509 Fabrications, Inc.

Project # 24-265
Model: Mini Me Pellet
Type: Pellet-Fired Room Heater
Original Report Date: October 11, 2024
Revision Date: March 10, 2025

ASTM E2779 Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters (EPA ALT-146)

Contact: Mr. Dusty Henderson
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(503) 650-0088
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Revision History

October 11, 2024– Original Issue

March 10, 2025 – Added revised manual including a specific section on Warranty (p. 114 of report). Replacement parts (such as door gaskets) were included in the original manual (see the Glass Gasket Replacement section on p. 138 of the report). New Certificate of Conformity (COC) also provided.

Contents

Affidavit

PFS-TECO was contracted by 509 Fabrications, Inc. to provide testing services for the Mini Me Pellet Pellet-Fired Room Heater per ASTM E2779, *Determining PM Emissions from Pellet Heaters*. All testing and associated procedures were conducted at PFS-TECO's Portland Laboratory on 8/14/2024. PFS-TECO's Portland Laboratory is located at 11785 SE Highway 212 – Suite 305, Clackamas, Oregon 97015. Testing procedures followed EPA ALT-146 / ASTM E2779. 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 Accreditation Certificate Numbers 4 and 4M (mobile). PFS-TECO is accredited by IAS to ISO 17020:2012 "Criteria for Bodies Performing Inspections", and ISO 17025:2005 "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

509 Fabrications of Post Falls, ID, contracted with PFS-TECO to perform EPA certification testing on the Mini Me Pellet Pellet-Fired Room Heater. All testing was performed at PFS-TECO's Portland Laboratory. Testing was performed by Mr. Aaron Kravitz.

Notes

- Prior to start of testing, 50 hours of conditioning was performed by the manufacturer at a medium heat setting, per ASTM E2779
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- A separate, independent sample train was utilized to determine 1st hour emissions.
- Two test runs were performed in accordance with EPA ALT-146 burn rate settings:
  - 1 Hour at Maximum Burn Setting
  - 2 Hours at Medium Burn Setting (less than the mid-point of the high and low rates)
  - 3 Hours at Minimum Burn Setting
- Of the two test runs, only Run 2 was valid, as the medium burn rate of Run 1 was outside of the permitted burn rate range.

Pellet Heater Identification and Testing

- Appliance Tested: ***Mini Me Pellet***
- Serial Number: ***N/A – Prototype Unit; PFS Tracking #212***
- Manufacturer*:* ***509 Fabrication, Inc.***
- Catalyst: ***No***
- Heat exchange blower: ***None***
- Type: **Pellet Stove**
- Style: **Free Standing**
- Date Received: **Wednesday, July 24, 2024**
- Testing Period – Start: **Tuesday, August 13, 2024** Finish: **Wednesday, August 14, 2024**
- Test Location: **PFS-TECO Portland Laboratory, 11785 SE HWY 212 - Suite 305, Clackamas, OR 97015**
- Elevation: **≈131 Feet above sea level**
- Test Technician(s): **Aaron Kravitz**
- Observers: **N/A**

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Aaron Kravitz. All procedures used are directly from ASTM E2779 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
189	Mettler Toledo 3'x3' floor scale w/digital weight indicator
053	APEX XC-60 Digital Emissions Sampling Box A
054	APEX XC-60 Digital Emissions Sampling Box B
203	APEX XC-50-DIR Digital Emissions Sampling Box C
055	APEX Ambient sampling box
215	NI Temperature DAQ
057	California Analytical ZRE CO2/CO/O2 IR ANALYZER
109A/B	Troemner 100mg/200mg Audit Weights
107	Sartorius Analytical Balance
097	10 lb audit weight
095	Anemometer
217	Microtector
CC505834	Gas Analyzer Calibration Span Gas
CC341544	Gas Analyzer Calibration Mid Gas

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 6.1.2 is 1:1.

