4	9.00	1.11	19.4	19.1	19.2	0.93
2x4	9.00	1.25	23.8	24.6	23.8	1.01
					Total Dry Weight, no spacers (lbs):	5.73
					Total Dry Weight, with spacers (lbs):	8.02

Spacer Moisture Readings (%DB)

11.4	12.3	13.1					
12.4	11.4	12.9					
12.1	12.3	12.5					
12.1	12.0	11.7					
11.1	13.2	12.2					
11.4	13.5	12.0					
11.1	11.2	11.6					
12.1	12.4	11.8					

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	34.9	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	7.02	OK
2x4 Fuel Mix	35 - 65 % of total weight	N/A	N/A

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	La Castellamonte	Job #:	24-364
Model:	Round Stack	Tracking #:	224
Run #:	1	Technician:	AK
Test Start Time:	10:53	Date:	6/10/2025

Total Sampling Time (min):	79	
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. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	6/9/2025	
Test Fuel Scale Audit (lbs)	10.00	
Platform Scale Audit (lbs)	10.0	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.80	29.78	29.79
Relative Humidity (%)	26.2	23.9	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:		17.946	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)	0.002	0.001	cfm @	-7	in. Hg
(Ambient)	0.000	0.000	cfm @	-12	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.038	84
2	0.058	84
3	0.064	84
4	0.042	84
5	0.048	84
6	0.070	84
7	0.068	84
8	0.036	84
Center	0.068	84

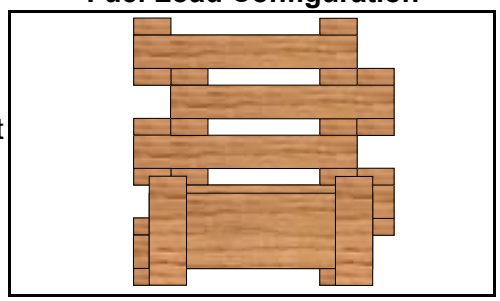
Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	15.40	ft/sec
V_{scent}:	17.58	ft/sec
F_p:	0.876	[ratio]
Initial Tunnel Flow:	171.8	scf/min

Static Pressure: -0.160 in. H_2O

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Left



Firebox Right

Firebox Front View

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)	23.2

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Recording Interval (min): 1
Run Time (min): 61

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	4.01	-0.039	73	74	75	92	70	76.8	214	67
1	3.84	-0.060	76	78	79	116	70	83.6	338	68
2	3.62	-0.070	80	84	86	136	70	91.1	476	68
3	3.36	-0.081	86	92	94	146	70	97.6	604	68
4	3.05	-0.095	92	100	102	168	70	106.4	774	68
5	2.72	-0.095	99	108	108	216	70	120.2	826	68
6	2.40	-0.096	106	117	112	276	70	136.2	856	68
7	2.06	-0.096	112	126	118	342	70	153.4	877	68
8	1.75	-0.097	120	135	122	407	70	170.9	893	69
9	1.44	-0.098	129	142	126	460	70	185.2	898	69
10	1.19	-0.095	137	148	130	502	70	197.3	867	69
11	0.97	-0.094	147	157	134	526	70	207.0	809	69
12	0.77	-0.093	160	170	141	535	71	215.4	792	69
13	0.62	-0.087	173	183	151	523	71	220.2	729	69
14	0.52	-0.081	186	197	163	508	72	225.0	629	69
15	0.43	-0.075	199	210	175	488	72	228.8	550	69
16	0.35	-0.073	212	223	188	468	73	232.7	511	69
17	0.28	-0.071	224	236	200	450	74	236.7	486	69
18	0.22	-0.067	236	248	213	431	75	240.6	461	69
19	0.19	-0.066	247	259	225	412	76	243.8	434	69
20	0.18	-0.063	258	270	237	394	77	247.1	413	69
21	8.02	-0.056	268	279	248	373	78	249.1	343	69
22	7.97	-0.058	276	288	258	355	80	251.4	342	69
23	7.94	-0.057	283	296	267	340	81	253.2	337	69
24	7.86	-0.060	289	302	274	328	83	255.1	350	69
25	7.79	-0.061	293	307	281	321	84	257.1	378	69
26	7.72	-0.059	296	310	285	313	86	258.1	372	69
27	7.66	-0.058	299	313	289	305	87	258.6	357	69
28	7.55	-0.066	300	315	292	303	89	259.7	379	69
29	7.42	-0.071	301	316	294	310	90	262.4	444	69
30	7.27	-0.074	302	318	296	316	92	264.7	480	69
31	7.13	-0.074	304	319	297	324	93	267.5	497	69
32	6.99	-0.073	306	321	299	330	95	269.9	494	69
33	6.84	-0.074	307	323	300	337	96	272.6	498	69
34	6.70	-0.075	309	326	302	343	97	275.4	501	69
35	6.54	-0.075	312	329	304	350	98	278.6	509	70
36	6.38	-0.077	316	332	306	357	99	282.1	520	70
37	6.21	-0.076	319	336	309	365	100	285.9	526	70
38	6.03	-0.079	324	341	311	375	101	290.4	540	70
39	5.84	-0.080	328	345	315	388	102	295.5	558	70
40	5.64	-0.081	334	350	319	401	102	301.2	578	70
41	5.44	-0.082	340	356	323	414	103	307.3	601	70
42	5.23	-0.083	348	363	328	427	104	313.9	615	70
43	5.04	-0.082	355	371	334	439	104	320.5	622	70
44	4.84	-0.082	363	379	340	448	105	327.1	613	71

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Recording Interval (min): 1
Run Time (min): 61

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	4.66	-0.084	371	387	347	458	105	333.7	614	71
46	4.46	-0.084	380	396	354	468	106	340.9	628	71
47	4.26	-0.085	389	405	362	482	106	348.5	654	71
48	4.06	-0.085	396	415	369	493	106	355.8	666	71
49	3.87	-0.086	405	424	377	504	107	363.3	661	71
50	3.66	-0.086	414	434	385	512	107	370.2	670	71
51	3.47	-0.088	422	443	394	520	107	377.3	674	71
52	3.29	-0.088	431	453	402	528	107	384.3	679	71
53	3.08	-0.086	439	463	411	533	108	390.7	684	71
54	2.89	-0.088	448	473	420	538	108	397.0	682	71
55	2.71	-0.087	456	482	429	545	108	403.9	683	71
56	2.56	-0.087	462	491	438	553	108	410.6	690	72
57	2.41	-0.088	469	500	447	560	109	417.0	693	72
58	2.24	-0.086	476	508	457	563	109	422.6	678	72
59	2.10	-0.084	481	516	466	561	109	426.7	660	72
60	1.98	-0.085	486	523	476	554	110	429.7	645	72
61	1.86	-0.083	492	530	486	547	110	433.0	629	72

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.072	0.01	75	0.1		9.62		160	653	84	72
1	0.141	0.141	0.065	2.31	75	1.0	-	9.47	-0.15	191	582	84	72
2	0.294	0.153	0.070	2.36	75	1.0	-	9.12	-0.35	183	641	85	72
3	0.442	0.148	0.071	2.39	75	1.0	-	8.84	-0.28	161	736	85	73
4	0.596	0.154	0.068	2.41	75	1.1	-	8.58	-0.26	155	785	87	72
5	0.744	0.148	0.068	2.41	75	1.0	-	8.30	-0.28	153	808	87	73
6	0.900	0.156	0.068	2.44	75	1.1	-	8.03	-0.27	149	801	88	73
7	1.050	0.150	0.070	2.45	75	1.1	-	7.78	-0.25	149	800	86	73
8	1.208	0.158	0.071	2.47	75	1.1	-	7.53	-0.25	150	805	84	73
9	1.358	0.150	0.070	2.49	75	1.1	-	7.26	-0.27	150	800	81	73
10	1.516	0.158	0.069	2.51	75	1.1	98	7.01	-0.25	150	789	82	73
11	1.668	0.152	0.069	2.51	76	1.1	-	6.79	-0.22	150	763	82	73
12	1.824	0.156	0.072	2.53	76	1.1	-	6.57	-0.22	149	747	83	74
13	1.982	0.158	0.071	2.56	76	1.1	-	6.36	-0.21	148	731	83	74
14	2.138	0.156	0.069	2.59	76	1.1	-	6.16	-0.20	147	723	83	74
15	2.296	0.158	0.071	2.59	77	1.1	-	5.95	-0.21	147	716	84	73
16	2.451	0.155	0.071	2.61	77	1.1	-	5.76	-0.19	148	707	84	73
17	2.614	0.163	0.071	2.62	77	1.1	-	5.57	-0.19	145	699	84	74
18	2.768	0.154	0.068	2.62	77	1.1	-	5.39	-0.18	145	693	85	74
19	2.929	0.161	0.069	2.63	78	1.1	-	5.23	-0.16	145	687	85	74
20	3.091	0.162	0.070	2.65	78	1.1	102	5.05	-0.18	144	684	85	74
21	3.246	0.155	0.071	2.65	78	1.1	-	4.89	-0.16	141	682	85	74
22	3.409	0.163	0.070	2.68	79	1.1	-	4.73	-0.16	142	673	85	74
23	3.566	0.157	0.071	2.67	79	1.1	-	4.57	-0.16	140	664	85	74
24	3.728	0.162	0.071	2.68	79	1.1	-	4.43	-0.14	138	667	85	74
25	3.891	0.163	0.070	2.69	80	1.1	-	4.28	-0.15	138	660	86	74
26	4.048	0.157	0.071	2.69	80	1.1	-	4.12	-0.16	138	652	86	74
27	4.214	0.166	0.069	2.72	80	1.1	-	3.96	-0.16	138	652	86	74
28	4.372	0.158	0.069	2.71	81	1.1	-	3.82	-0.14	137	653	86	74
29	4.535	0.163	0.069	2.72	81	1.1	-	3.68	-0.14	136	646	86	74
30	4.698	0.163	0.071	2.72	82	1.1	102	3.53	-0.15	137	644	86	74
31	4.859	0.161	0.071	2.73	82	1.1	-	3.36	-0.17	137	650	86	74

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
32	5.022	0.163	0.070	2.74	82	1.1	-	3.21	-0.15	139	660	86	74
33	5.187	0.165	0.070	2.74	83	1.1	-	3.06	-0.15	139	673	86	74
34	5.345	0.158	0.070	2.55	83	1.1	-	2.90	-0.16	142	682	86	74
35	5.507	0.162	0.070	2.55	83	1.1	-	2.72	-0.18	139	685	86	74
36	5.662	0.155	0.068	2.56	84	1.1	-	2.58	-0.14	138	679	86	75
37	5.820	0.158	0.070	2.56	84	1.1	-	2.42	-0.16	141	678	86	75
38	5.979	0.159	0.068	2.56	84	1.1	-	2.27	-0.15	141	667	86	74
39	6.136	0.157	0.071	2.57	85	1.1	-	2.14	-0.13	142	653	86	74
40	6.296	0.160	0.070	2.57	85	1.1	101	2.03	-0.11	142	646	86	75
41	6.452	0.156	0.069	2.57	85	1.1	-	1.89	-0.14	140	636	86	75
42	6.614	0.162	0.073	2.58	86	1.1	-	1.78	-0.11	140	623	87	74
43	6.770	0.156	0.071	2.57	86	1.1	-	1.69	-0.09	138	612	86	75
44	6.930	0.160	0.070	2.58	86	1.1	-	1.58	-0.11	133	601	86	75
45	7.090	0.160	0.072	2.58	87	1.1	-	1.49	-0.09	134	593	86	74
46	7.246	0.156	0.071	2.58	87	1.1	-	1.43	-0.06	132	581	86	75
47	7.409	0.163	0.069	2.59	87	1.1	-	1.34	-0.09	131	570	86	74
48	7.565	0.156	0.069	2.59	87	1.1	-	1.25	-0.09	131	562	86	75
49	7.726	0.161	0.070	2.59	88	1.1	-	1.19	-0.06	131	559	86	75
50	7.888	0.162	0.070	2.60	88	1.1	100	1.12	-0.07	130	554	86	75
51	8.044	0.156	0.071	2.60	88	1.1	-	1.05	-0.07	129	548	86	75
52	8.208	0.164	0.072	2.61	89	1.1	-	1.00	-0.05	129	541	86	75
53	8.366	0.158	0.069	2.61	89	1.1	-	0.94	-0.06	128	535	86	75
54	8.528	0.162	0.069	2.61	89	1.1	-	0.88	-0.06	127	528	86	75
55	8.689	0.161	0.072	2.61	89	1.1	-	0.82	-0.06	126	526	86	75
56	8.847	0.158	0.072	2.61	90	1.1	-	0.76	-0.06	126	521	86	75
57	9.012	0.165	0.070	2.63	90	1.1	-	0.71	-0.05	125	517	86	75
58	9.170	0.158	0.069	2.61	90	1.1	-	0.67	-0.04	124	514	86	75
59	9.332	0.162	0.070	2.63	91	1.1	-	0.62	-0.05	123	508	86	75
60	9.495	0.163	0.070	2.63	91	1.1	99	0.58	-0.04	124	509	86	76
61	9.654	0.159	0.071	2.64	91	1.1	-	0.55	-0.03	122	504	86	76
62	9.817	0.163	0.070	2.63	91	1.1	-	0.49	-0.06	122	495	86	76
63	9.979	0.162	0.071	2.65	92	1.1	-	0.45	-0.04	121	489	86	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
64	10.137	0.158	0.071	2.64	92	1.1	-	0.43	-0.02	120	484	86	76
65	10.304	0.167	0.070	2.64	92	1.1	-	0.39	-0.04	120	477	86	76
66	10.462	0.158	0.070	2.64	92	1.1	-	0.36	-0.03	119	474	85	75
67	10.626	0.164	0.068	2.66	92	1.1	-	0.32	-0.04	118	471	85	76
68	10.789	0.163	0.074	2.64	93	1.1	-	0.29	-0.03	118	466	85	76
69	10.949	0.160	0.070	2.65	93	1.1	-	0.26	-0.03	118	465	85	75
70	11.113	0.164	0.070	2.64	93	1.1	99	0.24	-0.02	118	463	85	75
71	11.275	0.162	0.073	2.65	93	1.1	-	0.20	-0.04	118	461	85	75
72	11.435	0.160	0.070	2.66	93	1.1	-	0.16	-0.04	117	456	85	75
73	11.602	0.167	0.069	2.66	94	1.1	-	0.14	-0.02	117	455	85	75
74	11.761	0.159	0.074	2.64	94	1.1	-	0.11	-0.03	117	454	85	75
75	11.926	0.165	0.072	2.67	94	1.1	-	0.08	-0.03	117	452	85	75
76	12.089	0.163	0.070	2.66	94	1.1	-	0.05	-0.03	115	452	85	75
77	12.251	0.162	0.069	2.68	94	1.1	-	0.03	-0.02	115	451	85	75
78	12.415	0.164	0.070	2.67	95	1.1	-	0.01	-0.02	116	449	85	75
79	12.579	0.164	0.068	2.67	95	1.1	100	0.00	-0.01	115	446	85	75
Avg/Tot	12.579	0.159	0.070	2.57	84.4	1.1	100			135.5	607.7	85.3	74.3

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.01	75	0.7		83	-0.085	8.54	0.104
1	0.135	0.135	2.92	75	1.8	-	81	-0.075	8.03	0.112
2	0.301	0.166	1.89	75	3.6	-	81	-0.087	5.38	0.260
3	0.449	0.148	2.37	75	2.1	-	80	-0.092	17.08	0.313
4	0.601	0.152	2.36	75	1.6	-	80	-0.094	19.03	1.026
5	0.751	0.150	2.36	75	1.8	-	81	-0.095	19.52	1.565
6	0.901	0.150	2.35	75	1.6	-	81	-0.094	19.73	1.344
7	1.051	0.150	2.36	75	1.8	-	81	-0.094	18.94	0.644
8	1.201	0.150	2.35	75	1.7	-	82	-0.093	18.11	0.260
9	1.352	0.151	2.35	75	1.6	-	82	-0.094	18.09	0.214
10	1.501	0.149	2.35	75	1.7	101	83	-0.092	17.54	0.189
11	1.652	0.151	2.35	76	1.6	-	83	-0.091	16.30	0.144
12	1.801	0.149	2.34	76	1.7	-	83	-0.092	15.72	0.131
13	1.952	0.151	2.34	76	1.8	-	84	-0.090	15.33	0.121
14	2.100	0.148	2.34	76	2.1	-	84	-0.090	15.08	0.090
15	2.252	0.152	2.35	77	1.9	-	84	-0.088	14.92	0.092
16	2.401	0.149	2.35	77	1.9	-	85	-0.089	14.36	0.091
17	2.553	0.152	2.35	77	1.6	-	85	-0.088	14.02	0.105
18	2.701	0.148	2.34	77	2.1	-	85	-0.090	13.67	0.114
19	2.855	0.154	2.35	78	2.1	-	85	-0.087	13.44	0.121
20	3.004	0.149	2.35	78	1.9	101	85	-0.087	13.02	0.141
21	3.158	0.154	2.36	78	1.9	-	85	-0.086	12.50	0.172
22	3.306	0.148	2.35	79	1.8	-	86	-0.085	12.17	0.170
23	3.460	0.154	2.36	79	2.0	-	86	-0.086	12.05	0.165
24	3.609	0.149	2.36	79	1.6	-	86	-0.085	12.01	0.189
25	3.762	0.153	2.36	80	1.8	-	86	-0.084	12.03	0.176
26	3.911	0.149	2.36	80	1.6	-	86	-0.082	12.18	0.144
27	4.064	0.153	2.36	80	1.7	-	86	-0.084	12.38	0.137
28	4.215	0.151	2.35	81	1.6	-	86	-0.083	12.81	0.118
29	4.368	0.153	2.36	81	1.7	-	86	-0.083	12.87	0.111
30	4.520	0.152	2.37	81	1.9	100	86	-0.084	12.81	0.088
31	4.672	0.152	2.36	82	1.8	-	86	-0.084	12.77	0.089

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.825	0.153	2.36	82	1.7	-	86	-0.085	13.12	0.113
33	4.974	0.149	2.36	82	1.6	-	86	-0.086	13.79	0.106
34	5.129	0.155	2.37	83	2.1	-	86	-0.086	13.95	0.099
35	5.278	0.149	2.35	83	2.1	-	87	-0.085	14.35	0.120
36	5.434	0.156	2.36	83	1.7	-	87	-0.087	14.04	0.103
37	5.584	0.150	2.37	84	1.8	-	87	-0.085	13.68	0.102
38	5.739	0.155	2.37	84	1.8	-	87	-0.084	12.94	0.074
39	5.889	0.150	2.36	84	2.1	-	87	-0.083	12.31	0.067
40	6.043	0.154	2.37	85	1.7	100	87	-0.082	12.11	0.074
41	6.194	0.151	2.37	85	2.1	-	87	-0.079	11.75	0.064
42	6.348	0.154	2.37	85	1.7	-	87	-0.080	11.53	0.056
43	6.502	0.154	2.37	86	2.0	-	87	-0.080	11.09	0.068
44	6.655	0.153	2.37	86	2.0	-	87	-0.079	10.44	0.059
45	6.809	0.154	2.38	86	2.1	-	87	-0.079	9.96	0.052
46	6.961	0.152	2.37	87	1.7	-	87	-0.078	9.55	0.043
47	7.116	0.155	2.36	87	1.7	-	87	-0.076	9.18	0.041
48	7.268	0.152	2.37	87	1.7	-	87	-0.075	9.08	0.042
49	7.424	0.156	2.37	87	2.0	-	87	-0.075	9.13	0.041
50	7.575	0.151	2.38	88	1.9	100	87	-0.075	8.96	0.040
51	7.730	0.155	2.38	88	1.6	-	87	-0.073	8.93	0.038
52	7.883	0.153	2.38	88	1.9	-	87	-0.074	8.56	0.035
53	8.038	0.155	2.39	89	2.0	-	86	-0.074	8.34	0.036
54	8.193	0.155	2.39	89	1.9	-	86	-0.073	8.20	0.035
55	8.346	0.153	2.38	89	1.6	-	86	-0.070	8.18	0.044
56	8.501	0.155	2.38	89	1.9	-	86	-0.071	8.06	0.042
57	8.654	0.153	2.39	90	1.7	-	86	-0.072	8.06	0.043
58	8.811	0.157	2.38	90	2.1	-	86	-0.071	7.96	0.039
59	8.963	0.152	2.40	90	1.9	-	86	-0.070	7.91	0.041
60	9.119	0.156	2.39	90	1.6	100	86	-0.071	7.93	0.039
61	9.273	0.154	2.40	91	1.6	-	86	-0.069	7.81	0.043
62	9.429	0.156	2.39	91	1.6	-	86	-0.069	7.35	0.046
63	9.585	0.156	2.40	91	1.7	-	86	-0.068	7.16	0.039

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.737	0.152	2.39	91	1.9	-	86	-0.068	7.14	0.053
65	9.894	0.157	2.40	92	2.1	-	86	-0.068	6.93	0.053
66	10.048	0.154	2.40	92	1.8	-	86	-0.066	6.94	0.050
67	10.205	0.157	2.40	92	2.1	-	85	-0.066	6.82	0.052
68	10.358	0.153	2.40	92	1.9	-	85	-0.066	6.67	0.054
69	10.514	0.156	2.40	93	2.0	-	85	-0.066	6.77	0.056
70	10.670	0.156	2.40	93	1.8	99	85	-0.067	6.71	0.064
71	10.824	0.154	2.40	93	1.9	-	85	-0.064	6.58	0.069
72	10.981	0.157	2.39	93	1.6	-	85	-0.066	6.57	0.075
73	11.135	0.154	2.41	93	1.9	-	85	-0.064	6.53	0.073
74	11.293	0.158	2.40	94	1.8	-	85	-0.065	6.45	0.076
75	11.446	0.153	2.41	94	1.9	-	85	-0.067	6.57	0.072
76	11.603	0.157	2.40	94	1.7	-	85	-0.064	6.44	0.084
77	11.759	0.156	2.41	94	1.9	-	85	-0.063	6.32	0.091
78	11.914	0.155	2.41	94	1.6	-	85	-0.064	6.76	0.076
79	12.071	0.157	2.40	95	2.1	99	85	-0.064	6.80	0.062
Avg/Tot	12.071	0.153	2.34	84.2	1.8	100	85.2	-0.079	11.06	0.146

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		-0.07	77	0.1		81
1	0.100	0.100	0.80	77	1.5	-	81
2	0.237	0.137	0.80	78	1.6	-	81
3	0.377	0.140	0.81	78	1.6	-	82
4	0.514	0.137	0.80	78	1.6	-	82
5	0.654	0.140	0.81	78	1.5	-	82
6	0.792	0.138	0.81	78	1.7	-	82
7	0.931	0.139	0.82	78	1.7	-	82
8	1.071	0.140	0.82	78	1.5	-	82
9	1.209	0.138	0.81	78	1.5	-	82
10	1.350	0.141	0.83	78	1.7	97	81
11	1.490	0.140	0.82	79	1.5	-	81
12	1.629	0.139	0.82	79	1.6	-	81
13	1.771	0.142	0.83	79	1.5	-	81
14	1.911	0.140	0.83	79	1.7	-	81
15	2.051	0.140	0.83	79	1.7	-	81
16	2.192	0.141	0.83	79	1.7	-	81
17	2.332	0.140	0.83	79	1.7	-	82
18	2.473	0.141	0.83	80	1.5	-	82
19	2.615	0.142	0.84	80	1.6	-	82
20	2.756	0.141	0.83	80	1.5	101	82
21	2.896	0.140	0.84	80	1.5	-	82
22	3.039	0.143	0.84	81	1.7	-	83
23	3.181	0.142	0.84	81	1.5	-	83
24	3.322	0.141	0.83	81	1.6	-	83
25	3.465	0.143	0.85	81	1.7	-	83
26	3.608	0.143	0.85	82	1.7	-	83
27	3.750	0.142	0.84	82	1.7	-	83
28	3.892	0.142	0.85	82	1.6	-	83
29	4.036	0.144	0.86	83	1.5	-	84
30	4.180	0.144	0.86	83	1.6	100	84
31	4.323	0.143	0.85	84	1.5	-	84

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
32	4.466	0.143	0.85	84	1.6	-	84
33	4.610	0.144	0.86	84	1.6	-	84
34	4.755	0.145	0.86	85	1.7	-	84
35	4.899	0.144	0.86	85	1.7	-	84
36	5.044	0.145	0.85	85	1.7	-	84
37	5.188	0.144	0.85	85	1.5	-	84
38	5.332	0.144	0.86	86	1.7	-	84
39	5.478	0.146	0.87	86	1.6	-	84
40	5.624	0.146	0.87	86	1.6	101	84
41	5.769	0.145	0.86	87	1.6	-	84
42	5.914	0.145	0.85	87	1.5	-	84
43	6.059	0.145	0.86	87	1.6	-	85
44	6.205	0.146	0.85	88	1.6	-	85
45	6.350	0.145	0.86	88	1.7	-	85
46	6.497	0.147	0.87	88	1.7	-	85
47	6.644	0.147	0.87	88	1.6	-	85
48	6.790	0.146	0.86	89	1.7	-	85
49	6.937	0.147	0.86	89	1.6	-	85
50	7.083	0.146	0.86	90	1.5	102	85
51	7.230	0.147	0.85	90	1.6	-	85
52	7.376	0.146	0.85	90	1.7	-	85
53	7.523	0.147	0.85	91	1.7	-	84
54	7.670	0.147	0.86	91	1.6	-	84
55	7.817	0.147	0.86	91	1.7	-	84
56	7.964	0.147	0.87	92	1.6	-	84
57	8.112	0.148	0.87	92	1.6	-	84
58	8.260	0.148	0.87	92	1.6	-	84
59	8.408	0.148	0.87	93	1.6	-	84
60	8.555	0.147	0.87	93	1.7	101	84
Avg/Tot	8.555	0.143	0.83	83.7	1.6	100	83.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 17

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	500	538	502	548	111	439.6	982.2
1	508	544	513	528	111	440.8	718.7
2	510	551	527	537	112	447.2	930.6
3	513	556	534	564	113	456.0	1199.8
4	515	559	539	593	114	464.1	1306.9
5	517	560	542	624	115	471.5	1324.2
6	519	561	543	648	116	477.2	1304.3
7	520	561	543	666	117	481.2	1329.1
8	520	561	541	684	118	484.6	1345.5
9	522	561	540	699	118	487.9	1344.7
10	523	560	538	710	119	490.0	1311.8
11	524	560	536	711	120	490.1	1257.9
12	525	560	533	706	121	489.1	1232.3
13	526	560	531	703	121	488.2	1197.0
14	528	560	529	700	122	487.6	1172.1
15	530	560	527	697	123	487.3	1158.4
16	530	560	526	693	123	486.4	1144.4
17	533	560	524	685	124	485.2	1129.1
18	533	560	523	677	124	483.4	1119.6
19	533	560	521	669	125	481.6	1111.6
20	534	559	519	660	125	479.4	1103.9
21	532	559	518	653	125	477.3	1092.4
22	534	558	516	646	126	475.8	1074.7
23	533	556	515	639	126	473.9	1064.6
24	533	556	514	631	126	472.0	1060.6
25	533	555	514	625	127	470.4	1049.3
26	533	553	513	618	127	468.8	1041.0
27	533	552	513	612	127	467.5	1045.5
28	535	552	513	609	127	467.2	1052.9
29	536	551	514	606	127	466.7	1045.1
30	537	551	515	602	128	466.3	1044.9
31	538	551	515	599	128	466.2	1046.4
32	540	552	516	599	128	466.9	1052.4
33	542	553	518	602	128	468.4	1081.2
34	544	553	520	606	128	469.9	1100.6
35	548	555	522	609	128	472.4	1115.2
36	551	557	526	610	128	474.4	1109.3
37	554	561	530	609	128	476.3	1107.9
38	559	564	534	606	128	478.2	1083.1
39	563	568	539	602	128	480.1	1051.9
40	567	572	545	598	128	482.1	1012.8
41	571	577	550	593	128	483.8	993.6
42	573	581	555	587	128	484.9	978.3
43	578	585	561	579	128	486.3	957.2
44	582	589	567	571	128	487.5	933.1
45	585	594	572	564	128	488.6	911.8
46	589	598	577	555	128	489.4	891.9
47	592	601	582	546	128	489.7	871.0

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 17

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	595	604	586	538	128	490.4	859.6
49	598	607	590	531	129	490.8	854.6
50	600	610	593	523	129	490.9	845.7
51	602	612	596	517	129	491.0	838.2
52	603	614	599	510	129	490.9	826.6
53	604	615	601	504	130	490.6	810.9
54	605	616	603	497	130	490.2	798.6
55	606	617	604	491	130	489.6	792.8
56	604	618	605	486	131	488.6	787.1
57	603	617	606	480	131	487.5	780.9
58	605	617	606	476	131	486.9	771.2
59	604	616	607	471	132	485.8	764.5
60	603	616	606	467	132	484.6	759.0
61	602	615	606	462	132	483.4	750.6
62	599	614	606	457	133	481.8	736.9
63	598	613	606	453	133	480.5	725.7
64	598	612	605	448	134	479.3	717.7
65	596	611	604	444	134	477.7	709.7
66	594	609	604	439	135	476.2	702.1
67	592	608	603	434	135	474.6	694.4
68	590	607	603	430	136	473.0	687.4
69	588	605	601	426	137	471.3	683.5
70	587	603	600	422	137	469.9	679.7
71	585	601	599	419	138	468.4	675.8
72	584	599	598	416	139	466.9	672.6
73	582	597	597	413	139	465.4	670.8
74	579	595	595	410	140	463.8	668.7
75	578	593	594	407	140	462.3	665.9
76	575	591	592	405	141	460.7	663.9
77	573	588	591	402	141	459.2	662.8
78	571	586	589	400	142	457.7	661.0
79	570	584	588	398	143	456.5	655.5
Average	560.6	579.6	558.5	556.9	127.8	476.7	952.1

LAB SAMPLE DATA - ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 1

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01285	244.1	245.9	1.8
	B	G01286	243.7	245.4	1.7
	C - 1st Hour	G01287	244.8	246.2	1.4
	Amb	G01288	242.5	242.5	0.0
Probes	**A**	18A	117500.3	117500.3	0.0
	B	18B	117332.8	117333.0	0.2
	C - 1st Hour	18C	114335.5	114335.8	0.3
O-rings	**A**	18A	3599.4	3600.4	1.0
	B	18B	3542.5	3543.1	0.6
	C - 1st Hour	18C	3525.3	3525.7	0.4

Placed in Dessicator on:	6/10/2025

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**	245.8	6/16 15:30	245.9	6/18 10:00				
	B	245.5	6/16 15:30	245.4	6/18 10:00				
	C - 1st Hour	246.3	6/16 15:30	246.2	6/18 10:00				
	Amb	242.5	6/16 15:30	242.5	6/18 10:00				
Probes	**A**	117500.3	6/16 15:30	117500.3	6/18 10:00				
	B	117332.9	6/16 15:30	117333.0	6/18 10:00				
	C - 1st Hour	114335.9	6/16 15:30	114335.8	6/18 10:00				
O-Rings	**A**	3600.5	6/16 15:30	3600.4	6/18 10:00				
	B	3543.2	6/16 15:30	3543.1	6/18 10:00				
	C - 1st Hour	3525.9	6/16 15:30	3525.7	6/18 10:00				

Train A Aggregate, mg:	**2.8**
Train B Aggregate, mg:	**2.5**
Train C Aggregate, mg:	**2.1**
Ambient, mg:	**0.0**

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 1 Test Date: 6/10/25

Wood Heater Run Notes

Test Control Settings

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

Preburn Notes

Time	Notes
20:00	+7.8 lb

Test Notes

Test Burn Start Time: 10:53 Test Fuel Loaded by: 30 seconds
Door Closed: 45 seconds Air Control Set at: 0 seconds
Other Loading Notes: None

Time	Notes
	-None-

Test Burn End Time: 12:12

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

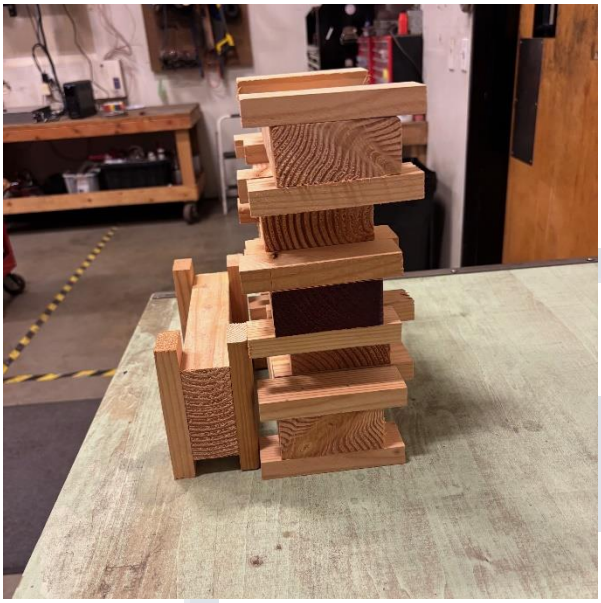
	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Mid	Span
Time	9:31	9:32	9:33	18:08	18:09	18:10
CO_2	0.00	17.32	10.40	0.06	16.98	10.23
CO	0.000	4.347	2.524	0.026	4.290	2.544

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

Technician Signature:  Date: 6/16/25

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 1 Test Date: 6/10/25



Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: Date: 6/16/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 2 Data Summary

Client:	La Castellamonte
Model:	Round Stack
Job #:	24-364
Tracking #:	224
Test Date:	6/10/2025

Technician Signature — Date: 7/21/2025

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Burn Rate (kg/hr):	0.96

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	50.943	36.038	35.185	8.868
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.0			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10345.4			
Average Gas Meter Temperature (°F)	75.4	99.9	100.1	90.0
Total Sample Volume (dscf)	50.537	34.647	33.333	8.683
Average Tunnel Temperature (°F)	102.0			
Total Time of Test (min)	223			
Total Particulate Catch (mg)	0.1	2.6	2.8	2.2
Particulate Concentration, dry-standard (g/dscf)	0.0000020	0.0000750	0.0000840	0.0002534
Total PM Emissions (g)	0.08	2.81	3.15	2.60
Particulate Emission Rate (g/hr)	0.02	0.76	0.85	2.60
Emissions Factor (g/kg)	-	0.79	0.89	-
Difference from Average Total Particulate Emissions (g)	-	0.17	0.17	-
Difference from Average Total Particulate Emissions (%)	-	5.8%	5.8%	
Difference from Average Emissions Factor (g/kg)	-	0.05	0.05	-

Final Average Results	
Total Particulate Emissions (g)	2.98
Particulate Emission Rate (g/hr)	0.80
Emissions Factor (g/kg)	0.84
HHV Efficiency (%)	77.9%
LHV Efficiency (%)	84.2%
CO Emissions (g/min)	0.11

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	86.5	OK
Face Velocity	< 30 ft/min	9.0	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	Min:73.9/Max:77.6	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	74.4	OK

B415.1 Efficiency Results

Manufacturer: La Castellamonte
Model: Round Stack
Date: 06/10/25
Run: 2
Control #: 24-364
Test Duration: 223
Output Category: 2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	77.9%	84.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	78.3%	84.6%

Output Rate (kJ/h)	14,472	13,728	**(Btu/h)**
Burn Rate (kg/h)	0.94	2.07	**(lb/h)**
Input (kJ/h)	18,581	17,626	**(Btu/h)**

Test Load Weight (dry kg)	3.49	7.68	**dry lb**
MC wet (%)	18.44		
MC dry (%)	22.61		
Particulate (g)	2.98		
CO (g)	25		
Test Duration (h)	3.72		

Emissions	**Particulate**	**CO**
g/MJ Output	0.06	0.47
g/kg Dry Fuel	0.86	7.19
g/h	0.80	6.74
g/min	0.01	0.11
lb/MM Btu Output	0.13	1.08

Air/Fuel Ratio (A/F)	11.86

VERSION: **2.4** **4/15/2010**

WOODSTOVE FUEL DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	9.00	23.1			
2x4	9.00	22.3			
2x4	9.00	20.8			
2x4	9.00	19.1			
2x4	9.00	23.9			
2x4	9.00	25.0			
2x4	9.00	21.2			
2x4	9.00	23.7			
Total Fuel Weight (lbs):		7.98	Average Moisture (%DB):		22.4

Firebox Volume (ft^3):	1.37
Total 2x4 Crib Weight, with spacers (lbs):	9.42
Total 4x4 Crib Weight, with spacers (lbs):	0.00
Total Wet Fuel Weight, with spacers (lbs):	9.42

Coal Bed Range (20-25%):
Min (lbs): 1.88
Max (lbs): 2.36

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	9.00	1.21	24.7	24.2	23.6	0.97
2x4	9.00	1.21	23.8	23.8	24.2	0.98
2x4	9.00	1.14	22.7	24.4	24.8	0.92
2x4	9.00	1.12	21.4	21.2	22.0	0.92
2x4	9.00	1.10	21.0	19.7	21.1	0.91
2x4	9.00	1.13	21.0	19.6	23.7	0.93
					Total Dry Weight, no spacers (lbs):	5.63
					Total Dry Weight, with spacers (lbs):	7.85

Spacer Moisture Readings (%DB)

12.2	13.2	12.3					
14.4	14.4	12.6					
14.1	11.7	12.7					
14.4	14.0	14.3					
12.0	13.3	12.6					
12.5	14.5	12.2					
13.5	11.5	12.3					
14.1	12.3	14.4					

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	34.3	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	6.88	OK
2x4 Fuel Mix	35 - 65 % of total weight	N/A	N/A

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	La Castellamonte	Job #:	24-364
Model:	Round Stack	Tracking #:	224
Run #:	2	Technician:	AK
Test Start Time:	13:49	Date:	6/10/2025

Total Sampling Time (min):	223	
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)

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.77	29.74	29.76
Relative Humidity (%)	23.9	28.7	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:		50.943	ft^3

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	6/9/2025
Test Fuel Scale Audit (lbs)	10.00
Platform Scale Audit (lbs)	10.0

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)	0.000	0.001	cfm @	-7	in. Hg
(Ambient)	0.000	0.000	cfm @	-12	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.038	84
2	0.058	84
3	0.064	84
4	0.042	84
5	0.048	84
6	0.070	84
7	0.068	84
8	0.036	84
Center	0.068	84

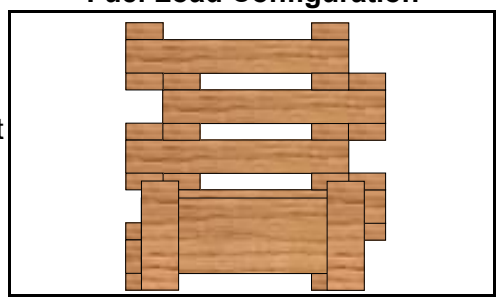
Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	15.41	ft/sec
V_{scent}:	17.59	ft/sec
F_p:	0.876	[ratio]
Initial Tunnel Flow:	171.7	scf/min

Static Pressure: -0.160 in. H_2O

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Left



Firebox Right

Firebox Front View

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: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Recording Interval (min): 1
Run Time (min): 73

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	6.58	-0.088	552	569	550	666	150	497.4	764	75
1	6.46	-0.086	553	573	551	655	151	496.5	649	75
2	6.34	-0.084	556	575	552	634	151	493.6	621	76
3	6.19	-0.083	556	578	553	617	152	491.2	613	76
4	6.12	-0.079	558	579	554	603	154	489.6	607	75
5	5.99	-0.083	558	580	555	590	154	487.5	598	75
6	5.85	-0.081	558	579	556	578	156	485.2	596	76
7	5.75	-0.082	558	578	557	567	157	483.1	599	76
8	5.62	-0.081	555	577	557	558	158	481.0	604	76
9	5.49	-0.080	553	575	556	554	159	479.6	604	76
10	5.36	-0.082	552	573	556	549	160	478.0	613	76
11	5.25	-0.081	549	571	556	545	161	476.5	627	75
12	5.13	-0.083	548	569	556	544	161	475.4	630	75
13	4.99	-0.083	545	566	556	542	162	474.3	636	75
14	4.89	-0.082	542	564	555	542	163	473.1	639	75
15	4.78	-0.081	539	561	554	542	164	472.1	646	75
16	4.66	-0.081	538	559	553	543	164	471.3	645	75
17	4.56	-0.084	535	557	552	545	164	470.4	647	75
18	4.47	-0.081	533	554	551	547	165	469.9	645	75
19	4.31	-0.082	531	552	550	548	165	469.4	642	75
20	4.24	-0.082	528	551	549	550	165	468.7	643	75
21	4.07	-0.081	526	549	549	553	166	468.4	644	75
22	3.99	-0.078	525	548	548	566	166	470.5	608	75
23	3.88	-0.076	523	546	548	569	166	470.5	572	76
24	3.82	-0.074	522	546	548	565	166	469.2	537	75
25	3.72	-0.076	521	545	548	548	167	465.3	548	75
26	3.61	-0.078	520	544	547	538	167	463.2	569	75
27	3.56	-0.076	519	543	547	533	167	461.7	579	76
28	3.48	-0.075	519	542	546	536	167	461.8	571	76
29	3.38	-0.073	519	541	546	536	167	461.6	535	76
30	3.33	-0.069	518	540	545	532	167	460.4	503	75
31	3.26	-0.069	517	540	545	520	167	457.8	498	75
32	3.16	-0.069	518	540	545	518	167	457.5	502	75
33	3.07	-0.067	517	540	545	516	167	456.7	480	76
34	3.01	-0.067	517	540	544	512	167	456.0	467	75
35	2.93	-0.066	518	540	544	506	167	455.1	456	75
36	2.91	-0.071	519	541	544	497	167	453.3	484	75
37	2.83	-0.072	519	542	543	493	166	452.6	503	75
38	2.74	-0.071	519	542	543	491	166	452.2	519	75
39	2.72	-0.069	519	542	543	489	166	451.7	509	75
40	2.66	-0.067	519	542	543	484	166	450.7	487	75
41	2.63	-0.066	518	541	543	475	166	448.7	458	75
42	2.60	-0.063	517	540	543	465	166	446.1	431	75
43	2.60	-0.060	517	539	543	452	166	443.4	406	75
44	2.56	-0.058	516	538	542	440	166	440.4	383	75

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Recording Interval (min): 1
Run Time (min): 73

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	2.52	-0.055	515	536	542	429	166	437.4	365	75
46	2.54	-0.054	514	535	541	418	166	434.5	354	75
47	2.50	-0.054	512	533	539	409	165	431.6	340	75
48	2.49	-0.053	510	532	538	400	165	429.0	329	75
49	2.48	-0.053	508	529	537	392	165	426.2	324	74
50	2.42	-0.052	509	527	535	385	164	424.1	318	75
51	2.43	-0.049	506	525	533	378	164	421.3	311	74
52	2.42	-0.049	504	523	531	372	164	418.7	306	74
53	2.43	-0.050	503	520	529	367	164	416.4	304	75
54	2.39	-0.049	499	518	527	362	164	414.0	304	75
55	2.40	-0.047	499	515	525	358	164	412.2	302	74
56	2.39	-0.047	495	513	523	355	164	409.9	299	75
57	2.37	-0.047	494	510	521	352	164	408.2	297	75
58	2.06	-0.045	492	508	519	347	164	406.1	313	75
59	2.02	-0.047	490	506	517	344	165	404.1	294	75
60	2.02	-0.046	488	504	515	341	165	402.5	292	76
61	2.00	-0.048	486	502	513	339	165	401.0	291	76
62	1.97	-0.047	483	500	511	336	165	398.9	289	75
63	1.94	-0.046	481	498	509	334	165	397.2	285	76
64	1.95	-0.044	479	497	507	332	165	395.7	281	76
65	1.95	-0.045	477	495	504	329	165	394.0	279	76
66	1.94	-0.044	475	493	503	327	165	392.4	276	76
67	1.92	-0.044	473	491	500	325	165	390.6	272	75
68	1.92	-0.043	472	489	498	323	165	389.1	271	75
69	1.91	-0.042	467	487	496	321	165	386.9	269	75
70	1.88	-0.043	466	485	493	319	164	385.4	267	75
71	1.87	-0.042	464	482	491	317	165	383.9	267	76
72	1.87	-0.041	463	480	489	316	165	382.5	267	76
73	1.87	-0.042	461	478	487	314	165	380.9	268	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.068	0.01	86	0.1		9.42		113	354	83	76
1	0.107	0.107	0.069	2.30	86	1.0	-	9.28	-0.14	131	334	84	75
2	0.254	0.147	0.069	2.33	86	1.1	-	9.04	-0.24	126	424	82	76
3	0.408	0.154	0.068	2.33	85	1.0	-	8.84	-0.20	126	543	84	76
4	0.557	0.149	0.070	2.36	85	1.1	-	8.68	-0.16	131	591	84	75
5	0.713	0.156	0.068	2.38	86	1.0	-	8.46	-0.22	136	632	84	76
6	0.863	0.150	0.069	2.40	85	1.0	-	8.25	-0.21	130	599	85	76
7	1.021	0.158	0.071	2.42	85	1.1	-	8.16	-0.09	121	531	83	76
8	1.173	0.152	0.070	2.43	85	1.1	-	8.04	-0.12	116	494	83	76
9	1.330	0.157	0.069	2.46	86	1.1	-	7.95	-0.09	115	473	83	76
10	1.484	0.154	0.071	2.47	86	1.0	96	7.85	-0.10	112	452	83	76
11	1.640	0.156	0.071	2.49	86	1.1	-	7.74	-0.11	112	446	83	76
12	1.799	0.159	0.069	2.49	86	1.0	-	7.60	-0.14	111	447	83	76
13	1.953	0.154	0.070	2.50	86	1.1	-	7.51	-0.09	110	440	85	76
14	2.112	0.159	0.068	2.51	86	1.1	-	7.39	-0.12	108	435	83	76
15	2.267	0.155	0.075	2.52	87	1.1	-	7.31	-0.08	107	436	84	75
16	2.428	0.161	0.075	2.54	87	1.1	-	7.23	-0.08	107	445	84	76
17	2.583	0.155	0.071	2.54	87	1.1	-	7.15	-0.08	107	448	83	76
18	2.742	0.159	0.069	2.54	87	1.1	-	7.07	-0.08	107	439	84	76
19	2.903	0.161	0.074	2.56	87	1.1	-	6.97	-0.10	106	428	85	76
20	3.057	0.154	0.073	2.56	87	1.1	100	6.90	-0.07	106	429	83	76
21	3.220	0.163	0.075	2.57	88	1.0	-	6.83	-0.07	106	438	84	77
22	3.376	0.156	0.070	2.57	88	1.1	-	6.74	-0.09	106	453	83	76
23	3.536	0.160	0.073	2.57	88	1.1	-	6.66	-0.08	106	459	85	76
24	3.698	0.162	0.071	2.57	88	1.1	-	6.60	-0.06	107	453	83	76
25	3.854	0.156	0.070	2.59	89	1.1	-	6.50	-0.10	106	439	83	76
26	4.018	0.164	0.070	2.59	89	1.1	-	6.42	-0.08	106	427	83	76
27	4.176	0.158	0.070	2.60	89	1.1	-	6.33	-0.09	105	419	83	77
28	4.337	0.161	0.070	2.60	89	1.1	-	6.22	-0.11	105	411	83	76
29	4.501	0.164	0.069	2.62	90	1.1	-	6.16	-0.06	106	407	83	76
30	4.657	0.156	0.070	2.61	90	1.0	101	6.07	-0.09	106	408	83	76
31	4.823	0.166	0.070	2.63	90	1.1	-	6.04	-0.03	106	407	84	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
32	4.982	0.159	0.069	2.63	91	1.1	-	5.92	-0.12	105	409	85	76
33	5.144	0.162	0.074	2.64	91	1.1	-	5.86	-0.06	105	407	84	76
34	5.307	0.163	0.071	2.64	91	1.1	-	5.78	-0.08	106	404	83	76
35	5.467	0.160	0.072	2.65	91	1.1	-	5.69	-0.09	105	399	82	76
36	5.630	0.163	0.069	2.65	92	1.1	-	5.60	-0.09	105	401	82	76
37	5.794	0.164	0.069	2.65	92	1.1	-	5.50	-0.10	105	399	83	76
38	5.953	0.159	0.073	2.65	92	1.1	-	5.42	-0.08	105	395	83	77
39	6.120	0.167	0.071	2.67	93	1.1	-	5.34	-0.08	105	393	85	76
40	6.280	0.160	0.074	2.66	93	1.1	101	5.26	-0.08	105	389	83	77
41	6.444	0.164	0.071	2.67	93	1.1	-	5.17	-0.09	104	385	83	77
42	6.608	0.164	0.070	2.68	94	1.1	-	5.11	-0.06	105	382	83	76
43	6.769	0.161	0.069	2.66	94	1.1	-	5.05	-0.06	105	383	85	77
44	6.933	0.164	0.074	2.66	94	1.1	-	4.97	-0.08	104	379	83	76
45	7.099	0.166	0.072	2.69	94	1.1	-	4.86	-0.11	104	379	82	76
46	7.259	0.160	0.070	2.68	95	1.1	-	4.81	-0.05	105	380	84	76
47	7.426	0.167	0.070	2.69	95	1.1	-	4.73	-0.08	105	379	82	76
48	7.589	0.163	0.074	2.68	95	1.1	-	4.64	-0.09	105	378	85	76
49	7.748	0.159	0.068	2.52	95	1.1	-	4.54	-0.10	105	385	84	76
50	7.908	0.160	0.069	2.51	95	1.0	102	4.48	-0.06	106	391	85	76
51	8.066	0.158	0.073	2.52	96	1.0	-	4.36	-0.12	107	400	83	76
52	8.226	0.160	0.073	2.51	96	1.0	-	4.30	-0.06	106	407	83	76
53	8.385	0.159	0.070	2.52	96	1.1	-	4.22	-0.08	105	408	84	76
54	8.545	0.160	0.073	2.53	96	1.0	-	4.12	-0.10	104	410	82	77
55	8.706	0.161	0.070	2.54	96	1.0	-	3.99	-0.13	105	411	83	77
56	8.864	0.158	0.072	2.53	97	1.0	-	3.92	-0.07	106	414	83	76
57	9.025	0.161	0.072	2.54	97	1.0	-	3.84	-0.08	106	417	83	76
58	9.184	0.159	0.069	2.53	97	1.0	-	3.83	-0.01	106	422	85	76
59	9.344	0.160	0.069	2.53	97	1.0	-	3.69	-0.14	107	423	83	76
60	9.506	0.162	0.070	2.55	98	1.0	101	3.55	-0.14	107	432	84	76
61	9.664	0.158	0.069	2.55	98	1.0	-	3.45	-0.10	108	441	84	76
62	9.825	0.161	0.071	2.54	98	1.1	-	3.35	-0.10	108	446	83	77
63	9.986	0.161	0.070	2.54	98	1.1	-	3.27	-0.08	109	450	83	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
64	10.146	0.160	0.073	2.55	99	1.0	-	3.22	-0.05	106	448	83	77
65	10.308	0.162	0.073	2.54	99	1.0	-	3.09	-0.13	104	444	83	77
66	10.466	0.158	0.075	2.55	99	1.1	-	3.07	-0.02	105	434	85	77
67	10.628	0.162	0.072	2.55	99	1.0	-	2.95	-0.12	106	431	84	77
68	10.790	0.162	0.075	2.55	99	1.1	-	2.91	-0.04	107	426	85	77
69	10.948	0.158	0.069	2.54	99	1.0	-	2.83	-0.08	107	422	83	77
70	11.112	0.164	0.070	2.56	99	1.0	101	2.77	-0.06	107	412	83	77
71	11.270	0.158	0.068	2.56	99	1.0	-	2.72	-0.05	108	406	83	77
72	11.432	0.162	0.070	2.55	100	1.1	-	2.65	-0.07	107	401	86	77
73	11.596	0.164	0.069	2.57	100	1.0	-	2.59	-0.06	107	396	86	77
74	11.752	0.156	0.072	2.55	100	1.0	-	2.53	-0.06	106	397	86	78
75	11.918	0.166	0.068	2.56	100	1.0	-	2.48	-0.05	105	388	85	77
76	12.076	0.158	0.070	2.56	100	1.0	-	2.40	-0.08	105	386	84	78
77	12.239	0.163	0.069	2.57	100	1.0	-	2.33	-0.07	106	380	83	77
78	12.400	0.161	0.068	2.57	100	1.1	-	2.33	0.00	106	375	83	78
79	12.560	0.160	0.073	2.57	101	1.0	-	2.23	-0.10	106	374	83	77
80	12.723	0.163	0.071	2.56	101	1.0	100	2.21	-0.02	106	368	84	77
81	12.885	0.162	0.073	2.56	101	1.0	-	2.17	-0.04	106	366	84	77
82	13.045	0.160	0.068	2.57	101	1.0	-	2.11	-0.06	106	366	84	77
83	13.209	0.164	0.068	2.57	101	1.0	-	2.07	-0.04	106	362	84	77
84	13.369	0.160	0.071	2.57	101	1.1	-	2.08	0.01	106	359	84	77
85	13.531	0.162	0.069	2.57	101	1.1	-	2.00	-0.08	106	358	82	77
86	13.695	0.164	0.072	2.58	101	1.0	-	1.95	-0.05	105	357	84	76
87	13.852	0.157	0.070	2.57	102	1.0	-	1.86	-0.09	105	358	85	77
88	14.019	0.167	0.072	2.58	102	1.0	-	1.87	0.01	105	364	82	76
89	14.178	0.159	0.071	2.57	102	1.0	-	1.81	-0.06	105	372	85	76
90	14.341	0.163	0.072	2.58	102	1.1	100	1.77	-0.04	105	372	83	76
91	14.504	0.163	0.071	2.57	102	1.0	-	1.76	-0.01	105	371	84	76
92	14.664	0.160	0.071	2.58	103	1.0	-	1.75	-0.01	105	365	83	76
93	14.827	0.163	0.071	2.59	103	1.0	-	1.72	-0.03	105	359	83	76
94	14.991	0.164	0.068	2.58	102	1.0	-	1.70	-0.02	104	352	82	76
95	15.149	0.158	0.073	2.58	103	1.1	-	1.66	-0.04	104	343	84	76

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
96	15.316	0.167	0.071	2.59	103	1.1	-	1.64	-0.02	103	339	85	76
97	15.475	0.159	0.071	2.59	103	1.0	-	1.60	-0.04	103	330	84	76
98	15.638	0.163	0.073	2.58	103	1.0	-	1.60	0.00	103	324	85	76
99	15.802	0.164	0.070	2.59	103	1.1	-	1.55	-0.05	103	315	83	76
100	15.962	0.160	0.071	2.58	103	1.0	100	1.55	0.00	102	308	83	76
101	16.125	0.163	0.072	2.58	103	1.0	-	1.53	-0.02	102	301	82	76
102	16.289	0.164	0.071	2.58	103	1.0	-	1.52	-0.01	102	301	83	76
103	16.448	0.159	0.072	2.59	103	1.0	-	1.49	-0.03	102	299	83	76
104	16.614	0.166	0.069	2.58	103	1.0	-	1.48	-0.01	102	298	86	76
105	16.774	0.160	0.073	2.59	103	1.0	-	1.46	-0.02	101	294	82	76
106	16.938	0.164	0.072	2.58	103	1.0	-	1.44	-0.02	101	292	82	75
107	17.101	0.163	0.071	2.59	103	1.1	-	1.46	0.02	101	291	85	76
108	17.262	0.161	0.069	2.58	103	1.0	-	1.42	-0.04	101	290	85	75
109	17.425	0.163	0.071	2.59	103	1.0	-	1.42	0.00	101	288	86	75
110	17.589	0.164	0.074	2.58	103	1.0	99	1.39	-0.03	101	288	82	75
111	17.748	0.159	0.069	2.59	104	1.1	-	1.39	0.00	101	287	85	75
112	17.915	0.167	0.071	2.59	103	1.0	-	1.36	-0.03	101	287	83	75
113	18.074	0.159	0.068	2.58	103	1.0	-	1.35	-0.01	100	288	86	75
114	18.238	0.164	0.072	2.59	103	1.0	-	1.35	0.00	100	283	82	75
115	18.402	0.164	0.069	2.59	103	1.0	-	1.33	-0.02	100	283	82	75
116	18.563	0.161	0.070	2.59	104	1.0	-	1.31	-0.02	100	283	83	75
117	18.726	0.163	0.072	2.59	104	1.0	-	1.28	-0.03	100	283	83	75
118	18.891	0.165	0.069	2.59	104	1.0	-	1.28	0.00	100	281	83	75
119	19.049	0.158	0.071	2.57	104	1.1	-	1.28	0.00	100	281	85	75
120	19.216	0.167	0.070	2.58	104	1.0	99	1.27	-0.01	99	281	83	75
121	19.376	0.160	0.070	2.58	104	1.0	-	1.26	-0.01	99	281	85	75
122	19.539	0.163	0.068	2.58	104	1.0	-	1.19	-0.07	99	280	82	75
123	19.704	0.165	0.070	2.59	104	1.0	-	1.19	0.00	99	280	85	75
124	19.864	0.160	0.073	2.59	104	1.0	-	1.21	0.02	99	278	85	75
125	20.028	0.164	0.071	2.59	104	1.0	-	1.18	-0.03	99	279	82	75
126	20.192	0.164	0.071	2.59	104	1.0	-	1.19	0.01	99	279	83	75
127	20.352	0.160	0.070	2.59	104	1.0	-	1.18	-0.01	99	278	84	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
128	20.517	0.165	0.074	2.59	104	1.0	-	1.16	-0.02	99	279	84	75
129	20.680	0.163	0.071	2.59	104	1.0	-	1.15	-0.01	99	280	84	75
130	20.841	0.161	0.070	2.59	104	1.0	100	1.11	-0.04	98	280	84	75
131	21.008	0.167	0.072	2.59	104	1.0	-	1.11	0.00	99	279	83	75
132	21.166	0.158	0.069	2.59	104	1.0	-	1.12	0.01	99	280	82	75
133	21.331	0.165	0.070	2.60	104	1.0	-	1.10	-0.02	99	282	84	75
134	21.495	0.164	0.072	2.60	104	1.0	-	1.09	-0.01	98	281	83	75
135	21.656	0.161	0.068	2.60	104	1.0	-	1.08	-0.01	98	282	84	75
136	21.821	0.165	0.071	2.61	104	1.1	-	1.03	-0.05	98	283	83	75
137	21.985	0.164	0.071	2.60	104	1.0	-	1.05	0.02	98	285	84	75
138	22.144	0.159	0.070	2.60	104	1.0	-	0.99	-0.06	98	287	83	75
139	22.311	0.167	0.074	2.60	104	1.1	-	1.00	0.01	98	285	84	75
140	22.471	0.160	0.068	2.60	104	1.0	101	1.00	0.00	98	285	84	75
141	22.636	0.165	0.069	2.60	104	1.0	-	1.00	0.00	98	285	84	75
142	22.800	0.164	0.070	2.58	104	1.0	-	0.94	-0.06	98	289	85	75
143	22.961	0.161	0.075	2.59	104	1.0	-	0.96	0.02	98	288	84	75
144	23.125	0.164	0.069	2.61	104	1.1	-	0.91	-0.05	98	289	84	75
145	23.290	0.165	0.068	2.60	104	1.0	-	1.00	0.09	98	288	82	75
146	23.450	0.160	0.069	2.59	104	1.0	-	0.92	-0.08	98	288	83	75
147	23.615	0.165	0.075	2.59	104	1.0	-	0.92	0.00	98	290	83	75
148	23.779	0.164	0.071	2.59	104	1.0	-	0.89	-0.03	98	290	83	75
149	23.939	0.160	0.074	2.59	105	1.0	-	0.87	-0.02	98	288	83	75
150	24.107	0.168	0.069	2.58	104	1.0	102	0.91	0.04	98	288	83	75
151	24.267	0.160	0.070	2.60	104	1.0	-	0.84	-0.07	98	289	84	75
152	24.431	0.164	0.070	2.58	104	1.0	-	0.81	-0.03	98	289	83	75
153	24.596	0.165	0.073	2.59	104	1.0	-	0.86	0.05	98	290	82	75
154	24.757	0.161	0.070	2.58	104	1.0	-	0.83	-0.03	98	291	83	75
155	24.921	0.164	0.072	2.57	104	1.0	-	0.80	-0.03	97	287	84	75
156	25.087	0.166	0.069	2.59	105	1.0	-	0.79	-0.01	98	287	83	75
157	25.246	0.159	0.072	2.58	104	1.0	-	0.79	0.00	98	287	84	75
158	25.413	0.167	0.071	2.58	104	1.0	-	0.78	-0.01	98	289	83	75
159	25.575	0.162	0.072	2.58	105	1.0	-	0.74	-0.04	98	287	83	75

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
160	25.737	0.162	0.070	2.59	105	1.0	101	0.75	0.01	98	287	86	75
161	25.904	0.167	0.070	2.60	104	1.0	-	0.73	-0.02	98	287	82	75
162	26.063	0.159	0.070	2.59	105	1.0	-	0.73	0.00	97	286	84	75
163	26.229	0.166	0.069	2.59	104	1.1	-	0.69	-0.04	97	283	83	75
164	26.393	0.164	0.074	2.60	105	1.0	-	0.68	-0.01	97	282	83	75
165	26.555	0.162	0.071	2.60	105	1.0	-	0.69	0.01	97	283	83	75
166	26.719	0.164	0.073	2.60	105	1.0	-	0.66	-0.03	97	284	83	75
167	26.885	0.166	0.070	2.61	105	1.0	-	0.67	0.01	97	284	82	75
168	27.044	0.159	0.070	2.59	105	1.0	-	0.61	-0.06	97	284	83	75
169	27.211	0.167	0.070	2.60	105	1.0	-	0.64	0.03	97	286	82	75
170	27.373	0.162	0.069	2.58	105	1.0	101	0.62	-0.02	97	287	84	75
171	27.535	0.162	0.069	2.58	104	1.0	-	0.61	-0.01	97	285	84	75
172	27.702	0.167	0.072	2.59	105	1.0	-	0.60	-0.01	97	283	83	75
173	27.861	0.159	0.070	2.60	105	1.0	-	0.57	-0.03	97	282	82	75
174	28.027	0.166	0.069	2.60	104	1.0	-	0.58	0.01	97	281	83	75
175	28.192	0.165	0.071	2.59	105	1.0	-	0.54	-0.04	97	281	83	75
176	28.353	0.161	0.070	2.59	105	1.0	-	0.56	0.02	97	282	83	75
177	28.517	0.164	0.068	2.60	105	1.0	-	0.53	-0.03	97	283	84	74
178	28.682	0.165	0.070	2.60	105	1.0	-	0.50	-0.03	97	285	83	75
179	28.842	0.160	0.071	2.59	105	1.0	-	0.51	0.01	97	286	83	75
180	29.009	0.167	0.072	2.60	105	1.0	100	0.50	-0.01	97	286	83	75
181	29.171	0.162	0.072	2.60	105	1.0	-	0.44	-0.06	97	286	84	75
182	29.333	0.162	0.073	2.60	105	1.0	-	0.47	0.03	97	286	83	74
183	29.500	0.167	0.074	2.60	105	1.0	-	0.48	0.01	97	288	83	74
184	29.660	0.160	0.072	2.59	105	1.0	-	0.47	-0.01	97	286	84	74
185	29.825	0.165	0.071	2.59	105	1.0	-	0.40	-0.07	97	288	83	75
186	29.990	0.165	0.072	2.60	105	1.0	-	0.41	0.01	96	287	84	75
187	30.151	0.161	0.074	2.59	105	1.0	-	0.40	-0.01	97	286	82	74
188	30.316	0.165	0.070	2.60	105	1.0	-	0.38	-0.02	97	285	83	74
189	30.481	0.165	0.071	2.60	105	1.0	-	0.35	-0.03	97	287	83	74
190	30.644	0.163	0.069	2.59	105	1.0	100	0.37	0.02	97	287	83	74
191	30.808	0.164	0.074	2.59	105	1.0	-	0.36	-0.01	97	290	84	74

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
192	30.970	0.162	0.074	2.59	105	1.0	-	0.33	-0.03	97	289	83	74
193	31.132	0.162	0.074	2.58	105	1.0	-	0.34	0.01	97	290	83	74
194	31.299	0.167	0.069	2.59	105	1.0	-	0.32	-0.02	97	289	82	74
195	31.459	0.160	0.073	2.59	105	1.0	-	0.31	-0.01	96	285	84	74
196	31.625	0.166	0.074	2.58	105	1.0	-	0.29	-0.02	96	279	82	74
197	31.789	0.164	0.071	2.60	105	1.0	-	0.26	-0.03	96	269	85	74
198	31.951	0.162	0.074	2.58	105	1.0	-	0.27	0.01	96	261	83	74
199	32.117	0.166	0.070	2.58	105	1.0	-	0.26	-0.01	96	255	84	74
200	32.281	0.164	0.071	2.59	105	1.0	100	0.24	-0.02	96	249	83	74
201	32.440	0.159	0.072	2.58	105	1.1	-	0.23	-0.01	96	245	83	74
202	32.607	0.167	0.070	2.59	105	1.0	-	0.21	-0.02	95	244	83	74
203	32.770	0.163	0.073	2.58	105	1.0	-	0.19	-0.02	95	240	85	74
204	32.934	0.164	0.071	2.59	105	1.0	-	0.21	0.02	95	240	85	74
205	33.099	0.165	0.071	2.60	105	1.0	-	0.17	-0.04	95	237	84	74
206	33.258	0.159	0.073	2.60	105	1.0	-	0.18	0.01	95	235	82	74
207	33.424	0.166	0.072	2.60	105	1.0	-	0.16	-0.02	95	236	82	74
208	33.588	0.164	0.070	2.60	105	1.0	-	0.14	-0.02	94	234	84	74
209	33.750	0.162	0.072	2.58	105	1.0	-	0.16	0.02	94	232	82	74
210	33.914	0.164	0.071	2.60	105	1.0	99	0.12	-0.04	94	235	85	74
211	34.080	0.166	0.070	2.59	105	1.0	-	0.11	-0.01	94	235	83	74
212	34.239	0.159	0.069	2.59	105	1.0	-	0.10	-0.01	94	234	84	74
213	34.406	0.167	0.070	2.60	105	1.0	-	0.10	0.00	94	235	82	74
214	34.569	0.163	0.069	2.59	105	1.0	-	0.10	0.00	94	236	83	74
215	34.730	0.161	0.069	2.60	105	1.0	-	0.06	-0.04	94	236	83	74
216	34.897	0.167	0.070	2.59	105	1.0	-	0.07	0.01	94	240	82	74
217	35.057	0.160	0.071	2.61	105	1.0	-	0.05	-0.02	94	237	84	74
218	35.223	0.166	0.068	2.59	105	1.0	-	0.04	-0.01	94	240	83	74
219	35.387	0.164	0.071	2.60	105	1.0	-	0.02	-0.02	94	243	84	74
220	35.549	0.162	0.069	2.59	105	1.0	100	0.06	0.04	94	243	84	74
221	35.713	0.164	0.073	2.61	105	1.0	-	0.05	-0.01	94	245	84	74
222	35.878	0.165	0.072	2.60	105	1.0	-	0.01	-0.04	94	244	82	74
223	36.038	0.160	0.070	2.59	105	1.0	100	0.00	-0.01	94	244	83	74

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
Avg/Tot	36.038	0.162	0.071	2.57	99.9	1.0	100			102.0	336.2	83.4	75.4

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.01	87	0.7		83	-0.059	3.76	0.144
1	0.110	0.110	2.41	87	1.8	-	85	-0.050	3.59	0.062
2	0.262	0.152	2.42	87	1.8	-	85	-0.072	6.24	0.273
3	0.418	0.156	2.41	87	2.1	-	85	-0.079	14.01	0.161
4	0.573	0.155	2.41	87	1.6	-	85	-0.081	13.12	0.139
5	0.726	0.153	2.40	87	1.8	-	87	-0.083	13.85	0.164
6	0.881	0.155	2.40	87	1.9	-	86	-0.075	15.29	0.174
7	1.033	0.152	2.39	87	1.8	-	86	-0.072	15.42	0.137
8	1.189	0.156	2.40	87	1.6	-	86	-0.070	11.79	0.083
9	1.342	0.153	2.39	87	1.6	-	86	-0.068	13.27	0.061
10	1.499	0.157	2.39	87	2.1	99	86	-0.065	14.91	0.043
11	1.650	0.151	2.39	87	2.1	-	85	-0.067	15.21	0.040
12	1.805	0.155	2.38	87	2.1	-	85	-0.066	17.81	0.074
13	1.960	0.155	2.40	87	1.8	-	85	-0.065	15.46	0.055
14	2.114	0.154	2.39	87	1.8	-	85	-0.066	13.87	0.063
15	2.269	0.155	2.39	88	2.0	-	85	-0.066	13.05	0.079
16	2.422	0.153	2.39	88	1.7	-	85	-0.066	11.67	0.093
17	2.579	0.157	2.40	88	2.0	-	85	-0.066	11.49	0.086
18	2.732	0.153	2.39	88	2.0	-	85	-0.064	12.91	0.055
19	2.888	0.156	2.40	88	1.6	-	85	-0.064	13.93	0.042
20	3.041	0.153	2.40	88	1.6	100	85	-0.063	12.84	0.068
21	3.198	0.157	2.40	89	2.0	-	85	-0.066	11.40	0.093
22	3.353	0.155	2.40	89	1.8	-	85	-0.065	10.52	0.124
23	3.507	0.154	2.40	89	1.7	-	85	-0.067	10.26	0.139
24	3.663	0.156	2.40	89	1.6	-	85	-0.062	11.71	0.078
25	3.816	0.153	2.40	90	1.7	-	86	-0.062	12.52	0.056
26	3.974	0.158	2.40	90	2.0	-	85	-0.061	13.19	0.052
27	4.127	0.153	2.40	90	2.0	-	86	-0.060	13.59	0.043
28	4.283	0.156	2.39	90	1.6	-	85	-0.062	13.48	0.037
29	4.439	0.156	2.41	91	1.8	-	86	-0.061	12.71	0.057
30	4.594	0.155	2.41	91	1.7	100	86	-0.061	12.25	0.058
31	4.750	0.156	2.40	91	2.0	-	84	-0.062	11.75	0.061

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.903	0.153	2.40	91	1.7	-	85	-0.063	11.40	0.071
33	5.062	0.159	2.41	91	1.6	-	84	-0.062	12.01	0.054
34	5.216	0.154	2.41	92	1.8	-	84	-0.059	13.17	0.039
35	5.372	0.156	2.41	92	2.0	-	85	-0.060	14.88	0.024
36	5.528	0.156	2.41	92	1.6	-	84	-0.059	15.42	0.021
37	5.685	0.157	2.41	93	1.6	-	85	-0.060	15.27	0.018
38	5.841	0.156	2.41	93	1.7	-	84	-0.060	14.99	0.027
39	5.994	0.153	2.41	93	1.7	-	85	-0.059	14.37	0.021
40	6.154	0.160	2.41	93	1.8	100	85	-0.059	13.60	0.029
41	6.307	0.153	2.41	94	1.7	-	85	-0.057	13.37	0.022
42	6.464	0.157	2.40	94	1.6	-	86	-0.058	13.22	0.027
43	6.621	0.157	2.41	94	1.9	-	85	-0.057	13.27	0.018
44	6.777	0.156	2.42	94	2.1	-	85	-0.057	13.49	0.026
45	6.934	0.157	2.41	94	2.1	-	85	-0.056	13.78	0.019
46	7.089	0.155	2.42	95	2.1	-	85	-0.058	14.09	0.016
47	7.249	0.160	2.42	95	1.7	-	85	-0.057	14.45	0.017
48	7.402	0.153	2.42	95	2.0	-	84	-0.059	14.98	0.016
49	7.560	0.158	2.41	95	2.0	-	84	-0.057	15.25	0.019
50	7.718	0.158	2.42	96	1.8	100	84	-0.060	15.98	0.022
51	7.873	0.155	2.42	96	1.7	-	84	-0.060	16.69	0.030
52	8.032	0.159	2.42	96	2.0	-	85	-0.061	16.85	0.036
53	8.187	0.155	2.42	96	1.7	-	84	-0.061	16.81	0.035
54	8.345	0.158	2.42	96	2.0	-	84	-0.060	16.24	0.032
55	8.501	0.156	2.42	97	2.0	-	84	-0.058	15.93	0.032
56	8.658	0.157	2.42	97	1.6	-	85	-0.059	15.98	0.035
57	8.816	0.158	2.42	97	1.7	-	85	-0.061	16.65	0.046
58	8.971	0.155	2.42	97	1.6	-	84	-0.060	16.70	0.047
59	9.131	0.160	2.43	97	1.6	-	85	-0.062	16.87	0.053
60	9.286	0.155	2.42	98	1.9	101	85	-0.062	17.36	0.058
61	9.444	0.158	2.42	98	2.1	-	84	-0.063	17.08	0.041
62	9.602	0.158	2.42	98	1.8	-	84	-0.060	17.64	0.058
63	9.757	0.155	2.42	98	1.9	-	85	-0.064	17.68	0.060

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.917	0.160	2.42	98	1.8	-	85	-0.063	17.35	0.059
65	10.072	0.155	2.43	99	1.6	-	85	-0.061	16.66	0.049
66	10.231	0.159	2.42	99	1.7	-	85	-0.062	16.04	0.040
67	10.388	0.157	2.42	99	1.9	-	84	-0.062	15.60	0.047
68	10.545	0.157	2.43	99	1.7	-	84	-0.062	15.34	0.042
69	10.703	0.158	2.42	99	2.0	-	84	-0.060	14.79	0.030
70	10.860	0.157	2.42	99	1.6	101	85	-0.059	14.13	0.028
71	11.019	0.159	2.42	100	1.8	-	86	-0.060	13.87	0.028
72	11.175	0.156	2.42	100	1.6	-	85	-0.060	13.39	0.036
73	11.334	0.159	2.43	100	1.9	-	85	-0.057	13.63	0.025
74	11.492	0.158	2.43	100	1.8	-	85	-0.058	13.84	0.036
75	11.648	0.156	2.42	100	2.0	-	85	-0.056	14.26	0.017
76	11.809	0.161	2.42	100	1.9	-	85	-0.056	13.84	0.017
77	11.964	0.155	2.43	100	1.8	-	86	-0.054	13.40	0.036
78	12.123	0.159	2.43	101	2.0	-	85	-0.054	13.39	0.018
79	12.282	0.159	2.43	101	1.6	-	86	-0.054	12.43	0.028
80	12.437	0.155	2.42	101	2.0	101	86	-0.054	12.27	0.031
81	12.598	0.161	2.42	101	2.0	-	86	-0.054	12.13	0.021
82	12.754	0.156	2.43	101	1.8	-	86	-0.054	12.26	0.038
83	12.913	0.159	2.42	101	1.7	-	84	-0.055	12.05	0.035
84	13.073	0.160	2.43	101	1.7	-	84	-0.052	11.70	0.035
85	13.228	0.155	2.43	102	2.1	-	85	-0.052	11.89	0.040
86	13.389	0.161	2.43	102	1.6	-	84	-0.053	11.76	0.044
87	13.544	0.155	2.43	102	1.8	-	84	-0.057	11.47	0.042
88	13.704	0.160	2.43	102	1.7	-	85	-0.053	11.03	0.067
89	13.863	0.159	2.43	102	1.7	-	84	-0.056	10.81	0.071
90	14.020	0.157	2.43	102	1.9	100	84	-0.056	10.45	0.070
91	14.181	0.161	2.44	102	1.7	-	83	-0.054	10.02	0.058
92	14.337	0.156	2.44	102	1.8	-	85	-0.053	9.83	0.057
93	14.496	0.159	2.43	102	2.0	-	85	-0.054	9.61	0.065
94	14.655	0.159	2.43	103	2.1	-	84	-0.051	9.38	0.059
95	14.812	0.157	2.44	103	2.0	-	84	-0.052	9.35	0.052

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.973	0.161	2.43	103	1.7	-	84	-0.052	9.17	0.047
97	15.129	0.156	2.44	103	1.9	-	84	-0.049	9.11	0.051
98	15.289	0.160	2.43	103	2.0	-	84	-0.049	9.07	0.047
99	15.448	0.159	2.44	103	1.7	-	84	-0.049	8.98	0.042
100	15.605	0.157	2.44	103	1.8	100	84	-0.048	9.25	0.041
101	15.766	0.161	2.44	103	1.8	-	84	-0.046	9.14	0.036
102	15.923	0.157	2.44	103	1.9	-	84	-0.046	9.01	0.049
103	16.082	0.159	2.44	103	2.0	-	84	-0.047	8.88	0.046
104	16.242	0.160	2.44	103	1.6	-	83	-0.047	8.81	0.039
105	16.399	0.157	2.44	103	1.8	-	83	-0.044	8.70	0.057
106	16.560	0.161	2.44	103	2.1	-	84	-0.046	8.77	0.041
107	16.716	0.156	2.44	103	1.9	-	83	-0.045	8.77	0.048
108	16.876	0.160	2.44	103	1.8	-	83	-0.045	8.62	0.055
109	17.036	0.160	2.44	104	1.8	-	83	-0.044	8.15	0.057
110	17.193	0.157	2.44	104	1.7	99	83	-0.044	7.95	0.049
111	17.354	0.161	2.44	104	1.6	-	83	-0.046	7.96	0.051
112	17.510	0.156	2.44	104	2.0	-	83	-0.045	7.89	0.050
113	17.670	0.160	2.44	104	1.8	-	83	-0.045	7.93	0.054
114	17.830	0.160	2.44	104	1.9	-	83	-0.044	8.07	0.053
115	17.987	0.157	2.44	104	1.7	-	83	-0.042	8.09	0.055
116	18.148	0.161	2.44	104	2.1	-	83	-0.042	8.18	0.051
117	18.304	0.156	2.44	104	1.7	-	82	-0.045	8.25	0.053
118	18.465	0.161	2.43	104	1.6	-	83	-0.044	8.06	0.052
119	18.625	0.160	2.44	104	1.6	-	83	-0.043	8.06	0.053
120	18.781	0.156	2.43	104	1.8	99	82	-0.046	8.00	0.053
121	18.943	0.162	2.43	104	1.7	-	83	-0.043	7.98	0.056
122	19.099	0.156	2.44	104	1.6	-	83	-0.043	8.09	0.056
123	19.260	0.161	2.44	104	1.6	-	83	-0.044	8.11	0.054
124	19.419	0.159	2.45	104	2.0	-	83	-0.043	8.11	0.057
125	19.576	0.157	2.44	104	1.8	-	83	-0.044	8.08	0.055
126	19.738	0.162	2.44	104	2.1	-	83	-0.043	8.10	0.053
127	19.894	0.156	2.44	104	1.6	-	82	-0.042	8.08	0.052

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	20.055	0.161	2.44	104	1.6	-	82	-0.042	8.00	0.059
129	20.214	0.159	2.44	104	2.1	-	82	-0.045	7.93	0.061
130	20.372	0.158	2.44	104	1.7	100	82	-0.041	7.97	0.065
131	20.533	0.161	2.44	104	1.9	-	83	-0.042	7.98	0.068
132	20.689	0.156	2.44	104	2.0	-	83	-0.042	7.97	0.048
133	20.850	0.161	2.44	104	2.0	-	83	-0.043	7.89	0.062
134	21.010	0.160	2.45	104	2.1	-	83	-0.044	8.00	0.069
135	21.167	0.157	2.44	104	1.7	-	82	-0.043	8.07	0.064
136	21.328	0.161	2.45	104	2.0	-	83	-0.042	8.07	0.065
137	21.485	0.157	2.44	104	1.6	-	82	-0.044	8.03	0.070
138	21.646	0.161	2.45	104	2.1	-	83	-0.044	7.99	0.064
139	21.805	0.159	2.44	104	2.1	-	82	-0.043	7.98	0.065
140	21.963	0.158	2.45	104	1.9	101	82	-0.044	7.97	0.070
141	22.123	0.160	2.45	104	2.0	-	82	-0.044	8.00	0.073
142	22.282	0.159	2.45	104	1.7	-	83	-0.044	7.96	0.069
143	22.441	0.159	2.45	104	1.9	-	83	-0.042	7.97	0.068
144	22.601	0.160	2.44	104	1.9	-	82	-0.042	7.96	0.066
145	22.759	0.158	2.44	104	1.6	-	83	-0.043	7.90	0.070
146	22.919	0.160	2.45	104	1.6	-	83	-0.044	7.96	0.071
147	23.079	0.160	2.45	104	2.0	-	83	-0.042	7.86	0.071
148	23.236	0.157	2.44	105	2.1	-	82	-0.046	7.76	0.065
149	23.398	0.162	2.45	105	2.0	-	83	-0.043	8.00	0.070
150	23.555	0.157	2.44	105	1.6	101	82	-0.043	8.07	0.072
151	23.715	0.160	2.44	104	1.6	-	82	-0.044	8.00	0.074
152	23.875	0.160	2.44	105	1.9	-	82	-0.043	7.96	0.077
153	24.032	0.157	2.45	105	1.7	-	83	-0.044	8.08	0.073
154	24.194	0.162	2.44	105	1.6	-	82	-0.044	8.10	0.070
155	24.350	0.156	2.45	104	1.6	-	82	-0.045	8.06	0.069
156	24.511	0.161	2.45	105	1.6	-	83	-0.044	8.09	0.072
157	24.672	0.161	2.45	105	1.9	-	82	-0.044	8.06	0.069
158	24.828	0.156	2.45	105	1.6	-	82	-0.045	7.90	0.068
159	24.990	0.162	2.45	105	2.0	-	83	-0.044	7.92	0.077

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	25.147	0.157	2.45	105	1.9	101	83	-0.042	7.83	0.076
161	25.308	0.161	2.45	105	1.8	-	82	-0.044	7.73	0.068
162	25.467	0.159	2.45	105	2.1	-	83	-0.043	7.80	0.069
163	25.625	0.158	2.45	105	1.5	-	82	-0.046	7.65	0.073
164	25.787	0.162	2.44	105	2.1	-	82	-0.043	7.69	0.070
165	25.943	0.156	2.44	105	1.7	-	82	-0.044	7.67	0.072
166	26.104	0.161	2.45	105	1.7	-	83	-0.044	7.71	0.070
167	26.264	0.160	2.45	105	1.6	-	83	-0.045	7.68	0.081
168	26.422	0.158	2.44	105	1.8	-	82	-0.043	7.56	0.074
169	26.583	0.161	2.44	105	2.1	-	82	-0.045	7.62	0.079
170	26.740	0.157	2.44	105	1.7	101	82	-0.044	7.63	0.073
171	26.901	0.161	2.45	105	1.6	-	82	-0.045	7.54	0.070
172	27.060	0.159	2.44	105	2.0	-	83	-0.044	7.52	0.071
173	27.218	0.158	2.44	105	1.7	-	83	-0.043	7.45	0.072
174	27.379	0.161	2.45	105	1.7	-	82	-0.044	7.56	0.064
175	27.537	0.158	2.44	105	1.6	-	83	-0.044	7.42	0.072
176	27.696	0.159	2.45	105	1.7	-	82	-0.044	7.57	0.067
177	27.857	0.161	2.45	105	1.8	-	82	-0.044	7.68	0.075
178	28.015	0.158	2.45	105	1.7	-	83	-0.045	7.57	0.074
179	28.175	0.160	2.45	105	2.0	-	83	-0.045	7.54	0.075
180	28.334	0.159	2.44	105	2.1	100	83	-0.043	7.60	0.075
181	28.492	0.158	2.45	105	1.7	-	82	-0.045	7.56	0.070
182	28.654	0.162	2.44	105	1.6	-	82	-0.043	7.59	0.070
183	28.811	0.157	2.45	105	1.9	-	83	-0.047	7.52	0.075
184	28.971	0.160	2.45	105	1.9	-	82	-0.046	7.61	0.078
185	29.131	0.160	2.45	105	1.9	-	83	-0.044	7.59	0.078
186	29.288	0.157	2.45	105	2.0	-	82	-0.045	7.73	0.076
187	29.450	0.162	2.44	105	1.5	-	82	-0.045	7.56	0.079
188	29.607	0.157	2.45	105	1.6	-	82	-0.044	7.43	0.074
189	29.768	0.161	2.45	105	1.8	-	83	-0.045	7.56	0.075
190	29.930	0.162	2.45	105	1.6	100	83	-0.043	7.54	0.080
191	30.085	0.155	2.45	105	2.0	-	82	-0.044	7.49	0.078

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	30.248	0.163	2.45	105	2.1	-	83	-0.045	7.40	0.080
193	30.404	0.156	2.45	105	1.6	-	83	-0.043	7.44	0.080
194	30.565	0.161	2.44	105	2.1	-	82	-0.044	7.47	0.081
195	30.724	0.159	2.45	105	1.7	-	82	-0.044	7.44	0.065
196	30.882	0.158	2.44	105	1.6	-	82	-0.041	7.92	0.048
197	31.043	0.161	2.45	105	1.8	-	82	-0.041	7.61	0.038
198	31.200	0.157	2.44	105	2.0	-	83	-0.042	7.40	0.040
199	31.364	0.164	2.45	105	2.1	-	82	-0.039	7.39	0.041
200	31.521	0.157	2.45	105	1.8	100	83	-0.038	7.42	0.041
201	31.679	0.158	2.44	105	1.6	-	83	-0.037	7.40	0.043
202	31.840	0.161	2.45	105	1.9	-	83	-0.039	7.48	0.038
203	31.998	0.158	2.45	105	1.8	-	82	-0.039	7.59	0.044
204	32.159	0.161	2.44	105	1.8	-	82	-0.037	7.54	0.040
205	32.318	0.159	2.44	105	2.0	-	82	-0.037	7.50	0.043
206	32.476	0.158	2.45	105	2.0	-	82	-0.039	7.48	0.029
207	32.636	0.160	2.45	105	1.6	-	82	-0.037	7.47	0.035
208	32.795	0.159	2.44	105	2.0	-	81	-0.039	7.48	0.043
209	32.953	0.158	2.45	105	1.9	-	82	-0.037	7.53	0.041
210	33.115	0.162	2.45	105	2.1	99	82	-0.038	7.49	0.044
211	33.272	0.157	2.45	105	1.9	-	83	-0.036	7.51	0.053
212	33.432	0.160	2.44	105	1.6	-	82	-0.037	7.51	0.041
213	33.593	0.161	2.45	105	1.6	-	82	-0.038	7.60	0.048
214	33.749	0.156	2.45	105	2.1	-	82	-0.038	7.58	0.051
215	33.912	0.163	2.44	105	1.7	-	82	-0.035	7.60	0.051
216	34.068	0.156	2.45	105	1.6	-	82	-0.039	7.63	0.053
217	34.229	0.161	2.44	105	1.5	-	81	-0.036	7.51	0.046
218	34.389	0.160	2.45	105	2.0	-	82	-0.038	7.49	0.048
219	34.546	0.157	2.44	105	1.6	-	82	-0.039	7.50	0.051
220	34.708	0.162	2.44	105	1.9	100	82	-0.038	7.53	0.051
221	34.864	0.156	2.44	105	1.7	-	82	-0.038	7.40	0.052
222	35.025	0.161	2.44	105	2.1	-	82	-0.039	7.42	0.050
223	35.185	0.160	2.44	105	2.1	100	82	-0.039	7.44	0.048

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
Avg/Tot	35.185	0.158	2.42	100.1	1.8	100	83.5	-0.051	10.26	0.058

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		-0.08	89	0.1		83
1	0.118	0.118	0.82	89	1.7	-	83
2	0.262	0.144	0.82	88	1.5	-	83
3	0.406	0.144	0.83	89	1.6	-	83
4	0.550	0.144	0.82	89	1.5	-	83
5	0.693	0.143	0.81	89	1.5	-	83
6	0.837	0.144	0.82	89	1.5	-	83
7	0.982	0.145	0.83	87	1.6	-	83
8	1.127	0.145	0.82	89	1.6	-	83
9	1.271	0.144	0.82	88	1.6	-	84
10	1.416	0.145	0.82	87	1.7	98	84
11	1.560	0.144	0.82	89	1.6	-	84
12	1.705	0.145	0.83	89	1.5	-	84
13	1.852	0.147	0.84	89	1.6	-	83
14	1.997	0.145	0.84	89	1.6	-	83
15	2.143	0.146	0.84	89	1.5	-	83
16	2.289	0.146	0.83	89	1.6	-	83
17	2.435	0.146	0.84	89	1.6	-	83
18	2.582	0.147	0.83	89	1.7	-	83
19	2.729	0.147	0.83	89	1.7	-	84
20	2.876	0.147	0.84	89	1.5	99	84
21	3.023	0.147	0.84	89	1.6	-	84
22	3.171	0.148	0.85	90	1.6	-	84
23	3.320	0.149	0.85	90	1.7	-	84
24	3.468	0.148	0.85	88	1.7	-	84
25	3.617	0.149	0.86	88	1.6	-	84
26	3.765	0.148	0.86	90	1.5	-	84
27	3.914	0.149	0.86	88	1.7	-	84
28	4.063	0.149	0.86	91	1.7	-	84
29	4.211	0.148	0.86	88	1.7	-	84
30	4.360	0.149	0.86	88	1.6	101	84
31	4.510	0.150	0.86	91	1.5	-	84

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
32	4.659	0.149	0.86	91	1.5	-	84
33	4.808	0.149	0.86	91	1.5	-	83
34	4.958	0.150	0.86	91	1.6	-	83
35	5.107	0.149	0.87	89	1.5	-	84
36	5.257	0.150	0.87	91	1.6	-	84
37	5.406	0.149	0.87	89	1.5	-	83
38	5.556	0.150	0.87	92	1.6	-	84
39	5.706	0.150	0.87	92	1.6	-	84
40	5.856	0.150	0.87	90	1.5	101	84
41	6.005	0.149	0.86	89	1.5	-	84
42	6.156	0.151	0.86	89	1.7	-	84
43	6.306	0.150	0.85	92	1.7	-	84
44	6.457	0.151	0.85	91	1.7	-	84
45	6.607	0.150	0.85	91	1.7	-	84
46	6.758	0.151	0.85	93	1.7	-	84
47	6.908	0.150	0.85	91	1.7	-	84
48	7.059	0.151	0.85	93	1.6	-	84
49	7.209	0.150	0.85	93	1.5	-	83
50	7.360	0.151	0.85	93	1.7	101	84
51	7.511	0.151	0.86	93	1.6	-	84
52	7.662	0.151	0.86	91	1.5	-	84
53	7.813	0.151	0.86	93	1.5	-	84
54	7.964	0.151	0.86	91	1.6	-	84
55	8.114	0.150	0.86	94	1.5	-	84
56	8.265	0.151	0.87	90	1.6	-	84
57	8.415	0.150	0.86	90	1.7	-	84
58	8.566	0.151	0.86	94	1.7	-	84
59	8.717	0.151	0.85	90	1.7	-	84
60	8.868	0.151	0.85	94	1.5	103	84
Avg/Tot	8.868	0.148	0.83	90.0	1.6	100	83.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 74