Results

The integrated test run emission rate for test Run 2 was measured to be **0.36 g/hr** with a Higher Heating Value efficiency of **76%** and a CO emission rate of **0.22 g/min**. The calculated first hour particulate emission rate was **1.2 g/hr**. The 509 Fabrications Model Mini Me Pellet Pellet-Fired Room Heater meets the 2020 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

Run Number	Date	Segments		Run Time (min)	Heat Output (BTU/hr)	1st Hr Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (%HHV)	Overall Heating Efficiency (%HHV)
		Setting	BR								
1	8/13/2024	OA	1.27	360	18096	0.78	0.38	0.25	0.25	75%	75%
		H	1.98	60	27803			0.16		74%	
		M	1.55	120	22096			0.25		75%	
		L	0.85	180	12088			0.27		75%	

*Run #1 is invalid due to its medium burn rate and is included here for informational purposes only.

Run Number	Date	Segments		Run Time (min)	Heat Output (BTU/hr)	1st Hr Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (%HHV)	Overall Heating Efficiency (%HHV)
		Setting	BR								
2	8/14/2024	OA	1.22	360	17609	1.2	0.36	0.22	0.22	76%	76%
		H	2.07	60	29388			0.17		74%	
		M	1.34	120	19167			0.23		75%	
		L	0.86	180	12567			0.23		77%	

Test Run Narrative

Run 1

Run 1 was performed on 8/13/2024 as an attempted integrated test run per EPA ALT-146/ ASTM E2779. The overall test duration was 360 minutes. The particulate emissions rate for the integrated test run was 0.38 g/hr. The run had an overall HHV efficiency of 75%. A separate filter train C was run for the first hour of the run only. The burn rate of the medium segment was 1.55 kg/hr, which is outside the acceptable range, per EPA ALT-146, of 0.85 kg/hr – 1.41 kg/hr. Therefore, this run is deemed invalid and its results are not used for evaluating emissions compliance.

Run 2

Run 2 was performed on 8/14/2024 as an attempted integrated test run per EPA ALT-146/ ASTM E2779. The overall test duration was 360 minutes. The particulate emissions rate for the integrated test run was 0.36 g/hr. The run had an overall HHV efficiency of 76%. A separate filter train C was run for the first hour of the run only. All test results were appropriate and valid and the burn rate requirement for the integrated test run were achieved. There were no anomalies and all criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of ASTM E2779 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Runs	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	71	73	41.8	33.9	30.00	4.1	17.2	2.2%	360
2	71	76	39.7	37.2	29.95	3.9	16.5	2.2%	360

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	Test Run		
Run 1	Damper full open (max)	**Maximum Segment** Damper full open (max)	**Medium Segment** Damper open 3/32”	**Minimum Segment** Damper full closed (min)
Run 2	Damper full open (max)	**Maximum Segment** Damper full open (max)	**Medium Segment** Damper open 1/16”	**Minimum Segment** Damper full closed (min)

Appliance Description

Model(s): Mini Me Pellet

Appliance Type: Gravity-Fed Pellet-Fired Room Heater

Additional Models: None

Air Introduction System: Air is introduced to the pellet burn pot by several stainless steel tubes angled as to create a swirl pattern.

Combustion Control: A control slide located under the firebox regulates combustion air intake.

Fueling System: The unit is entirely gravity-fed; fuel is loaded into a hopper above the firebox and fuel feed can be turned on or off via actuation of a sliding gate.

Baffles: N/A

Flue Outlet: Venting is through a 4" diameter steel pipe, which exits through the top of the unit.

Appliance Dimensions

Mini Me Pellet Dimensions

Height	Width	Depth	Weight
35”	22.5”	22.5”	140 lb

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

Appliance Front

Appliance Left

Appliance Right

Appliance Rear

Test Fuel Properties

Test fuel used was Lignetics Pellet Fuel, a PFI Certified Premium Pellet Brand. A sample of pellets was sent to Twin Ports Testing for analysis, see report below.