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	459	475	484	318	165	380.0	511.0
1	458	474	483	312	164	378.1	387.2
2	454	473	482	329	163	380.4	609.0
3	453	472	481	357	162	384.8	905.8
4	450	470	479	387	160	389.4	980.2
5	450	469	476	421	159	395.1	1054.3
6	449	469	473	447	158	399.1	1063.4
7	450	470	470	449	157	399.0	993.5
8	450	471	467	450	156	398.9	925.8
9	451	473	465	454	156	399.6	873.2
10	451	474	462	456	156	399.7	837.1
11	450	474	460	459	155	399.5	826.9
12	451	474	457	461	155	399.6	850.4
13	453	475	455	461	155	399.6	848.1
14	451	476	453	458	154	398.4	842.0
15	452	476	451	453	154	397.1	876.0
16	452	476	449	447	154	395.8	923.5
17	451	476	447	447	155	395.2	916.4
18	451	475	446	451	155	395.6	864.1
19	449	475	444	450	155	394.7	830.0
20	449	474	443	446	155	393.3	854.6
21	448	474	441	440	155	391.5	912.0
22	447	473	440	434	155	389.7	967.7
23	446	472	438	433	155	388.7	982.4
24	444	471	437	434	155	388.3	911.5
25	442	469	435	434	155	387.1	860.3
26	441	468	433	434	155	386.2	827.1
27	440	466	432	433	156	385.3	806.4
28	438	465	430	433	155	384.2	794.3
29	438	464	429	431	155	383.1	799.9
30	436	463	428	428	154	382.0	805.6
31	437	462	427	425	154	381.1	812.9
32	436	462	426	424	154	380.2	824.4
33	436	461	425	424	154	379.9	811.9
34	435	461	424	427	153	380.1	788.6
35	435	460	424	431	153	380.5	772.8
36	435	460	423	434	153	381.1	771.8
37	434	460	423	437	153	381.3	773.4
38	435	460	423	440	153	382.0	770.2
39	435	461	423	441	152	382.2	763.5
40	436	462	423	441	152	382.8	757.6
41	437	463	423	441	152	383.1	752.4
42	437	465	424	440	151	383.5	751.3
43	439	466	424	440	151	384.1	749.7
44	439	468	425	440	150	384.4	747.8
45	439	469	425	441	150	384.7	745.4
46	441	471	426	442	150	385.6	745.3
47	441	472	426	443	149	386.2	748.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 74

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	442	474	427	444	148	386.9	755.3
49	443	475	427	447	148	388.0	762.8
50	444	477	429	451	148	389.6	779.3
51	445	479	429	454	147	390.9	801.7
52	446	481	430	459	147	392.5	818.1
53	448	482	431	463	146	394.1	824.8
54	451	485	432	465	146	395.8	828.6
55	452	487	434	468	146	397.2	829.2
56	455	489	435	470	145	398.8	832.6
57	456	491	436	472	145	400.1	850.5
58	460	493	438	475	145	402.0	866.3
59	460	495	439	479	144	403.5	883.6
60	462	497	441	483	143	405.2	900.9
61	464	499	442	486	143	407.0	903.6
62	467	501	443	491	142	408.8	913.7
63	468	503	445	495	142	410.5	923.8
64	470	506	447	497	141	412.0	920.4
65	472	508	448	498	140	413.2	908.8
66	473	510	450	499	140	414.3	898.0
67	475	511	451	498	139	414.9	889.2
68	477	513	453	496	139	415.4	871.7
69	479	514	455	493	139	415.8	851.9
70	479	515	456	490	138	415.8	830.6
71	481	517	458	486	138	416.0	816.2
72	482	517	459	483	138	415.8	810.5
73	483	518	460	480	138	415.9	799.2
74	483	518	461	478	138	415.8	797.9
75	483	518	462	476	138	415.3	792.7
76	484	519	463	474	138	415.3	785.9
77	484	519	464	472	137	415.2	773.4
78	484	519	465	468	137	414.8	762.7
79	484	520	466	464	137	414.0	755.1
80	484	520	467	460	136	413.4	746.1
81	485	520	468	457	136	412.9	742.6
82	484	520	468	453	136	412.2	746.4
83	484	520	469	449	135	411.4	741.9
84	484	520	470	445	135	410.7	732.4
85	483	521	471	440	135	410.0	732.4
86	483	521	472	436	135	409.0	734.9
87	482	521	473	430	134	408.1	749.2
88	482	522	474	424	134	407.0	793.2
89	481	521	475	420	134	406.1	819.2
90	480	521	476	416	133	405.1	813.4
91	479	520	476	411	133	403.8	795.4
92	479	519	477	406	133	402.6	773.6
93	477	517	477	401	133	401.1	754.5
94	476	516	478	396	133	399.7	736.9
95	475	514	478	391	133	398.2	720.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 74

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	474	512	478	387	133	396.7	701.1
97	472	510	479	382	133	395.1	683.9
98	472	508	479	377	132	393.6	666.6
99	470	506	479	373	132	391.9	648.1
100	469	505	479	368	132	390.6	633.9
101	468	503	479	363	132	389.1	626.8
102	467	501	479	359	132	387.6	624.6
103	467	499	479	355	132	386.4	625.1
104	466	497	479	352	132	385.1	620.5
105	465	495	479	348	132	384.0	612.8
106	464	493	479	345	132	382.6	614.6
107	463	492	478	342	132	381.5	612.5
108	462	490	478	339	132	380.3	609.3
109	461	488	478	337	133	379.3	612.0
110	459	487	478	334	133	378.1	615.7
111	458	485	477	332	133	377.0	611.9
112	457	483	477	329	133	375.7	608.4
113	455	481	476	328	133	374.6	604.4
114	454	479	475	326	133	373.3	606.1
115	452	478	474	324	133	372.1	605.1
116	451	476	474	322	134	371.0	604.1
117	449	474	472	320	134	369.9	603.1
118	448	472	471	319	134	368.7	603.3
119	447	470	470	317	134	367.6	600.8
120	445	469	469	316	134	366.4	600.5
121	444	467	468	314	134	365.5	601.9
122	442	465	467	313	134	364.4	601.8
123	441	464	466	312	134	363.4	599.9
124	439	462	465	311	134	362.2	601.3
125	438	460	464	310	135	361.3	600.9
126	437	459	463	309	135	360.4	600.3
127	436	457	462	308	135	359.3	603.9
128	434	456	461	307	135	358.4	602.2
129	433	454	460	306	135	357.7	609.9
130	432	453	459	305	135	356.7	607.5
131	431	451	458	304	135	355.9	612.2
132	430	450	457	304	136	355.1	612.6
133	429	449	456	303	136	354.3	616.3
134	427	447	455	302	136	353.5	618.9
135	426	446	454	302	136	352.6	619.2
136	425	444	453	301	136	351.9	622.3
137	424	443	452	301	136	351.1	623.2
138	423	442	450	301	136	350.4	625.9
139	422	441	450	300	136	349.6	625.2
140	421	439	448	300	136	349.0	628.6
141	420	439	447	299	136	348.3	628.1
142	419	437	447	299	137	347.7	630.4
143	418	436	446	299	137	347.0	626.1

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 74

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	417	435	444	298	137	346.2	625.2
145	415	434	444	298	137	345.5	630.9
146	415	433	443	297	137	344.9	634.4
147	415	432	442	297	137	344.4	633.6
148	414	431	441	297	137	343.7	635.7
149	413	430	440	297	137	343.1	634.7
150	412	429	439	296	137	342.5	634.3
151	410	427	438	296	137	341.7	634.0
152	410	427	437	296	137	341.2	637.3
153	409	426	436	295	137	340.6	636.0
154	409	425	435	295	137	340.1	632.7
155	407	424	434	294	137	339.3	629.0
156	407	423	433	294	137	338.8	626.9
157	406	422	432	294	137	338.1	629.6
158	405	421	431	293	137	337.6	627.7
159	405	420	431	293	137	337.1	625.5
160	404	420	430	292	137	336.5	627.1
161	403	419	429	292	137	335.8	624.8
162	403	418	428	291	137	335.3	624.4
163	402	417	427	291	137	334.8	628.5
164	401	416	426	290	137	334.1	627.1
165	400	415	425	290	137	333.4	629.0
166	399	415	425	290	137	333.0	626.6
167	399	414	424	289	137	332.4	626.8
168	398	413	423	289	137	331.7	622.0
169	397	412	422	288	137	331.2	621.1
170	397	411	421	288	137	330.6	624.0
171	395	410	420	287	137	329.8	624.1
172	395	409	419	287	137	329.5	620.5
173	394	409	418	286	137	328.8	620.9
174	394	408	417	286	137	328.3	618.6
175	393	407	417	286	137	327.8	614.4
176	392	406	416	285	137	327.2	618.9
177	392	405	415	285	137	326.7	621.9
178	390	405	414	285	137	326.0	626.7
179	390	404	414	284	136	325.6	626.0
180	390	403	413	284	137	325.1	631.7
181	389	402	412	284	137	324.7	632.8
182	388	402	411	284	136	324.3	627.9
183	387	401	410	284	136	323.6	631.1
184	387	400	409	284	136	323.2	634.4
185	386	399	409	284	136	322.8	635.3
186	385	399	408	284	136	322.3	635.4
187	385	398	407	284	136	321.9	632.4
188	384	397	406	284	136	321.5	634.4
189	384	396	406	284	136	321.0	638.0
190	383	396	405	284	136	320.5	634.0
191	382	395	404	283	136	320.0	631.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

Stove ΔT: 74

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	381	394	403	283	136	319.5	636.9
193	381	394	403	283	136	319.2	632.4
194	381	393	402	283	136	318.8	636.6
195	380	392	401	283	135	318.2	626.1
196	379	392	401	282	135	317.7	587.2
197	378	391	400	280	135	317.0	550.6
198	378	391	399	278	135	316.1	527.6
199	377	390	398	276	135	315.1	513.6
200	377	389	398	274	135	314.5	507.3
201	377	389	397	272	135	313.8	506.7
202	376	388	396	270	135	313.1	502.6
203	376	388	396	268	135	312.5	495.0
204	375	387	395	267	135	312.0	496.5
205	375	387	395	266	135	311.4	492.1
206	374	387	394	265	135	310.9	487.4
207	374	386	393	264	135	310.4	487.1
208	373	386	393	263	135	309.9	488.7
209	373	385	392	262	135	309.6	486.8
210	373	385	392	262	135	309.3	487.2
211	372	385	392	261	135	308.8	490.1
212	372	384	391	261	135	308.5	496.9
213	372	384	391	260	135	308.4	503.0
214	371	384	390	260	135	307.8	500.8
215	371	383	389	260	135	307.7	510.9
216	370	383	389	260	135	307.4	511.1
217	370	383	388	260	135	307.1	519.1
218	369	382	388	260	135	306.9	518.8
219	369	382	388	260	135	306.7	524.8
220	368	382	387	260	135	306.4	529.2
221	368	381	386	260	135	306.1	525.3
222	368	381	386	260	135	306.1	525.8
223	367	381	385	260	135	305.6	522.2
Average	430.6	454.0	439.6	360.7	140.4	365.1	692.3

LAB SAMPLE DATA - ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 2

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/10/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01289	244.8	246.5	1.7
	B	G01290	245.0	246.6	1.6
	C - 1st Hour	G01291	245.4	247.1	1.7
	Amb	G01292	244.0	244.1	0.1
Probes	**A**	19A	117026.6	117026.7	0.1
	B	19B	117014.0	117014.4	0.4
	C - 1st Hour	19C	114231.8	114231.8	0.0
O-rings	**A**	19A	3582.9	3583.7	0.8
	B	19B	3628.9	3629.7	0.8
	C - 1st Hour	19C	3611.6	3612.1	0.5

Placed in Dessicator on:	6/10/2025

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**	246.5	6/16 15:30	246.5	6/18 10:00				
	B	246.4	6/16 15:30	246.6	6/18 10:00				
	C - 1st Hour	247.0	6/16 15:30	247.1	6/18 10:00				
	Amb	244.1	6/16 15:30	244.1	6/18 10:00				
Probes	**A**	117026.6	6/16 15:30	117026.7	6/18 10:00				
	B	117014.5	6/16 15:30	117014.4	6/18 10:00				
	C - 1st Hour	114231.8	6/16 15:30	114231.8	6/18 10:00				
O-Rings	**A**	3583.9	6/16 15:30	3583.7	6/18 10:00				
	B	3629.9	6/16 15:30	3629.7	6/18 10:00				
	C - 1st Hour	3612.2	6/16 15:30	3612.1	6/18 10:00				

Train A Aggregate, mg:	**2.6**
Train B Aggregate, mg:	**2.8**
Train C Aggregate, mg:	**2.2**
Ambient, mg:	**0.1**

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 2 Test Date: 6/10/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary fully closed (opening 4mm), secondary fully closed (opening 10mm)
Targeted Burn Category: I

Preburn Notes

Time	Notes
57:00	-0.30 lb

Test Notes

Test Burn Start Time: 13:49 Test Fuel Loaded by: 35 seconds
Door Closed: 45 seconds Air Control Set at: 300 seconds
Other Loading Notes: None

Time	Notes
	-None-

Test Burn End Time: 17:32

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Mid	Span
Time	9:31	9:32	9:33	18:08	18:09	18:10
CO_2	0.00	17.32	10.40	0.06	16.98	10.23
CO	0.000	4.347	2.524	0.026	4.290	2.544

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

Technician Signature:  Date: 6/16/25

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 2 Test Date: 6/10/25

Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove

Air Setting

Technician Signature: Date: 6/16/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 3 Data Summary

Client:	La Castellamonte
Model:	Round Stack
Job #:	24-364
Tracking #:	224
Test Date:	6/11/2025

Technician Signature

7/21/2025
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Burn Rate (kg/hr):	1.18

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	42.599	29.440	28.935	8.697
Average Gas Velocity in Dilution Tunnel (ft/sec)	17.0			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11019.1			
Average Gas Meter Temperature (°F)	72.7	93.3	93.4	84.8
Total Sample Volume (dscf)	42.634	28.736	27.848	8.626
Average Tunnel Temperature (°F)	102.5			
Total Time of Test (min)	187			
Total Particulate Catch (mg)	0.0	1.9	1.6	1.0
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000661	0.0000575	0.0001159
Total PM Emissions (g)	0.00	2.27	1.97	1.28
Particulate Emission Rate (g/hr)	0.00	0.73	0.63	1.28
Emissions Factor (g/kg)	-	0.62	0.54	-
Difference from Average Total Particulate Emissions (g)	-	0.15	0.15	-
Difference from Average Total Particulate Emissions (%)	-	7.0%	7.0%	
Difference from Average Emissions Factor (g/kg)	-	0.04	0.04	-

Final Average Results	
Total Particulate Emissions (g)	2.12
Particulate Emission Rate (g/hr)	0.68
Emissions Factor (g/kg)	0.58
HHV Efficiency (%)	75.8%
LHV Efficiency (%)	82.0%
CO Emissions (g/min)	0.12

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	86.9	OK
Face Velocity	< 30 ft/min	8.9	OK
Leakage Rate	Less than 4% of average sample rate	0 cfm	OK
Ambient Temp	55-90 °F	Min:71.6/Max:73.3	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	51.5	OK

B415.1 Efficiency Results

Manufacturer: La Castellamonte
Model: Round Stack
Date: 06/11/25
Run: 3
Control #: 24-364
Test Duration: 187
Output Category: 2

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	75.8%	82.0%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	76.2%	82.4%

Output Rate (kJ/h)	17,233	16,347	**(Btu/h)**
Burn Rate (kg/h)	1.15	2.53	**(lb/h)**
Input (kJ/h)	22,726	21,558	**(Btu/h)**

Test Load Weight (dry kg)	3.58	7.88	**dry lb**
MC wet (%)	19.09		
MC dry (%)	23.60		
Particulate (g)	2.12		
CO (g)	23		
Test Duration (h)	3.12		

Emissions	**Particulate**	**CO**
g/MJ Output	0.04	0.43
g/kg Dry Fuel	0.59	6.45
g/h	0.68	7.40
g/min	0.01	0.12
lb/MM Btu Output	0.09	1.00

Air/Fuel Ratio (A/F)	12.57

VERSION: **2.4** **4/15/2010**

WOODSTOVE FUEL DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	9.00	19.0	2x4	9.00	24.7
2x4	9.00	23.8			
2x4	9.00	20.2			
2x4	9.00	23.2			
2x4	9.00	21.9			
2x4	9.00	23.8			
2x4	9.00	23.1			
2x4	9.00	19.6			
Total Fuel Weight (lbs):		8.88	Average Moisture (%DB):		22.1

Firebox Volume (ft^3):	1.37
Total 2x4 Crib Weight, with spacers (lbs):	9.74
Total 4x4 Crib Weight, with spacers (lbs):	0.00
Total Wet Fuel Weight, with spacers (lbs):	9.74

Coal Bed Range (20-25%):
Min (lbs): 1.95
Max (lbs): 2.44

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	9.00	1.18	24.2	24.5	24.4	0.95
2x4	9.00	1.14	24.8	20.2	22.4	0.93
2x4	9.00	1.18	23.7	23.8	23.6	0.95
2x4	9.00	1.21	21.5	23.8	24.8	0.98
2x4	9.00	1.23	20.8	24.2	25.0	1.00
2x4	9.00	1.16	24.7	24.2	24.2	0.93
					Total Dry Weight, no spacers (lbs):	5.74
					Total Dry Weight, with spacers (lbs):	8.08

Spacer Moisture Readings (%DB)

12.7	13.3	12.4					
13.4	12.3	12.8					
12.0	13.3	11.5					
13.4	12.7	14.1					
14.3	14.4	12.0					
14.2	11.8	14.0					
12.4	12.5	14.3					
13.6	13.3	13.3					

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	35.0	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	7.11	OK
2x4 Fuel Mix	35 - 65 % of total weight	N/A	N/A

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	La Castellamonte	Job #:	24-364
Model:	Round Stack	Tracking #:	224
Run #:	3	Technician:	AK
Test Start Time:	13:17	Date:	6/11/2025

Total Sampling Time (min):	187		
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. H_2O):	0		
Smoke Capture Check (%):	100%		
Date Flue Pipe Last Cleaned:	6/9/2025		
Test Fuel Scale Audit (lbs)	10.00		
Platform Scale Audit (lbs)	10.0		

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.89	29.84	29.87
Relative Humidity (%)	33.6	30.1	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:		42.599	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 @	-6	in. Hg
(C)	0.000	0.000	cfm @	-7	in. Hg
(Ambient)	0.000	0.000	cfm @	-13	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.046	75
2	0.062	75
3	0.070	75
4	0.044	75
5	0.052	75
6	0.074	75
7	0.076	75
8	0.078	75
Center	0.083	75

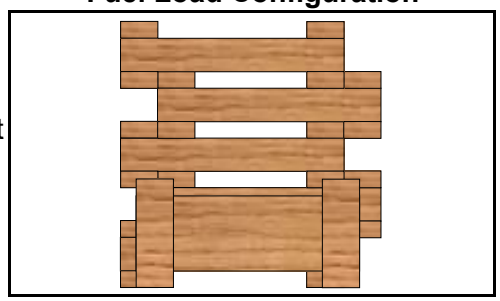
Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.63	ft/sec
V_{scent}:	19.23	ft/sec
F_p:	0.865	[ratio]
Initial Tunnel Flow:	189.1	scf/min

Static Pressure: -0.170 in. H_2O

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Left



Firebox Right

Firebox Front View

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)	23.6

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Recording Interval (min): 1
Run Time (min): 76

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	7.28	-0.075	367	397	355	430	101	329.7	539	70
1	7.17	-0.072	371	403	358	423	102	331.1	496	70
2	7.08	-0.071	374	409	362	414	103	332.2	466	71
3	6.99	-0.068	377	414	365	404	104	332.6	445	70
4	7.62	-0.071	382	418	368	392	105	333.1	447	71
5	7.46	-0.071	382	420	371	385	107	333.0	448	70
6	7.30	-0.071	382	422	373	381	108	333.3	478	70
7	7.19	-0.074	384	423	374	383	109	334.6	492	70
8	7.07	-0.072	383	423	375	388	110	336.1	490	70
9	6.93	-0.071	385	423	376	394	111	338.1	484	70
10	6.79	-0.073	385	424	377	402	112	340.2	486	71
11	6.69	-0.072	386	425	378	411	114	342.7	493	71
12	6.53	-0.074	387	426	379	419	115	345.0	496	71
13	6.42	-0.071	387	428	380	426	116	347.3	492	71
14	6.30	-0.071	389	429	381	433	117	349.8	494	71
15	6.18	-0.071	392	431	382	441	117	352.6	496	71
16	6.05	-0.071	394	433	383	447	118	355.2	500	71
17	5.94	-0.071	396	435	385	452	119	357.5	504	71
18	5.80	-0.071	399	438	387	456	120	359.9	498	71
19	5.66	-0.071	403	440	389	460	120	362.5	499	71
20	5.56	-0.070	407	443	391	464	121	365.2	500	71
21	5.41	-0.072	410	447	394	468	122	368.0	509	71
22	5.31	-0.072	415	451	396	475	122	371.6	515	71
23	5.18	-0.072	419	454	399	480	123	374.9	517	71
24	5.10	-0.073	424	458	402	482	123	377.9	517	71
25	4.98	-0.071	428	462	405	483	123	380.2	511	71
26	4.85	-0.072	432	465	408	481	124	382.1	503	71
27	4.77	-0.070	436	468	411	480	124	383.8	496	71
28	4.67	-0.069	440	471	414	478	124	385.6	488	71
29	4.58	-0.068	443	474	417	477	125	387.2	480	71
30	4.47	-0.068	447	476	420	477	125	388.8	474	71
31	4.41	-0.068	450	479	422	477	125	390.6	472	71
32	4.30	-0.067	453	481	425	479	126	392.8	473	71
33	4.22	-0.068	456	484	428	481	126	394.8	476	71
34	4.13	-0.069	458	487	431	481	126	396.6	476	71
35	4.04	-0.069	462	490	433	482	126	398.6	476	71
36	3.93	-0.068	465	492	436	481	126	400.0	469	71
37	3.88	-0.067	467	494	438	480	127	401.1	466	71
38	3.80	-0.064	470	496	440	476	127	401.7	458	72
39	3.73	-0.067	472	497	442	472	127	402.0	450	71
40	3.67	-0.063	474	499	444	468	127	402.4	445	72
41	3.60	-0.066	477	499	446	465	127	402.9	446	72
42	3.50	-0.066	479	501	448	463	128	403.5	446	72
43	3.43	-0.065	481	502	450	461	128	404.2	445	72
44	3.36	-0.065	483	502	452	460	128	405.0	445	72

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Recording Interval (min): 1
Run Time (min): 76

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.30	-0.065	485	504	454	459	128	405.9	447	72
46	3.20	-0.064	487	504	455	458	129	406.5	446	72
47	3.14	-0.065	489	505	457	458	129	407.5	447	72
48	3.08	-0.065	491	506	459	458	129	408.4	448	72
49	3.00	-0.065	492	507	460	457	129	409.1	445	72
50	2.93	-0.063	494	507	462	456	129	409.7	449	72
51	2.86	-0.064	495	508	464	456	130	410.3	448	72
52	2.81	-0.063	496	508	465	455	130	410.6	444	72
53	2.74	-0.063	496	509	467	454	129	411.0	438	72
54	2.66	-0.062	497	509	468	453	130	411.4	435	72
55	2.62	-0.063	498	510	469	449	130	411.4	431	72
56	2.55	-0.062	499	511	471	446	130	411.1	428	72
57	2.52	-0.062	500	511	472	442	130	410.9	423	72
58	2.50	-0.061	500	512	473	438	130	410.5	417	72
59	2.43	-0.060	500	512	474	434	131	410.1	413	72
60	2.40	-0.059	500	512	476	430	131	409.7	410	72
61	2.36	-0.060	500	512	477	426	131	409.2	406	72
62	2.29	-0.060	500	511	478	421	131	408.3	400	72
63	2.26	-0.062	499	511	479	416	131	407.3	401	72
64	2.22	-0.061	498	511	480	411	131	406.4	405	72
65	2.19	-0.058	497	511	481	407	132	405.5	406	72
66	2.16	-0.059	496	510	482	403	132	404.6	398	72
67	2.10	-0.058	495	509	482	398	132	403.4	388	72
68	2.11	-0.056	494	509	483	393	132	402.0	381	72
69	2.07	-0.056	493	508	483	387	132	400.4	371	72
70	2.07	-0.055	491	507	484	381	132	398.8	365	72
71	2.03	-0.054	489	505	484	375	133	397.2	353	72
72	2.02	-0.055	487	504	484	369	133	395.3	348	72
73	1.98	-0.052	486	502	484	364	133	393.5	341	72
74	1.99	-0.053	483	500	483	359	133	391.7	334	72
75	1.96	-0.052	481	498	482	354	134	389.7	332	72
76	1.93	-0.051	479	496	482	350	134	388.0	328	72

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.082	0.00	76	0.1		9.74		118	370	82	72
1	0.088	0.088	0.081	1.99	76	1.0	-	9.66	-0.08	134	354	82	72
2	0.233	0.145	0.085	2.03	76	0.9	-	9.49	-0.17	127	463	83	72
3	0.371	0.138	0.082	2.06	76	0.9	-	9.26	-0.23	129	562	83	72
4	0.513	0.142	0.082	2.08	76	1.0	-	9.04	-0.22	132	619	83	72
5	0.658	0.145	0.081	2.10	76	1.0	-	8.93	-0.11	129	593	83	72
6	0.799	0.141	0.083	2.14	76	1.0	-	8.79	-0.14	120	549	83	72
7	0.947	0.148	0.084	2.16	76	1.0	-	8.66	-0.13	116	538	83	72
8	1.088	0.141	0.085	2.16	76	1.0	-	8.50	-0.16	114	515	83	72
9	1.236	0.148	0.083	2.18	77	1.0	-	8.40	-0.10	112	500	83	72
10	1.380	0.144	0.082	2.21	77	1.0	92	8.28	-0.12	111	489	83	72
11	1.530	0.150	0.084	2.23	77	1.0	-	8.13	-0.15	110	483	83	72
12	1.675	0.145	0.084	2.24	77	1.0	-	8.03	-0.10	110	478	83	72
13	1.824	0.149	0.083	2.26	77	1.0	-	7.90	-0.13	110	474	83	72
14	1.971	0.147	0.084	2.27	78	1.0	-	7.78	-0.12	109	472	83	72
15	2.120	0.149	0.084	2.28	78	1.0	-	7.67	-0.11	110	470	83	72
16	2.268	0.148	0.083	2.30	78	1.0	-	7.54	-0.13	110	469	83	73
17	2.418	0.150	0.084	2.31	78	1.0	-	7.42	-0.12	108	468	83	73
18	2.567	0.149	0.084	2.31	79	1.0	-	7.30	-0.12	109	467	83	73
19	2.717	0.150	0.085	2.31	79	1.0	-	7.19	-0.11	108	467	83	73
20	2.867	0.150	0.083	2.32	79	1.0	98	7.06	-0.13	109	464	83	73
21	3.019	0.152	0.082	2.33	80	1.0	-	6.94	-0.12	109	463	83	72
22	3.169	0.150	0.083	2.34	80	1.0	-	6.83	-0.11	109	461	83	73
23	3.321	0.152	0.084	2.36	80	1.0	-	6.72	-0.11	109	459	83	73
24	3.472	0.151	0.083	2.37	81	1.0	-	6.60	-0.12	108	458	83	73
25	3.625	0.153	0.082	2.36	81	1.0	-	6.52	-0.08	108	456	83	73
26	3.775	0.150	0.082	2.38	81	1.0	-	6.40	-0.12	107	459	83	72
27	3.930	0.155	0.085	2.38	82	1.0	-	6.30	-0.10	107	459	83	73
28	4.079	0.149	0.085	2.38	82	1.0	-	6.21	-0.09	107	464	83	73
29	4.234	0.155	0.085	2.38	82	1.0	-	6.06	-0.15	107	460	83	73
30	4.384	0.150	0.081	2.40	82	1.0	99	5.98	-0.08	107	458	83	73
31	4.540	0.156	0.082	2.39	83	1.0	-	5.87	-0.11	107	455	83	73

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
32	4.691	0.151	0.081	2.41	83	1.0	-	5.79	-0.08	107	454	83	73
33	4.848	0.157	0.083	2.42	83	1.0	-	5.71	-0.08	107	455	83	73
34	4.999	0.151	0.084	2.42	84	1.0	-	5.59	-0.12	107	453	83	73
35	5.155	0.156	0.085	2.43	84	1.0	-	5.48	-0.11	107	449	83	73
36	5.307	0.152	0.084	2.43	85	1.0	-	5.38	-0.10	107	444	83	73
37	5.462	0.155	0.084	2.42	85	1.0	-	5.27	-0.11	106	442	83	73
38	5.618	0.156	0.082	2.43	85	1.0	-	5.18	-0.09	107	439	83	73
39	5.772	0.154	0.082	2.44	85	1.0	-	5.10	-0.08	107	437	83	72
40	5.929	0.157	0.084	2.44	86	1.0	100	4.99	-0.11	107	436	83	72
41	6.080	0.151	0.081	2.44	86	1.0	-	4.91	-0.08	107	434	83	72
42	6.239	0.159	0.080	2.44	86	1.0	-	4.82	-0.09	105	434	83	72
43	6.392	0.153	0.084	2.45	87	1.0	-	4.70	-0.12	105	434	83	72
44	6.551	0.159	0.085	2.46	87	1.0	-	4.62	-0.08	106	438	83	73
45	6.703	0.152	0.084	2.45	87	1.0	-	4.52	-0.10	106	442	83	72
46	6.860	0.157	0.084	2.47	88	1.0	-	4.46	-0.06	106	446	83	72
47	7.017	0.157	0.084	2.46	88	1.0	-	4.34	-0.12	106	453	83	72
48	7.172	0.155	0.081	2.47	88	1.0	-	4.28	-0.06	107	457	83	72
49	7.330	0.158	0.080	2.47	88	1.0	-	4.17	-0.11	107	460	83	72
50	7.483	0.153	0.081	2.47	89	1.0	100	4.07	-0.10	107	460	83	72
51	7.643	0.160	0.083	2.47	89	1.0	-	3.98	-0.09	107	464	83	72
52	7.797	0.154	0.083	2.48	89	1.0	-	3.92	-0.06	107	463	83	72
53	7.955	0.158	0.084	2.47	90	1.0	-	3.79	-0.13	107	459	83	73
54	8.111	0.156	0.085	2.48	90	1.0	-	3.72	-0.07	107	454	83	73
55	8.269	0.158	0.081	2.49	90	1.0	-	3.66	-0.06	106	447	83	73
56	8.428	0.159	0.083	2.49	90	1.0	-	3.56	-0.10	106	440	83	73
57	8.581	0.153	0.083	2.49	90	1.0	-	3.50	-0.06	106	435	83	73
58	8.742	0.161	0.083	2.49	91	1.0	-	3.43	-0.07	106	432	83	72
59	8.897	0.155	0.084	2.50	91	1.0	-	3.36	-0.07	106	426	83	72
60	9.055	0.158	0.083	2.49	91	1.0	101	3.26	-0.10	105	425	83	72
61	9.212	0.157	0.082	2.50	91	1.0	-	3.24	-0.02	106	423	84	72
62	9.370	0.158	0.083	2.50	92	1.0	-	3.13	-0.11	105	421	83	72
63	9.529	0.159	0.084	2.50	92	1.0	-	3.07	-0.06	105	422	83	73

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
64	9.684	0.155	0.082	2.50	92	1.0	-	3.01	-0.06	105	422	83	73
65	9.846	0.162	0.083	2.51	92	1.0	-	2.94	-0.07	104	422	83	73
66	10.000	0.154	0.080	2.50	92	1.0	-	2.85	-0.09	104	422	83	73
67	10.159	0.159	0.083	2.50	92	1.0	-	2.80	-0.05	105	421	83	73
68	10.320	0.161	0.082	2.52	93	1.0	-	2.73	-0.07	105	421	83	73
69	10.475	0.155	0.084	2.51	93	1.0	-	2.65	-0.08	105	421	83	72
70	10.636	0.161	0.082	2.52	93	1.0	101	2.61	-0.04	105	417	83	73
71	10.792	0.156	0.081	2.52	93	1.0	-	2.53	-0.08	104	415	83	73
72	10.952	0.160	0.084	2.52	93	1.0	-	2.48	-0.05	104	409	83	73
73	11.110	0.158	0.082	2.51	94	1.0	-	2.43	-0.05	104	409	83	73
74	11.269	0.159	0.082	2.51	94	1.0	-	2.39	-0.04	104	408	83	72
75	11.428	0.159	0.085	2.51	94	1.0	-	2.32	-0.07	104	404	83	73
76	11.584	0.156	0.081	2.53	94	1.0	-	2.26	-0.06	103	402	83	73
77	11.747	0.163	0.083	2.53	94	1.0	-	2.22	-0.04	103	395	83	73
78	11.903	0.156	0.082	2.53	94	1.0	-	2.16	-0.06	102	391	83	73
79	12.063	0.160	0.081	2.54	95	1.0	-	2.11	-0.05	103	390	84	73
80	12.224	0.161	0.080	2.53	95	1.0	102	2.07	-0.04	103	389	83	72
81	12.381	0.157	0.080	2.51	95	1.0	-	2.01	-0.06	103	389	83	73
82	12.542	0.161	0.083	2.54	95	1.0	-	1.98	-0.03	103	388	83	73
83	12.698	0.156	0.081	2.54	95	1.0	-	1.94	-0.04	103	387	84	73
84	12.858	0.160	0.083	2.53	95	1.0	-	1.90	-0.04	103	387	83	73
85	13.019	0.161	0.082	2.53	95	1.0	-	1.88	-0.02	103	383	83	73
86	13.175	0.156	0.084	2.53	96	1.0	-	1.84	-0.04	103	374	83	73
87	13.338	0.163	0.084	2.53	96	1.0	-	1.80	-0.04	102	372	83	73
88	13.496	0.158	0.080	2.54	96	1.0	-	1.79	-0.01	102	368	83	73
89	13.655	0.159	0.079	2.54	96	1.0	-	1.76	-0.03	102	370	83	73
90	13.816	0.161	0.081	2.54	96	1.0	102	1.74	-0.02	102	367	83	73
91	13.973	0.157	0.080	2.53	96	1.0	-	1.71	-0.03	102	367	83	73
92	14.135	0.162	0.082	2.53	96	1.0	-	1.67	-0.04	102	366	83	73
93	14.293	0.158	0.083	2.54	96	1.0	-	1.64	-0.03	102	366	83	73
94	14.453	0.160	0.078	2.55	97	1.0	-	1.60	-0.04	102	364	83	73
95	14.614	0.161	0.082	2.55	97	1.0	-	1.59	-0.01	102	363	83	73

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
96	14.771	0.157	0.080	2.54	97	1.0	-	1.53	-0.06	101	362	83	73
97	14.934	0.163	0.080	2.54	97	1.0	-	1.54	0.01	101	359	83	73
98	15.091	0.157	0.082	2.55	97	1.0	-	1.47	-0.07	101	355	83	73
99	15.253	0.162	0.080	2.55	97	1.0	-	1.46	-0.01	101	355	83	73
100	15.413	0.160	0.083	2.54	97	1.0	101	1.39	-0.07	101	352	83	73
101	15.571	0.158	0.083	2.55	97	1.0	-	1.45	0.06	101	348	83	73
102	15.734	0.163	0.084	2.55	97	1.0	-	1.41	-0.04	100	348	83	73
103	15.892	0.158	0.083	2.55	98	1.0	-	1.38	-0.03	100	343	83	73
104	16.053	0.161	0.083	2.56	98	1.0	-	1.35	-0.03	100	341	83	73
105	16.214	0.161	0.084	2.55	98	1.0	-	1.34	-0.01	100	340	83	73
106	16.371	0.157	0.082	2.55	98	1.0	-	1.28	-0.06	100	337	83	73
107	16.535	0.164	0.085	2.55	98	1.0	-	1.26	-0.02	100	337	83	73
108	16.693	0.158	0.083	2.56	98	1.0	-	1.25	-0.01	100	334	83	73
109	16.854	0.161	0.080	2.55	98	1.0	-	1.25	0.00	99	336	83	73
110	17.016	0.162	0.084	2.55	98	1.0	100	1.23	-0.02	99	338	83	73
111	17.173	0.157	0.082	2.57	98	1.0	-	1.16	-0.07	99	335	83	73
112	17.337	0.164	0.084	2.55	98	1.0	-	1.21	0.05	99	335	83	73
113	17.494	0.157	0.080	2.56	98	1.0	-	1.14	-0.07	99	329	83	73
114	17.656	0.162	0.080	2.55	99	1.0	-	1.13	-0.01	99	327	83	73
115	17.819	0.163	0.080	2.56	99	1.0	-	1.13	0.00	99	325	83	73
116	17.975	0.156	0.082	2.55	99	1.0	-	1.10	-0.03	99	324	83	73
117	18.140	0.165	0.080	2.55	99	1.0	-	1.11	0.01	99	324	83	73
118	18.297	0.157	0.079	2.55	99	1.0	-	1.06	-0.05	99	322	83	73
119	18.459	0.162	0.082	2.55	99	1.0	-	1.07	0.01	98	322	83	73
120	18.621	0.162	0.083	2.57	99	1.0	100	1.00	-0.07	98	322	83	73
121	18.778	0.157	0.082	2.55	99	1.0	-	0.99	-0.01	98	320	83	73
122	18.943	0.165	0.079	2.57	99	1.0	-	0.94	-0.05	98	319	83	73
123	19.101	0.158	0.084	2.55	99	1.0	-	0.98	0.04	98	320	83	73
124	19.263	0.162	0.083	2.56	99	1.0	-	0.95	-0.03	98	320	83	73
125	19.424	0.161	0.081	2.57	100	1.0	-	0.94	-0.01	98	319	83	73
126	19.583	0.159	0.081	2.57	99	1.0	-	0.87	-0.07	98	318	83	73
127	19.746	0.163	0.084	2.56	100	1.0	-	0.86	-0.01	98	315	83	73

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
128	19.906	0.160	0.083	2.56	100	1.0	-	0.87	0.01	98	312	83	73
129	20.067	0.161	0.081	2.57	100	1.0	-	0.91	0.04	98	307	83	73
130	20.229	0.162	0.081	2.56	100	1.0	101	0.85	-0.06	98	304	83	73
131	20.388	0.159	0.082	2.57	100	1.0	-	0.85	0.00	98	301	83	73
132	20.550	0.162	0.084	2.56	100	1.0	-	0.84	-0.01	98	301	83	73
133	20.712	0.162	0.081	2.57	100	1.0	-	0.82	-0.02	97	300	83	73
134	20.870	0.158	0.083	2.58	100	1.0	-	0.75	-0.07	97	300	83	73
135	21.035	0.165	0.080	2.58	100	1.0	-	0.75	0.00	97	302	83	73
136	21.193	0.158	0.081	2.56	100	1.0	-	0.74	-0.01	97	302	83	73
137	21.356	0.163	0.082	2.57	100	1.0	-	0.73	-0.01	97	302	83	73
138	21.518	0.162	0.084	2.57	100	1.0	-	0.69	-0.04	97	303	83	73
139	21.676	0.158	0.080	2.56	100	1.0	-	0.70	0.01	97	304	83	73
140	21.841	0.165	0.080	2.58	100	1.0	102	0.67	-0.03	97	305	83	73
141	21.999	0.158	0.083	2.57	101	1.0	-	0.64	-0.03	97	305	83	73
142	22.162	0.163	0.083	2.57	101	1.0	-	0.66	0.02	97	305	83	73
143	22.324	0.162	0.080	2.58	101	1.0	-	0.63	-0.03	97	301	83	73
144	22.483	0.159	0.083	2.58	101	1.0	-	0.60	-0.03	97	296	83	73
145	22.646	0.163	0.081	2.58	101	1.0	-	0.59	-0.01	97	293	83	73
146	22.808	0.162	0.083	2.56	101	1.0	-	0.57	-0.02	97	292	83	73
147	22.967	0.159	0.081	2.57	101	1.0	-	0.56	-0.01	96	291	83	73
148	23.132	0.165	0.083	2.57	101	1.0	-	0.57	0.01	96	289	83	73
149	23.290	0.158	0.083	2.58	101	1.0	-	0.54	-0.03	96	287	83	73
150	23.452	0.162	0.082	2.57	101	1.0	101	0.54	0.00	96	286	83	73
Avg/Tot	29.440	0.157	0.082	2.48	93.3	1.0	100			102.5	374.2	82.8	72.7

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	-0.001		0.01	76	0.7		84	-0.060	5.56	0.108
1	0.095	0.096	2.33	76	1.6	-	84	-0.058	4.07	0.043
2	0.247	0.152	2.32	76	1.7	-	84	-0.077	6.88	0.137
3	0.394	0.147	2.33	76	1.7	-	83	-0.082	11.21	0.167
4	0.546	0.152	2.33	76	1.8	-	84	-0.085	12.56	0.175
5	0.694	0.148	2.34	76	2.1	-	84	-0.078	13.01	0.217
6	0.846	0.152	2.34	76	1.8	-	83	-0.076	12.77	0.136
7	0.993	0.147	2.33	76	1.7	-	84	-0.074	9.96	0.174
8	1.144	0.151	2.34	77	2.0	-	84	-0.073	13.02	0.079
9	1.292	0.148	2.34	77	1.9	-	83	-0.071	12.25	0.066
10	1.443	0.151	2.33	77	1.7	97	84	-0.071	11.56	0.076
11	1.591	0.148	2.33	77	2.0	-	83	-0.070	12.08	0.075
12	1.743	0.152	2.34	77	2.1	-	83	-0.070	12.31	0.072
13	1.892	0.149	2.34	78	2.1	-	84	-0.070	12.32	0.071
14	2.043	0.151	2.34	78	1.8	-	84	-0.069	13.00	0.061
15	2.192	0.149	2.33	78	2.1	-	84	-0.068	13.24	0.046
16	2.343	0.151	2.33	78	2.1	-	83	-0.069	12.73	0.052
17	2.493	0.150	2.35	79	1.8	-	83	-0.069	12.69	0.064
18	2.644	0.151	2.34	79	1.7	-	84	-0.068	12.89	0.055
19	2.795	0.151	2.35	79	1.6	-	83	-0.071	12.71	0.048
20	2.946	0.151	2.35	79	1.6	100	84	-0.069	12.85	0.049
21	3.097	0.151	2.34	80	2.0	-	83	-0.068	12.67	0.048
22	3.247	0.150	2.35	80	2.0	-	84	-0.068	12.81	0.037
23	3.399	0.152	2.36	80	1.8	-	83	-0.067	12.77	0.039
24	3.548	0.149	2.35	81	1.6	-	84	-0.068	12.43	0.036
25	3.701	0.153	2.35	81	1.8	-	84	-0.067	12.41	0.061
26	3.850	0.149	2.35	81	1.6	-	83	-0.068	12.79	0.061
27	4.003	0.153	2.34	82	2.0	-	83	-0.068	12.85	0.059
28	4.153	0.150	2.36	82	1.7	-	84	-0.066	13.15	0.062
29	4.307	0.154	2.36	82	2.1	-	83	-0.066	13.01	0.051
30	4.457	0.150	2.36	83	1.9	101	84	-0.069	12.81	0.048
31	4.611	0.154	2.36	83	1.7	-	83	-0.066	12.67	0.049

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.760	0.149	2.37	83	1.9	-	83	-0.067	12.75	0.042
33	4.914	0.154	2.36	83	1.8	-	83	-0.066	12.70	0.048
34	5.064	0.150	2.37	84	2.0	-	83	-0.064	12.71	0.043
35	5.217	0.153	2.36	84	1.9	-	83	-0.065	12.67	0.032
36	5.369	0.152	2.36	84	2.1	-	83	-0.065	12.52	0.032
37	5.522	0.153	2.37	85	1.7	-	83	-0.065	12.30	0.031
38	5.675	0.153	2.37	85	2.1	-	84	-0.065	12.14	0.029
39	5.827	0.152	2.38	85	2.1	-	84	-0.063	12.29	0.030
40	5.980	0.153	2.37	86	1.9	100	83	-0.065	12.42	0.027
41	6.131	0.151	2.37	86	2.1	-	83	-0.064	12.42	0.021
42	6.286	0.155	2.37	86	1.6	-	83	-0.064	12.67	0.018
43	6.437	0.151	2.38	87	1.8	-	84	-0.064	12.76	0.019
44	6.593	0.156	2.38	87	1.7	-	84	-0.064	12.82	0.024
45	6.744	0.151	2.38	87	1.7	-	83	-0.063	13.09	0.022
46	6.898	0.154	2.38	87	2.0	-	83	-0.065	13.13	0.030
47	7.050	0.152	2.37	88	1.7	-	84	-0.067	13.31	0.039
48	7.204	0.154	2.39	88	2.0	-	83	-0.067	13.37	0.042
49	7.358	0.154	2.38	88	2.1	-	83	-0.066	13.68	0.042
50	7.511	0.153	2.38	89	2.1	100	84	-0.065	13.63	0.040
51	7.665	0.154	2.37	89	1.7	-	83	-0.068	13.68	0.042
52	7.817	0.152	2.38	89	1.6	-	83	-0.065	13.50	0.039
53	7.974	0.157	2.39	89	2.1	-	84	-0.065	13.20	0.027
54	8.125	0.151	2.39	90	1.6	-	84	-0.065	12.78	0.025
55	8.282	0.157	2.39	90	1.7	-	83	-0.065	12.33	0.019
56	8.433	0.151	2.39	90	2.1	-	83	-0.065	12.05	0.019
57	8.588	0.155	2.38	90	1.6	-	83	-0.066	11.75	0.015
58	8.742	0.154	2.39	91	1.6	-	84	-0.064	11.67	0.018
59	8.897	0.155	2.39	91	2.1	-	83	-0.062	11.82	0.018
60	9.052	0.155	2.40	91	2.0	101	83	-0.062	11.70	0.020
61	9.204	0.152	2.40	91	1.6	-	83	-0.063	11.88	0.022
62	9.361	0.157	2.40	91	1.6	-	83	-0.061	11.92	0.015
63	9.513	0.152	2.40	92	1.7	-	84	-0.063	11.91	0.007

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.670	0.157	2.40	92	1.6	-	84	-0.063	11.95	0.016
65	9.823	0.153	2.40	92	1.7	-	84	-0.061	12.07	0.019
66	9.978	0.155	2.40	92	1.7	-	83	-0.062	12.01	0.021
67	10.134	0.156	2.40	92	1.8	-	83	-0.062	11.83	0.019
68	10.288	0.154	2.40	93	2.0	-	83	-0.063	11.69	0.025
69	10.444	0.156	2.41	93	2.1	-	83	-0.061	11.56	0.012
70	10.596	0.152	2.40	93	1.6	100	84	-0.060	11.57	0.020
71	10.754	0.158	2.41	93	2.1	-	83	-0.062	11.41	0.016
72	10.907	0.153	2.41	93	2.1	-	83	-0.061	11.28	0.012
73	11.064	0.157	2.40	94	2.2	-	84	-0.060	11.23	0.016
74	11.218	0.154	2.41	94	1.6	-	83	-0.061	11.03	0.020
75	11.374	0.156	2.40	94	1.6	-	83	-0.061	10.97	0.019
76	11.530	0.156	2.41	94	2.0	-	83	-0.060	10.60	0.015
77	11.683	0.153	2.40	94	1.8	-	83	-0.059	10.42	0.013
78	11.841	0.158	2.41	95	2.0	-	83	-0.056	10.15	0.023
79	11.995	0.154	2.41	95	1.8	-	83	-0.059	9.98	0.022
80	12.151	0.156	2.41	95	2.1	101	83	-0.060	10.03	0.024
81	12.308	0.157	2.41	95	2.1	-	83	-0.060	9.67	0.028
82	12.462	0.154	2.41	95	2.1	-	84	-0.061	9.56	0.027
83	12.619	0.157	2.41	95	2.0	-	83	-0.056	9.83	0.021
84	12.772	0.153	2.41	95	1.6	-	84	-0.058	9.13	0.066
85	12.930	0.158	2.41	96	2.1	-	84	-0.055	9.46	0.022
86	13.084	0.154	2.40	96	1.9	-	84	-0.055	9.44	0.024
87	13.241	0.157	2.41	96	1.8	-	84	-0.056	8.83	0.054
88	13.395	0.154	2.40	96	1.7	-	83	-0.054	8.46	0.065
89	13.552	0.157	2.41	96	2.1	-	83	-0.055	8.53	0.067
90	13.709	0.157	2.41	96	1.7	101	84	-0.056	8.72	0.075
91	13.863	0.154	2.41	96	1.6	-	83	-0.056	8.87	0.064
92	14.021	0.158	2.41	97	1.9	-	84	-0.055	9.04	0.065
93	14.175	0.154	2.41	97	1.8	-	84	-0.056	9.12	0.072
94	14.332	0.157	2.41	97	1.7	-	84	-0.056	9.22	0.064
95	14.486	0.154	2.40	97	2.1	-	83	-0.057	9.16	0.073

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.644	0.158	2.42	97	2.0	-	83	-0.053	9.21	0.067
97	14.801	0.157	2.42	97	1.6	-	83	-0.056	9.36	0.079
98	14.955	0.154	2.42	97	1.7	-	84	-0.053	9.28	0.061
99	15.114	0.159	2.41	97	2.1	-	83	-0.053	9.26	0.060
100	15.268	0.154	2.41	97	1.6	100	83	-0.054	9.35	0.068
101	15.425	0.157	2.42	98	1.9	-	84	-0.052	9.12	0.064
102	15.581	0.156	2.41	98	1.7	-	83	-0.052	9.08	0.066
103	15.737	0.156	2.41	98	2.1	-	84	-0.054	8.99	0.058
104	15.894	0.157	2.41	98	2.1	-	83	-0.053	9.02	0.064
105	16.048	0.154	2.41	98	2.0	-	83	-0.052	9.00	0.062
106	16.208	0.160	2.42	98	2.1	-	83	-0.051	8.84	0.060
107	16.362	0.154	2.41	98	1.6	-	83	-0.052	8.88	0.062
108	16.519	0.157	2.41	98	2.1	-	84	-0.053	8.73	0.070
109	16.676	0.157	2.42	98	1.6	-	83	-0.051	8.67	0.067
110	16.832	0.156	2.42	98	2.0	99	83	-0.052	8.64	0.069
111	16.990	0.158	2.41	98	2.1	-	83	-0.053	8.57	0.071
112	17.145	0.155	2.42	99	1.9	-	83	-0.051	8.33	0.067
113	17.304	0.159	2.42	99	1.9	-	83	-0.051	8.22	0.065
114	17.458	0.154	2.42	99	2.1	-	83	-0.049	7.84	0.066
115	17.616	0.158	2.42	99	1.6	-	83	-0.049	7.83	0.064
116	17.774	0.158	2.42	99	1.7	-	83	-0.051	7.95	0.067
117	17.928	0.154	2.42	99	2.1	-	84	-0.051	8.10	0.066
118	18.087	0.159	2.42	99	1.6	-	83	-0.048	8.02	0.066
119	18.242	0.155	2.42	99	2.1	-	83	-0.049	7.97	0.067
120	18.400	0.158	2.42	99	1.7	99	84	-0.048	7.83	0.068
121	18.556	0.156	2.42	99	2.1	-	83	-0.050	8.02	0.072
122	18.713	0.157	2.43	99	2.1	-	83	-0.050	8.01	0.074
123	18.871	0.158	2.43	99	1.9	-	83	-0.049	7.98	0.073
124	19.026	0.155	2.42	100	2.0	-	84	-0.050	8.02	0.070
125	19.185	0.159	2.42	100	1.6	-	84	-0.048	8.01	0.071
126	19.339	0.154	2.43	100	1.6	-	83	-0.049	8.06	0.069
127	19.498	0.159	2.42	100	1.7	-	83	-0.047	7.76	0.052

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.656	0.158	2.42	100	1.9	-	84	-0.047	7.70	0.056
129	19.810	0.154	2.43	100	1.6	-	83	-0.046	7.70	0.055
130	19.970	0.160	2.42	100	1.8	100	83	-0.047	7.70	0.057
131	20.125	0.155	2.43	100	1.6	-	84	-0.048	7.76	0.057
132	20.283	0.158	2.43	100	2.0	-	83	-0.046	7.75	0.062
133	20.439	0.156	2.42	100	2.1	-	84	-0.049	7.77	0.058
134	20.597	0.158	2.43	100	2.0	-	83	-0.049	7.87	0.058
135	20.754	0.157	2.43	100	1.8	-	84	-0.047	7.80	0.064
136	20.909	0.155	2.42	100	2.0	-	84	-0.047	7.79	0.070
137	21.069	0.160	2.43	100	2.0	-	84	-0.047	7.80	0.067
138	21.224	0.155	2.43	100	1.8	-	83	-0.048	7.74	0.065
139	21.382	0.158	2.42	100	1.6	-	84	-0.049	7.79	0.068
140	21.540	0.158	2.43	100	1.7	101	84	-0.048	7.76	0.069
141	21.695	0.155	2.42	101	2.0	-	83	-0.048	7.74	0.072
142	21.854	0.159	2.42	101	1.9	-	84	-0.047	7.41	0.062
143	22.010	0.156	2.43	101	1.7	-	84	-0.048	7.28	0.052
144	22.168	0.158	2.43	101	1.9	-	83	-0.046	7.31	0.052
145	22.325	0.157	2.42	101	2.1	-	83	-0.048	7.33	0.047
146	22.482	0.157	2.43	101	1.8	-	83	-0.046	7.34	0.053
147	22.640	0.158	2.43	101	1.6	-	84	-0.045	7.07	0.053
148	22.795	0.155	2.43	101	2.1	-	84	-0.046	7.06	0.048
149	22.955	0.160	2.43	101	1.6	-	83	-0.044	7.14	0.059
150	23.109	0.154	2.43	101	1.7	100	82	-0.046	7.13	0.053
Avg/Tot	28.935	0.155	2.39	93.4	1.9	100	83.3	-0.056	9.68	0.056

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	-0.002		-0.12	81	0.1		82
1	0.114	0.116	0.69	83	1.5	-	85
2	0.252	0.138	0.69	82	1.6	-	81
3	0.392	0.140	0.70	83	1.6	-	82
4	0.531	0.139	0.69	82	1.6	-	82
5	0.670	0.139	0.70	83	1.6	-	84
6	0.811	0.141	0.71	83	1.7	-	86
7	0.952	0.141	0.70	82	1.5	-	82
8	1.092	0.140	0.71	81	1.7	-	82
9	1.235	0.143	0.72	83	1.6	-	86
10	1.377	0.142	0.71	82	1.7	97	82
11	1.518	0.141	0.71	84	1.7	-	83
12	1.661	0.143	0.72	84	1.5	-	83
13	1.804	0.143	0.73	83	1.6	-	82
14	1.946	0.142	0.72	82	1.5	-	82
15	2.088	0.142	0.72	83	1.7	-	82
16	2.231	0.143	0.73	84	1.5	-	83
17	2.374	0.143	0.73	84	1.6	-	86
18	2.517	0.143	0.73	83	1.7	-	82
19	2.660	0.143	0.72	84	1.5	-	83
20	2.804	0.144	0.74	83	1.7	99	82
21	2.948	0.144	0.74	84	1.7	-	83
22	3.091	0.143	0.73	83	1.7	-	82
23	3.235	0.144	0.73	84	1.5	-	82
24	3.379	0.144	0.74	84	1.6	-	85
25	3.524	0.145	0.74	83	1.5	-	82
26	3.669	0.145	0.73	84	1.6	-	86
27	3.815	0.146	0.73	85	1.6	-	82
28	3.960	0.145	0.72	84	1.5	-	84
29	4.105	0.145	0.72	85	1.5	-	86
30	4.250	0.145	0.72	84	1.6	101	82
31	4.396	0.146	0.73	85	1.6	-	86

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
32	4.543	0.147	0.73	85	1.7	-	86
33	4.690	0.147	0.73	86	1.6	-	83
34	4.836	0.146	0.73	86	1.5	-	82
35	4.983	0.147	0.73	86	1.7	-	83
36	5.130	0.147	0.73	86	1.6	-	83
37	5.277	0.147	0.73	85	1.7	-	85
38	5.424	0.147	0.73	84	1.7	-	83
39	5.571	0.147	0.73	84	1.7	-	83
40	5.719	0.148	0.73	87	1.6	102	87
41	5.867	0.148	0.73	86	1.7	-	86
42	6.014	0.147	0.73	87	1.6	-	82
43	6.163	0.149	0.74	85	1.7	-	83
44	6.311	0.148	0.75	86	1.5	-	82
45	6.459	0.148	0.75	87	1.6	-	82
46	6.607	0.148	0.75	87	1.6	-	83
47	6.756	0.149	0.75	87	1.6	-	82
48	6.905	0.149	0.75	88	1.7	-	84
49	7.054	0.149	0.75	88	1.7	-	87
50	7.202	0.148	0.76	86	1.7	102	85
51	7.351	0.149	0.76	88	1.5	-	86
52	7.500	0.149	0.76	88	1.7	-	84
53	7.649	0.149	0.76	86	1.7	-	84
54	7.799	0.150	0.76	88	1.5	-	82
55	7.948	0.149	0.76	88	1.6	-	83
56	8.097	0.149	0.76	89	1.7	-	86
57	8.246	0.149	0.76	89	1.7	-	87
58	8.396	0.150	0.76	86	1.7	-	83
59	8.545	0.149	0.76	89	1.7	-	87
60	8.695	0.150	0.76	89	1.6	103	83
Avg/Tot	8.697	0.145	0.72	84.8	1.6	101	83.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Stove ΔT: 52

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	477	493	480	347	135	386.2	522.1
1	474	491	480	341	135	384.1	411.7
2	471	489	479	362	135	387.3	731.4
3	468	487	478	391	135	391.9	963.8
4	465	485	476	425	134	397.2	1074.7
5	462	483	473	448	134	400.1	1058.4
6	460	483	471	448	134	399.0	1002.9
7	458	482	469	454	134	399.4	984.7
8	456	481	467	461	134	399.8	917.5
9	455	481	464	463	135	399.5	884.5
10	454	481	461	463	136	399.0	873.2
11	452	480	459	464	136	398.1	862.0
12	451	480	456	464	137	397.3	851.9
13	450	479	453	464	137	396.8	847.6
14	449	479	451	466	138	396.4	848.7
15	448	478	449	466	139	396.0	846.3
16	449	478	447	467	139	395.9	845.3
17	448	478	445	467	140	395.5	849.2
18	448	478	443	468	140	395.3	847.0
19	447	478	442	467	140	394.8	841.2
20	447	478	440	467	141	394.4	837.5
21	447	478	439	467	141	394.3	834.8
22	447	478	437	467	141	394.1	830.2
23	447	478	436	467	142	394.1	826.7
24	446	478	435	466	142	393.4	825.9
25	446	478	434	465	142	393.2	834.5
26	446	478	434	465	142	392.9	841.5
27	445	478	433	465	142	392.8	846.4
28	445	479	432	466	142	392.9	852.2
29	446	479	432	466	142	393.0	841.5
30	446	479	432	466	142	393.1	835.7
31	446	479	431	466	142	392.8	828.8
32	447	479	431	465	142	392.9	823.7
33	447	480	432	465	142	393.0	821.9
34	448	480	432	464	142	393.1	819.3
35	449	480	432	464	142	393.4	812.8
36	451	481	433	463	142	393.6	805.0
37	451	481	433	461	141	393.5	800.5
38	453	482	433	459	141	393.7	795.3
39	453	482	434	458	141	393.7	793.2
40	455	484	435	457	140	394.1	791.2
41	456	484	435	457	140	394.5	788.6
42	458	485	436	457	140	395.2	788.1
43	458	486	437	459	139	395.8	793.3
44	459	487	438	461	139	396.6	803.0
45	460	488	439	463	139	397.9	809.8
46	461	489	440	466	139	398.9	819.9
47	461	490	441	470	138	400.0	835.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Stove ΔT: 52

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	462	491	442	474	138	401.2	847.2
49	463	492	442	479	137	402.5	853.8
50	463	492	444	483	137	403.6	857.6
51	463	493	445	486	137	404.5	861.6
52	464	494	446	488	136	405.5	858.6
53	465	495	447	488	136	406.1	845.8
54	466	496	448	487	136	406.4	831.8
55	467	497	449	485	135	406.4	817.4
56	468	498	450	482	135	406.5	806.2
57	469	499	451	478	134	406.5	796.5
58	470	500	453	475	134	406.3	788.4
59	470	501	454	471	134	406.0	784.0
60	472	502	455	468	134	406.1	781.7
61	472	503	456	466	133	406.0	779.9
62	473	504	457	464	133	406.2	778.1
63	474	505	458	462	133	406.3	777.6
64	475	506	459	461	133	406.7	778.5
65	475	507	461	460	133	407.0	781.2
66	476	508	462	460	132	407.5	783.5
67	478	509	462	459	132	408.1	779.6
68	479	510	464	459	132	408.6	776.5
69	478	511	465	458	132	408.9	773.5
70	479	512	466	457	132	409.2	768.7
71	480	512	468	456	132	409.5	763.6
72	480	513	469	455	132	409.6	758.9
73	481	513	470	453	132	409.8	754.1
74	481	514	471	451	132	409.5	750.2
75	481	514	472	449	132	409.5	745.4
76	481	515	472	446	131	409.1	738.5
77	482	515	473	443	131	408.8	731.5
78	482	515	474	440	131	408.3	725.5
79	481	515	475	436	131	407.5	731.3
80	481	515	475	433	131	406.8	728.0
81	481	514	476	429	131	406.1	734.6
82	481	514	476	425	130	405.2	740.9
83	480	513	477	423	130	404.6	728.7
84	481	512	477	420	131	403.8	732.4
85	480	511	477	417	130	403.0	715.8
86	480	510	477	414	130	402.2	702.0
87	479	508	477	409	130	400.5	697.6
88	478	507	477	403	130	398.8	697.9
89	478	506	476	399	130	397.8	699.1
90	477	504	476	394	130	396.4	697.7
91	477	503	476	391	130	395.1	696.9
92	477	501	476	387	130	394.3	695.2
93	477	500	476	384	130	393.2	694.9
94	476	498	476	381	130	392.3	695.0
95	475	497	476	378	130	391.2	693.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Stove ΔT: 52

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	475	496	476	376	130	390.5	686.2
97	475	494	476	373	130	389.7	681.5
98	475	493	477	371	130	389.1	677.0
99	474	492	477	369	130	388.3	671.2
100	474	491	477	366	130	387.7	665.5
101	474	490	478	364	130	387.3	659.8
102	474	489	478	361	130	386.5	656.3
103	474	488	479	359	131	386.2	652.1
104	474	487	480	357	131	385.7	649.2
105	474	487	480	355	131	385.3	648.1
106	473	486	481	353	131	384.7	646.3
107	473	486	481	352	131	384.4	644.7
108	473	485	482	350	131	384.1	644.2
109	473	485	482	348	131	383.6	644.1
110	473	484	482	346	131	383.3	644.4
111	473	484	482	344	131	382.9	643.8
112	473	483	483	342	132	382.5	636.5
113	472	483	483	340	132	381.7	628.2
114	471	482	483	338	132	381.2	623.0
115	471	481	482	336	132	380.5	620.8
116	471	481	482	334	132	379.9	620.2
117	470	480	482	333	132	379.4	618.5
118	469	479	482	331	132	378.6	615.9
119	468	479	481	329	133	377.9	616.2
120	467	478	481	328	133	377.2	616.7
121	467	477	480	326	133	376.6	618.0
122	465	476	479	326	133	375.8	618.6
123	465	475	479	325	133	375.3	617.4
124	464	474	478	323	133	374.7	618.9
125	463	473	478	323	134	374.1	619.4
126	462	472	477	321	134	373.2	614.8
127	461	471	476	320	134	372.5	599.0
128	460	471	476	319	134	371.8	585.8
129	459	470	475	317	134	371.0	577.7
130	458	469	474	316	135	370.2	574.9
131	457	468	473	315	135	369.6	572.8
132	456	467	473	313	135	368.8	573.7
133	455	466	472	312	135	368.1	575.1
134	454	466	471	311	135	367.4	577.6
135	453	465	471	311	135	366.8	581.0
136	451	464	470	310	136	366.1	583.3
137	451	464	469	309	136	365.7	584.4
138	449	463	468	309	136	365.0	586.2
139	449	462	468	308	136	364.5	589.0
140	448	461	467	308	136	364.0	591.4
141	447	461	466	307	136	363.4	593.4
142	446	460	465	307	136	362.7	586.0
143	445	459	464	306	137	362.0	570.6

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

Stove ΔT: 52

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	443	458	464	305	137	361.3	557.9
145	442	457	462	303	137	360.4	552.6
146	442	457	462	302	137	360.0	552.8
147	440	456	461	301	137	359.1	552.5
148	440	455	460	300	138	358.5	551.4
149	439	454	459	299	138	357.8	551.4
150	438	453	458	298	138	356.8	550.7
Average	455.0	476.5	457.6	382.9	135.8	381.6	696.8

LAB SAMPLE DATA - ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 3

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/11/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01293	243.5	244.9	1.4
	B	G01294	244.0	244.7	0.7
	C - 1st Hour	G01295	244.4	245.1	0.7
	Amb	G01296	243.6	243.6	0.0
Probes	**A**	20A	115628.3	115628.4	0.1
	B	20B	115968.0	115968.0	0.0
	C - 1st Hour	20C	113776.6	113776.6	0.0
O-rings	**A**	20A	3556.3	3556.7	0.4
	B	20B	3611.6	3612.5	0.9
	C - 1st Hour	20C	3607.5	3607.8	0.3

Placed in Dessicator on:	6/11/2025

		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**		244.8	6/16 15:30	244.9	6/18 10:00				
	B		244.6	6/16 15:30	244.7	6/18 10:00				
	C - 1st Hour		245.1	6/16 15:30	245.1	6/18 10:00				
	Amb		243.7	6/16 15:30	243.6	6/18 10:00				
Probes	**A**		115628.5	6/16 15:30	115628.4	6/18 10:00				
	B		115968.0	6/16 15:30	115968.0	6/18 10:00				
	C - 1st Hour		113776.6	6/16 15:30	113776.6	6/18 10:00				
O-Rings	**A**		3556.8	6/16 15:30	3556.7	6/18 10:00				
	B		3612.4	6/16 15:30	3612.5	6/18 10:00				
	C - 1st Hour		3607.8	6/16 15:30	3607.8	6/18 10:00				

Train A Aggregate, mg:	**1.9**
Train B Aggregate, mg:	**1.6**
Train C Aggregate, mg:	**1.0**
Ambient, mg:	**0.0**

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 3 Test Date: 6/11/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary open 2mm (opening 6mm), secondary open 5mm (opening 15mm)
Targeted Burn Category: II

Preburn Notes

Time	Notes
	-None-

Test Notes

Test Burn Start Time: 13:17 Test Fuel Loaded by: 30 seconds
Door Closed: 40 seconds Air Control Set at: 300 seconds
Other Loading Notes: None

Time	Notes
	-None-

Test Burn End Time: 16:24

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

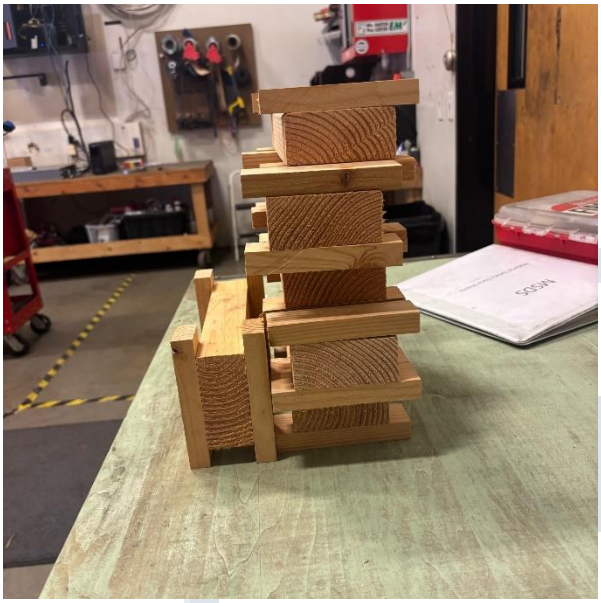
	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Mid	Span
Time	11:42	11:43	11:44	17:00	17:01	17:02
CO_2	0.00	17.33	10.18	0.04	17.44	10.23
CO	0.000	4.350	2.544	0.024	4.415	2.489

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

Technician Signature:  Date: 6/16/25

ASTM E2780 Wood Heater Run Sheets

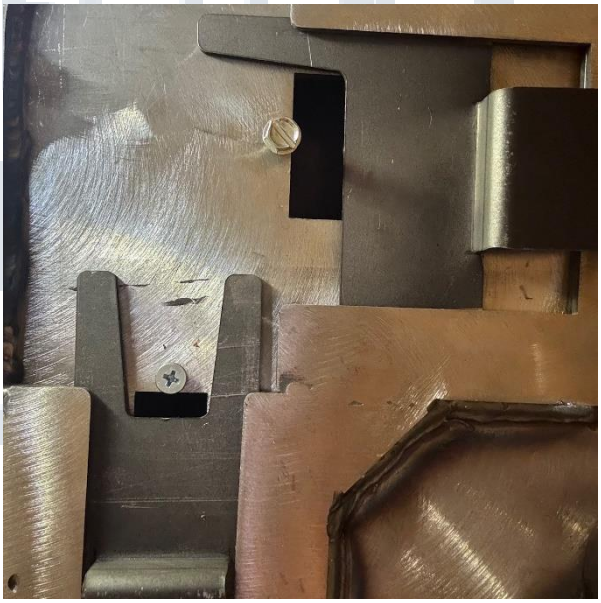
Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 3 Test Date: 6/11/25



Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove



Air Setting

Technician Signature: Date: 6/16/25

WOOD STOVE TEST DATA PACKET
ASTM E2780/E2515

Run 4 Data Summary

Client:	La Castellamonte
Model:	Round Stack
Job #:	24-364
Tracking #:	224
Test Date:	6/12/2025

Techician Signature

7/21/2025
Date

TEST RESULTS - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Burn Rate (kg/hr):	1.43

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	34.361	23.135	23.149	8.565
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.6			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10728.3			
Average Gas Meter Temperature (°F)	68.6	88.2	88.5	83.9
Total Sample Volume (dscf)	34.703	22.821	22.508	8.519
Average Tunnel Temperature (°F)	105.6			
Total Time of Test (min)	150			
Total Particulate Catch (mg)	0.1	2.4	2.5	2.0
Particulate Concentration, dry-standard (g/dscf)	0.0000029	0.0001052	0.0001111	0.0002348
Total PM Emissions (g)	0.08	2.74	2.90	2.49
Particulate Emission Rate (g/hr)	0.03	1.10	1.16	2.49
Emissions Factor (g/kg)	-	0.77	0.81	-
Difference from Average Total Particulate Emissions (g)	-	0.08	0.08	-
Difference from Average Total Particulate Emissions (%)	-	2.8%	2.8%	
Difference from Average Emissions Factor (g/kg)	-	0.02	0.02	-

Final Average Results	
Total Particulate Emissions (g)	2.82
Particulate Emission Rate (g/hr)	1.13
Emissions Factor (g/kg)	0.79
HHV Efficiency (%)	71.3%
LHV Efficiency (%)	77.1%
CO Emissions (g/min)	0.29

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	84.5	OK
Face Velocity	< 30 ft/min	8.8	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	Min:67.6/Max:69.7	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	37.7	OK

B415.1 Efficiency Results

Manufacturer: La Castellamonte
Model: Round Stack
Date: 06/12/25
Run: 4
Control #: 24-364
Test Duration: 150
Output Category: 3

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	71.3%	77.1%
Combustion Efficiency	99.4%	99.4%
Heat Transfer Efficiency	71.7%	77.5%

Output Rate (kJ/h)	19,715	18,701	**(Btu/h)**
Burn Rate (kg/h)	1.40	3.08	**(lb/h)**
Input (kJ/h)	27,641	26,220	**(Btu/h)**

Test Load Weight (dry kg)	3.49	7.69	**dry lb**
MC wet (%)	18.99		
MC dry (%)	23.44		
Particulate (g)	2.82		
CO (g)	43		
Test Duration (h)	2.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.06	0.87
g/kg Dry Fuel	0.81	12.30
g/h	1.13	17.16
g/min	0.02	0.29
lb/MM Btu Output	0.13	2.02

Air/Fuel Ratio (A/F)	15.04

VERSION: **2.4** **4/15/2010**

WOODSTOVE FUEL DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Preburn Fuel Information

Size	Length (in)	Moisture Content (% DB)	Size	Length (in)	Moisture Content (% DB)
2x4	9.00	23.8	2x4	9.00	23.8
2x4	9.00	23.8	2x4	9.00	21.4
2x4	9.00	21.1	2x4	9.00	19.6
2x4	9.00	22.8			
2x4	9.00	22.8			
2x4	9.00	20.9			
2x4	9.00	23.4			
2x4	9.00	22.6			
Total Fuel Weight (lbs):		10.65	Average Moisture (%DB):		22.4

Firebox Volume (ft^3):	1.37
Total 2x4 Crib Weight, with spacers (lbs):	9.49
Total 4x4 Crib Weight, with spacers (lbs):	0.00
Total Wet Fuel Weight, with spacers (lbs):	9.49

Coal Bed Range (20-25%):
Min (lbs): 1.90
Max (lbs): 2.37

Test Fuel Information

Size	Length (in)	Weight (lbs)	Moisture Content (%DB)			Dry Weight (lbs)
2x4	9.00	1.10	24.3	24.4	24.8	0.88
2x4	9.00	1.12	21.0	23.1	23.6	0.91
2x4	9.00	1.22	21.1	21.6	24.9	1.00
2x4	9.00	1.12	24.1	24.9	24.5	0.90
2x4	9.00	1.20	19.7	23.8	24.5	0.98
2x4	9.00	1.15	24.7	23.5	23.4	0.93
					Total Dry Weight, no spacers (lbs):	5.60
					Total Dry Weight, with spacers (lbs):	7.88

Spacer Moisture Readings (%DB)

12.2	13.0	13.0					
13.3	12.7	11.6					
13.6	13.5	14.0					
12.5	14.1	12.9					
13.6	11.5	13.5					
12.5	14.5	11.9					
12.8	13.5	12.4					
14.4	11.7	13.0					

Quality Checks	Requirement	Observed	Result
Fuel Density	25 - 36 (lbs/ft^3, DB)	34.1	OK
Loading Density	6.3 - 7.7 (lbs/ft^3, WB)	6.93	OK
2x4 Fuel Mix	35 - 65 % of total weight	N/A	N/A

DILUTION TUNNEL & MISC. DATA - ASTM E2780 / E2515

Client:	La Castellamonte	Job #:	24-364
Model:	Round Stack	Tracking #:	224
Run #:	4	Technician:	AK
Test Start Time:	10:59	Date:	6/12/2025

Total Sampling Time (min):	150
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. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	6/9/2025
Test Fuel Scale Audit (lbs)	10.00
Platform Scale Audit (lbs)	10.0

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.93	29.88	29.91
Relative Humidity (%)	36.6	20.9	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:		34.361	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_2O)	Temp (°F)
1	0.044	71
2	0.064	71
3	0.070	71
4	0.048	71
5	0.050	71
6	0.072	71
7	0.074	71
8	0.058	71
Center	0.082	71

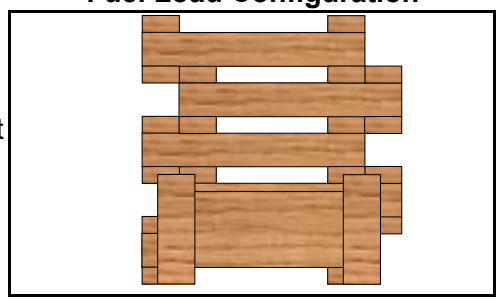
Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.21	ft/sec
V_{scent}:	19.03	ft/sec
F_p:	0.852	[ratio]
Initial Tunnel Flow:	186.0	scf/min

Static Pressure: -0.170 in. H_2O

TEST FUEL PROPERTIES

Fuel Load Configuration

Firebox Left



Firebox Right

Firebox Front View

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)	23.4

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Recording Interval (min): 1
Run Time (min): 77

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
0	9.99	-0.072	336	315	293	323	91	271.5	487	69
1	9.90	-0.072	342	316	294	324	92	273.6	474	69
2	9.80	-0.073	347	317	295	326	93	275.8	473	69
3	9.65	-0.072	353	319	296	327	95	278.1	471	69
4	9.55	-0.073	357	320	298	331	96	280.4	469	69
5	9.42	-0.074	361	321	298	341	97	283.8	481	69
6	9.28	-0.074	364	323	299	355	98	287.9	492	69
7	9.11	-0.074	367	324	300	365	100	291.1	495	69
8	8.96	-0.076	370	325	300	377	101	294.6	505	69
9	8.82	-0.078	373	327	301	388	102	298.0	515	69
10	8.63	-0.076	375	329	301	401	103	301.9	520	70
11	8.47	-0.077	377	331	302	416	104	306.0	525	69
12	8.28	-0.079	380	334	303	429	105	309.8	527	69
13	8.12	-0.078	382	337	304	439	106	313.3	529	69
14	7.96	-0.077	387	340	305	447	106	317.0	529	69
15	7.80	-0.077	391	344	306	453	107	320.1	532	70
16	7.66	-0.078	395	348	308	458	108	323.1	532	69
17	7.46	-0.078	399	352	310	462	108	326.0	534	70
18	7.32	-0.077	403	356	312	465	109	328.9	540	70
19	7.15	-0.077	408	359	314	468	110	331.8	544	70
20	6.99	-0.077	412	363	316	471	110	334.5	546	70
21	6.87	-0.078	417	367	319	473	111	337.2	549	70
22	6.73	-0.078	421	371	322	475	111	339.8	550	70
23	6.58	-0.077	424	375	325	477	111	342.5	554	70
24	6.46	-0.079	428	378	328	483	112	345.6	558	70
25	6.27	-0.079	430	382	331	488	112	348.5	558	70
26	6.14	-0.080	432	386	334	493	113	351.4	562	70
27	6.01	-0.079	435	390	337	500	113	354.8	568	70
28	5.82	-0.079	437	394	341	509	113	358.7	580	70
29	5.67	-0.082	441	399	344	518	113	363.0	589	71
30	5.51	-0.083	443	404	348	529	114	367.4	598	70
31	5.30	-0.083	447	409	352	541	114	372.5	610	71
32	5.12	-0.083	449	414	356	556	114	377.8	625	71
33	4.99	-0.084	453	420	360	569	114	383.3	632	71
34	4.83	-0.084	456	425	364	579	115	387.9	635	71
35	4.66	-0.082	460	431	369	586	115	392.0	629	71
36	4.50	-0.084	462	436	373	591	115	395.6	622	71
37	4.37	-0.082	466	442	377	595	115	399.0	619	71
38	4.27	-0.082	468	447	382	596	116	401.7	615	71
39	4.06	-0.081	472	452	386	599	116	405.1	616	71
40	3.94	-0.084	476	458	391	600	116	407.9	616	71
41	3.80	-0.082	478	463	395	601	116	410.4	614	71
42	3.70	-0.082	481	468	400	601	116	413.0	612	71
43	3.55	-0.082	485	472	404	600	116	415.6	606	71
44	3.45	-0.079	487	477	409	594	117	416.8	595	71

WOODSTOVE PREBURN DATA - ASTM E2780

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Recording Interval (min): 1
Run Time (min): 77

			Temperatures (°F)							
Elapsed Time (min)	Scale Reading (lbs)	Flue Draft (in H_2O)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Flue	Ambient
45	3.33	-0.079	491	482	414	585	117	417.7	578	71
46	3.24	-0.077	493	486	418	573	117	417.5	561	71
47	3.15	-0.076	497	491	423	558	117	417.2	544	71
48	3.09	-0.074	500	494	427	545	117	416.8	527	71
49	3.02	-0.073	502	498	432	533	118	416.4	514	71
50	2.92	-0.072	506	501	436	522	118	416.4	510	71
51	2.86	-0.072	507	503	440	512	118	416.0	503	71
52	2.81	-0.073	508	506	444	504	118	415.9	503	71
53	2.73	-0.072	509	508	447	497	119	415.8	503	71
54	2.67	-0.072	510	509	451	489	119	415.5	497	71
55	2.64	-0.070	510	511	454	479	120	414.7	488	71
56	2.57	-0.070	511	512	457	469	120	414.0	476	71
57	2.57	-0.067	511	514	460	459	120	412.8	465	72
58	2.48	-0.067	510	515	463	450	121	411.6	449	71
59	2.44	-0.066	509	515	467	440	121	410.3	438	70
60	2.42	-0.064	509	516	470	431	121	409.2	429	70
61	2.37	-0.064	508	516	474	422	121	407.9	419	69
62	2.34	-0.063	508	516	477	413	121	406.8	411	69
63	2.30	-0.062	506	517	480	405	121	405.6	406	68
64	2.28	-0.060	505	516	483	398	121	404.5	399	69
65	2.28	-0.061	504	516	485	391	121	403.3	395	69
66	2.22	-0.061	504	516	487	384	121	402.3	392	69
67	2.21	-0.059	501	515	488	379	121	400.8	389	68
68	2.19	-0.061	500	514	489	374	121	399.8	388	68
69	2.17	-0.060	499	513	491	370	122	398.9	385	68
70	2.14	-0.058	497	512	492	366	122	397.8	381	68
71	2.13	-0.060	495	511	492	362	122	396.8	381	68
72	2.06	-0.059	493	510	493	359	123	395.3	380	68
73	2.06	-0.059	492	509	493	356	123	394.5	378	68
74	2.03	-0.059	490	508	493	352	124	393.3	378	68
75	2.00	-0.060	489	506	493	349	124	392.1	379	68
76	1.95	-0.058	487	504	493	347	124	391.0	380	68
77	1.96	-0.057	486	503	492	344	125	390.0	379	68

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.082	0.05	74	0.2		9.49		116	371	82	68
1	0.093	0.093	0.079	1.97	74	0.9	-	9.40	-0.09	133	336	83	68
2	0.229	0.136	0.082	2.02	74	0.9	-	9.29	-0.11	125	396	83	68
3	0.372	0.143	0.082	2.05	74	0.9	-	9.10	-0.19	126	506	83	68
4	0.511	0.139	0.082	2.05	74	1.0	-	8.88	-0.22	131	587	83	68
5	0.652	0.141	0.080	2.08	74	0.9	-	8.70	-0.18	126	577	83	68
6	0.797	0.145	0.081	2.11	74	1.0	-	8.54	-0.16	120	553	82	68
7	0.935	0.138	0.081	2.12	74	0.9	-	8.39	-0.15	117	546	82	68
8	1.082	0.147	0.081	2.13	74	1.0	-	8.27	-0.12	116	544	82	68
9	1.224	0.142	0.081	2.16	74	1.0	-	8.09	-0.18	115	550	83	68
10	1.370	0.146	0.081	2.17	75	1.0	92	7.92	-0.17	116	553	83	68
11	1.513	0.143	0.080	2.18	75	1.0	-	7.78	-0.14	117	556	82	68
12	1.658	0.145	0.082	2.21	75	1.0	-	7.60	-0.18	118	557	83	68
13	1.805	0.147	0.079	2.22	75	1.0	-	7.44	-0.16	118	560	82	68
14	1.950	0.145	0.082	2.24	75	1.0	-	7.27	-0.17	119	560	83	68
15	2.099	0.149	0.082	2.25	76	1.0	-	7.13	-0.14	118	565	84	68
16	2.244	0.145	0.081	2.26	76	1.0	-	6.93	-0.20	119	573	82	68
17	2.394	0.150	0.081	2.28	76	1.0	-	6.79	-0.14	120	578	82	68
18	2.538	0.144	0.080	2.28	76	1.0	-	6.60	-0.19	119	578	82	68
19	2.692	0.154	0.081	2.28	77	1.0	-	6.44	-0.16	119	572	83	68
20	2.837	0.145	0.080	2.29	77	1.0	99	6.27	-0.17	120	574	82	68
21	2.989	0.152	0.080	2.30	77	1.0	-	6.16	-0.11	119	574	82	68
22	3.135	0.146	0.081	2.31	77	1.0	-	5.97	-0.19	118	571	82	68
23	3.285	0.150	0.080	2.31	78	1.0	-	5.82	-0.15	118	568	82	68
24	3.431	0.146	0.081	2.32	78	1.0	-	5.70	-0.12	117	564	82	68
25	3.584	0.153	0.080	2.32	78	1.0	-	5.57	-0.13	119	561	82	68
26	3.731	0.147	0.079	2.33	79	1.0	-	5.44	-0.13	118	555	82	68
27	3.885	0.154	0.081	2.34	79	1.0	-	5.27	-0.17	116	553	83	68
28	4.032	0.147	0.080	2.35	79	1.0	-	5.12	-0.15	115	551	83	68
29	4.186	0.154	0.081	2.34	80	1.0	-	4.99	-0.13	116	550	82	68
30	4.334	0.148	0.079	2.35	80	1.0	101	4.87	-0.12	116	545	82	68
31	4.489	0.155	0.082	2.36	80	1.0	-	4.73	-0.14	116	543	83	69

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
32	4.637	0.148	0.081	2.36	81	1.0	-	4.61	-0.12	115	542	83	68
33	4.792	0.155	0.081	2.38	81	1.0	-	4.50	-0.11	115	542	83	68
34	4.941	0.149	0.080	2.38	81	1.0	-	4.37	-0.13	115	539	83	68
35	5.096	0.155	0.081	2.38	82	1.0	-	4.25	-0.12	116	541	82	68
36	5.246	0.150	0.080	2.38	82	1.0	-	4.11	-0.14	116	543	83	68
37	5.400	0.154	0.081	2.39	82	1.0	-	3.98	-0.13	116	542	83	68
38	5.550	0.150	0.078	2.39	82	1.0	-	3.88	-0.10	116	543	82	68
39	5.707	0.157	0.080	2.40	83	1.0	-	3.73	-0.15	115	547	82	68
40	5.859	0.152	0.081	2.39	83	1.0	101	3.63	-0.10	114	549	82	68
41	6.013	0.154	0.081	2.40	83	1.0	-	3.54	-0.09	114	552	82	69
42	6.164	0.151	0.079	2.41	84	1.0	-	3.46	-0.08	115	577	82	69
43	6.317	0.153	0.079	2.41	84	1.0	-	3.30	-0.16	118	642	82	69
44	6.472	0.155	0.081	2.42	84	1.0	-	3.21	-0.09	119	610	82	68
45	6.623	0.151	0.082	2.42	84	1.0	-	3.09	-0.12	119	576	82	68
46	6.779	0.156	0.081	2.42	85	1.0	-	3.01	-0.08	117	563	82	69
47	6.930	0.151	0.081	2.42	85	1.0	-	2.91	-0.10	116	553	83	69
48	7.087	0.157	0.080	2.43	85	1.0	-	2.84	-0.07	115	538	82	68
49	7.239	0.152	0.081	2.43	86	1.0	-	2.73	-0.11	115	526	83	68
50	7.396	0.157	0.081	2.44	86	1.0	101	2.70	-0.03	115	513	82	68
51	7.548	0.152	0.081	2.44	86	1.0	-	2.62	-0.08	114	499	82	68
52	7.703	0.155	0.082	2.45	86	1.0	-	2.56	-0.06	112	492	83	69
53	7.857	0.154	0.080	2.43	87	1.0	-	2.52	-0.04	112	483	83	68
54	8.013	0.156	0.081	2.44	87	1.0	-	2.39	-0.13	111	478	83	68
55	8.169	0.156	0.081	2.45	87	1.0	-	2.35	-0.04	110	472	81	68
56	8.322	0.153	0.083	2.45	87	1.0	-	2.28	-0.07	109	469	81	69
57	8.479	0.157	0.081	2.45	87	1.0	-	2.24	-0.04	108	465	83	69
58	8.634	0.155	0.081	2.45	88	1.0	-	2.17	-0.07	107	460	82	69
59	8.793	0.159	0.080	2.46	88	1.0	-	2.12	-0.05	108	456	82	68
60	8.946	0.153	0.080	2.46	88	1.0	101	2.06	-0.06	107	453	82	68
61	9.100	0.154	0.080	2.45	88	1.0	-	2.01	-0.05	107	449	82	68
62	9.254	0.154	0.082	2.46	89	1.0	-	1.96	-0.05	107	443	83	68
63	9.410	0.156	0.080	2.45	89	1.0	-	1.92	-0.04	107	439	81	68