Pellet Fuel Analysis

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

Analytical Test Report

Report No: USR:W224-0189-01
Issue No: 1

Client: PFS-TECO
11785 SE Hwy 212, Ste 305
Clackamas, OR 97015
Attention: Sebastian Button

PO No:

Signed: Katy Jahr
Katy Jahr
Chemistry Lab Supervisor
Date of Issue: 5/13/2024

Sample Details

Sample Log No:	W224-0189-01	**Sample Date:**	
Sample Designation:	Lignetics Pellets (Mill # 16036)	**Sample Time:**	
Sample Recognized As:	Wood Pellets	**Arrival Date:**	4/26/2024

Test Results

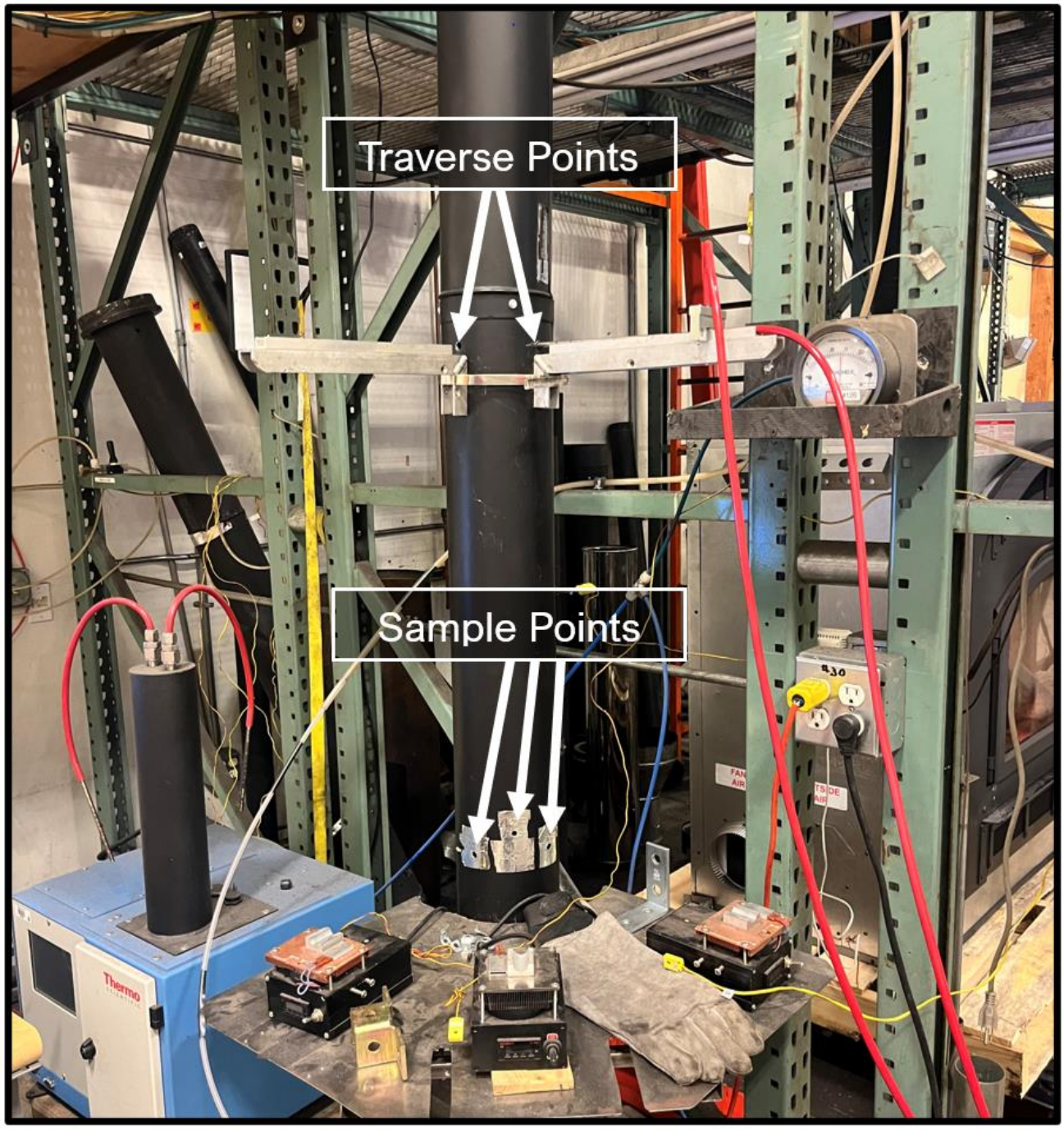
	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		2.10
Ash	ASTM D1102	wt. %	0.17	0.17
Volatile Matter	ASTM D3175	wt. %	80.51	78.82
Fixed Carbon by Difference	ASTM D3172	wt. %	19.31	18.91
Sulfur	ASTM D4239	wt. %	0.070	0.069
SO_2	Calculated	lb/mmbtu		0.163
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	18.71	18.27
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8627	8445
Carbon	ASTM D5373	wt. %	49.48	48.44
Hydrogen*	ASTM D5373	wt. %	6.22	6.09
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.20
Oxygen*	ASTM D3176	wt. %	> 43.86	> 42.94
*Note: As received values do not include hydrogen and oxygen in the total moisture.				
Chlorine	ASTM D6721	mg/kg		
Fluorine	ASTM D3761	mg/kg		
Mercury	ASTM D6722	mg/kg		
Bulk Density	ASTM E873	lbs/ft^3		
Fines (Less than 1/8")	TPT CH-P-06	wt.%		
Durability Index	Kansas State	PDI		
Sample Above 1.50"	TPT CH-P-06	wt.%		
Maximum Length (Single Pellet)	TPT CH-P-06	inch		
Diameter, Range	TPT CH-P-05	inch		to
Diameter, Average	TPT CH-P-05	inch		
Stated Bag Weight	TPT CH-P-01	lbs		
Actual Bag Weight	TPT CH-P-01	lbs		