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
64	9.567	0.157	0.082	2.46	89	1.0	-	1.88	-0.04	105	437	82	69
65	9.721	0.154	0.078	2.48	89	1.0	-	1.80	-0.08	105	434	83	69
66	9.879	0.158	0.080	2.48	89	1.0	-	1.78	-0.02	105	425	83	69
67	10.031	0.152	0.081	2.47	89	1.0	-	1.71	-0.07	105	419	82	69
68	10.194	0.163	0.080	2.46	90	1.0	-	1.67	-0.04	106	416	82	68
69	10.347	0.153	0.080	2.47	90	1.0	-	1.64	-0.03	105	414	83	69
70	10.504	0.157	0.081	2.47	90	1.0	101	1.59	-0.05	105	419	82	68
71	10.662	0.158	0.079	2.48	90	1.0	-	1.55	-0.04	104	419	82	69
72	10.814	0.152	0.080	2.47	90	1.0	-	1.50	-0.05	103	418	81	69
73	10.973	0.159	0.081	2.48	90	1.0	-	1.50	0.00	102	416	82	69
74	11.126	0.153	0.083	2.48	91	1.0	-	1.46	-0.04	102	415	82	69
75	11.286	0.160	0.080	2.48	91	1.0	-	1.37	-0.09	102	413	82	69
76	11.439	0.153	0.080	2.47	91	1.0	-	1.39	0.02	101	409	83	69
77	11.598	0.159	0.080	2.48	91	1.0	-	1.35	-0.04	101	404	83	68
78	11.753	0.155	0.080	2.48	91	1.0	-	1.31	-0.04	102	402	82	68
79	11.911	0.158	0.081	2.48	91	1.0	-	1.29	-0.02	102	399	83	69
80	12.070	0.159	0.082	2.49	92	1.0	100	1.29	0.00	101	399	82	69
81	12.222	0.152	0.081	2.49	92	1.0	-	1.19	-0.10	101	397	82	69
82	12.382	0.160	0.080	2.49	92	1.0	-	1.22	0.03	101	392	83	69
83	12.540	0.158	0.079	2.49	92	1.0	-	1.18	-0.04	101	388	82	69
84	12.698	0.158	0.080	2.49	92	1.0	-	1.17	-0.01	100	382	83	69
85	12.855	0.157	0.080	2.49	92	1.0	-	1.09	-0.08	100	380	83	69
86	13.012	0.157	0.081	2.50	92	1.0	-	1.09	0.00	100	378	82	69
87	13.169	0.157	0.080	2.51	92	1.0	-	1.09	0.00	100	374	82	69
88	13.322	0.153	0.081	2.50	93	1.0	-	1.10	0.01	100	374	83	69
89	13.483	0.161	0.082	2.50	93	1.0	-	1.04	-0.06	100	371	82	69
90	13.638	0.155	0.081	2.50	93	1.0	100	1.02	-0.02	99	372	82	69
91	13.797	0.159	0.080	2.50	93	1.0	-	1.00	-0.02	98	371	83	69
92	13.953	0.156	0.082	2.49	93	1.0	-	1.01	0.01	99	370	82	69
93	14.112	0.159	0.081	2.50	93	1.0	-	0.96	-0.05	98	370	82	69
94	14.271	0.159	0.080	2.51	93	1.0	-	0.97	0.01	99	371	82	69
95	14.424	0.153	0.080	2.50	93	1.0	-	0.94	-0.03	99	370	82	69

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
96	14.586	0.162	0.081	2.51	93	1.0	-	0.89	-0.05	99	370	82	69
97	14.741	0.155	0.080	2.50	94	1.0	-	0.88	-0.01	99	370	82	69
98	14.900	0.159	0.079	2.50	94	1.0	-	0.89	0.01	99	369	82	69
99	15.059	0.159	0.080	2.50	94	1.0	-	0.83	-0.06	98	368	82	69
100	15.215	0.156	0.080	2.51	94	1.0	101	0.80	-0.03	99	368	82	69
101	15.375	0.160	0.081	2.51	94	1.0	-	0.79	-0.01	98	365	82	69
102	15.529	0.154	0.080	2.50	94	1.0	-	0.79	0.00	97	365	83	69
103	15.691	0.162	0.079	2.51	94	1.0	-	0.78	-0.01	97	364	82	69
104	15.845	0.154	0.078	2.51	94	1.0	-	0.79	0.01	97	362	83	69
105	16.005	0.160	0.080	2.51	94	1.0	-	0.73	-0.06	97	363	82	69
106	16.165	0.160	0.079	2.49	94	1.0	-	0.69	-0.04	96	361	83	69
107	16.319	0.154	0.081	2.51	94	1.0	-	0.66	-0.03	96	361	83	70
108	16.483	0.164	0.080	2.50	94	1.0	-	0.66	0.00	96	362	82	70
109	16.639	0.156	0.082	2.52	95	1.0	-	0.63	-0.03	96	358	83	70
110	16.798	0.159	0.080	2.52	95	1.0	101	0.63	0.00	96	356	83	69
111	16.953	0.155	0.080	2.51	95	1.0	-	0.62	-0.01	96	355	83	69
112	17.111	0.158	0.080	2.51	95	1.0	-	0.63	0.01	96	353	83	69
113	17.270	0.159	0.082	2.51	95	1.0	-	0.59	-0.04	96	353	83	69
114	17.425	0.155	0.078	2.51	95	1.0	-	0.57	-0.02	96	353	82	69
115	17.588	0.163	0.081	2.51	95	1.0	-	0.57	0.00	97	352	83	69
116	17.742	0.154	0.080	2.50	95	1.0	-	0.56	-0.01	97	352	82	69
117	17.902	0.160	0.081	2.51	95	1.0	-	0.53	-0.03	96	352	83	69
118	18.062	0.160	0.079	2.51	95	1.0	-	0.50	-0.03	96	351	82	69
119	18.217	0.155	0.083	2.50	95	1.0	-	0.50	0.00	96	349	81	69
120	18.379	0.162	0.080	2.51	95	1.0	101	0.49	-0.01	96	349	83	69
121	18.535	0.156	0.083	2.51	95	1.0	-	0.47	-0.02	95	348	82	69
122	18.694	0.159	0.081	2.52	96	1.0	-	0.43	-0.04	95	349	83	69
123	18.852	0.158	0.081	2.51	96	1.0	-	0.44	0.01	96	349	82	69
124	19.011	0.159	0.082	2.52	96	1.0	-	0.38	-0.06	95	348	83	69
125	19.170	0.159	0.084	2.52	96	1.0	-	0.38	0.00	95	351	83	69
126	19.326	0.156	0.082	2.51	96	1.0	-	0.36	-0.02	96	347	82	69
127	19.488	0.162	0.081	2.52	96	1.0	-	0.34	-0.02	95	338	82	69

BOX A TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
128	19.644	0.156	0.082	2.53	96	1.0	-	0.33	-0.01	95	330	81	69
129	19.804	0.160	0.080	2.51	96	1.0	-	0.27	-0.06	95	325	83	69
130	19.964	0.160	0.081	2.52	96	1.0	101	0.25	-0.02	95	323	81	69
131	20.119	0.155	0.082	2.52	96	1.0	-	0.24	-0.01	96	322	81	69
132	20.281	0.162	0.080	2.52	96	1.0	-	0.24	0.00	96	322	83	69
133	20.439	0.158	0.082	2.52	96	1.0	-	0.23	-0.01	95	321	82	69
134	20.598	0.159	0.081	2.52	96	1.0	-	0.25	0.02	95	321	83	69
135	20.759	0.161	0.081	2.51	96	1.0	-	0.21	-0.04	94	319	83	69
136	20.913	0.154	0.082	2.52	96	1.0	-	0.18	-0.03	94	319	83	69
137	21.073	0.160	0.081	2.51	96	1.0	-	0.16	-0.02	94	318	82	69
138	21.230	0.157	0.079	2.51	96	1.0	-	0.17	0.01	94	319	83	69
139	21.390	0.160	0.081	2.51	96	1.0	-	0.15	-0.02	95	319	83	69
140	21.548	0.158	0.080	2.51	96	1.0	100	0.11	-0.04	95	320	82	69
141	21.707	0.159	0.082	2.52	96	1.0	-	0.09	-0.02	95	322	83	69
142	21.867	0.160	0.082	2.52	96	1.0	-	0.06	-0.03	94	322	82	69
143	22.022	0.155	0.086	2.51	96	1.0	-	0.05	-0.01	94	322	82	69
144	22.185	0.163	0.080	2.53	96	1.0	-	0.04	-0.01	94	322	83	69
145	22.340	0.155	0.082	2.51	96	1.0	-	0.03	-0.01	93	321	83	69
146	22.501	0.161	0.081	2.52	96	1.0	-	0.01	-0.02	94	321	82	69
147	22.662	0.161	0.080	2.52	96	1.0	-	0.01	0.00	94	320	83	69
148	22.816	0.154	0.080	2.52	96	1.0	-	0.03	0.02	94	319	82	69
149	22.979	0.163	0.081	2.51	97	1.0	-	0.01	-0.02	94	319	83	69
150	23.135	0.156	0.082	2.52	97	1.0	100	0.00	-0.01	94	320	83	69
Avg/Tot	23.135	0.154	0.081	2.41	88.2	1.0	100			105.6	433.3	82.4	68.6

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	-0.001		0.07	74	0.8		83	-0.060	2.06	0.196
1	0.105	0.106	2.37	74	1.9	-	84	-0.048	3.55	0.052
2	0.253	0.148	2.37	74	2.0	-	84	-0.074	4.87	0.299
3	0.404	0.151	2.37	74	1.8	-	84	-0.080	10.82	0.181
4	0.554	0.150	2.36	74	2.0	-	85	-0.087	13.08	0.191
5	0.704	0.150	2.38	74	1.9	-	84	-0.080	13.83	0.166
6	0.855	0.151	2.38	74	2.1	-	84	-0.077	10.61	0.141
7	1.005	0.150	2.37	74	2.1	-	83	-0.079	10.52	0.146
8	1.156	0.151	2.37	74	2.1	-	83	-0.078	11.46	0.104
9	1.306	0.150	2.38	75	2.1	-	83	-0.079	12.40	0.092
10	1.456	0.150	2.37	75	1.8	97	83	-0.079	12.44	0.089
11	1.606	0.150	2.37	75	2.1	-	83	-0.081	12.21	0.083
12	1.758	0.152	2.37	75	1.6	-	84	-0.078	12.15	0.083
13	1.906	0.148	2.37	75	1.8	-	84	-0.081	12.10	0.078
14	2.058	0.152	2.37	76	2.0	-	84	-0.080	12.13	0.074
15	2.206	0.148	2.37	76	1.7	-	83	-0.079	12.37	0.074
16	2.358	0.152	2.37	76	1.9	-	83	-0.082	12.72	0.075
17	2.507	0.149	2.36	76	1.7	-	84	-0.080	12.77	0.084
18	2.659	0.152	2.37	77	2.1	-	83	-0.081	12.66	0.069
19	2.810	0.151	2.38	77	1.6	-	83	-0.081	12.27	0.069
20	2.964	0.154	2.37	77	1.9	101	84	-0.080	12.17	0.074
21	3.112	0.148	2.38	77	1.8	-	84	-0.079	12.04	0.068
22	3.266	0.154	2.38	78	1.9	-	83	-0.081	11.80	0.063
23	3.412	0.146	2.38	78	2.1	-	83	-0.080	11.70	0.067
24	3.565	0.153	2.38	78	1.6	-	83	-0.079	11.45	0.061
25	3.715	0.150	2.38	79	1.8	-	83	-0.078	11.24	0.064
26	3.867	0.152	2.39	79	2.1	-	83	-0.080	11.15	0.068
27	4.016	0.149	2.38	79	1.9	-	83	-0.078	11.13	0.073
28	4.170	0.154	2.39	79	1.6	-	83	-0.077	11.06	0.068
29	4.320	0.150	2.38	80	2.0	-	83	-0.077	10.97	0.064
30	4.473	0.153	2.39	80	1.9	101	83	-0.078	10.90	0.069
31	4.625	0.152	2.39	80	1.7	-	83	-0.077	10.85	0.060

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	4.777	0.152	2.39	81	1.6	-	83	-0.077	10.85	0.063
33	4.930	0.153	2.39	81	2.1	-	83	-0.077	10.92	0.064
34	5.080	0.150	2.40	81	2.1	-	83	-0.077	10.97	0.063
35	5.234	0.154	2.40	82	2.1	-	83	-0.078	10.92	0.062
36	5.384	0.150	2.39	82	1.7	-	83	-0.077	10.91	0.056
37	5.539	0.155	2.40	82	1.6	-	84	-0.077	11.00	0.057
38	5.690	0.151	2.40	83	2.1	-	83	-0.077	10.98	0.060
39	5.848	0.158	2.41	83	2.1	-	83	-0.076	11.00	0.059
40	5.997	0.149	2.40	83	1.9	101	83	-0.076	10.96	0.064
41	6.152	0.155	2.41	83	1.7	-	83	-0.076	10.97	0.064
42	6.301	0.149	2.40	84	2.1	-	83	-0.082	10.78	0.079
43	6.455	0.154	2.41	84	2.1	-	84	-0.084	10.50	0.459
44	6.609	0.154	2.41	84	2.2	-	84	-0.082	11.07	0.290
45	6.762	0.153	2.41	84	1.7	-	84	-0.078	10.19	0.108
46	6.916	0.154	2.41	85	1.6	-	83	-0.080	9.30	0.130
47	7.068	0.152	2.41	85	1.8	-	83	-0.078	8.86	0.188
48	7.223	0.155	2.41	85	1.9	-	83	-0.078	8.77	0.155
49	7.375	0.152	2.41	86	1.8	-	83	-0.074	8.44	0.153
50	7.531	0.156	2.42	86	2.0	101	83	-0.073	8.57	0.139
51	7.682	0.151	2.42	86	1.6	-	83	-0.071	8.58	0.117
52	7.838	0.156	2.41	86	1.7	-	83	-0.073	8.41	0.125
53	7.991	0.153	2.42	87	1.7	-	83	-0.071	8.30	0.114
54	8.146	0.155	2.42	87	1.6	-	83	-0.071	8.24	0.116
55	8.301	0.155	2.42	87	1.9	-	83	-0.070	8.26	0.107
56	8.453	0.152	2.42	87	2.0	-	83	-0.071	8.14	0.114
57	8.609	0.156	2.42	88	2.1	-	83	-0.072	8.21	0.098
58	8.764	0.155	2.42	88	1.7	-	83	-0.069	8.05	0.095
59	8.922	0.158	2.42	88	1.8	-	83	-0.069	7.94	0.079
60	9.073	0.151	2.42	88	1.6	101	83	-0.070	7.87	0.080
61	9.226	0.153	2.43	88	1.6	-	83	-0.069	7.69	0.085
62	9.381	0.155	2.43	89	1.8	-	83	-0.067	7.72	0.079
63	9.536	0.155	2.42	89	1.9	-	83	-0.068	7.70	0.063

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	9.691	0.155	2.43	89	1.9	-	83	-0.067	7.63	0.070
65	9.844	0.153	2.43	89	1.9	-	83	-0.065	7.70	0.079
66	10.002	0.158	2.43	89	1.9	-	83	-0.066	7.54	0.034
67	10.154	0.152	2.43	90	2.1	-	83	-0.065	7.50	0.023
68	10.313	0.159	2.43	90	2.1	-	83	-0.063	7.32	0.032
69	10.466	0.153	2.42	90	1.6	-	83	-0.065	7.18	0.053
70	10.623	0.157	2.43	90	2.1	100	83	-0.066	7.34	0.092
71	10.780	0.157	2.44	90	1.7	-	83	-0.065	7.13	0.098
72	10.930	0.150	2.43	91	1.7	-	83	-0.065	7.33	0.090
73	11.087	0.157	2.43	91	2.1	-	83	-0.065	7.50	0.089
74	11.241	0.154	2.44	91	1.7	-	83	-0.063	7.31	0.117
75	11.399	0.158	2.44	91	1.6	-	83	-0.065	7.50	0.108
76	11.552	0.153	2.44	91	2.1	-	83	-0.061	7.36	0.114
77	11.708	0.156	2.44	91	1.6	-	83	-0.063	7.43	0.108
78	11.865	0.157	2.44	92	1.9	-	83	-0.062	7.29	0.109
79	12.019	0.154	2.45	92	1.6	-	83	-0.060	7.51	0.098
80	12.176	0.157	2.44	92	1.8	99	83	-0.060	7.47	0.112
81	12.330	0.154	2.44	92	2.1	-	83	-0.059	7.25	0.128
82	12.489	0.159	2.45	92	1.9	-	83	-0.061	7.28	0.114
83	12.645	0.156	2.44	92	1.6	-	83	-0.060	7.02	0.122
84	12.802	0.157	2.44	92	1.8	-	83	-0.059	7.23	0.105
85	12.959	0.157	2.44	93	2.1	-	83	-0.060	7.27	0.098
86	13.112	0.153	2.44	93	2.0	-	83	-0.059	7.11	0.103
87	13.268	0.156	2.44	93	1.9	-	83	-0.058	7.06	0.102
88	13.422	0.154	2.44	93	1.9	-	83	-0.059	6.93	0.110
89	13.581	0.159	2.45	93	2.1	-	83	-0.059	6.74	0.117
90	13.735	0.154	2.45	93	1.7	99	83	-0.058	6.68	0.132
91	13.892	0.157	2.44	93	1.9	-	83	-0.059	6.59	0.131
92	14.049	0.157	2.45	93	1.8	-	83	-0.058	6.55	0.135
93	14.203	0.154	2.44	93	1.8	-	83	-0.059	6.52	0.141
94	14.361	0.158	2.44	94	1.7	-	83	-0.059	6.47	0.144
95	14.516	0.155	2.44	94	1.8	-	83	-0.059	6.43	0.145

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	14.674	0.158	2.45	94	1.6	-	83	-0.059	6.38	0.148
97	14.828	0.154	2.44	94	1.6	-	83	-0.059	6.35	0.153
98	14.987	0.159	2.45	94	1.8	-	83	-0.058	6.29	0.152
99	15.144	0.157	2.45	94	1.7	-	83	-0.059	6.25	0.153
100	15.298	0.154	2.44	94	1.6	100	83	-0.059	6.24	0.157
101	15.457	0.159	2.45	94	1.6	-	83	-0.058	6.15	0.159
102	15.612	0.155	2.45	95	1.6	-	83	-0.057	6.11	0.160
103	15.769	0.157	2.45	95	2.1	-	83	-0.058	6.14	0.163
104	15.925	0.156	2.44	95	1.7	-	83	-0.057	6.06	0.159
105	16.082	0.157	2.45	95	1.7	-	83	-0.060	6.05	0.162
106	16.240	0.158	2.45	95	1.7	-	83	-0.057	5.98	0.163
107	16.394	0.154	2.45	95	1.6	-	83	-0.059	5.95	0.171
108	16.556	0.162	2.45	95	1.7	-	83	-0.057	6.14	0.164
109	16.710	0.154	2.45	95	2.0	-	83	-0.057	6.08	0.162
110	16.868	0.158	2.45	95	1.6	100	83	-0.056	6.04	0.163
111	17.023	0.155	2.45	95	2.1	-	83	-0.058	5.97	0.161
112	17.178	0.155	2.45	95	1.8	-	83	-0.055	5.86	0.157
113	17.337	0.159	2.45	95	1.8	-	83	-0.055	5.92	0.166
114	17.492	0.155	2.45	96	1.6	-	83	-0.056	5.92	0.163
115	17.650	0.158	2.45	96	1.9	-	83	-0.057	5.91	0.163
116	17.805	0.155	2.45	96	1.6	-	83	-0.057	5.92	0.161
117	17.963	0.158	2.45	96	1.8	-	83	-0.055	6.12	0.166
118	18.121	0.158	2.46	96	1.7	-	83	-0.057	6.10	0.160
119	18.275	0.154	2.45	96	1.7	-	83	-0.056	6.07	0.162
120	18.435	0.160	2.45	96	1.7	100	83	-0.057	5.97	0.164
121	18.589	0.154	2.45	96	1.6	-	83	-0.056	5.89	0.164
122	18.748	0.159	2.45	96	2.1	-	83	-0.056	5.98	0.154
123	18.906	0.158	2.45	96	2.0	-	83	-0.056	5.84	0.163
124	19.061	0.155	2.45	96	1.7	-	83	-0.057	5.82	0.162
125	19.220	0.159	2.45	96	1.8	-	83	-0.059	5.77	0.162
126	19.375	0.155	2.45	96	1.7	-	83	-0.056	5.95	0.129
127	19.533	0.158	2.45	96	2.1	-	83	-0.054	5.97	0.069

BOX B TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	19.689	0.156	2.45	96	1.6	-	83	-0.054	6.02	0.055
129	19.847	0.158	2.45	96	2.0	-	83	-0.054	6.03	0.052
130	20.005	0.158	2.45	96	1.6	100	83	-0.053	6.05	0.057
131	20.160	0.155	2.45	96	1.7	-	83	-0.053	6.07	0.066
132	20.320	0.160	2.45	96	1.7	-	83	-0.052	6.11	0.066
133	20.477	0.157	2.46	96	2.1	-	83	-0.053	6.10	0.073
134	20.636	0.159	2.46	97	1.8	-	83	-0.050	6.13	0.074
135	20.794	0.158	2.46	97	2.1	-	83	-0.052	6.06	0.077
136	20.946	0.152	2.46	97	2.0	-	83	-0.053	6.03	0.078
137	21.106	0.160	2.46	97	1.8	-	83	-0.053	6.04	0.081
138	21.261	0.155	2.47	97	1.8	-	83	-0.054	5.86	0.082
139	21.419	0.158	2.46	97	1.8	-	83	-0.051	5.91	0.082
140	21.576	0.157	2.45	97	1.8	100	83	-0.052	5.92	0.080
141	21.734	0.158	2.46	97	2.0	-	83	-0.053	5.89	0.083
142	21.891	0.157	2.46	97	1.7	-	83	-0.053	5.94	0.088
143	22.047	0.156	2.45	97	1.9	-	83	-0.052	5.86	0.092
144	22.207	0.160	2.46	97	2.0	-	83	-0.053	5.80	0.092
145	22.361	0.154	2.46	97	2.0	-	83	-0.053	5.78	0.093
146	22.520	0.159	2.46	97	2.0	-	83	-0.053	5.65	0.093
147	22.678	0.158	2.46	97	2.1	-	83	-0.053	5.47	0.088
148	22.832	0.154	2.45	97	1.6	-	83	-0.051	5.45	0.093
149	22.993	0.161	2.45	97	2.1	-	83	-0.054	5.42	0.094
150	23.148	0.155	2.46	97	1.7	99	83	-0.054	5.45	0.100
Avg/Tot	23.149	0.154	2.41	88.5	1.8	100	83.1	-0.065	8.03	0.112

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
0	0.000		-0.10	78	0.6		81
1	0.113	0.113	0.60	79	1.6	-	81
2	0.249	0.136	0.59	78	1.5	-	81
3	0.388	0.139	0.60	79	1.5	-	82
4	0.524	0.136	0.59	79	1.6	-	82
5	0.663	0.139	0.60	79	1.7	-	82
6	0.801	0.138	0.60	79	1.7	-	82
7	0.939	0.138	0.61	79	1.5	-	82
8	1.079	0.140	0.62	79	1.5	-	82
9	1.218	0.139	0.61	79	1.7	-	82
10	1.359	0.141	0.62	79	1.7	97	82
11	1.498	0.139	0.62	79	1.7	-	82
12	1.638	0.140	0.61	79	1.7	-	82
13	1.779	0.141	0.63	79	1.5	-	83
14	1.919	0.140	0.62	80	1.6	-	83
15	2.059	0.140	0.62	80	1.5	-	83
16	2.201	0.142	0.63	80	1.5	-	83
17	2.341	0.140	0.63	80	1.6	-	83
18	2.481	0.140	0.63	80	1.5	-	83
19	2.626	0.145	0.64	81	1.5	-	83
20	2.766	0.140	0.63	81	1.5	101	84
21	2.907	0.141	0.63	81	1.6	-	83
22	3.049	0.142	0.64	81	1.7	-	83
23	3.188	0.139	0.64	81	1.6	-	83
24	3.329	0.141	0.63	82	1.7	-	83
25	3.472	0.143	0.64	82	1.5	-	83
26	3.615	0.143	0.65	82	1.6	-	83
27	3.757	0.142	0.64	82	1.7	-	83
28	3.899	0.142	0.64	83	1.6	-	83
29	4.043	0.144	0.65	83	1.7	-	83
30	4.186	0.143	0.65	83	1.5	102	83
31	4.329	0.143	0.65	84	1.5	-	83

BOX C TEST DATA - ASTM E2780 / ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

	Particulate Sampling Data						
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)
32	4.473	0.144	0.65	84	1.6	-	83
33	4.616	0.143	0.65	84	1.6	-	83
34	4.762	0.146	0.66	85	1.6	-	83
35	4.906	0.144	0.66	85	1.7	-	83
36	5.050	0.144	0.65	85	1.6	-	84
37	5.194	0.144	0.65	85	1.5	-	84
38	5.338	0.144	0.66	86	1.7	-	84
39	5.486	0.148	0.66	86	1.7	-	84
40	5.632	0.146	0.67	86	1.6	102	84
41	5.777	0.145	0.67	87	1.5	-	84
42	5.920	0.143	0.66	87	1.5	-	84
43	6.065	0.145	0.66	87	1.7	-	84
44	6.211	0.146	0.66	87	1.7	-	84
45	6.356	0.145	0.67	88	1.7	-	83
46	6.503	0.147	0.68	88	1.7	-	83
47	6.650	0.147	0.68	88	1.6	-	83
48	6.796	0.146	0.68	89	1.7	-	82
49	6.943	0.147	0.68	89	1.5	-	82
50	7.089	0.146	0.67	89	1.5	102	83
51	7.236	0.147	0.67	90	1.5	-	84
52	7.383	0.147	0.67	90	1.5	-	84
53	7.530	0.147	0.67	90	1.7	-	84
54	7.677	0.147	0.67	91	1.7	-	84
55	7.824	0.147	0.68	91	1.6	-	84
56	7.971	0.147	0.68	91	1.6	-	84
57	8.119	0.148	0.69	92	1.7	-	83
58	8.269	0.150	0.69	92	1.6	-	83
59	8.417	0.148	0.69	92	1.5	-	83
60	8.565	0.148	0.69	92	1.7	103	83
Avg/Tot	8.565	0.143	0.63	83.9	1.6	101	82.9

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Stove ΔT: 38

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	483	500	492	340	126	388.3	514.8
1	485	499	492	331	127	386.6	374.0
2	479	497	492	341	128	387.3	575.8
3	476	495	491	368	128	391.6	861.2
4	473	492	489	405	129	397.5	1019.1
5	470	490	487	426	129	400.3	996.4
6	467	489	484	432	129	400.0	937.9
7	464	487	481	442	129	400.6	932.0
8	462	486	478	455	129	402.1	943.9
9	461	485	475	466	130	403.4	958.1
10	460	485	472	477	130	404.6	968.1
11	460	484	469	486	130	405.7	965.6
12	459	484	467	493	131	406.6	968.8
13	459	484	465	500	131	407.6	972.5
14	458	485	463	507	131	408.8	976.3
15	459	485	461	515	131	410.3	992.9
16	458	486	460	526	131	412.3	1005.2
17	459	487	459	535	132	414.2	1010.8
18	460	488	458	541	132	415.8	1008.8
19	462	489	457	546	132	417.3	1003.7
20	463	491	457	551	132	418.8	1002.6
21	465	493	457	554	132	420.1	996.0
22	468	495	457	556	132	421.3	989.4
23	471	496	456	557	132	422.3	981.4
24	473	498	457	557	131	423.0	969.5
25	475	500	457	556	131	423.8	962.6
26	477	502	457	554	131	424.2	956.8
27	479	504	458	551	131	424.6	955.2
28	481	506	459	549	131	425.1	951.0
29	483	508	459	546	130	425.4	944.1
30	485	510	460	544	130	425.9	938.8
31	487	513	461	541	130	426.3	933.7
32	489	515	462	539	130	426.9	932.9
33	491	518	464	538	129	427.8	935.5
34	492	520	465	537	129	428.6	934.5
35	495	522	467	537	128	429.7	934.2
36	496	524	468	537	128	430.7	936.9
37	499	527	470	537	128	432.2	941.4
38	500	529	472	538	128	433.3	944.7
39	502	531	474	540	127	434.8	948.5
40	503	533	476	542	127	436.1	954.3
41	504	534	477	544	127	437.4	962.7
42	504	535	479	535	127	435.9	1062.5
43	505	535	481	530	126	435.4	1221.5
44	505	536	482	538	126	437.2	1063.3
45	505	536	484	534	125	436.8	981.2
46	504	535	486	523	125	434.8	970.6
47	504	535	488	513	125	432.9	960.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Stove ΔT: 38

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	503	534	490	504	125	431.1	927.4
49	503	534	493	493	124	429.3	898.7
50	501	533	495	485	124	427.5	869.5
51	501	532	497	476	124	425.9	843.3
52	500	532	499	468	124	424.6	826.4
53	500	531	501	461	124	423.3	814.2
54	500	531	503	454	123	422.2	805.4
55	499	530	505	448	123	421.1	797.6
56	499	530	507	443	123	420.1	794.7
57	499	529	508	439	123	419.5	787.2
58	499	529	510	435	123	418.9	777.8
59	499	528	511	432	122	418.5	765.7
60	498	528	512	429	122	417.7	758.9
61	498	527	513	426	122	417.3	755.2
62	498	527	514	423	122	416.8	743.6
63	498	526	515	420	122	416.4	734.9
64	498	526	516	418	122	416.0	735.2
65	498	525	517	416	122	415.6	731.2
66	499	525	517	414	122	415.4	706.8
67	498	525	517	412	122	415.0	691.0
68	498	525	518	410	123	414.7	683.5
69	499	525	518	405	123	413.9	699.7
70	498	525	518	401	123	413.0	719.0
71	498	525	518	398	123	412.3	723.4
72	497	525	517	396	123	411.6	718.6
73	497	524	517	393	123	410.8	712.0
74	497	524	516	390	123	409.9	712.6
75	496	523	516	387	123	408.8	709.0
76	495	522	515	384	123	407.8	702.0
77	495	520	515	381	123	406.8	691.4
78	494	519	514	379	123	405.8	683.9
79	494	518	514	376	123	404.9	677.2
80	493	516	513	373	123	403.8	676.8
81	493	515	513	370	124	402.7	674.6
82	492	514	512	367	124	401.7	664.7
83	491	513	512	363	124	400.6	655.7
84	491	512	511	361	124	399.7	647.9
85	491	510	511	358	124	398.9	641.1
86	490	509	510	356	124	397.9	637.7
87	490	508	510	353	124	397.2	635.0
88	489	507	510	351	124	396.2	633.2
89	489	506	509	348	125	395.4	632.8
90	488	505	509	345	125	394.4	633.3
91	488	504	508	343	125	393.6	633.1
92	487	503	507	341	125	392.6	634.3
93	487	502	507	339	125	391.9	635.7
94	486	501	506	337	125	391.1	634.8
95	485	500	505	335	125	390.1	634.8

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Stove ΔT: 38

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	485	499	505	334	125	389.4	634.4
97	483	497	504	332	126	388.4	632.9
98	483	496	503	331	126	387.6	631.7
99	483	495	502	329	126	386.8	631.1
100	481	494	501	328	126	385.7	630.1
101	480	492	500	326	126	384.9	629.3
102	479	491	499	325	126	383.8	628.1
103	477	490	497	324	127	382.9	627.2
104	477	489	496	322	127	382.0	625.5
105	476	487	495	321	127	381.2	624.7
106	474	486	494	320	127	380.1	625.0
107	472	484	493	319	127	379.2	626.0
108	471	483	492	318	128	378.3	623.1
109	470	482	491	317	127	377.3	616.2
110	469	480	489	316	127	376.3	609.7
111	467	479	488	315	128	375.4	605.8
112	466	478	487	313	128	374.4	603.9
113	464	477	486	312	128	373.3	604.3
114	463	475	485	311	128	372.4	606.8
115	462	474	483	310	128	371.4	606.4
116	461	473	482	309	128	370.6	603.1
117	459	471	480	309	128	369.4	601.6
118	458	470	479	308	128	368.5	599.4
119	456	469	478	307	128	367.5	599.1
120	455	468	476	306	128	366.6	598.2
121	453	466	475	305	128	365.6	596.9
122	452	465	473	304	129	364.7	597.1
123	451	464	472	303	129	363.7	596.4
124	449	463	471	303	129	362.8	594.5
125	449	462	469	302	129	362.1	592.7
126	447	461	468	302	129	361.1	573.1
127	445	460	466	302	129	360.4	544.0
128	445	459	465	301	129	359.7	523.4
129	443	458	464	301	129	358.8	514.0
130	443	457	463	300	129	358.4	511.4
131	443	456	463	299	129	357.7	512.2
132	442	456	462	298	129	357.4	513.8
133	442	455	462	297	129	356.9	515.6
134	441	455	461	297	129	356.5	518.0
135	441	455	460	296	129	356.1	518.3
136	441	454	460	296	129	355.9	517.6
137	440	454	460	295	129	355.3	518.0
138	439	453	459	295	129	355.0	518.5
139	439	454	459	294	129	354.8	519.2
140	439	454	458	294	129	354.7	521.7
141	439	453	457	294	129	354.4	523.4
142	437	453	457	294	129	354.0	525.4
143	437	453	456	293	129	353.7	526.7

WOODSTOVE SURFACE TEMPERATURE DATA

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

Stove ΔT: 38

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	437	452	455	293	129	353.3	527.1
145	436	451	455	293	130	352.8	527.7
146	436	451	454	292	129	352.5	526.7
147	436	450	453	292	129	352.1	524.5
148	435	450	453	292	130	351.6	523.1
149	434	449	452	291	130	351.1	523.7
150	433	449	451	291	130	350.6	525.2
Average	475.5	496.6	484.7	400.1	126.9	396.7	736.7

LAB SAMPLE DATA - ASTM E2515

Client: La Castellamonte
Model: Round Stack
Run #: 4

Job #: 24-364
Tracking #: 224
Technician: AK
Date: 6/12/2025

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01297	246.1	248.1	2.0
	B	G01298	244.4	246.3	1.9
	C - 1st Hour	G01299	245.3	246.2	0.9
	Amb	G01300	244.1	244.2	0.1
Probes	**A**	1A	115628.8	115628.9	0.1
	B	1B	115904.0	115904.0	0.0
	C - 1st Hour	1C	116434.4	116434.5	0.1
O-rings	**A**	1A	3566.1	3566.4	0.3
	B	1B	3554.7	3555.3	0.6
	C - 1st Hour	1C	4165.2	4166.2	1.0

Placed in Dessicator on:	6/12/2025

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**	248.0	6/16 15:30	248.1	6/18 10:00				
	B	246.2	6/16 15:30	246.3	6/18 10:00				
	C - 1st Hour	246.2	6/16 15:30	246.2	6/18 10:00				
	Amb	244.2	6/16 15:30	244.2	6/18 10:00				
Probes	**A**	115628.9	6/16 15:30	115628.9	6/18 10:00				
	B	115904.0	6/16 15:30	115904.0	6/18 10:00				
	C - 1st Hour	116434.4	6/16 15:30	116434.5	6/18 10:00				
O-Rings	**A**	3566.3	6/16 15:30	3566.4	6/18 10:00				
	B	3555.3	6/16 15:30	3555.3	6/18 10:00				
	C - 1st Hour	4166.1	6/16 15:30	4166.2	6/18 10:00				

Train A Aggregate, mg:	**2.4**
Train B Aggregate, mg:	**2.5**
Train C Aggregate, mg:	**2.0**
Ambient, mg:	**0.1**

ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 4 Test Date: 6/12/25

Wood Heater Run Notes

Test Control Settings

Primary Air Setting(s): Primary open 8mm (opening 12mm), secondary open 15mm (opening 25mm)
Targeted Burn Category: III

Preburn Notes

Time	Notes
	-None-

Test Notes

Test Burn Start Time: 10:59 Test Fuel Loaded by: 35 seconds
Door Closed: 45 seconds Air Control Set at: 300 seconds
Other Loading Notes: None

Time	Notes
	-None-

Test Burn End Time: 13:29

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 17.32 CO (%): 4.350
Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Mid	Span
Time	9:35	9:36	9:37	14:06	14:08	14:09
CO_2	0.00	17.32	10.12	0.01	17.43	10.24
CO	0.000	4.351	2.468	0.010	4.421	2.505

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

Technician Signature:  Date: 6/16/25

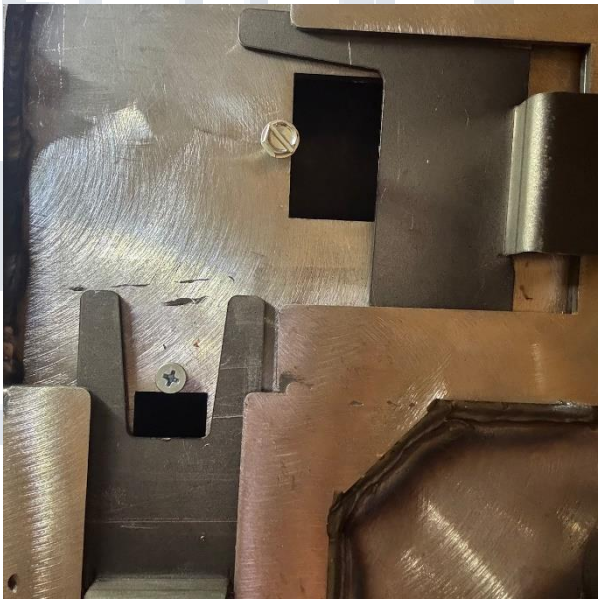
ASTM E2780 Wood Heater Run Sheets

Client: La Castellamonte Job Number: 24-364 Tracking #: 224
Model: Round Stack Run Number: 4 Test Date: 6/12/25

Test Fuel Front/Side View

Test Fuel Iso View

Test Fuel Loaded in Stove



Air Setting

Technician Signature: Date: 6/16/25

ASTM E2515 - Glass Fiber Filters

Date:	6/8/25	6/9/25	-	-			
Time:	1230	14:15	-	-			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
G01285	244.2	244.1	-	-	A	24-364	#1
G01286	243.8	243.7	-	-	A		
G01287	244.4	244.8	-	-	A		
G01288	242.87	242.5	-	-	A		
G01289	244.6	244.8	-	-	A		#2
G01290	244.8	245.0	-	-	A		
G01291	245.4	245.4	-	-	A		
G01292	244.72	244.0	-	-	A		
G01293	243.4	243.5	-	-	A		#3
G01294	244.1	244.0	-	-	A		
G01295	244.6	244.4	-	-	A		
G01296	243.8	243.6	-	-	A		
G01297	246.2	246.1	-	-	A		#4
G01298	244.5	244.4	-	-	A		
G01299	245.3	245.3	-	-	A		
G01300	243.9	244.1	-	-	A		

Date:	6/9/25	6/10/25	-	-			
Time:	14:15	15:30	-	-			
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
G01301	244.0	243.9	-	-	A	25-428 24-274RT	#1
G01302	242.5	242.5	-	-	A		
G01303	243.3	243.4	-	-	A		
G01304	244.9	245.0	-	-	A		
G01305	241.1	241.1	-	-	A		#2
G01306	241.9	241.9	-	-	A		
G01307	243.5	243.3	-	-	A		
G01308	243.8	243.7	-	-	A		
G01309	242.6	242.5	-	-	A		#3
G01310	241.6	241.7	-	-	A		
G01311	242.8	242.9	-	-	A		
G01312	243.0	243.1	-	-	A		
G01313	242.8	242.6	-	-	A	22-791	Maple 1
G01314	242.4	242.2	-	-	A		
G01315	242.4	242.4	-	-	A		Maple 2
G01316	242.1	242.2	-	-	A		

ASTM E2515 - O-Ring Samples 1-10

Date:	6/9/25	6/10/25	6/11/25				
Time:	14:00	15:00	10:00				
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
1A	3565.9	3566.1	-	-	A	24-364	#4
1B	3554.5	3554.7	-	-	A		
1C	4165.0	4165.2	-	-	A		
2A	3550.9	3551.1	-	-	A	25-428	#1
2B	3570.6	3570.6	-	-	A	~~24-274~~ RT A	
2C	3387.5	3388.1	3388.1	-	A		
3A	3577.4	3577.6	-	-	A	25.428 ~~24-274~~ RT A	#2
3B	3565.8	3565.9	-	-	A		
3C	3619.9	3620.4	3620.4	-	A		
4A	3372.9	3373.3	3373.4	-	A	25-428 ~~24-274~~ RT A	#3
4B	3576.6	3577.0	3577.1	-	A		
4C	3368.6	3369.0	3369.1	-	A		
5A	3533.6	3533.8	-	-	A	22-791	Maple 1
5B	3528.8	3528.9	-	-	A	22-791	Maple 2
5C	3371.9	3372.3	3372.5	-	A		

Date:	6/25/25						
Time:	4:00 p-						
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
6A	3393.7						
6B	3610.9						
6C	3390.2						
7A	3568.9						
7B	3520.7						
7C	3403.5						
8A	3550.2						
8B	3355.3						
8C	3584.1						
9A	3578.4						
9B	3521.3						
9C	3427.6						
10A	3358.6						
10B	3568.6						
10C	3363.5						

ASTM E2515 - Probe Samples 1-10

Date:	6/9/25	6/10/25					
Time:	14:45	15:00					
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
1A	115629.0	115628.8	-	-	A	24-364	#4
1B	115904.1	115904.0	-	-	A		
1C	116434.6	116434.4	-	-	A		
2A	116059.1	116059.0	-	-	A	~~24-274~~ 24-364 25-428	#1
2B	116175.2	116175.0	-	-	A		
2C	116430.0	116429.9	-	-	A		
3A	115881.9	115881.9	-	-	A	~~24-274~~ 24-364 25-428	#2
3B	116122.2	116122.1	-	-	A		
3C	116619.4	116619.5	-	-	A		
4A	116024.9	116024.9	-	-	A	~~24-274~~ 24-364 25-428	#3
4B	116813.8	116183.8	-	-	A		
4C	116999.2	116999.1	-	-	A		
5A	116758.7	116758.6	-	-	A	22-791	Maple1
5B	116876.9	116876.8	-	-	A	22-791	Maple2
5C	115856.5	115856.6	-	-	A		

Date:	6/25/25						
Time:	4:20 pm						
	Weight 1	**Weight 2**	**Weigth 3**	**Weight 4**	**Initial**	**Project**	**Run**
6A	116384.1						
6B	115955.8						
6C	115129.0						
7A	116559.9						
7B	117130.3						
7C	116551.8						
8A	116635.3						
8B	116667.1						
8C	116663.6						
9A	116532.4						
9B	117739.3						
9C	116603.6						
10A	116647.6						
10B	117754.6						
10C	116729.1						

Pre-Conditioning Data

Client: La Castellamonte
Job #: 24-364
Model: Round Stack
Tracking #: 224
Date(s): 1/15/25 - 4/30/25
Technician: Aaron Kravitz
Medium Burn rate used: ☑
Catalyst: **Yes** ☑ **No** ☐

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	500	889	+9.17 lbs, doug fir, 19-25%, air medium
1	431	738	
2	439	765	+10.12 lbs, doug fir, 19-25%, air medium
3	492	903	
4	413	706	
5	325	527	
6	376	595	+10.45 lbs, doug fir, 19-25%, air medium
7	493	914	
8	417	679	
9	318	534	
10	284	469	
11	525	714	+9.41 lbs, doug fir, 19-25%, air medium
12	452	623	
13	359	536	
14	509	783	+11.23 lbs, doug fir, 19-25%, air medium
15	407	618	
16	315	571	
17	281	505	
18	262	467	+7.09 lbs, doug fir, 19-25%, air medium
19	253	439	
20	242	419	
21	218	390	
22	181	265	
23	396	686	+7.46 lbs, doug fir, 19-25%, air medium
24	347	595	
25	329	572	
26	495	825	+8.98 lbs, doug fir, 19-25%, air medium
27	360	660	
28	284	541	
29	261	501	
30	501	65	+9.66 lbs, doug fir, 19-25%, air medium
31	474	66	
32	339	65	
33	686	1062	+13.81 lbs, doug fir, 19-25%, air medium
34	510	809	
35	393	716	
36	405	715	+11.04 lbs, doug fir, 19-25%, air medium
37	328	602	
38	289	527	
39	231	418	+11.23 lbs, doug fir, 19-25%, air medium
40	213	434	
41	209	422	
42	232	492	
43	205	412	
44	396	740	+10.65 lbs, doug fir, 19-25%, air medium
45	330	641	
46	271	529	
47	278	550	+10.06 lbs, doug fir, 19-25%, air medium
48	357	714	
49	302	606	
50	259	528	

Signature/Date: 11/14/2025

Sample Calculations – ASTM E2780 & E2515

Client: La Castellamonte
Model: Round Stack
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/ft^3

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

BR – Dry burn rate, kg/hr

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

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

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

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to 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 = 12.1 %

M_{Swb} = 2.6 lbs

0.4536 = Conversion factor from lbs to kg

M_{Sdb} = [(2.6 x 0.4536) (100/(100 + 12.1)

M_{Sdb} = **1.04** kg

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

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

Where,

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

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

Sample Calculation (test fuel piece 1):

MC_{Pnwb} = 1.22

FM_{CPn} = 24.1

= 1.2 (100/(100+ 24.1)

= 1.0 lbs

Total dry crib weight, excluding spacers = 5.73 lbs

M_{Cdb} = **2.60** kg

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

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

Where,

V_C = Volume of fuel crib, ft^3

Sample calculation:

V_C = 283.5 in^3

1728 = conversion from in^3 to ft^3

D_{Cdb} = 5.73 / 283.5 * 1728

= **34.93** lbs/ft^3

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

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

Sample calculation:

$$M_{FTAdb} = 1.04 + 2.60$$

$$= \mathbf{3.64} \text{ kg}$$

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} = 3.64 kg
θ = 79 min

$$BR = \frac{60 \times 3.64}{79}$$

BR = **2.76** 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 H_2O
T_s	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
P_{bar}	=	Barometric pressure at test site, in. Hg
P_g	=	Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)
M_s	=	
		**The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{15.40}{17.58} = 0.876$$

$$V_s = 0.876 \times 85.49 \times 0.99 \times 0.265 \times \left(\frac{135.5 + 460}{\left(29.79 + \frac{-0.16}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **16.37** ft/s

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

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

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

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

Where:

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

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 16.37 \times 0.1963 \times \frac{528}{135.5 + 460} \times \frac{29.79 + \frac{-0.16}{13.6}}{29.92}$$

Q_{sd} = **10006.6** dscf/hr

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

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

Where:

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

Sample Calculation:

Using equation for Train A:

$$V_{m(std)} = 17.64 \times 12.579 \times 1.019 \times \frac{\left(29.79 + \frac{2.57}{13.6}\right)}{(84.4 + 460)}$$

$V_{m(std)}$ = **12.452** dscf

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 12.071 \times 1.005 \times \frac{\left(29.79 + \frac{2.34}{13.6}\right)}{(84.2 + 460)}$$

$V_{m(std)}$ = **11.783** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 17.95 \times 1.012 \times \frac{\left(29.79 + \frac{0.00}{13.6}\right)}{(74.3 + 460)}$$

$V_{m(std)}$ = **17.863** 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 + 1.8 + 1.0

m_n = **2.8** mg

Using equation for Train B:

m_n = 0.2 + 1.7 + 0.6

m_n = **2.5** 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:

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

Sample calculation:

For Train A:

$$C_s = 0.001 \times \frac{2.8}{12.45}$$

C_s = **0.00022** g/dscf

For Train B

$$C_s = 0.001 \times \frac{2.5}{11.78}$$

C_s = **0.00021** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{17.86}$$

C_r = **0.000000** 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 = (0.000225 - 0.000000) x 10006.6 x 79 /60

E_T = **2.96** g

For Train B

E_T = (0.000212 - 0.000000) x 10006.6 x 79 /60

E_T = **2.80** g

Average

E = **2.88** 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, ^oR

T_m = Absolute average dry gas meter temperature, ^oR

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

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

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

$$PR = \left(\frac{79 \times 1.516 \times 16.37 \times (149.7 + 460) \times (84.4 + 460)}{10 \times 12.579 \times 16.43 \times (135.5 + 460) \times (75.4 + 460)} \right) \times 100$$

PR = **99** %

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

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

E_T (Dual train average) = 2.88 g

θ = 79 min

$PM_R = 60 \times (2.88 / 79)$

PM_R = **2.19** g/hr

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

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

Sample Calculation:

E_T (Dual train average) = 2.88 g

M_{Bdb} = 3.64 kg

PM_F = 2.88 / 3.64

PM_F = **0.79** 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: La Castellamonte
Model: Round Stack
Date: 06/10/25
Run: 1
Control #: 24-364
Test Duration: 79 min

	HHV	LHV
Eff	68.57%	74.12%
Comb Eff	98.91%	98.91%
HT Eff	69.33%	74.94%
Output	36,564	kJ/h
Burn Rate	2.69	kg/h
Grams CO	62	g
Input	53,321	kJ/h
MC wet	18.81	

Note: In the "Input data", "Calc. % O_2", "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.

Ultimate CO_2
$CO_{2\text{-ult}}$ 19.64
F_0
1.062

Overall Heating Efficiency:	68.57%		Air Fue
Combustion Efficiency:	98.91%		Dry Molecular W
Heat Transfer Efficiency:	69.33%		Dry Moles Exhaus
			Air Fuel Ratio
Heat Output:	34,685 Btu/h	36,564	kJ/h
Heat Input:	50,581 Btu/h	53,321	kJ/h
Burn Duration:	1.32 h		
Burn Rate:	5.93 lb/h	2.692	kg/h
Stack Temp:	607.1 Deg. F	319.5	Deg. C

Averages	**0.15**	**11.06**	**0.98**	**20.20**	**9.07**	**319.81**	**23.46**	**99.4%**	**69.0%**	**68.6%**	**11.94**	**1.40**
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	4.36	0.10	8.54	127.2%	20.37	11.77	345.1	22.1	99.4%	62.8%	62.4%	13.7	4.36
1	4.30	0.11	8.03	141.2%	20.40	12.31	305.5	22.1	99.3%	64.9%	64.4%	14.6	4.30
2	4.14	0.26	5.38	248.6%	20.57	15.06	338.3	22.2	96.9%	50.3%	48.7%	20.9	4.14
3	4.01	0.31	17.08	12.9%	19.79	2.55	390.9	22.3	98.5%	72.0%	71.0%	6.8	4.01
4	3.89	1.03	19.03	-2.0%	19.62	0.08	418.5	22.6	95.7%	72.0%	68.9%	5.9	3.89
5	3.77	1.57	19.52	-6.8%	19.55	-0.76	430.9	22.4	93.7%	71.6%	67.1%	5.6	3.77
6	3.64	1.34	19.73	-6.8%	19.55	-0.86	427.3	22.5	94.6%	72.0%	68.1%	5.6	3.64
7	3.53	0.64	18.94	0.3%	19.65	0.39	426.5	22.5	97.2%	71.6%	69.6%	6.1	3.53
8	3.42	0.26	18.11	6.9%	19.73	1.49	429.3	22.7	98.8%	71.0%	70.2%	6.5	3.42
9	3.29	0.21	18.09	7.3%	19.73	1.53	426.4	22.9	99.0%	71.1%	70.4%	6.5	3.29
10	3.18	0.19	17.54	10.8%	19.77	2.14	420.7	22.8	99.1%	71.0%	70.4%	6.7	3.18
11	3.08	0.14	16.30	19.4%	19.85	3.48	406.0	22.8	99.3%	70.7%	70.2%	7.2	3.08
12	2.98	0.13	15.72	23.9%	19.89	4.11	397.4	22.8	99.4%	70.6%	70.2%	7.5	2.98
13	2.89	0.12	15.33	27.1%	19.92	4.53	388.3	23.1	99.4%	70.7%	70.3%	7.7	2.89
14	2.79	0.09	15.08	29.5%	19.94	4.82	384.1	23.1	99.6%	70.7%	70.5%	7.9	2.79
15	2.70	0.09	14.92	30.9%	19.95	4.98	379.8	23.1	99.6%	70.8%	70.5%	7.9	2.70
16	2.61	0.09	14.36	35.9%	19.99	5.58	374.9	23.0	99.6%	70.5%	70.2%	8.2	2.61
17	2.53	0.11	14.02	39.1%	20.01	5.94	370.6	22.8	99.5%	70.4%	70.0%	8.4	2.53
18	2.45	0.11	13.67	42.5%	20.03	6.31	367.1	23.1	99.4%	70.2%	69.8%	8.6	2.45
19	2.37	0.12	13.44	44.8%	20.04	6.54	363.8	23.2	99.4%	70.2%	69.7%	8.8	2.37
20	2.29	0.14	13.02	49.3%	20.07	6.98	362.4	23.2	99.2%	69.7%	69.2%	9.0	2.29
21	2.22	0.17	12.50	55.0%	20.10	7.52	361.2	23.3	99.0%	69.1%	68.5%	9.4	2.22
22	2.15	0.17	12.17	59.1%	20.13	7.87	355.8	23.2	99.0%	69.0%	68.4%	9.6	2.15
23	2.07	0.17	12.05	60.8%	20.13	8.00	351.3	23.3	99.0%	69.2%	68.5%	9.7	2.07
24	2.01	0.19	12.01	61.1%	20.13	8.03	352.7	23.2	98.9%	69.0%	68.2%	9.7	2.01
25	1.94	0.18	12.03	60.9%	20.13	8.02	348.8	23.4	99.0%	69.3%	68.6%	9.7	1.94
26	1.87	0.14	12.18	59.4%	20.13	7.87	344.4	23.2	99.2%	69.8%	69.2%	9.6	1.87
27	1.80	0.14	12.38	57.0%	20.11	7.67	344.2	23.2	99.3%	70.1%	69.5%	9.5	1.80
28	1.73	0.12	12.81	52.0%	20.09	7.22	345.0	23.1	99.4%	70.5%	70.1%	9.2	1.73
29	1.67	0.11	12.87	51.3%	20.08	7.15	341.3	23.2	99.4%	70.9%	70.5%	9.2	1.67
30	1.60	0.09	12.81	52.3%	20.09	7.23	339.8	23.5	99.6%	70.9%	70.6%	9.2	1.60
31	1.52	0.09	12.77	52.7%	20.09	7.27	343.3	23.5	99.6%	70.6%	70.3%	9.2	1.52
32	1.46	0.11	13.12	48.5%	20.07	6.89	348.8	23.5	99.4%	70.7%	70.3%	9.0	1.46
33	1.39	0.11	13.79	41.4%	20.02	6.18	356.1	23.4	99.5%	71.0%	70.6%	8.6	1.39
34	1.32	0.10	13.95	39.9%	20.01	6.02	361.2	23.4	99.5%	70.9%	70.5%	8.5	1.32
35	1.23	0.12	14.35	35.8%	19.98	5.58	362.7	23.4	99.4%	71.2%	70.8%	8.2	1.23
36	1.17	0.10	14.04	38.9%	20.01	5.91	359.4	23.3	99.5%	71.1%	70.7%	8.4	1.17
37	1.10	0.10	13.68	42.6%	20.03	6.30	359.0	23.6	99.5%	70.7%	70.4%	8.6	1.10

el Ratio (A/F)	
Weight (M_d)	30.13
st Gas (N_r):	379.25
o (A/F)	10.92

%HC 0.88

Combustion Efficiency:	98.91%		
Total Input (kJ):	70,206	66,587	(Btu)
Total Output (kJ):	48,143	45,661	(Btu)
Efficiency:	68.57%		
Total CO (g):	61.95		

Moisture of Wood (wet basis):	18.8055
Initial Dry Weight Wt_{do} (kg):	3.54
Moisture Content Dry	23.16

Load Weight (kg):	**4.36**			
Fuel Heating	**HHV**	**LHV**		**HHV**
Value in kj/kg - CV:	**19,810**	**18,329**	Btu/lb	**8522.5**

67.98	1.15	67.53	70249	4.06	6.87	2.74	19810.00	18.81	79.73	21.15	2.76	9.47	0.01	0.27	40.36
% Wet Consumed	Dry Wt. Now	% Dry Comsumed		Fuel Properties				Mw Moisture	Mass Balance (moles/100 mole dry flue gas)					kg Wood per 100 mole dfp	
x	Wt_{dn}	y	Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO_2
0.00	3.54	0.00	0	4.06	6.87	2.74	19810.00	18.81	79.58	21.11	2.13	7.32	0.00	0.21	40.34
1.56	3.49	1.56	2372	4.06	6.87	2.74	19810.00	18.81	79.54	21.10	2.00	6.89	0.00	0.20	40.27
5.20	3.36	5.20	2299	4.06	6.87	2.74	19810.00	18.81	79.30	21.04	1.39	4.75	0.01	0.14	38.84
8.11	3.26	8.11	1970	4.06	6.87	2.74	19810.00	18.81	80.05	21.23	4.29	14.67	0.04	0.43	39.98
10.81	3.16	10.81	1970	4.06	6.87	2.74	19810.00	18.81	79.87	21.19	4.97	16.79	0.15	0.49	38.44
13.72	3.06	13.72	2007	4.06	6.87	2.74	19810.00	18.81	79.67	21.13	5.25	17.57	0.23	0.52	37.38
16.53	2.96	16.53	1897	4.06	6.87	2.74	19810.00	18.81	79.78	21.16	5.24	17.60	0.20	0.52	37.86
19.13	2.87	19.13	1824	4.06	6.87	2.74	19810.00	18.81	80.03	21.23	4.84	16.45	0.09	0.48	39.28
21.73	2.77	21.73	1897	4.06	6.87	2.74	19810.00	18.81	80.14	21.26	4.53	15.50	0.04	0.45	40.16
24.53	2.67	24.53	1897	4.06	6.87	2.74	19810.00	18.81	80.16	21.26	4.52	15.45	0.03	0.45	40.27
27.13	2.58	27.13	1715	4.06	6.87	2.74	19810.00	18.81	80.14	21.26	4.37	14.97	0.02	0.43	40.32
29.42	2.50	29.42	1606	4.06	6.87	2.74	19810.00	18.81	80.07	21.24	4.05	13.89	0.02	0.40	40.42
31.70	2.42	31.70	1569	4.06	6.87	2.74	19810.00	18.81	80.04	21.23	3.91	13.39	0.01	0.39	40.44
33.89	2.34	33.89	1496	4.06	6.87	2.74	19810.00	18.81	80.02	21.23	3.81	13.06	0.01	0.38	40.47
35.97	2.27	35.97	1496	4.06	6.87	2.74	19810.00	18.81	80.02	21.22	3.74	12.82	0.01	0.37	40.56
38.15	2.19	38.15	1460	4.06	6.87	2.74	19810.00	18.81	80.01	21.22	3.70	12.69	0.01	0.37	40.55
40.12	2.12	40.12	1387	4.06	6.87	2.74	19810.00	18.81	79.97	21.21	3.56	12.22	0.00	0.35	40.54
42.10	2.05	42.10	1350	4.06	6.87	2.74	19810.00	18.81	79.94	21.20	3.48	11.94	0.01	0.35	40.49
43.97	1.99	43.97	1241	4.06	6.87	2.74	19810.00	18.81	79.91	21.20	3.40	11.65	0.01	0.34	40.46
45.63	1.93	45.63	1241	4.06	6.87	2.74	19810.00	18.81	79.89	21.19	3.34	11.46	0.01	0.33	40.43
47.51	1.86	47.51	1241	4.06	6.87	2.74	19810.00	18.81	79.86	21.18	3.24	11.12	0.01	0.32	40.35
49.17	1.80	49.17	1168	4.06	6.87	2.74	19810.00	18.81	79.81	21.17	3.12	10.70	0.01	0.31	40.22
50.83	1.74	50.83	1168	4.06	6.87	2.74	19810.00	18.81	79.79	21.16	3.04	10.43	0.01	0.30	40.21
52.49	1.68	52.49	1095	4.06	6.87	2.74	19810.00	18.81	79.78	21.16	3.01	10.32	0.01	0.30	40.22
53.95	1.63	53.95	1058	4.06	6.87	2.74	19810.00	18.81	79.77	21.16	3.01	10.30	0.01	0.30	40.13
55.51	1.58	55.51	1131	4.06	6.87	2.74	19810.00	18.81	79.78	21.16	3.01	10.31	0.01	0.30	40.18
57.17	1.52	57.17	1168	4.06	6.87	2.74	19810.00	18.81	79.80	21.17	3.04	10.42	0.01	0.30	40.31
58.84	1.46	58.84	1095	4.06	6.87	2.74	19810.00	18.81	79.82	21.17	3.08	10.58	0.01	0.31	40.34
60.29	1.41	60.29	1022	4.06	6.87	2.74	19810.00	18.81	79.85	21.18	3.18	10.93	0.01	0.32	40.42
61.75	1.36	61.75	1058	4.06	6.87	2.74	19810.00	18.81	79.86	21.18	3.20	10.98	0.00	0.32	40.45
63.31	1.30	63.31	1168	4.06	6.87	2.74	19810.00	18.81	79.87	21.19	3.18	10.91	0.00	0.32	40.53
65.07	1.24	65.07	1168	4.06	6.87	2.74	19810.00	18.81	79.86	21.18	3.17	10.88	0.00	0.32	40.53
66.63	1.18	66.63	1095	4.06	6.87	2.74	19810.00	18.81	79.88	21.19	3.26	11.18	0.01	0.32	40.45
68.19	1.13	68.19	1131	4.06	6.87	2.74	19810.00	18.81	79.92	21.20	3.42	11.75	0.01	0.34	40.49
69.85	1.07	69.85	1241	4.06	6.87	2.74	19810.00	18.81	79.94	21.20	3.46	11.87	0.00	0.34	40.51
71.73	1.00	71.73	1168	4.06	6.87	2.74	19810.00	18.81	79.96	21.21	3.56	12.23	0.01	0.35	40.45
73.18	0.95	73.18	1095	4.06	6.87	2.74	19810.00	18.81	79.94	21.20	3.48	11.96	0.01	0.35	40.50
74.84	0.89	74.84	1131	4.06	6.87	2.74	19810.00	18.81	79.92	21.20	3.39	11.65	0.00	0.34	40.50

Moisture Content M_{Cwb}: 18.80554

Dry kg : 3.54
CA: 49
HY: 7
OX: 43.9

LHV
7885.2

42.76	**0.45**	**0.00**	**327.32**	**34.53**	**12.87**	**592.96**	**12628.69**	**9139.33**	**8797.70**	**8719.01**	**12955.59**	**10499.38**	**296.61**	**40716.81**	**27063.32**
Moles per kg of Dry Wood					**Moisture**	**Stack Temp**	**Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent**						**Room Temp**		
O_2	**CO**	**HC**	**N_2**	**H_2O**	**Present**	**K**	**CO_2**	**O_2**	**CO**	**N_2**	**CH_4**	**H_2O**	**K**	**CO_2**	**O_2**
55.60	0.49	-0.02	375.76	34.56	12.87	618.26	13822.02	9980.03	9601.12	9516.49	14229.97	11456.32	295.21	557.57	554.85
61.74	0.56	-0.02	398.78	34.56	12.87	578.65	11964.45	8705.81	8392.45	8314.83	12170.81	10019.62	295.21	481.79	537.47
108.83	1.88	0.10	572.97	34.33	12.87	611.43	13494.09	9755.93	9388.78	9305.33	13864.58	11204.00	295.32	524.04	1061.76
5.97	0.73	0.10	187.36	34.33	12.87	664.09	16017.58	11463.84	11002.61	10911.14	16712.52	13120.27	295.48	640.43	68.47
0.16	2.07	0.30	161.37	33.92	12.87	691.65	17364.80	12363.40	11849.27	11754.32	18259.75	14124.51	295.71	667.46	1.95
-1.45	3.00	0.44	152.54	33.64	12.87	704.04	17987.84	12777.92	12238.99	12142.54	18978.57	14586.63	295.54	672.33	-18.49
-1.65	2.58	0.38	153.04	33.77	12.87	700.43	17803.39	12655.11	12123.51	12027.50	18765.97	14449.68	295.65	673.96	-20.82
0.81	1.34	0.19	166.03	34.14	12.87	699.65	17764.63	12629.38	12099.33	12003.42	18721.12	14421.02	295.65	697.85	10.22
3.29	0.58	0.08	177.70	34.37	12.87	702.48	17897.46	12716.60	12181.01	12084.85	18876.90	14517.77	295.87	718.71	41.90
3.41	0.48	0.06	178.44	34.39	12.87	699.54	17744.27	12614.26	12084.67	11988.91	18701.09	14403.50	296.04	714.60	43.02
4.91	0.43	0.06	184.24	34.41	12.87	693.82	17461.74	12426.76	11908.52	11813.41	18374.09	14194.67	295.98	704.10	61.06
8.62	0.36	0.04	198.51	34.45	12.87	679.15	16736.50	11943.34	11453.76	11360.48	17539.35	13655.34	295.98	676.44	103.01
10.58	0.34	0.03	205.96	34.46	12.87	670.59	16316.33	11662.24	11189.04	11096.88	17057.98	13341.31	295.98	659.88	123.37
11.95	0.32	0.03	211.21	34.47	12.87	661.48	15862.73	11357.07	10901.18	10810.34	16542.07	12999.66	296.21	641.90	135.74
12.96	0.24	0.01	215.24	34.49	12.87	657.21	15654.57	11217.12	10769.19	10678.95	16305.11	12843.02	296.21	634.88	145.33
13.55	0.25	0.01	217.44	34.49	12.87	652.98	15449.63	11079.15	10639.02	10549.38	16072.23	12688.51	296.21	626.45	150.07
15.75	0.26	0.01	225.75	34.50	12.87	648.04	15212.42	10919.41	10488.30	10399.37	15802.73	12509.63	296.15	616.76	171.95
17.15	0.30	0.02	230.90	34.49	12.87	643.76	15012.28	10784.88	10361.44	10273.08	15574.83	12359.07	295.98	607.88	184.91
18.67	0.34	0.02	236.55	34.48	12.87	640.26	14833.13	10662.74	10245.79	10158.05	15374.61	12221.66	296.26	600.09	199.04
19.68	0.36	0.02	240.30	34.48	12.87	636.98	14671.37	10552.85	10141.83	10054.64	15192.94	12098.19	296.37	593.12	207.68
21.65	0.44	0.03	247.52	34.46	12.87	635.54	14602.04	10505.89	10097.45	10010.48	15114.80	12045.49	296.37	589.14	227.41
24.19	0.55	0.04	256.80	34.44	12.87	634.37	14541.86	10464.71	10058.41	9971.66	15047.87	11999.09	296.48	584.83	253.15
25.99	0.56	0.04	263.57	34.44	12.87	628.98	14290.31	10294.65	9897.78	9811.81	14763.55	11808.37	296.32	574.62	267.53
26.71	0.55	0.04	266.35	34.45	12.87	624.48	14071.36	10145.48	9756.55	9671.35	14518.59	11640.59	296.43	566.01	271.03
26.85	0.63	0.05	266.62	34.42	12.87	625.87	14141.80	10193.76	9802.34	9716.87	14596.77	11695.02	296.32	567.54	273.70
26.78	0.59	0.04	266.49	34.44	12.87	621.93	13945.44	10059.43	9675.02	9590.27	14378.31	11543.70	296.54	560.35	269.40
26.05	0.48	0.03	264.05	34.47	12.87	617.54	13745.39	9923.95	9546.98	9462.87	14152.72	11391.66	296.32	554.05	258.50
24.99	0.45	0.02	260.15	34.47	12.87	617.32	13734.85	9916.77	9540.18	9456.10	14140.93	11383.58	296.32	554.08	247.85
22.79	0.37	0.02	252.04	34.49	12.87	618.15	13778.63	9946.99	9568.90	9484.65	14189.04	11417.73	296.21	556.96	226.69
22.48	0.35	0.01	250.94	34.49	12.87	614.48	13598.42	9823.54	9451.84	9368.26	13988.92	11278.61	296.37	550.04	220.83
22.88	0.28	0.00	252.68	34.52	12.87	612.93	13514.19	9765.11	9396.24	9313.02	13896.99	11212.46	296.65	547.73	223.46
23.08	0.28	0.00	253.41	34.51	12.87	616.43	13679.97	9878.21	9503.35	9419.55	14082.11	11339.73	296.65	554.39	228.00
21.25	0.35	0.02	246.31	34.49	12.87	621.93	13941.20	10056.16	9671.82	9587.10	14374.41	11539.86	296.65	563.88	213.74
18.15	0.31	0.02	234.66	34.49	12.87	629.26	14292.99	10295.48	9898.30	9812.39	14768.72	11808.90	296.59	578.65	186.82
17.48	0.29	0.01	232.21	34.50	12.87	634.37	14539.74	10463.07	10056.81	9970.08	15045.92	11997.17	296.54	589.02	182.88
15.73	0.34	0.02	225.44	34.47	12.87	635.87	14611.68	10511.82	10102.89	10015.92	15126.97	12051.89	296.54	591.04	165.35
17.05	0.30	0.02	230.57	34.49	12.87	632.59	14456.69	10406.96	10003.82	9917.34	14951.96	11934.25	296.48	585.49	177.47
18.66	0.30	0.01	236.63	34.49	12.87	632.15	14424.81	10384.34	9982.16	9895.86	14918.27	11908.45	296.76	584.15	193.77

SUMS					AVERAGE	SUMS						
10574.68	213243.46	-193.90	150431.41	56069.26	6223.81	22063.12	768.40	21294.72	48185.51	768.61	61.95	2.56
Energy Losses (kJ/kg of Dry Fuel)					Total							
Flue Gas Constituent					Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO	N_2	CH_4	H_2O Comb	H_2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
143.64	3575.95	-16.15	1915.41	713.18	7444.44	0.00	0	0.00	0	0	0.00	0.00
163.62	3315.80	-15.77	1865.72	694.69	7043.32	843.29	17	826.12	1529	17	1.88	-0.03
549.25	5331.66	89.26	1893.82	709.93	10159.72	1178.98	72	1107.09	1120	72	6.10	0.18
215.37	2044.33	88.13	1959.78	734.59	5751.09	572.04	29	542.82	1398	29	2.04	0.15
611.18	1896.78	274.26	1970.46	747.51	6169.61	613.67	85	528.59	1357	85	5.77	0.48
884.66	1852.26	399.22	1970.07	753.46	6513.51	659.88	126	534.37	1347	126	8.50	0.71
760.87	1840.71	344.00	1972.55	751.70	6322.95	605.63	102	503.48	1292	102	6.91	0.58
394.26	1992.97	175.82	1993.18	751.33	6015.63	554.03	51	503.35	1270	51	3.45	0.29
170.17	2147.47	71.57	2009.91	752.57	5912.30	566.30	22	543.96	1331	22	1.55	0.12
140.56	2139.26	58.12	2007.71	751.10	5854.38	560.75	18	542.38	1337	18	1.28	0.10
128.15	2176.55	50.37	2001.51	748.41	5870.15	508.20	15	493.28	1207	15	1.05	0.08
105.12	2255.21	34.64	1984.94	741.47	5900.84	478.25	11	467.30	1127	11	0.81	0.05
99.17	2285.54	29.14	1974.82	737.43	5909.35	468.05	10	458.23	1101	10	0.75	0.04
93.86	2283.25	24.78	1963.59	733.04	5876.15	443.77	9	435.11	1052	9	0.68	0.03
71.12	2298.51	13.09	1959.66	731.02	5853.62	442.07	6	435.93	1054	6	0.51	0.02
73.42	2293.88	13.28	1954.30	729.03	5840.44	430.32	6	424.14	1029	6	0.52	0.02
75.39	2347.65	10.97	1948.42	726.73	5897.88	412.82	6	406.98	974	6	0.50	0.01
88.97	2372.04	15.06	1942.72	724.80	5936.38	404.58	7	397.73	946	7	0.58	0.02
98.95	2402.90	17.35	1937.70	723.03	5979.04	374.45	7	367.40	866	7	0.59	0.02
106.68	2416.16	19.36	1933.19	721.44	5997.63	375.62	8	367.97	865	8	0.64	0.02
128.09	2477.82	26.14	1930.53	720.76	6099.90	382.02	9	372.66	859	9	0.77	0.03
162.18	2560.74	37.79	1927.49	720.16	6246.36	368.18	11	356.76	799	11	0.91	0.04
164.47	2586.08	36.24	1921.11	717.71	6267.77	369.44	11	357.98	798	11	0.93	0.04
161.26	2575.96	33.76	1915.64	715.55	6239.20	344.77	10	334.32	750	10	0.85	0.03
184.96	2590.74	44.23	1916.23	716.25	6293.65	336.19	12	324.32	722	12	0.94	0.04
172.06	2555.72	38.54	1911.71	714.30	6222.10	355.29	12	343.62	776	12	0.94	0.04
139.39	2498.69	24.91	1908.14	712.35	6096.03	359.32	9	349.93	808	9	0.79	0.03
130.63	2460.04	22.50	1908.16	712.24	6035.50	333.52	8	325.31	761	8	0.69	0.02
108.96	2390.53	15.94	1910.14	712.68	5921.91	305.43	6	299.18	716	6	0.54	0.01
102.00	2350.85	13.27	1905.67	710.89	5853.55	312.68	6	306.71	746	6	0.52	0.01
81.40	2353.19	3.40	1904.59	710.04	5823.83	343.28	5	338.43	824	5	0.46	0.00
82.60	2387.04	3.64	1908.96	711.68	5876.32	346.37	5	341.45	821	5	0.47	0.00
101.98	2361.38	15.01	1914.47	714.25	5884.72	325.19	6	318.92	770	6	0.54	0.01
91.15	2302.59	14.63	1923.79	717.72	5815.36	332.07	6	326.21	799	6	0.50	0.01
84.28	2315.13	12.49	1930.55	720.14	5834.49	365.40	6	359.53	875	6	0.50	0.01
99.17	2258.01	21.74	1931.30	720.84	5787.45	341.13	7	334.23	827	7	0.56	0.02
87.04	2286.62	14.36	1928.15	719.33	5798.45	320.42	5	314.99	774	5	0.46	0.01
88.48	2341.68	12.67	1927.47	719.00	5867.23	335.03	6	329.43	796	6	0.48	0.01

Appendix B: Labels & Manuals

CAUTION - ATTENTION

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

CHAUD EN CAS DE FONCTIONNEMENT, NE PAS TOUCHER, GARDER LES ENFANTS ET LES VÊTEMENTS. CONTACT PEUT CAUSER DES BRÛLURES DE LA PEAU. GARDER FOURNITURE ET AUTRES MATÉRIAUX COMBUSTIBLES LOIN DU FOYER. VOIR LA PLAQUE DE NOM ET LES INSTRUCTIONS.

LA CASTELLAMONTE

c UL us LISTED

MH61305

SERIAL NO.

Solid Fuel Room Heater

Issue No. _____

LISTED ROOM HEATER SOLID FUEL TYPE

For use with solid fuel only

PREVENT HOUSE FIRES

Install and use only in accordance with manufacturer's installation and operating instructions. Contact local building or fire officials about restrictions and installation inspections in your area. Do not obstruct the space beneath heater.

Refer to manufacturer's instructions and local codes for precautions required for passing chimney through a combustible wall or ceiling and maximum offsets.

Inspect and clean chimney frequently – Under Certain Conditions of Use Creosote Buildup May Occur Rapidly.

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

Replace glass only with 4mm ceramic available from your dealer.

Do not use grate or elevate fire. Build wood fire directly on earth.

Do not overfire – if heater or chimney connector glows, you are overfiring.

OPERATE ONLY WITH DOORS CLOSED.

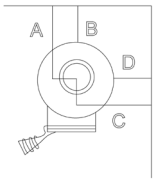
Open only to add fuel to the fire.

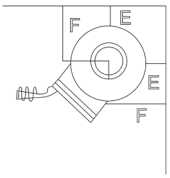
Do NOT operate before fully assembling components.

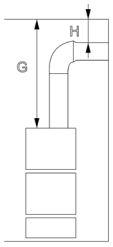
WARNING - ATTENTION: only use approved wood fuel listed in owner's manual. Burning any other fuel will void warranty - N'utilisez que du bois approuvé figurant dans le manuel du propriétaire. Le brûlage de tout autre carburant annulera la garantie.

VENT SPECIFICATIONS:

SINGLE WALL: six inch (6 inches) (152mm) diameter, minimum 24 MSG black or blued steel connector pipe, with a listed factory-built UL103HT* Class A* chimney, suitable for use with solid fuels, or a masonry chimney and the referenced clearances. In Canada must comply with Standard CAN/ULC-S629-M87 for the 650 C Factory-Built Chimneys.







MIN CLEARANCES TO COMBUSTIBLE MATERIALS: inches & (Millimeters)

NOTE: All "A", "C" and "F" Dimensions are to the center diameter of flue collar.

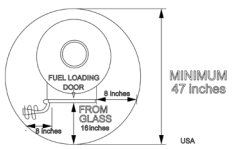
INSTALLATION: FULL VERTICAL

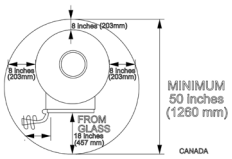
	A	B	C	D	E	F	G	H*	I*	J
SINGLE WALL PIPE	21	8	21	8	8	21	44			

INSTALLATION HORIZONTAL WITH MINIMUM 2 FT VERTICAL OFF STOVE TOP

	A	B	C	D	E*	F*	G	H	I*	J
SINGLE WALL PIPE	21	8	21	8	8	21	44	23		

FLOOR PROTECTION: floor protector must be ½ in. minimum non-combustible material extending beneath heater and to front/sides/rear as indicated on the diagram below. Exceptions: non-combustible floor protections must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side.





This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual. To be installed as a freestanding space heater with the clearances in the manufacturer's installation instructions. Not to be installed in any fireplace. This wood heater uses a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed

Average particulate emissions: g/hr: 1,1 - U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emission standards - Emissions tested to EPA Method 28R - Manufactured in Italy by: LA CASTELLAMONTE di R. Perino SAS – Via Casari 13, 10081 Castellamonte (To) – Italy www.lacastellamonte.it

LA CASTELLAMONTE

Stufe da sempre. Per sempre.
Stoves since 1975.

INSTRUCTION MANUAL

FOR INSTALLATION

USE AND MAINTENANCE

TYPE	**RNO 200**
MODEL	

SAVE THESE INSTRUCTIONS

INDEX

SAFETY NOTICE: IF THIS APPLIANCE IS NOT PROPERLY INSTALLED, OPERATED AND MAINTAINED, A HOUSE FIRE MAY RESULT. TO REDUCE THE RISK OF FIRE, FOLLOW THE INSTALLATION INSTRUCTIONS. FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY OR EVEN DEATH.
CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA .
This wood heater uses a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed. Catalytic filter instructions on page 27

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.

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. If you have any doubt, please contact the selling Firm or the Producer.

THE CHIMNEY FLUE

The chimney flue: our stoves' "engine"

The chimney flue is a key element for the optimal functioning of our stoves.

General Rules

- Each stove must have its own, adequately insulated, chimney flue to the roof; through it the smoke will flow outside, by natural draft. **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**

- the chimney flue must be separated from combustible or flammable materials (wooden roofs, matchboards and any plastic pipes) through a suitable insulating material, for at least 30 cm (12 inches) all around. The insulation is also recommended when the chimney is installed inside a masonry. This will prevent the cold air from creeping between the steel pipe and the wall. Furthermore, a good insulation will be needed in case of passage in an open floor.

- If the chimneypot is installed on a roof lower than a higher nearby roof, the distance must be more than 5 meters (16,50 ft). FIG. 4A

- The inner section of the chimney flue shall be uniform and without narrowings, possibly round shaped, with smooth walls and corners not any higher than 45°.

- The section of the chimney flue must be **bigger than** the diameter of the stove smoke pipe 150mm (6 inches). For our stoves we recommend a chimney flue diameter from 160 mm to 180 mm (6 to 7 inches) and a chimney flue height of no less than 2,5 meters (8 ft).

- The connection between the stove smoke pipe and the chimney flue in the wall must be done through a pipe fitting (90° or 135°). Moreover, the connection must not have more than two 90° bends and it must have an horizontal length of no more than 2 meters (6,50 ft) with a gradient of 5%. We recommend that the chimney flue is equipped with a condensate and soot collection chamber, which shall end with an airtight door, accessible for cleaning. This will avoid unpleasant smells, bad draft and frequent cleaning of the stove.

FIG. 2 A

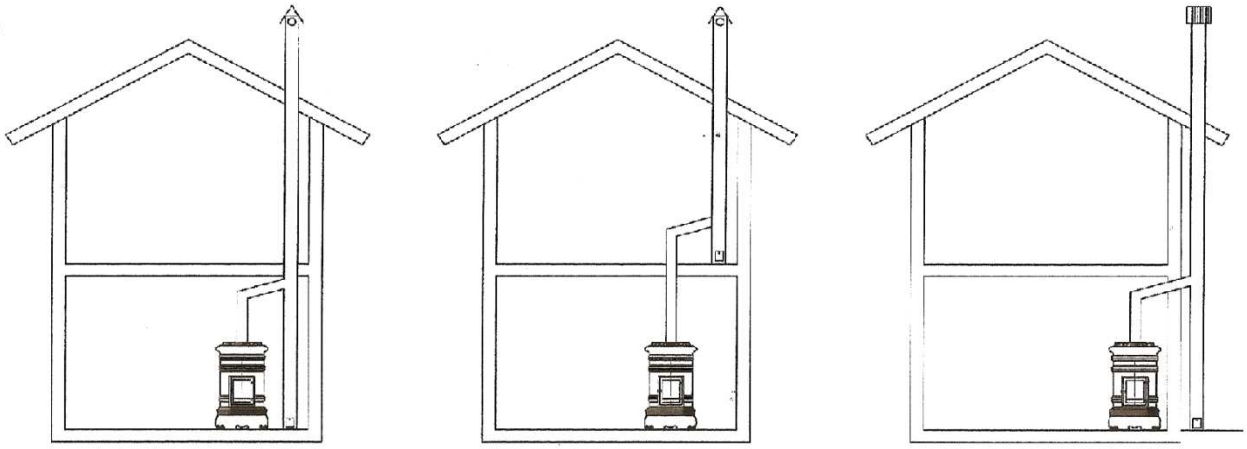
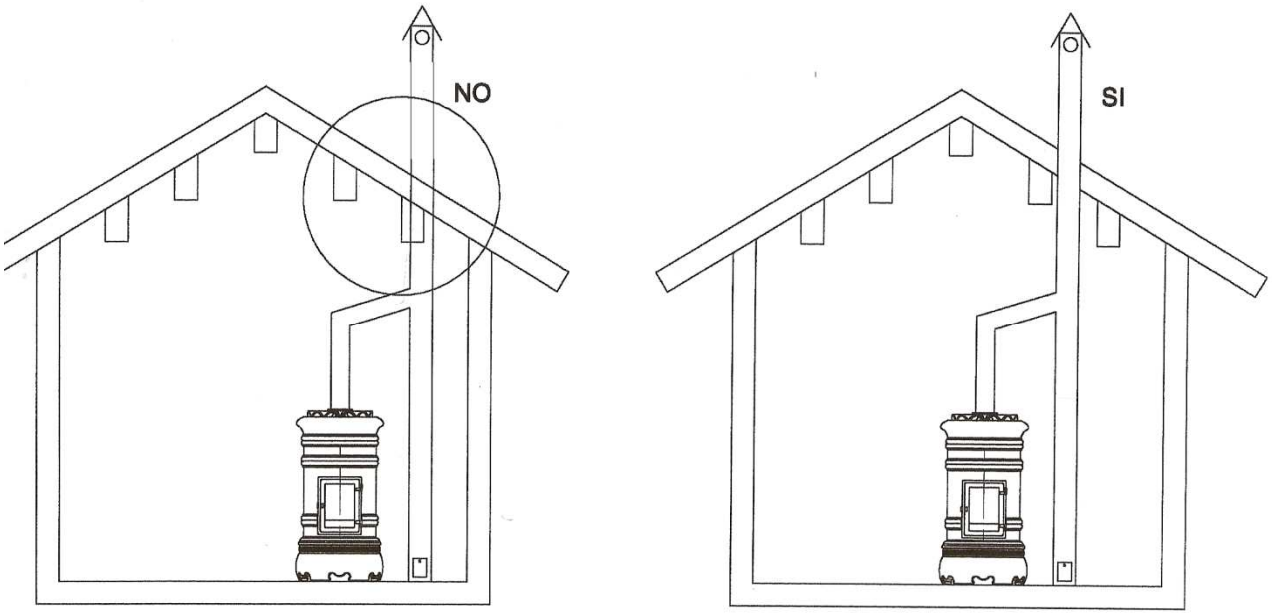


FIG. 2 B



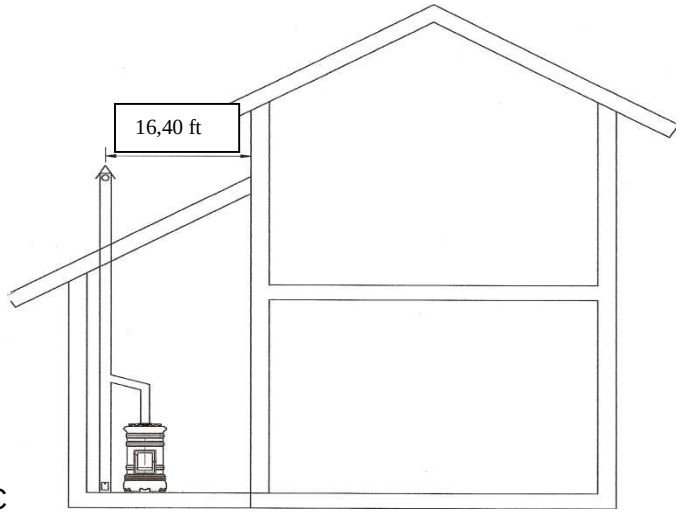


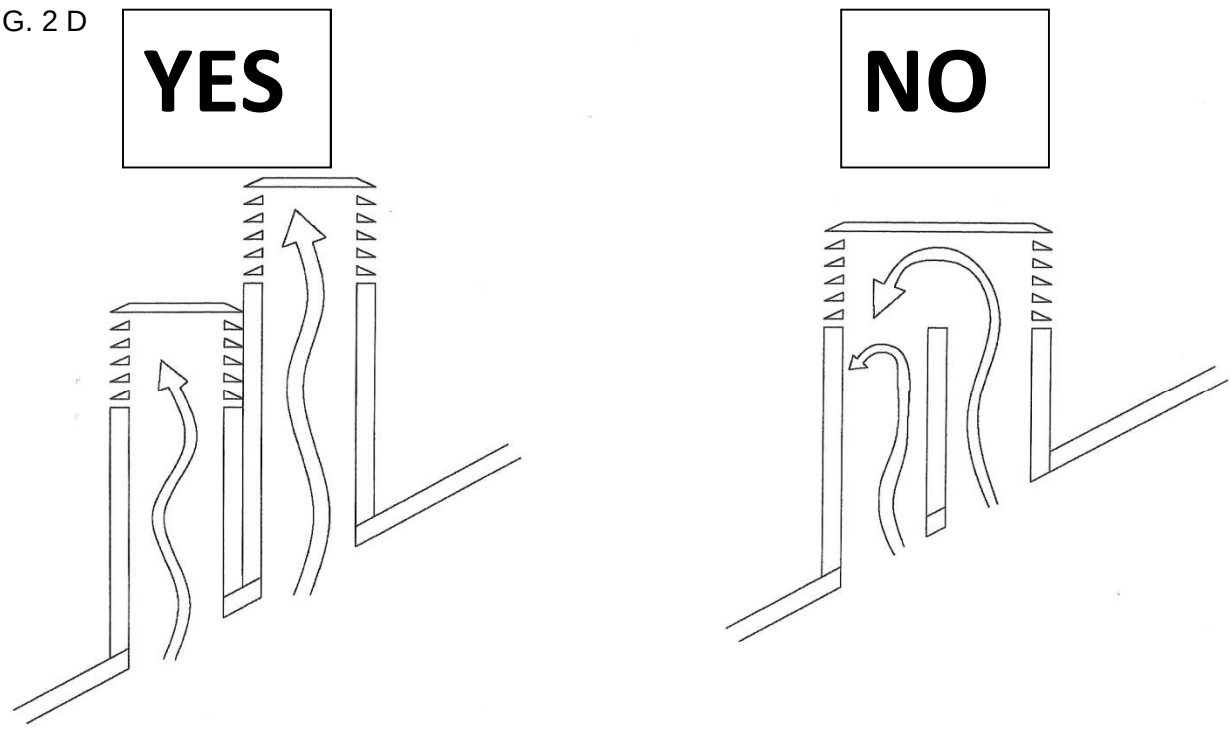
FIG. 2 C

The Chimneypot

The chimney pot is placed on top of the chimney and helps to expell the smoke. The fundamental characteristics of the chimneypot are:

- It must have the same diameter of the chimney flue
- useful outlet section not less than twice the minimum of the chimney flue (ex. Chimney flue section 200 cm^2 -31 $inches^2$ – total output section holes > 400 cm^2 ¯ 62 $inches^2$)
- It must prevent, through an appropriate construction, the entrance into the chimney flue of rain and snow. In very windy areas, it is recommended to install an appropriate chimneypot.
- It must be insulated, like the chimney flue, until its holes.
- In case the brick chimney flue has an internal pipe, this pipe shall continue until the holes in the chimneypot.
- Avoid the output of two chimneys flues in the same chimneypot. (fig. 2D)
- If the chimneypot cannot be placed on the ridge of the roof, it should at least be positioned so as to ensure the dispersion of smoke outside the reflux area, in order to prevent the formation of back pression in the chimney, which can compromise the exit of the smoke into the atmosphere.

FIG. 2 D



CHIMNEY SYSTEMS

- DO NOT INSTALL A FLUE DAMPER
- DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE

A. Venting Systems

The venting system consists of:
• A chimney connector (also known as flue or stove pipe)
• A chimney
• Thimble
These get extremely hot during use. In the event of a creosote fire, temperatures inside the chimney may exceed 2000°F (1100°C). To protect against the possibility of a house fire:
• Chimney connector and chimney **must be properly installed and maintained.**
• An approved thimble must be used when a connection is made through a combustible wall to a chimney.
• A chimney support package must be used when a connection is made through the ceiling to a factory built chimney.
• An approved thimble and chimney support package are **absolutely necessary** to provide safe clearances to combustible wall and ceiling material.

Thimble

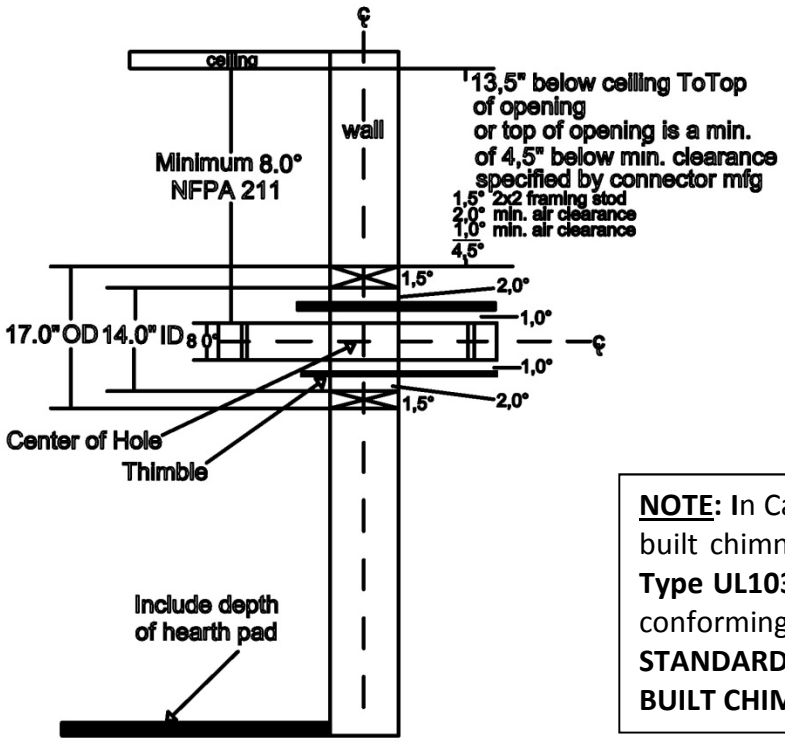
A thimble is a manufactured or site-constructed device installed in combustible walls through which the chimney connector passes to the chimney.

• It is intended to keep the walls from igniting.
• Site constructed thimbles must meet NFPA 211 Standards.
• Factory-built must be suitable for use with selected chimney and meet UL103 Type HT Standards.
• Follow instructions provided by the manufacturer for manufactured thimbles for masonry chimney and factory-built chimneys.

Instructions:

1. Open inside wall at proper height for the chimney connector to entry the masonry chimney.
2. Entry hole to masonry chimney must be lined with an 8 inch (203mm) minimum diameter clay liner, or equivalent, secured with refractory mortar.
3. Construct a 17 inch x 17 inch (432mm x 432mm) outside dimension frame from 2 x 2 framing lumber to fit into wall opening. Inside opening of frame should be no less than 14 inch x 14 inch (356mm x 356mm).
4. Attach the wall spacer to the chimney side of the frame.
5. Nail the frame into the wall opening. The spacer should be on the chimney side.
6. Insert the section of the solid insulated chimney into the outer wall of the masonry chimney.
7. Tightly secure the length of the solid insulated chimney with the wall band to the masonry chimney.
8. Insert a section of chimney connector into the chimney. Make sure it does not protrude past the edge of the clay chimney liner inside the chimney.
9. Seal the end of the chimney connector to the clay liner with refractory mortar.
10. Install trim collar around the sold pack chimney section.

FIGURE 3A



NOTE: In Canada when using a factory-built chimney it must be safety listed, **Type UL103 HT (2100oF) CLASS "A"** or conforming to **CAN/ULC-S629M, STANDARD FOR 650oC FACTORY-BUILT CHIMNEYS.**

FIGURE 3B - Solid Pack Chimney with metal Supports as a Thimble

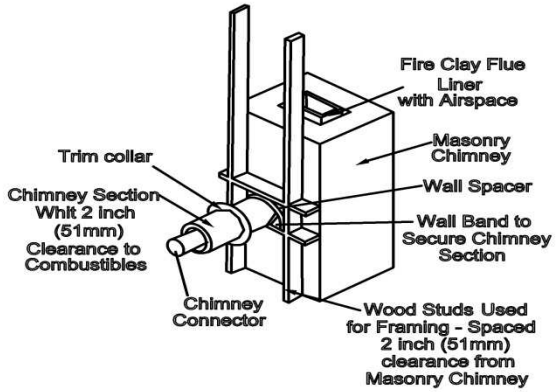
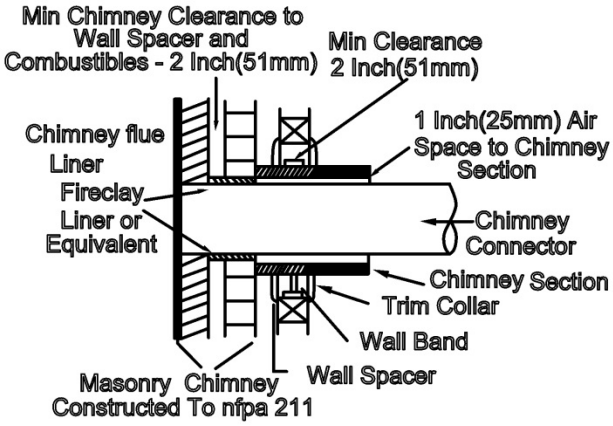


FIGURE 3C



B. Chimney Systems

- The chimney connector joins the stove to the chimney.
- It must be a 6 inch (152mm) minimum diameter 24 gauge mild steel black or 26 gauge blued steel.
- Or an approved air-insulated double wall venting pipe.

Single wall connector or stove pipe

- Must be at least 24 gauge mild steel or 26 gauge blue steel.
- Sections must be attached to the appliance and to each other with the crimped (male) end pointing toward the stove.
- All joints, including the connection at the flue collar, should be secured with 3 sheet metal screws.
- Follow the minimum clearances to combustibles Factory-built chimney connector (vented).

Factory-built chimney connector (vented)

- The listed connectors must conform to each other to ensure a proper fit and seal.

C. Installing Chimney Components

Single wall connector or stove pipe

This must be at least 24 gauge mild steel or 26 gauge blue steel. The sections must be attached to the appliance and to each other with the crimped (male) end pointing toward the stove. All joints, including the connection at the flue collar, should be secured with 3 sheet metal screws. Make sure to follow the minimum clearances to combustibles.

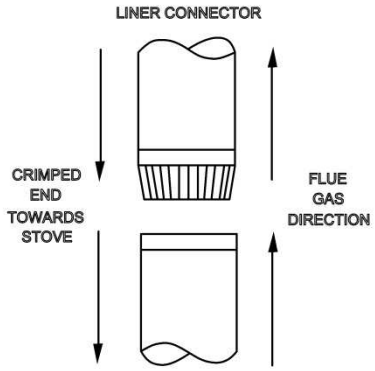
CANADA: Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor or ceiling. Where passage through the wall or partition of combustible construction is

desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid Fuel Burning Appliances and Equipment.

Factory built listed chimney connector (vented)

The listed connectors must conform to each other to ensure a proper fit and seal.

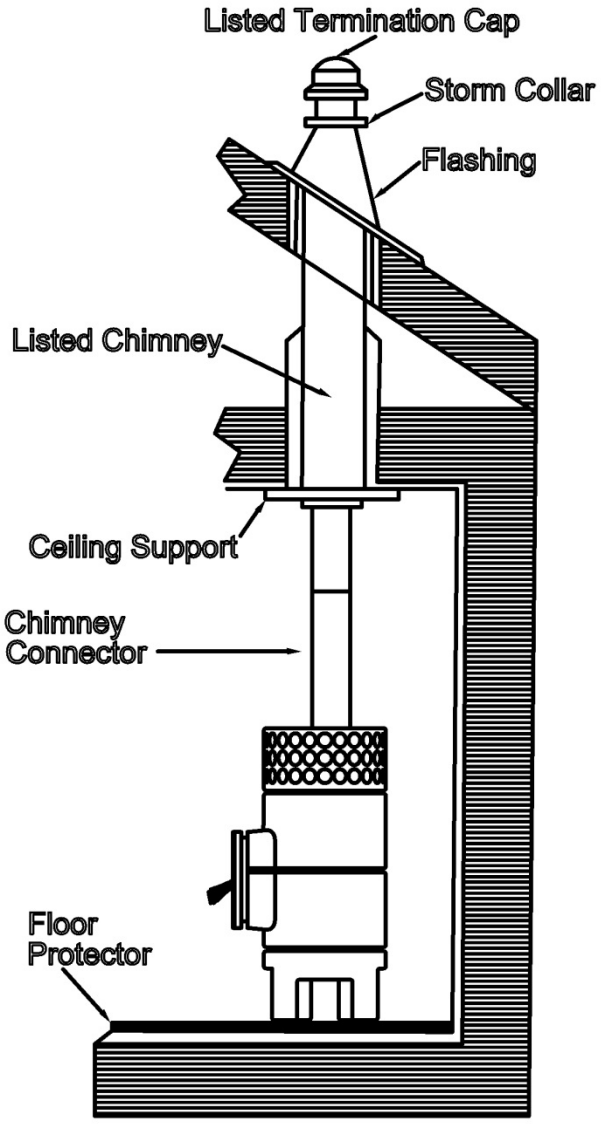
FIGURE 3D



WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this information manual provided with the appliance. For assistance or additional information consult a qualified installer, service agency or your dealer.

FIGURE 3F – Factory built interior chimney



WARNING

Fire Risk – do NOT pack insulation or other combustibles between spacers. ALWAYS maintain specified clearances around venting and spacers. Install spacers as specified.

FAILURE TO KEEP INSULATION OR OTHER MATERIAL AWAY FROM VENT PIPE MAY CAUSE FIRE.

WARNING

Fire Risk – Inspection of chimney:

- chimney must be in good condition
- meets minimum standard of NFPA 211
- factory-built chimney must be 7-8 (180-200mm) UL 103 HT.

WARNING

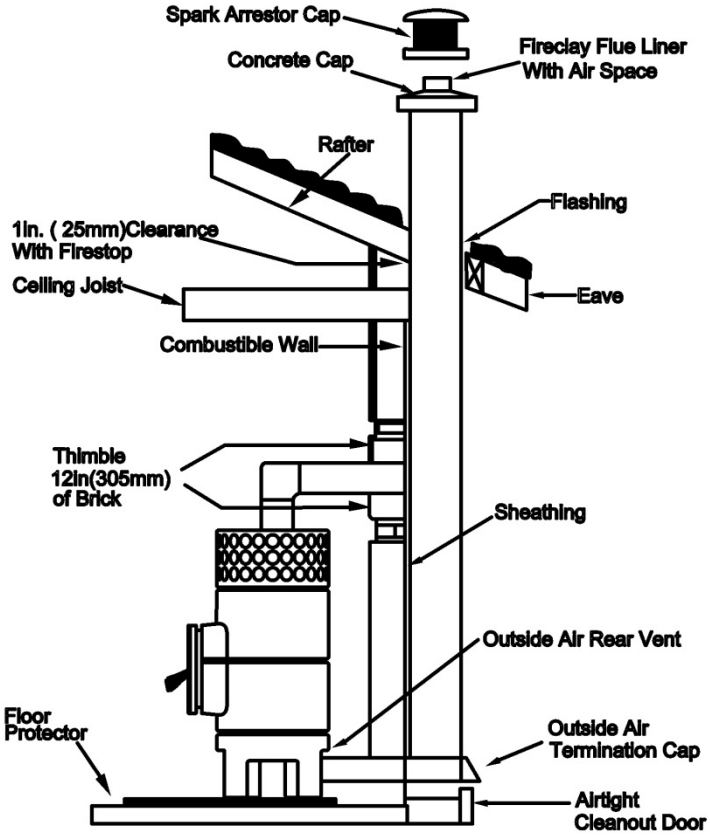
ASPHYXIATION RISK!

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

• DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

May allow flue gases to enter the house.

FIGURE 3G



WARNING

Fire risk – When lining air-cooled factory-built chimneys:

- run chimney liner approved to UL 1777 Type HT requirements (2100 degrees F)
- re-install original factory built chimney cap ONLY
- DO NOT block cooling air openings in chimney
- blocking cooling air will overheat the chimney

E. Masonry Chimney Liner

For optimal performance, masonry chimneys used to vent this appliance should be: **1. Lined with a 6 to 8 inches (160 – 200 mm) stainless steel liner.**

• Installations into a clay flue without a stainless steel liner may reduce draw which affects performance, cause the glass to darken and produce excessive creosote.

2. It is recommended that a chimney with a larger diameter than 6-8 inches (160-200 mm) be relined.

- the oversized flue can cause poor performance and contribute to the accumulation of creosote.

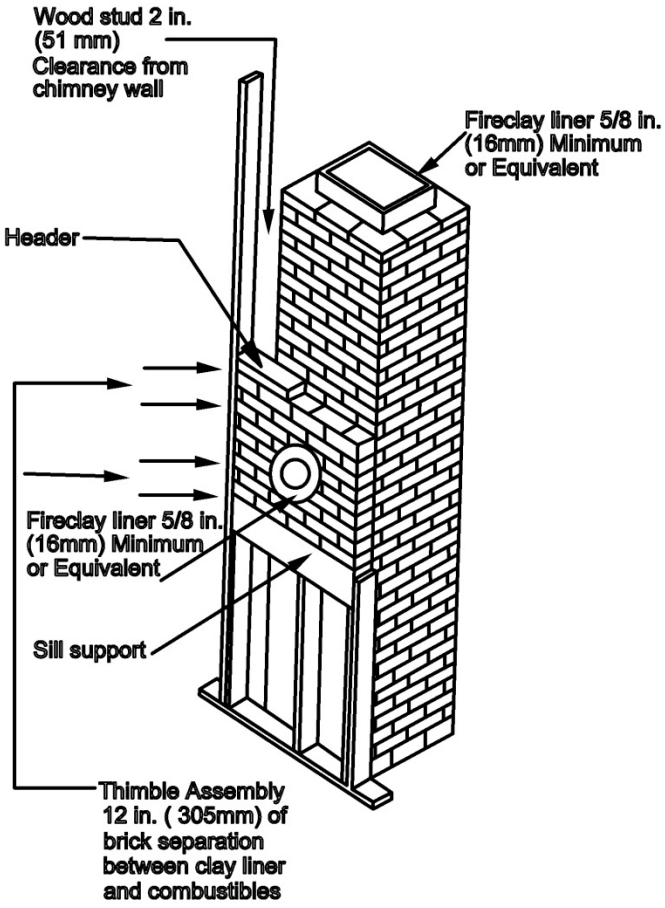
3. Have the chimney cleaned before the appliance is installed and operated.

The following bullets list the more critical requirements for a properly constructed chimney:

- The masonry wall of the chimney, if brick or modular block, must be a minimum of 4 inches (102mm) nominal thickness.
- A chimney of rubble stone must be at least 12 inches (305mm) thick.
- The chimney must have a fire clay flue liner (or equivalent) with a minimum thickness of 5/8 inch (16mm) and must be installed with refractory mortar.
- An equivalent liner must be a listed chimney liner system or other approved material.
- Since an oversized flue contributes to the accumulation of creosote, the size of the flue should be checked to determine that it is not too large for the appliance.
- The chimney should also be checked to ensure it meets the minimum standard of the National Fire Protection Association (NFPA) Standard 211.
- A chimney support package must be used when a connection is made through the ceiling to a factory built chimney.
- An approved thimble and chimney support package are **absolutely necessary** to provide safe clearances to combustible wall and ceiling material.

***NOTICE*: In Canada when using a factory-built chimney it must be safety listed, Type UL103 HT (2100°F)[1149°C] CLASS "A" or conforming to CAN/ULCS629M, STANDARD FOR 650°C FACTORY-BUILT CHIMNEYS.**

FIGURE 3H



CHIMNEY TERMINATION REQUIREMENTS

Follow manufacturer's instructions for clearance, securing flashing and terminating the chimney.

- Must have an approved and Listed cap
- Must not be located where it will become plugged by snow or other material
- Must be located away from trees or other structures

D. Locating Your Stove & Chimney

Location of the appliance and chimney will affect performance. The chimney should:

- Install through the warm space enclosed by the building envelope. This helps to produce more draft, especially during lighting and die down of the fire.
- Penetrate the highest part of the roof. This minimizes the affects of wind turbulence and down drafts.
- Consider the appliance location in order to avoid floor and ceiling attic joists and rafters.
- Locate termination cap away from trees, adjacent structures, uneven roof lines and other obstructions.

Your local dealer is the expert in your geographic area and can usually make suggestions or discover solutions that will easily correct your flue problem.

***NOTICE*:**

Chimney performance may vary.

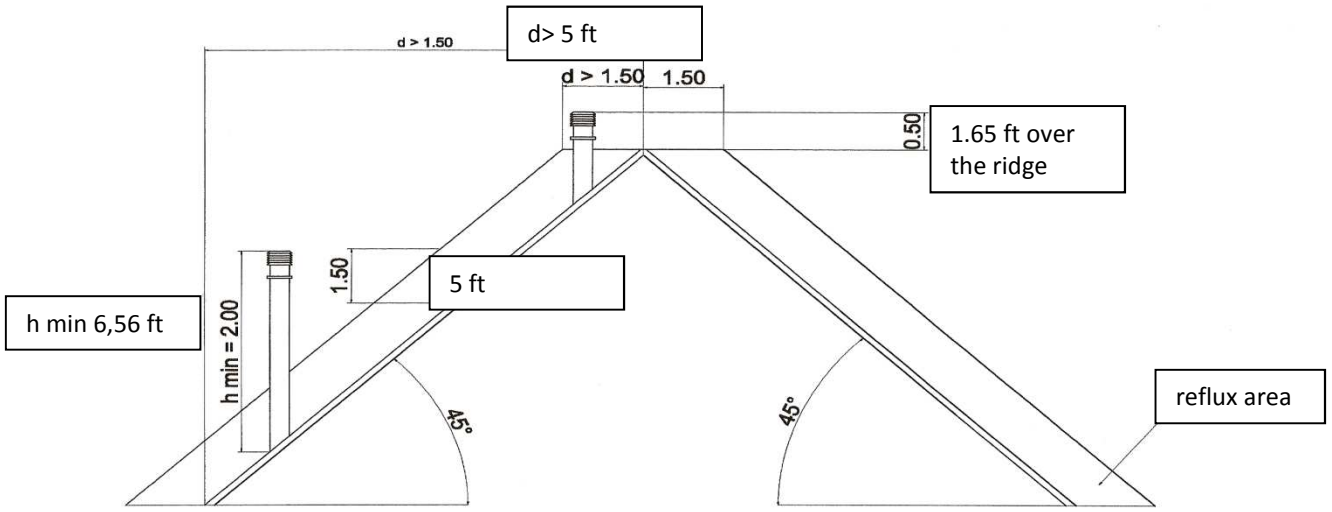
Trees, buildings, roof lines and wind conditions affect performance.

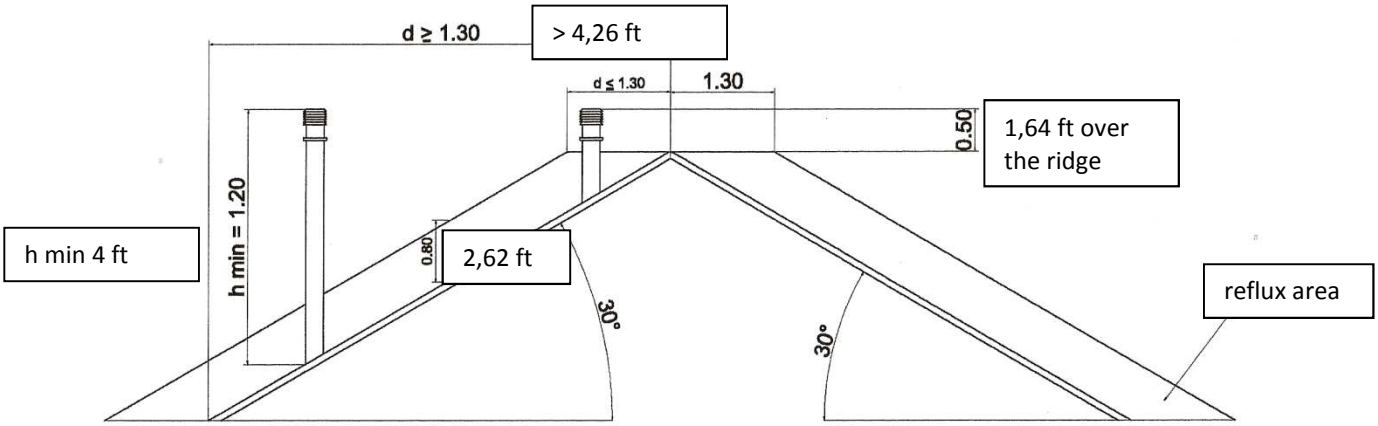
Chimney height may need adjustment if smoking or overdraft occurs.

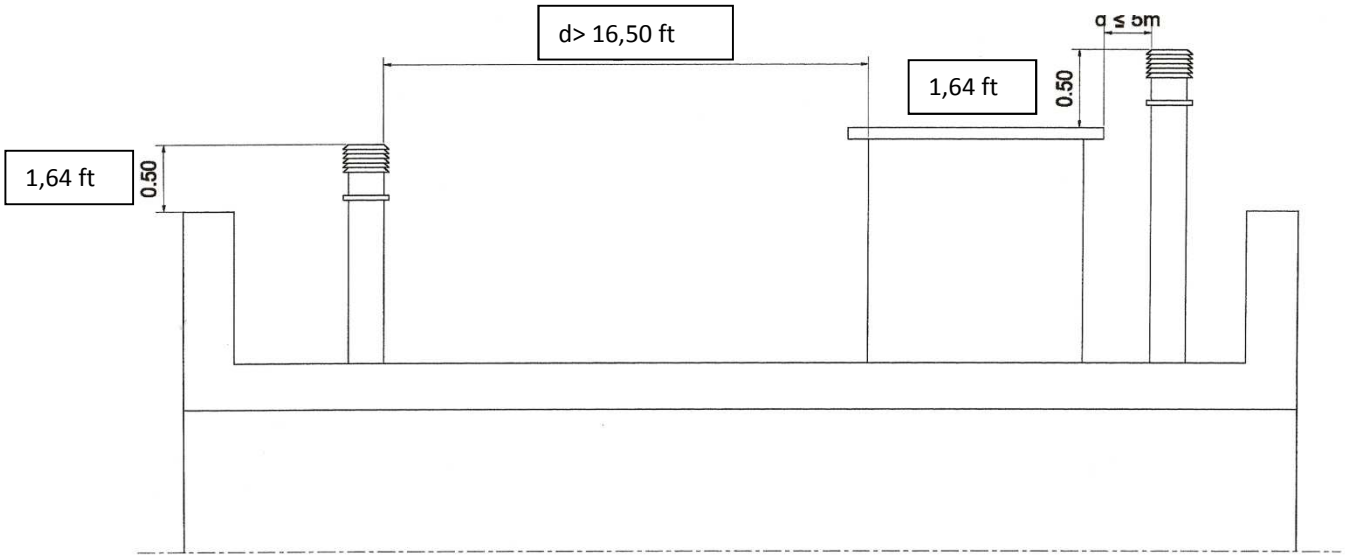
These are safety requirements and are not meant to assure proper flue draft.

This appliance is made with a 6 inch (152mm) diameter chimney connector as the flue collar on the unit. Changing the diameter of the chimney can affect draft and cause poor performance.

FIG. 4A




d ≥ 1.30
> 4,26 ft
d ≤ 1.30
1.30
0.50
1,64 ft over the ridge
h min = 1.20
h min 4 ft
0.80
2,62 ft
30°
30°
reflux area


d> 16,50 ft
d ≤ 5m
1,64 ft
0.50
1,64 ft
0.50

INSTALLATION

VENT SPECIFICATION: six (6) inches diameter, minimum 24 MSG black or blued steel connector pipe, with a listed factory-built UL103HT Class A chimney, suitable for use with solid fuels, or a masonry chimney and the referenced clearances.

THIS ROOM HEATER MUST BE CONNECTED TO:

1) A chimney complying with the requirements for Type HT chimneys in the Standard for Chimneys, Factory-Built, Residential Type and Building Heating Appliance, UL 103, or

2) A code-approved masonry chimney with a flue liner.

INITIAL ADVICES

- DO NOT INSTALL IN ANY FIREPLACE
- The stove must be installed on a floor with adequate capacity. If the existing building does not meet this requirement, appropriate measures (eg, load distribution plate) must be taken.
- The installation must guarantee easy access to clean the stove, the smoke pipes and the chimney flue as well.
- Air extraction fans, when installed in the same space or room with the stove can cause draft problems
- **ALL LOCAL REGULATIONS MUST BE RESPECTED IN THE INSTALLATION OF THE STOVE.**
- Do not use the stove as an incinerator or in any other way different from the one it has been conceived for.
- Do not use fuels different from those recommended.
- Do not use liquid fuels.
- **NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.**
- The stove, especially the external surfaces, while it is working gets hot to the touch. Handle carefully to avoid burns.
- Do not perform any unauthorized modification to the stove.
- Use only original replacement parts recommended by the Manufacturer.

INSTALLATION DISTANCES FROM FLAMMABLE MATERIAL

COMPLY WITH ALL MINIMUM CLEARANCES TO COMBUSTIBLES AS SPECIFIED. FAILURE TO COMPLY MAY CAUSE HOUSE FIRE.

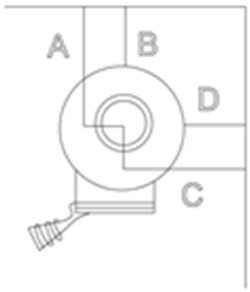
Minimum installation distances from flammable material

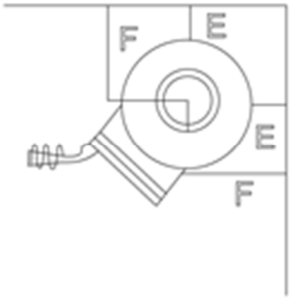
- Minimum distance from lateral flammable wall/material: 200 mm – 8 inches
- Minimum distance from rear flammable wall/material: 200 mm – 8 inches
- Minimum distance from flammable floor: 80 mm – 3 inches

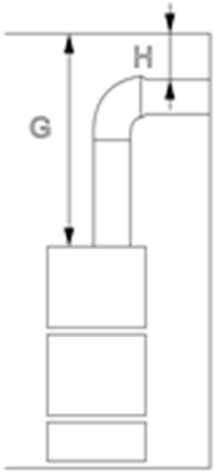
Minimum distance from front flammable material: 1000 mm – 40 inches

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS: inches

NOTE: All "A", "C" and "F" Dimensions are to the center diameter of flue collar.







INSTALLATION: FULL VERTICAL

SINGLE WALL PIPE A 18 B 8 C 18 D 8 E 8 F 18 G 44 H* I* J

INSTALLATION HORIZONTAL WITH MINIMUM 2 FT VERTICAL OFF STOVE TOP

SINGLE WALL PIPE A 18 B 8 C 18 D 8 E* 8 F* 18 G 44 H 23 I* J

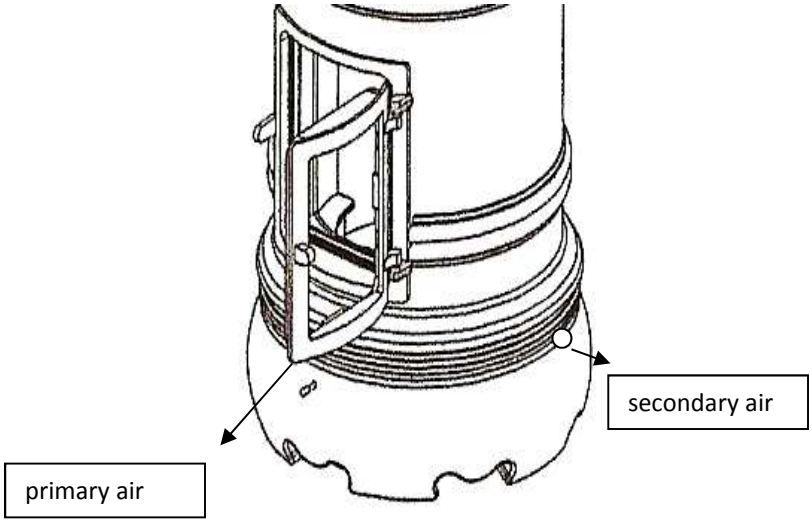
OPERATION

Lighting and combustion

DO NOT USE GRATES OR ELEVATE FIRE. BUILD WOOD FIRE DIRECTLY ON EARTH.

If, during the first lighting, the stove should emanate smells due to the evaporation of substances used in the manufacturing, it is sufficient to ventilate the room for a few hours.

Use small and medium-size logs and put them on the bottom of the fireplace (do not use the door flange - Stack Stove - as a volume for combustion) so that the air can penetrate between them. Place at the base of the stack some lighters (we recommend tablet derived from natural wax).
With the air regulation registers you can regulate the passage of primary and secondary air, necessary for combustion and post-combustion. While lighting the stove, both registers shall be totally opened.
This registers are placed in the base of the stove, like in the following drawings:



The use will be as follows:

- To light the stove: air registers completely opened
- For a fast and powerful combustion: primary air register half opened – secondary air register ¾ opened
- For slow combustion: primary air register ¼ opened – secondary air register 1/3 opened.

These positions can be changed in relation to the chimney flue draft, and they are to be considered for an insulated chimney flue with a 160 – 200 mm (6 – 8 inches) diameter and a 12 Pa draft.

ADVICE: do not close the registers completely because by doing so the combustion would be deprived of the necessary air, giving rise to a choked combustion and to the growing of soot on the door glass.

N.B. It is also necessary to clean the fireplace area immediately behind the door from the ashes in order to keep the primary air inlet open. The ash found in this area can be pushed towards the back of the fireplace or removed.
Remove the ashes from the fireplace before their level is so high as to close the primary air entrance. (see technical drawing of the stove interior below). **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 the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.**
NEVER STORE HOT ASHES IN A GARAGE OR BASEMENT. HOT ASHES GENERATE CARBON MONOXIDE AND/OR FLAMMABLE GASES. THESE GASES MAY CAUSE SUFFOCATION AND POSSIBLE DEATH.

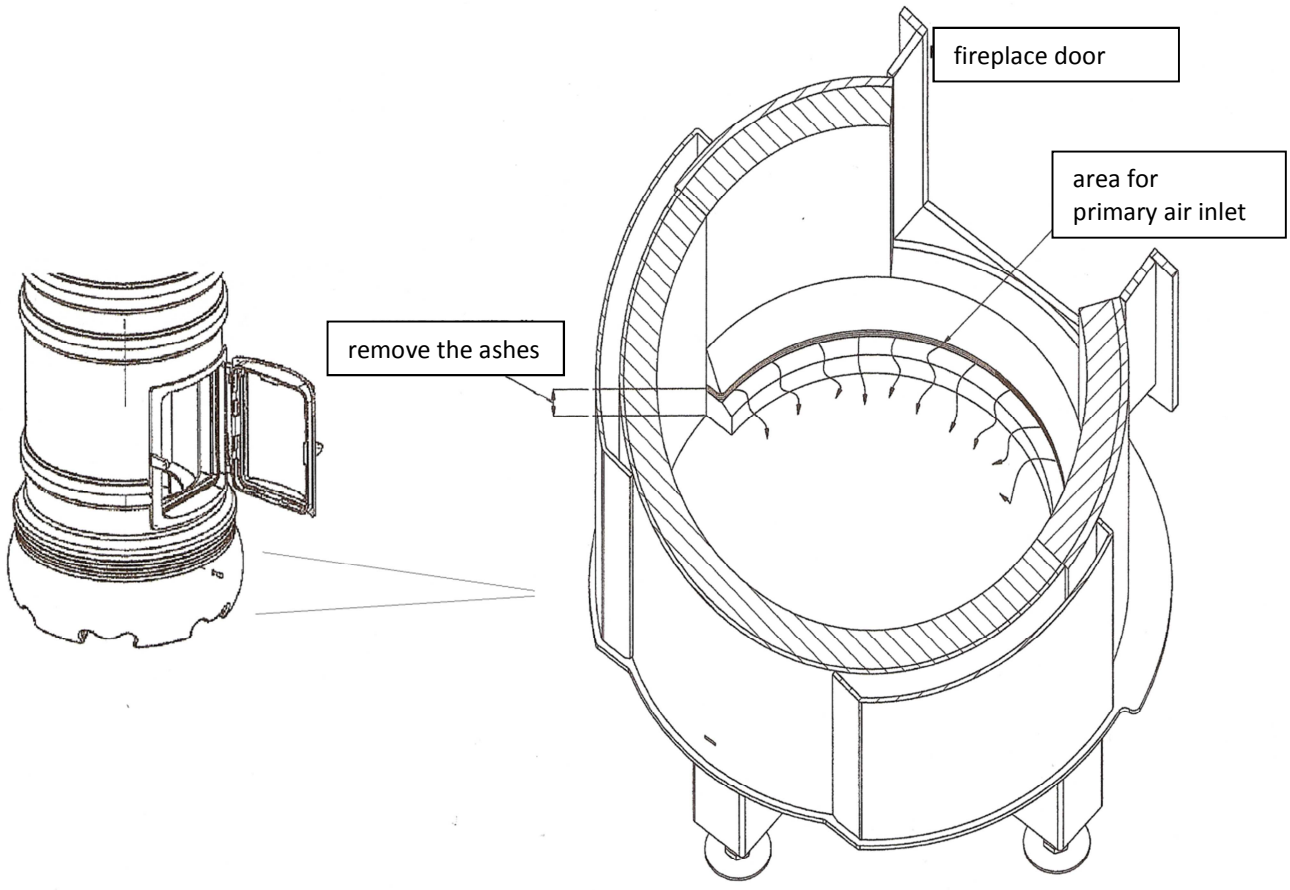


FIG. N. 13

By using dry and seasoned wood for lighting the stove, it is possible to obtain a high flame and to immediately activate the draft in the chimney.
When the brazier is formed on the fireplace floor, it is possible to insert larger logs (always crossed for proper oxygenation). When the charge is burned, it will remain a substantial bed of hot embers that will allow the charge of the fireplace, without having to perform another lighting; in this way, you will obtain a continuous combustion.
The combustion control through the glass door will avoid repeated openings of the fireplace and the consequent lowering of its temperature. FIREPLACE DOOR MUST BE KEPT CLOSED DURING COMBUSTION.

For a good yield, it is necessary to always have a good quantity of wood inside the fireplace; without overfilling it and without pressing its ceiling and its walls (it is always advisable to leave some space to let the air circulate and the inner refractory bricks to dilate).
In this way, the air will circulate freely while keeping a "lively" fire and the refractory bricks will not suffer unnecessary trauma.

The combustion is good if:

- After the lighting phase, there are no visible smokes from the chimney pot.
- The ashes are gray and white and no unburned wood remains.
- There is little soot in the chimney and inside the heat exchanger.

For a good, environment friendly wood combustion, these are the conditions :

- Use only seasoned wood (at least 2 years)
- Be sure the fireplace maintains a high temperature
- During the combustion, maintain an adequate combustion air supply
- Do not overload the fireplace while lighting the stove

A bad combustion is characterized by:

- Very dense smokes
- Gray or dark yellow smoke
- Unpleasant smell
- Very dark ashes with unburned pieces of wood
- Black mouth of the chimneypot
- High wood consumption

WARNING: RISK OF BACKFIRE AND EXPLOSION

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID OR SIMILAR LIQUIDS TO START OR "FRESHEN UP" A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE HEATER WHILE IT IS IN USE.
DURING COMBUSTION, THE FIREPLACE DOOR MUST REMAIN CLOSED.

Whenever you need to open the door to introduce wood in the fireplace, open the air registers for a few seconds before doing it.
Use the heat glove supplied to open the door and to reload the fireplace. By doing so you will be able to put the logs gently into the fireplace, avoiding unnecessary trauma to the refractory bricks.

Warning: the proper use of the heat glove is for charging the fireplace and NOT to remove glowing embers from it.

During combustion, some parts of the stove (door, handle, glass) can reach high temperatures so it is necessary to be careful and to use precautions.
If during combustion, loss of smoke should occur, do not charge anymore wood, ventilate the room immediately and cool the stove. When the stove is cold, check the reason of the loss and, if necessary, contact the Manufacturer.
However, if the smoke comes out from the stove while loading it, ventilate momentarily the room and continue to load more slowly, giving time to ignite the wood.

THE FIREPLACE DOOR MUST BE KEPT CLOSED during lighting (only the moment in which you light the lighter under the wood, then close it), charging and embers removing, in order to avoid smoke escape.

For night operating, use large size logs and possibly of hard species (beech, oak, etc..) and if the wind and draft conditions are reasonably stable, the stove will continue to burn calmly. If you want to prolong the combustion for many hours, you may need to adjust the air regulators to a minimum.

COMBUSTIBLE

THE PROPER COMBUSTIBLE IS WOOD LOGS.

Commercial firewood is usually divided into soft wood and hard wood. The hard species are characterized by a strong and heavy wood and provide a substained and persistent flame (eg. Beech, Ash, Walnut, etc..)
The soft species, light and soft wood, provide a short term flame (eg. Chestnuts, Poplars, Birch, etc.)

The resinous species (eg. Larch, Spruce, European species of Pine) while providing a significant amount of heat during combustion, have some drawbacks described below:

- Have a low specific weight and therefore burn quickly
- Contain resin, have a rather sooty combustion and therefore require more frequent chimneys and stove cleaning
- They produce hot particles
- They produce few embers

It is recommended to burn strong wood (eg. Beech, oak, etc.) and especially not to burn: garbage, painted wood, plywood or particle board, fibreboard or packagings because it could damage the stove and the chimney flue.

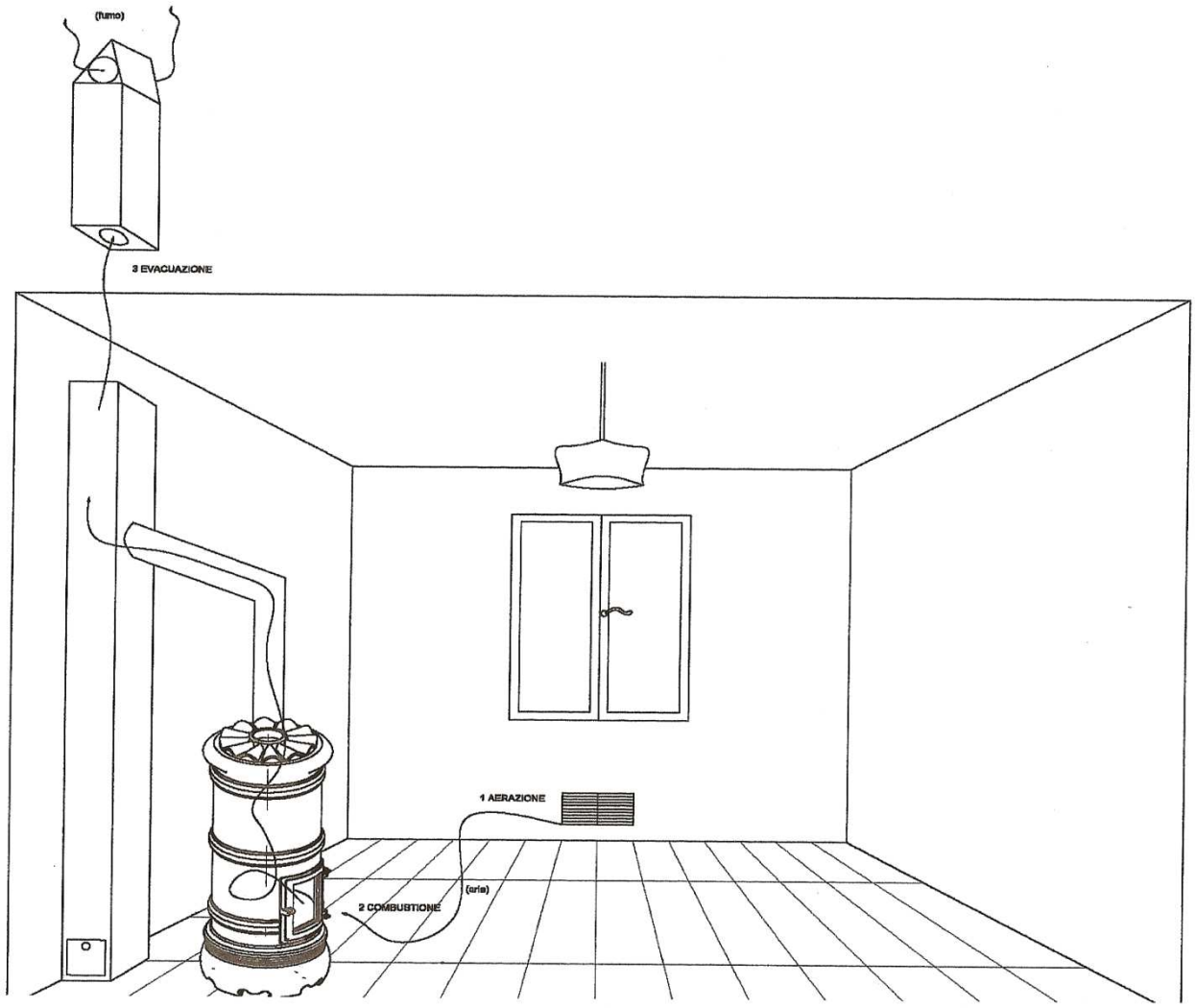
It is important to burn dry and seasoned wood, at least two years, since humidity has a significant influence on the quality of combustion. Infact, when the wood is very wet, it lower the combustion temperature, and also the first part of combustion is used to dry the wood at the expense of yield. Moreover, this lowers the temperature of the smoke and creates condensation and creosote which is very dangerous, flammable and with an unpleasant smell.

SAFETY

Air inlet

The stove must have the necessary air so as to ensure a regular combustion and a healthy environment, so:

- Make sure that in the room where the stove is installed there is adequate ventilation, the minimum recommended section is > 80 cm^2 (12 $inches^2$) for devices with closed fireplace
- The air intake must be directly communicating with the room in which the stove is installed. Avoid any obstruction and protect it with a grid as long as it does not reduce the minimum section.
- The adjacent room cannot be used as a garage, storage of combustible material or for activities with risk of fire.



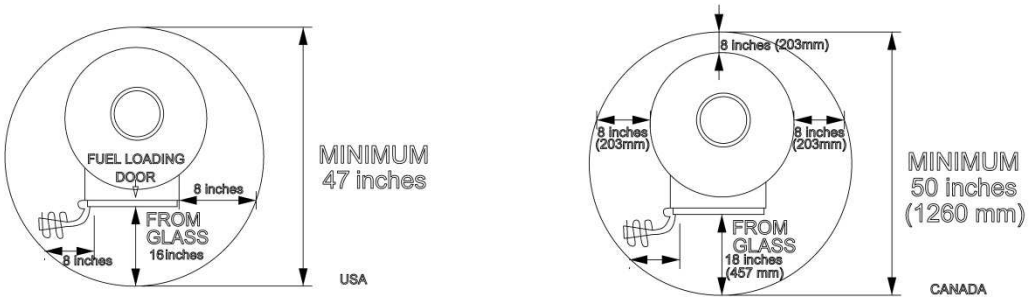
HOME FIRE SAFETY

Installation and use of the stove should be in accordance with the instructions of the Manufacturer and the local rules of habitability.

- When a flue pipe pass through a wall or ceiling particular methods of installation should be applied (protection, thermal insulation, distance from heat sensitive materials, etc)
- **NEVER CONNECT THE STOVE TO A CHIMNEY FLUE ALREADY IN USE FOR ANOTHER DEVICE.**
- Keep away from the fireplace radiation area all combustible and flammable materials (wood furniture, curtains, flammable liquids, etc…)
- If nearby there are shells in combustible or sensitive to heat materials, an insulating and not combustible protection must be interponed.
- If the floor is made in combustible material, at the mouth of the fireplace a protection made of incombustible material (i.e. inox steel, stone, glass) should be placed – with a lateral extension of 203mm (8 inches) and a frontal extension of 406mm (16 inches). Under the chimney connector: 2 inches (51 mm) beyond each side.

FLOOR PROTECTION REQUIREMENTS:

- Use of a floor protector listed to UL 1618
- Type 1 (ember) floor protector or ½" non-combustible material.
- Extend beneath appliance and to the front, sides and rear as indicated in the diagram below



- The floor must be non-combustible or otherwise adequately protected from sparks and falling embers.
- A layer of thin brick or ceramic over a combustible is sufficient.
- **In US installations,** it is necessary to install a floor protector of non-combustible material a minimum of 16 inches (406 mm) in front of glass and 8 inches (203 mm) to both sides of the fuel loading door. Open the door and measure 8 inches (203mm) from the side edge of the opening in the face of the appliance. **see exception**

- **In Canada,** it is necessary to install a floor protector of non-combustible material a minimum of 18 inches (457mm) in front of glass and 8 inches (203mm) to both sides and back of the appliance. **see exception**
- **EXCEPTION:** non-combustible floor protections must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side.

- ***WARNING! RISK OF FIRE! Hearth pads must be installed exactly as specified. High temperatures or hot embers may ignite concealed combustibles.***

To provide reasonable fire safety, the following should be given serious consideration:

1. Install at least one smoke detector on each floor of your home to ensure your safety. They should be located away from the heating appliance and close to the sleeping areas. Follow the smoke detector manufacturer's placement and installation instructions, and be sure to maintain regularly.
2. A CO detector should be installed in the room with the appliance.
3. A conveniently located Class A fire extinguisher to contend with small fires resulting from burning embers.
4. A practiced evacuation plan, consisting of at least two escape routes.
5. A plan to deal with a chimney fire as follows - In the event of a chimney fire:

a - Evacuate the house immediately

b - Notify fire department

Negative pressure results from the imbalance of air available for the appliance to operate properly. It can be strongest in lower levels of the house.

Causes include:

• Exhaust fans (kitchen, bath, etc.)
• Range hoods
• Combustion air requirements for furnaces, water heaters and other combustion appliances
• Clothes dryers
• Location of return-air vents to furnace or air conditioning
• Imbalances of the HVAC air handling system
• Upper level air leaks such as:

- Recessed lighting
- Attic hatch
- Duct leaks

INSTALLATION DISTANCES FROM FLAMMABLE MATERIAL

Minimum installation distances from flammable material:

-minimum distance from lateral flammable wall: 200mm – 8 inches
-minimum distance from flammable rear wall: 200mm – 8 inches
-minimum distance from flammable floor: 80mm – 3 inches

Minimum front distance from flammable material: 1000 mm – 40 inches

***NOTICE*:** LA CASTELLAMONTE assumes no responsibility for the improper performance of the appliance system caused by:

- Inadequate draft due to environmental conditions
- Downdrafts
- Tight sealing construction of the structure
- Mechanical exhausting devices
- Overdrafting caused by excessive chimney heights

CERAMIC LINING

- The various ceramic parts must be handled with extreme care.
- Check the leveling of the floor where the stove will be installed.
- If you notice that the packaging is damaged or any lack of professionalism of the transporter at the stove delivery, sign the note with words "subject to control".
- The installation must be done by at least two persons, carefully following the installation instructions provided in this manual.

ADVICE ON THE SAFETY OF CHILDREN AND ADULTS

During the stove functioning, the ceramic coating heats up progressively (until 40 / 50 °C) to give heat to the environment. It is very important to keep the children away from the stove in order to avoid touching the ceramic coating, with the risk of burns.
In addition, the ceramic glass and the metal door of the fireplace can get red hot; it is therefore essential to avoid touching these parts or leaving the stove lighted in the presence of unattended children.
As a general rule, it is essential to closely monitor children who are close to the lighted stove and to prevent them from touching it or attempting to open the fireplace door.
In relation to the instructions above, it remains at the Customer discretion the decision to install a protective shield around the stove or in front of the fireplace door.

HOT SURFACES!

Glass and other surfaces are hot during operation AND cool down. Hot glass will cause burns.

- **Do not touch glass until it is cooled**
- **NEVER allow children to touch glass**
- **Keep children away**
- **CAREFULLY SUPERVISE children in same room as appliance.**
- **Alert children and adults to hazards of high temperatures**
- **High temperatures may ignite clothing or other flammable materials.**
- **Keep clothing, furniture, draperies and other flammable materials away.**

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This wood heater uses a catalytic combustor, which **needs periodic inspection and replacement for proper operation**. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed.
The temperature in the stove and the gases entering the combustor must be raised between 500° to 700° F for catalytic activity to be initiated. During the startup of acold stove, a medium to high firing rate must be maintained for about 20 minutes. This ensures that the stove, catalyst and fuel are all stabilized at proper operating temperatures. Even though it is possible to have gas temperatures reach 600° F within 2 to 3 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 the smoke will keep it working.

REFUELING: during the refueling and rekindling of a cool fire, or a fire that has burned down to the charcoal phase, operate the stove at a medium to high firing rate for about 10 minutes to ensure that the catalyst reaches approximately 600° F.

CATALYST MONITORING: **it is important to periodically monitor the operation of the 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 of creosote and emissions. Following is a list of items that should be checked on a periodic basis:

- **combustors shuld be visually inspected at least three times during the heating season (and in any case at least every 45 days) to determine if physical degradation has occured. Actual removal of the combustor is recommended if a more detailed inspection is warranted because of decreased performance. If any of these conditions exists, refer to Catalyst Troubleshooting section of this manual.**
This catalytic heater is equipped with a catalytic thermometer to monitor catalyst operation. Properly functioning combustors tipically maintain temperatures in excess of 500° F and often reach temperatures in excess of 1000°
F. If catalyst temperatures are not in excess of 500° F, refer to Catalyst Troubleshooting section on this manual.

DO NOT OVEFIRE THIS HEATER - attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater and to the catalytic combustor.

Draft is the force which moves air from the appliance up through the chimney. The amount of draft in your chimney depends on the lenght of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance and may damage the catalytic combustor. Inadequate draft may cause back puffing into the room and plugging of the chimney or the catalyst. Inadequate draft will cause the appliance to leak smoke into the room through appliance and chimney connector joints.

A uncontrollable burn or excessive temperature indicates excessive draft.

COMBUSTOR TESTING

Follow these instructions to test the catalytic combustor:

1. light a fire per "LIGHTING AND COMBUSTION" instructions - page 19
2. after burning a well established fire for 1 hour, position the air regulation to a medium-low burn rate setting.
3. after 5 minutes at the lower burn rate, observe the location of the thermometer needle. A properly working combustor will have a temperature greater than 500F with the hermometer needle in the active zone. An improperly working combustor will yeld thermometer reading in the inactive zone.
4. repeat step 3 for at least 3 burn cycles.
5. if the thermometer needles is still not reaching the active zone, your combustor may require inspection and cleaning.
6. if, after cleaning the combustor and reburning, the thermometer needle is still not reaching the active zone, your combustor may need replacing. Contact your local supplier for a replacement combustor
7. note: it is also possible that the catalytic thermometer itself may not be functioning properly. Before deeming the combustor "dysfunctional" please refer to the "catalytic thermometer" section.

COMBUSTOR CLEANING

Under certain conditions, ash particles may become attached to the face of the combustor. Any deposit on the face of the combustor must be removed. There are 2 ways to clean the face of the combustor:

1. brushing the combustor with a clean soft bristle paint brush
2. passing a vacuum cleaner wand or brush near the face of the combustor

Do not scrape the combustor with any hard tool or brush and do not run pipe cleaner through the individual cells of the combustor as this may damage the combustor and make it ineffective.
Note: simply burning a hot fire usually proves to be the best method of cleaning the combustor of deposits.

COMBUSTOR REPLACEMENT

If the catalytic combustor has been deemed "dysfunctional" per the lines in "combustor testing", do not use the appliance until the combustor is replaced. Follow the steps below to complete the replacement. **LA CASTELLAMONTE STRONGLY RECOMMENDS THAT YOUR DEALER OR CERTIFIED INSTALLER PERFORM THIS PROCEDURE.**
DO NOT PERFORM ANY CLEANING UNTIL THE FIRE IS OUT AND THE APPLIANCE IS COOL. HOT ASH IN A VACUUM CLEANER BAG COULD MELT THE VACUUM AND COULD RESULT IN A HOUSE FIRE, CAUSING SERIOUS BODILY HARM.

1. the appliance must be cool to touch, having gone at least 12 hours without being burned. A combustor can reach 1400F and hold temperatures for several hours, even after the fire is out. After waiting 12 hours, begin by removing the smoke pipe on top of the stove.
2. Once the smoke pipe has been removed, you will have access to the combustor. The combustor is made in steel and caution should be taken so as not to drop or damage the combustor. If your combustor has never been cleaned according to the manufacturers directions, you may wish to clean the combustor before replacing it with a new one. Please refer to the "combustor cleaning" section.
3. to install the new combustor **DO NOT FORCE IT INTO THE STOVE COLLAR. TAKE YOUR TIME AND WORK IT INTO PLACE SWOWLY.**
4. once the combustor is reinserted, replace the smoke pipe on the stove. Do not operate the stove without the smoke pipe correctly installed.
5. **IMPORTANT REMINDER: do not burn anything other than dry, seasoned cordwood. Burning other materials may contaminate, obstruct or ruin your new combustor.**

COMBUSTOR TROUBLESHOOTING

PROBLEM: CREOSOTE PLUGGING

Possible cause: the combustor is coated with creosote burning material that produces substantial char and fly-ash.
Solution: burn only dry, seasoned cordwood. Do not burn materials such as garbage, gift wrap, cardboard, paper, wood derived from buildings or furnitures, vegetable waste, resinous wood.

Possible cause: burning wet, pitchy wood or burning large amounts of smaller diameter wood without the catalytic thermometer needle in the "optimum performance" zone.
Solution: burn dry, seasoned wood until temperatures are high enough to initiate catalyst activation (indicated by the catalytic thermometer needle in the "optimum performance" zone.

Possible cause: combustor not functioning.
Solution: if proper burning procedures have been followed and this problem persists, replace the combustor.

PROBLEM: COMBUSTOR PEELING
Possible cause: over firing can yeld extreme temperatures at combustor surface and can cause peeling.
Solution: avoid extreme temperatures by adjusting size of fuel loads. If peeling is severe, replace combustor.

Minor peeling does not affect prper combustor function, while severe peeling needs combustor replacement.

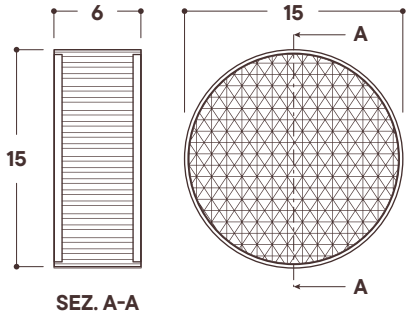
PROBLEM: CATALYTIC DEACTIVATION
Possible cause: burning improper fuels (ie. garbage, pressure treated lumber, painted wood, etc...).
Solution: burno good quality, dry, seasoned wood. If proper burning procedures have been followed and this problem persists, replace the combustor.

PROBLEM: COMBUSTOR MASKING
Possible cause: the combustor is coated with a layer of fly-ash or soot from burning material that produces substantial char and fly-ash.
Solution: When the appliance is cool to touch, clean the front face of the combustor with a soft-bristled brush or vacuum lightly (refer to COMBUSTOR CLEANING for proper procedure).

An example of creosote plugging on the face of the catlytic combustor

FILTER DATA SHEET

Measurements in **cm**

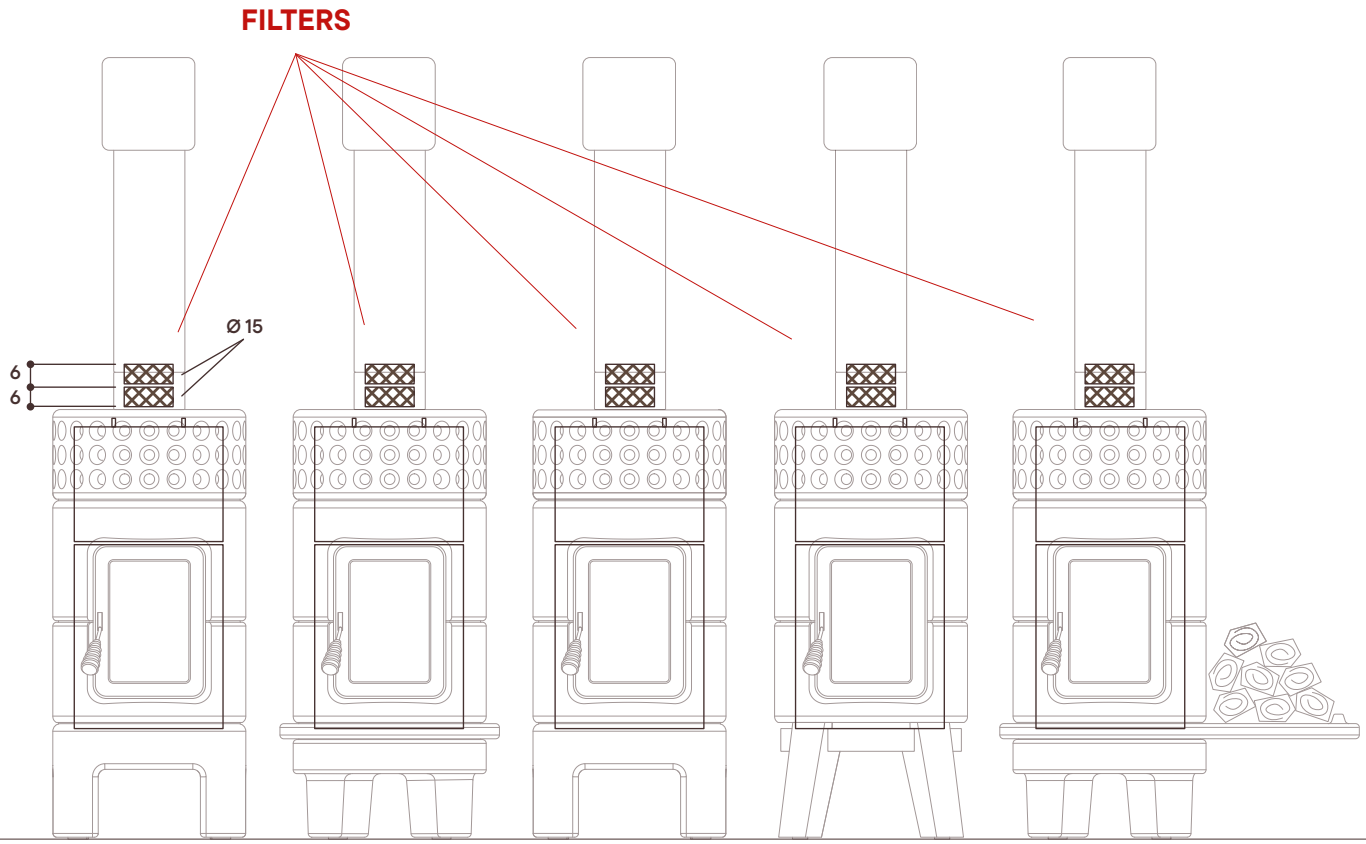


CODE: CAT 15/60

Description: catalytic converter
Shape: round
Measurements (d x h): 15 x 6 cm
Material: refractory steel with impregnation
Operating temperature: -20 °C / + 800 °C
Melting temperature: 1.400 °C

CATALYTIC FILTER POSITION

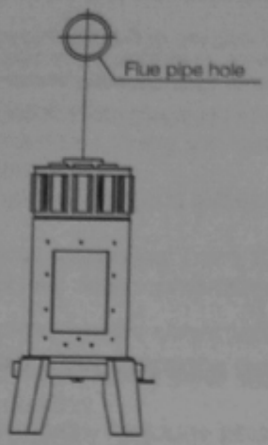
Measurements in **cm**



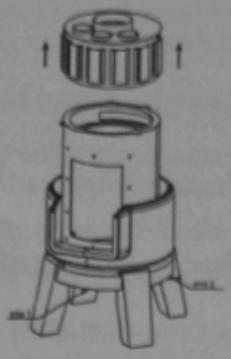
ASSEMBLY SCHEMES

ASSEMBLY SCHEMES

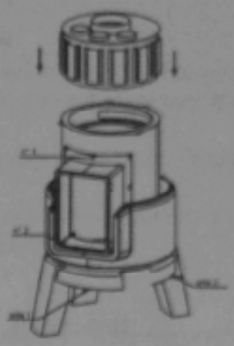
Round Stack - WOOD Base



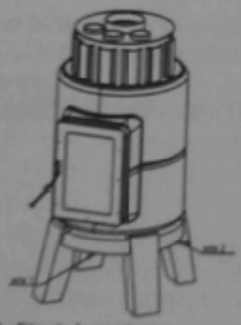
1. Position the fireplace in axis with the flue pipe hole.



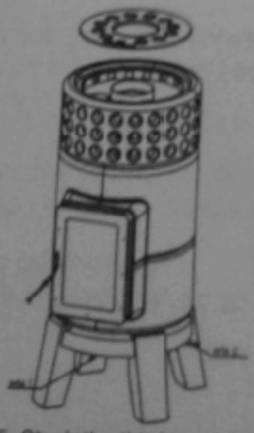
2. Unscrew and remove exchanger.
Put the 1st ceramic ring on the wood base.



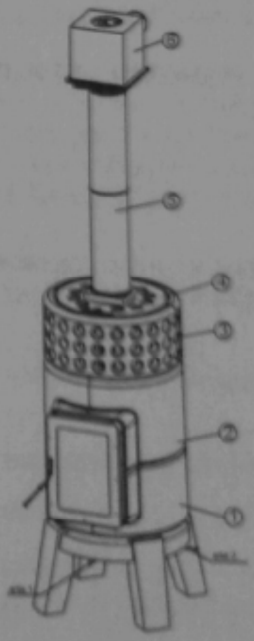
3. Door flange assembly with screws M6. To screw the flange, slightly move the 2 lateral refractory bricks. Start screwing n°1 and n°2.
When finished (all screws) stack the exchanger and screw it.



4. Stack fom above the second fireplace ceramic ring.
Tuck the door into its hinges.



5. Stack the third ceramic pierced body element and the top cover.



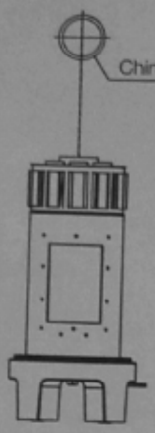
6. Flue pipe connection

1= First fireplace ceramic ring
2= Second fireplace ceramic ring
3= Third ceramic ring
4= Top cover
5= Ceramic column
6= Ceramic Cube

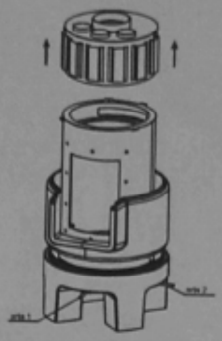
ASSEMBLY SCHEMES

ASSEMBLY SCHEMES

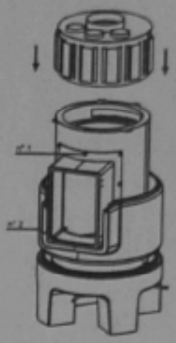
Round Stack - SLIM, RIM, LONG and SIDE base



1. Position the fireplace in axis with the flue pipe hole.

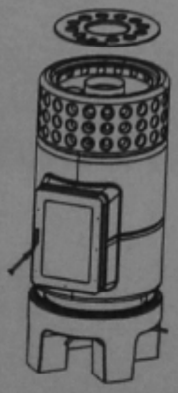


2. Unscrew and remove exchanger.
Put the 1st ceramic ring on the wood base.

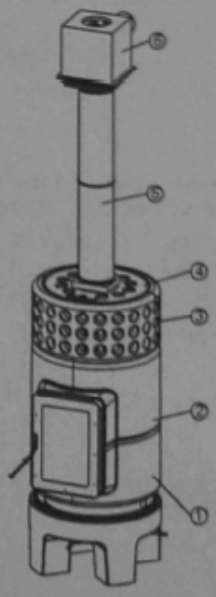


3. Door flange assembly with screws M6. To screw the flange, slightly move the 2 lateral refractory bricks. Start screwing n°1 and n°2.
When finished (all screws) stack the exchanger and screw it.

4. Stack fom above the second fireplace ceramic ring.
Tuck the door into its hinges.



5. Stack the third ceramic pierced body element and the top cover.



6. Flue pipe connection

1= First fireplace ceramic ring
2= Second fireplace ceramic ring
3= Third ceramic ring
4= Top cover
5= Ceramic column
6= Ceramic Cube

ASSEMBLY SCHEMES

ASSEMBLY SCHEMES

Rondò

1. Position the fireplace in axis with the flue pipe hole.

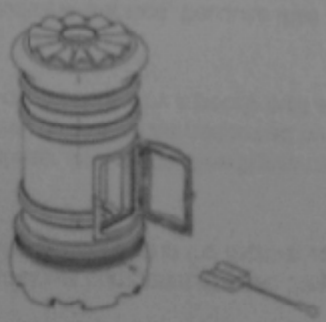
2. Insert ceramic base from above.
Insert primary air dipstick in its hole and screw it.

3. Brass door assembly with 4 M6 screws in the four corners under the gasket.
Put 2 M4 screws in the middle of the door.

4. Insert ceramic fireplace from above. Put it near the door.

5. Insert the following ceramic rings from above.

6. Stack ceramic top cover.
Connect to the chimney flue.



Ashes cleaning from the door with a proper shovel.

MAINTENANCE

WARNING! to prevent serious burns, do not perform any maintenance until the appliance is cool. Appliance surfaces, including the glass and any attached component, will remain hot for extended periods of time after the fire has been put out.

RECOMMENDED MAINTENANCE

It is strongly recommended to complete the following tasks on a regular basis throughout the heating season:

1. visually inspect catalytic combustor and clean as required (see COMBUSTOR CLEANING).
2. Check catalytic thermometer for proper calibration
3. remove all ash from firebox and ash drawer after final burn of season
4. check all gaskets for proper seal and adjust as required
5. inspect and clean the venting system

CATALYTIC THERMOMETER MAINTENANCE

ensure the fire is out and the appliance is cool, then remove the thermometer. While removed, confirm the thermometer indicator needle points towards the bottom of the "creosote buildup" zone (allow the thermometer to sit at room temperature for 10 minutes before checking). If the needle does not point towards the bottom of the "creosote buildup" zone, it may need adjustment. Contact your Dealer if replacement is needed.

MAINTENANCE

The installation of the stove must guarantee easy access for its cleaning, as well as for the cleaning of the flue pipes and of the chimney flue.

All maintenance operations must be carried out on the stove off and cold.

Ash disposal

The removal of the ashes from the fireplace is made with the proper paddle directly from the fireplace floor. All this must be done with the stove off and cold.

Remove the ashes from the fireplace before their level is so high as to close the primary air entrance. (see technical drawing of the stove interior – fig. 13 page 11). 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 the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled. Do not place other waste in this container. **NEVER STORE HOT ASHES IN A GARAGE OR BASEMENT. HOT ASHES GENERATE CARBON MONOXIDE AND/OR FLAMMABLE GASES. THESE GASES MAY CAUSE SUFFOCATION AND POSSIBLE DEATH.**

Stove and chimney flue cleaning - 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 the relatively cool chimney flue of a slow burning fire. As a result, creosote residues accumulates in the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated it should be removed to reduce the risk of a chimney fire. In normal conditions, where no creosote accumulates, the stove, the flue pipes and the chimney flue can be cleaned once a year.

Heat exchanger cleaning

For the internal cleaning of the heat exchanger: lift the ceramic top cover, unscrew the door on the exchanger (it is recommended to moisten the screws with special lubrificants before starting to loosen) and check that the space between the tubes is free, otherwise remove the soot with a special brush and vacuum cleaner.

Ceramic cleaning

The ceramic lining should be cleaned with a soft and dry cloth. DO NOT WET AND NEVER CLEAN THE CERAMIC WHILE IT IS HOT, THE THERMIC SHOCK COULD BREAK IT.

Glass cleaning

Do not clean the glass with materials that can scratch or damage it, the scratches could develop into cracks or breaks.

Do not clean the glass when it is hot, but wait until it cools down.

Use wet cloth with warm water or with suitable products.

Glass, gaskets and door gaskets replacement on RONDO' stove

1. Put some thick blanket or some bubble wrap on the ceramic base, to protect it from object falling on it.

2. Unscrew the screws of the top plate and remove it

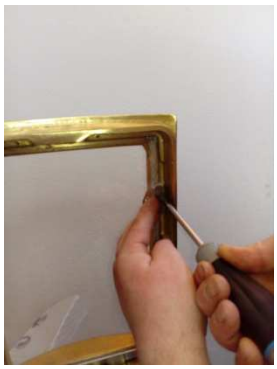
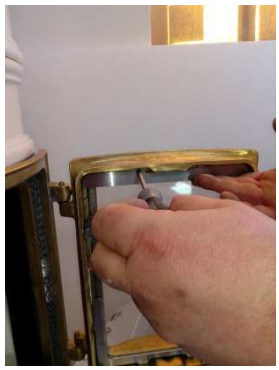
3. Unscrew the screws of the side and lower plates and remove all of them

4. Remove glass

5. Replace new glass with its proper gasket


6. Screw the plates back



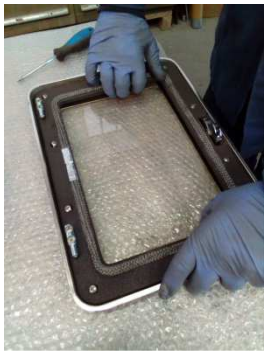
7. Remove the old gasket if necessary and place the new one




Glass, gaskets and door gaskets replacement on round stack stove

1. Remove the door from the stove by pulling it up from the hinges – and position it on a soft covered (bubble wrap) table with the ceramic handle out of the support plane.

2. Unscrew the 10 screws and lift the glass frame stop



3. Remove the glass

4. If necessary, replace the door gasket - be sure to put the gasket exactly in its proper position (see picture below)


5. Place the new glass and screw back the 10 screws of the frame glass stop



6. Replace the door on the stove by sliding it into its hinges


We suggest the need for regular maintenance by the Manufacturer or by a qualified technician.

WARRANTY

La Castellamonte will replace or repair the goods or its individual components when they are found in lack of conformity which existed at the time the goods were delivered in the manner and extent permitted by the law. (d. lgs 206/05)

The warranty does not cover defects caused by the purchaser as a result of negligent use, by the use of not suitable fuel and with a moisture content above 15%, by maintance performed by unauthorized persons, by modifications and substitutions of individual components, by a poorly built and not suitable chimney flue.

This warranty does not extend to the refractory bricks inside the fireplace, because their duration depends on how wood is loaded by the User.

The cost of repair or replacement of the goods shall be borne by the Seller. The buyer agrees to make use of this warranty, subject to revocation, to inform the Seller of any lack of conformity within 8 days of discovery.

The warranty period is 2 years from delivery.

In addition to the legal warranty, the Seller guarantees the ceramic parts for an additional period of 1 year.

LA CASTELLAMONTE

Stufe da sempre. Per sempre.
Stoves since 1975.

LA CASTELLAMONTE di R. Perino e S. Neri Snc
Via Casari 13, s.n. – Tel. e fax 0039 124 581690 – 0039 124 514149
10081 Castellamonte (TO) – Italy
www.lacastellamonte.it
www.stackstoves.com
e-mail: info@lacastellamonte.it

Appendix C: Calibrations

Established 1974

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

A2LA ACCREDITED
CERTIFICATE #1550.01

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: 100 / Tol: 0.05	Test Wt: HB44 / Tol: HB44	Test Wt: 100 / Tol: 0.01	☐ Good ☑ Fair ☐ Poor
As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	As-Found: Pass:☑ Fail:☐	Temperature: 17.2°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: 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:

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.

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	53
Serial #:	1902130
Calibration Date:	2/1/2025
Calibration Expiration:	8/1/2025
Barometric Pressure:	30.02 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	NI	Aquatech	Dwyer
Model:	SK25DA	9213	DBX2	W17AE
Lab ID#:	47	215	202	124
Calibration Expiration Date:	5/1/2025	2/26/2025	6/17/2025	6/16/2025
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. Caibrate 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)	236.809	287.051	244.102
Standard DGM Temperature (°F)	70.6	70.3	71.8
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	8.217	10.148	8.812
DGM Temperature (°F)	80.2	86.9	91.0
DGM Pressure (in H_2O)	3.43	2.25	1.38
Net Volume for Standard DGM (ft^3)	8.363	10.137	8.620
Net Volume for DGM (ft^3)	8.217	10.148	8.812

Dry Gas Meter γ Factor	1.025	1.022	1.008
γ Factor Deviation From Average	0.007	0.004	0.011

Average Gas Meter γ Factor: 1.019

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

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Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

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 In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± 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.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203324-21

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	54
Serial #:	1902133
Calibration Date:	2/1/2025
Calibration Expiration:	8/1/2025
Barometric Pressure:	30.02 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	NI	Aquatech	Dwyer
Model:	SK25DA	9213	DBX2	W17AE
Lab ID#:	47	215	202	124
Calibration Expiration Date:	5/1/2025	2/26/2025	6/17/2025	6/16/2025
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. Caibrate 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)	145.607	267.121	243.468
Standard DGM Temperature (°F)	63.5	66.0	67.5
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.095	9.615	8.854
DGM Temperature (°F)	69.9	81.0	89.9
DGM Pressure (in H_2O)	2.93	1.93	3.42
Net Volume for Standard DGM (ft^3)	5.142	9.433	8.598
Net Volume for DGM (ft^3)	5.095	9.615	8.854

Dry Gas Meter γ Factor	1.012	1.002	1.002
γ Factor Deviation From Average	0.007	0.003	0.004

Average Gas Meter γ Factor: 1.005

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

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Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #: 38860-203325-21 **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:**	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: 1.00 **Range Resolution:** 0.01 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± 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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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.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-203325-21

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A2LA ACCREDITED CERT #4986.01

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: 5.00 **Range Resolution:** 0.01 **Mode Verified:** Pressure

UUT Reading In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± 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.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203326-21

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-50-DIR
Lab ID #:	203
Serial #:	A2204292
Calibration Date:	2/1/2025
Calibration Expiration:	8/1/2025
Barometric Pressure:	30.02 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	NI	Aquatech	Dwyer
Model:	SK25DA	9213	DBX2	W17AE
Lab ID#:	47	215	202	124
Calibration Expiration Date:	5/1/2025	2/26/2025	6/17/2025	6/16/2025
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. Caibrate 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)	166.553	142.180	215.972
Standard DGM Temperature (°F)	66.2	65.6	68.1
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.748	5.020	7.675
DGM Temperature (°F)	72.1	80.1	84.0
DGM Pressure (in H_2O)	1.10	0.81	1.41
Net Volume for Standard DGM (ft^3)	5.882	5.021	7.627
Net Volume for DGM (ft^3)	5.748	5.020	7.675

Dry Gas Meter γ Factor	1.030	1.024	1.018
γ Factor Deviation From Average	0.006	0.000	0.006

Average Gas Meter γ Factor: 1.024

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

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Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

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 In H2O	Standard As Found In H2O	Standard Verification Reading #1 In H2O	Error In H2O	Standard Verification Reading #2 In H2O	Error In H2O	Tolerance In H2O	Expanded Uncertainty ± 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).

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.

Service Engineer: Samuel Owens **Date:** February 27, 2025

Quality Manager: Tony Lewandowski **Signature:** 

Report #: 38860-203319-21

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	55
Serial #:	810016
Calibration Date:	2/1/2025
Calibration Expiration:	8/1/2025
Barometric Pressure:	30.02 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	NI	Aquatech	Dwyer
Model:	SK25DA	9213	DBX2	W17AE
Lab ID#:	47	215	202	124
Calibration Expiration Date:	5/1/2025	2/26/2025	6/17/2025	6/16/2025
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. Caibrate 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)	148.998	157.125	207.888
Standard DGM Temperature (°F)	70.2	71.1	69.8
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.249	5.608	7.444
DGM Temperature (°F)	80.0	82.2	83.8
DGM Pressure (in H_2O)	0.00	0.00	0.00
Net Volume for Standard DGM (ft^3)	5.262	5.549	7.341
Net Volume for DGM (ft^3)	5.249	5.608	7.444

Dry Gas Meter γ Factor	1.019	1.008	1.010
γ Factor Deviation From Average	1.019	1.008	1.010

Average Gas Meter γ Factor: 1.012

Measurement Uncertainty: Total measurement uncertainty +/- 0.748% RD, K=2

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Report and Certificate of Calibration

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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 #:	36866-28785-3646	**Customer PO#:** 1122	
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: 05/02/2024 | Due: 04/30/2025 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 34722-30759-4525
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:	September 25, 2024	**Reference:**	Manufactures Tolerances
Recommended Due Date:	September 25, 2025	**Cal-Cert Procedure:**	CP-080
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Delmhorst	**Temperature:**	72 °F
Type:	Resistivity Meter	**Humidity:**	49% RH
Model Number:	MCS-1	**Asset #:**	#094
Serial #:	#094	**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	
1,100,000	1,095,000	1,095,000	-5,000.000	1,095,000	-5,000.000	
120,000,000	120,830,000	120,830,000	830,000.000	120,830,000	830,000.000	OUT OF TOLERANCE OUT OF TOLERANCE

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.
Cleaning and preventative maintenance were performed as part of this service.

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 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.

Service Engineer:	Brent Enbysk	**Date:**	September 25, 2024
Quality Manager:	Jason Wimmer	**Signature:**	

CERTIFICATE OF CALIBRATION

CUSTOMER:	**PFS-TECO :** CLACKAMAS, OR	**CALIBRATION DATE:**	***06/17/2024***
PO NUMBER:	1120	**CALIBRATION DUE:**	*06/17/2025*
INST. MANUFACTURER:	DWYER	**PROCEDURE:**	T.O.33K6-4-1769-1
INST. DESCRIPTION:	VELOMETER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70°F
MODEL NUMBER:	471	**RECEIVED CONDITION:**	WITHIN MFG. SPECS.
SERIAL NUMBER:	**CP288559 ID# 095**	**LEFT CONDITION:**	WITHIN MFG. SPECS.
RATED ACCURACY:	SEE NOTES BELOW.	**AMBIENT CONDITIONS:**	763mm HGA 53% RH 70°F
UNCERTAINTY GIVEN:	± 0.43% RD ; k=2	**CERTIFICATE FILE #:**	**490265.2024**

NOTES: ± 3.0% FS (0-500 / 0-1500) ** ± 4.0% F.S. (0-5000) **± 5.0% F.S. (0-15000) ** ± 2 °F

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
70	73	0 TO 200°F	0 TO 200°F
126	130	44.7	44.1
242	249	71.8	71.0
495	508	99.9	99.3
521	533		
1039	1066		
1490	1530		
507	522		
3214	3311		
4998	5156		
6975	7182		
14853	15322		

STANDARDS USED:		
A312 ± .02% RD -140 TO 1372 DEG °C TRACE# 2023004415	**DUE**	**11/13/24**
A800 flow nozzles +/- .2% RD (.2-5, 5-100, 100-1650 SCFM)TRACE# 144613547,1424683640,1583314714	**DUE**	**02/14/25**

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) and the Unit Under Test (UUT) is a minimum of 4:1, unless otherwise noted. 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

Issuing Date: 06/17/2024

Approved By:

Cal. Technician: A.N.

Calibrated at: ✓ Lab
___ On-Site (Customer's)

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

ACCREDITED
0723.01
Calibration

PO: 1033
Order Date: 03/08/2021
Authorized By: N/A

Property #: 097
User: N/A
Department: N/A
Make: Unknown
Model: 10 Lbs.
Serial #: 097
Description: Mass
Procedure: DCN 500901
Accuracy: Raw Data

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

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

Measurement Data

Parameter / Measurement Description	Range	Unit	Reference	Min	Max	*Error	UUT	Uncertainty
Before/After								Accredited = ü
Mass								
Raw Data		g	4535.92370000	0.0000000	0.0000000	0.1785299	4536.1022299 g	3.5E-01 ü

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/NCSL 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

Established 1974

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

A2LA ACCREDITED
CERTIFICATE #1550.01

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
Test Wt: 100 Tol: 0.0003
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

LINEARITY
Test Wt: 50 x 4 Tol: 0.0002
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION
Test Wt: 100 Tol: 0.0001

1. 100.0000	5. 100.0000	9. 99.9999
2. 99.9999	6. 100.0000	10. 99.9999
3. 99.9999	7. 99.9999	**Result**
4. 100.0000	8. 99.9999	0.00005

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 22.6°C

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: D.Oud

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

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QUALITY CONTROL SERVICES

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ACCREDITED
CERTIFICATE #1550.01

Report of Calibration

Firm: PFS-TECO
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 05/09/22
Purchase Order: 1067
Traceable Number: 20220682

Test Item: 200 mg and 100 mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner
Customer ID: Listed in Table

Material	Assumed Density	Range	Tolerance Class
Stainless Steel	7.95 g/cm^3	200 mg & 100 mg	ASTM Class 1

Method and Traceability
The procedure used for this calibration is NIST IR 6969 SOP 4 Double Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:
100 g to 1 mg Working Standards Were Calibrated: 07/02/21 Due: 07/31/22 Standards ID: 723318
Mass Comparators Used: MET-05 **Tested by:** D. Thompson

Conventional Mass: "The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). "Conventional Value of the Result of Weighing in Air" **(Previously known as "Apparent Mass vs. 8.0 g/cm^3).**

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor k=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 05/09/22

Signature David S. Thompson

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(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com

ACCREDITED
CERTIFICATE #1550.01

Report of Calibration

Firm: PFS-TECO
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 05/09/22
Purchase Order: 1067
Traceable Number: 20220682

Test Item: 200 mg and 100 mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner
Customer ID: Listed in Table

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.93 to 21.94	760.7 to 760.8	47.8 to 47.9

Conventional Mass Value

Nominal Value	As Found Value (g)	As Found Correction* (mg)	As Left Value (g)	As Left Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
200 mg, 1000101395, #109-B	0.2000082	0.0082	0.2000082	0.0082	0.0014	0.010
100 mg, 1000126267, #109-A	0.1000065	0.0065	0.1000065	0.0065	0.0014	0.010

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were received in good condition and were within ASTM Class 1 tolerances As Found.

Recalibration Due: The customer has requested a 5-year calibration cycle. The calibration due date for these weights is 05/09/27. The values listed above were found at the time of calibration. Any number of factors may cause these items to drift out of calibration before the calibration interval has expired.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2017 *General Requirements for the Competence of Testing and Calibration Laboratories.* This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 05/09/22

Signature David S. Thompson

Established 1974

QUALITY CONTROL SERVICES

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A2LA ACCREDITED
CERTIFICATE #1550.01

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 - 1000lbx0.	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: 400 Tol: 0.10	Test Wt: HB44 Tol: HB44	Test Wt: 200 Tol: 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: TVP **Date:** 12.04.2024 **Technician:** E.J. Vasko

Signature:

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.

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

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: 25.000 Feet **Range Resolution:** 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/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.

Service Engineer: Justin Roye **Date:** March 5, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

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 | Tegam | 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	

Manufacturer: National Instruments **Type:** Data Logger **Serial #:** 1B182FB

	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/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.

Service Engineer: Samuel Owens **Date:** February 28, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-206391-21

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

www.Cal-Cert.com

Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

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 | Tegam | 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	
	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	0.511
	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	
	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	0.436
	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	

Manufacturer: National Instruments **Type:** Data Logger **Serial #:** 1B182FB

	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	
	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	0.738
	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	
	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	0.511
	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	
	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	0.436
	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.
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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.
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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 28, 2025

Quality Manager: Tony Lewandowski **Signature:**

Report #: 38860-206391-21-B

Making our world more productive

DocNumber: 581320

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22024

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

LGEPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062-9547

Certificate Issuance Date: 09/30/2024
Linde Order Number: 72931026
Part Number: NI CD17CO8E-AS
Customer PO Number: 80945951

Fill Date: 09/17/2024
Lot Number: 70086426104
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 1290 psig 99 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date: 09/26/2032		NIST Traceable
Cylinder Number: DT0042934		Expanded Uncertainty
17.32 %	Carbon dioxide	± 0.16 %
4.35 %	Carbon monoxide	± 0.02 %
16.96 %	Oxygen	± 0.05 %
Balance	Nitrogen	

Certification Information:

Certification Date: 09/26/2024 Term: 96 Months Expiration Date: 09/26/2032

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. CO responses have been corrected for CO2 interference. CO responses have been corrected for O2 interference. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. **Component:** Carbon dioxide

Requested Concentration: 17 %
Certified Concentration: 17.32 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 08/30/2024

First Analysis Data:							Date 09/26/2024
Z: 0	R: 19.34	C: 17.38	Conc: 17.43
R: 19.28	Z: 0	C: 17.22	Conc: 17.27
Z: 0	C: 17.2	R: 19.23	Conc: 17.25
UOM: %			Mean Test Assay: 17.32 %

Reference Standard: Type / Cylinder #: NTRM / CC725981
Concentration / Uncertainty: 19.34 % ±0.16 %
Expiration Date: 01/12/2027
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 190701 / CC725973
SRM Concentration / Uncertainty: 19.34% / ±0.16%
SRM Expiration Date: 01/12/2027

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0
R: 0	Z: 0	C: 0	Conc: 0
Z: 0	C: 0	R: 0	Conc: 0
UOM: %			Mean Test Assay: %

2. **Component:** Carbon monoxide

Requested Concentration: 4.25 %
Certified Concentration: 4.35 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 08/30/2024

First Analysis Data:							Date 09/26/2024
Z: 0	R: 5.04	C: 4.35	Conc: 4.35
R: 5.04	Z: 0	C: 4.35	Conc: 4.35
Z: 0	C: 4.35	R: 5.05	Conc: 4.35
UOM: %			Mean Test Assay: 4.35 %

Reference Standard: Type / Cylinder #: GMIS / CC239379
Concentration / Uncertainty: 5.04 % ±0.03 %
Expiration Date: 12/27/2031
Traceable to: SRM # / Sample # / Cylinder #: 2642a / 51-D-23 / FF23106
SRM Concentration / Uncertainty: 7.859% / ±0.039%
SRM Expiration Date: 05/18/2026

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0
R: 0	Z: 0	C: 0	Conc: 0
Z: 0	C: 0	R: 0	Conc: 0
UOM: %			Mean Test Assay: %

3. **Component:** Oxygen

Requested Concentration: 17 %
Certified Concentration: 16.96 %
Instrument Used: Siemens Oxymat 6E S/N 7MB20211AA000CA1
Analytical Method: Paramagnetic
Last Multipoint Calibration: 09/04/2024

First Analysis Data:							Date 09/26/2024
Z: 0	R: 20.86	C: 16.98	Conc: 16.96
R: 20.88	Z: 0	C: 16.96	Conc: 16.94
Z: 0	C: 16.99	R: 20.9	Conc: 16.97
UOM: %			Mean Test Assay: 16.96 %

Reference Standard: Type / Cylinder #: GMIS / DT0040804
Concentration / Uncertainty: 20.86 % ±0.05 %
Expiration Date: 09/09/2032
Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-D-23 / CAL015788
SRM Concentration / Uncertainty: 20.720 % / ±0.043%
SRM Expiration Date: 02/28/2026

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0
R: 0	Z: 0	C: 0	Conc: 0
Z: 0	C: 0	R: 0	Conc: 0
UOM: %			Mean Test Assay: %

Analyzed By: Miriam Bahena

Certified By: Nelson Ma

Making our world more productive

DocNumber: 577393

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22024

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

LGEPKG TUALATIN OR H
10450 SW TUALATIN SHERWOOD ROAD
TUALATIN OR 97062-9547

Certificate Issuance Date: 07/29/2024
Linde Order Number: 72854903
Part Number: NI CD10CO80E-AS
Customer PO Number: 80868921

Fill Date: 06/22/2024
Lot Number: 70086417403
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 148 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date: 07/29/2032		NIST Traceable
Cylinder Number: CC174411		Expanded Uncertainty
10.02 %	Carbon dioxide	± 0.08 %
2.53 %	Carbon monoxide	± 0.02 %
10.07 %	Oxygen	± 0.04 %
Balance	Nitrogen	

Certification Information:

Certification Date: 07/29/2024 Term: 96 Months Expiration Date: 07/29/2032

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. **Component:** Carbon dioxide

Requested Concentration: 10 %
Certified Concentration: 10.02 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 07/25/2024

Reference Standard: Type / Cylinder #: NTRM / DT0030310
Concentration / Uncertainty: 7.011 % ±0.058 %
Expiration Date: 01/27/2027
Traceable to: SRM # / Sample # / Cylinder #: NTRM#DT0030296 / 190702 / DT0030296
SRM Concentration / Uncertainty: 7.011 / ±0.058
SRM Expiration Date: 01/27/2027

First Analysis Data:							Date 07/29/2024
Z: 0	R: 7.01	C: 10.02	Conc: 10.02				
R: 7.01	Z: 0	C: 10.03	Conc: 10.03				
Z: 0	C: 10.03	R: 7.02	Conc: 10.03				
UOM: %			Mean Test Assay: 10.02 %				

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: %			Mean Test Assay: %				

2. **Component:** Carbon monoxide

Requested Concentration: 2.5 %
Certified Concentration: 2.53 %
Instrument Used: Horiba VIA-510 S/N UB9UCSYX
Analytical Method: NDIR
Last Multipoint Calibration: 07/25/2024

Reference Standard: Type / Cylinder #: GMIS / CC109418
Concentration / Uncertainty: 2.004 % ±0.012 %
Expiration Date: 10/18/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 2640a / 53-C-38 / CAL013925
SRM Concentration / Uncertainty: 1.978% / ±0.011%
SRM Expiration Date: 07/30/2022

First Analysis Data:							Date 07/29/2024
Z: 0	R: 2	C: 2.52	Conc: 2.53				
R: 1.99	Z: 0	C: 2.52	Conc: 2.53				
Z: 0	C: 2.52	R: 2	Conc: 2.53				
UOM: %			Mean Test Assay: 2.53 %				

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: %			Mean Test Assay: %				

3. **Component:** Oxygen

Requested Concentration: 10 %
Certified Concentration: 10.07 %
Instrument Used: Siemens Oxymat 6E S/N 7MB20211AA000CA1
Analytical Method: Paramagnetic
Last Multipoint Calibration: 07/26/2024

Reference Standard: Type / Cylinder #: GMIS / CC506236
Concentration / Uncertainty: 15.08 % ±0.03 %
Expiration Date: 10/10/2031
Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 02/27/2026

First Analysis Data:							Date 07/29/2024
Z: 0	R: 15.08	C: 10.06	Conc: 10.07				
R: 15.06	Z: 0	C: 10.06	Conc: 10.07				
Z: 0	C: 10.06	R: 15.07	Conc: 10.07				
UOM: %			Mean Test Assay: 10.07 %				

Second Analysis Data:							Date
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: %			Mean Test Assay: %				

Analyzed By: Miriam Bahena

Certified By: Nelson Ma