Comments:

PJLA Testing
Accreditation #60243

Sampling Locations and Descriptions

Sample ports are located 14 feet downstream from any disturbances and 2 feet upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 4 feet upstream from any disturbances. (See below).



Sampling Methods

ASTM E2515 was used in collecting particulate samples. The dilution tunnel is 6 inches in diameter. All sampling conditions per ASTM E2515 were followed. No alternate procedures were used.

Analytical Methods Description

All sample recovery and analysis procedures followed ASTM E2515 procedures. At the end of each test run, filters, O-Rings and probes were removed from their housings, dessicated for a minimum of 24 hours, and then weighed in pairs at 6 hour intervals to a constant weight per ASTM E2515-11 Section 10.

Calibration, Quality Control and Assurances

Calibration procedures and results were conducted per EPA Method 28R, ASTM E2515-11 and ASTM E2780-10. Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined.

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: 6512 W. Seltice Way, Post Falls, ID 83854 for archival.

Sealing Label

ATTENTION:

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

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

REPORT #_____ DATE SEALED_____

MANUFACTURER_____ MODEL #_____

Sealed Unit

List of Appendices

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

Appendix A – Test Run Data, Technician Notes, and Sample Analysis- Page 20 of Non-CBI PDF

Appendix B – Labels and Manuals- Page 111 Non-CBI PDF

Appendix C –Equipment Calibration Records- Page 143 Non-CBI PDF

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

PELLET TEST DATA PACKET
ASTM E2779/E2515

Run 1 Data Summary

Client:	509 Fabrications
Model:	Mini Me
Job #:	24-265
Tracking #:	212
Test Date:	8/13/2024

Techician Signature

8/28/2024
Date

TEST RESULTS - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

Burn Rate Summary	
High Burn Rate (dry kg/hr)	1.98
Medium Burn Rate (dry kg/hr)	1.55
Low Burn Rate (dry kg/hr)	0.85
Overall Burn Rate (dry kg/hr)	1.27

Medium Burn Rate Target: < 1.41 dry kg/hr

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter - Train C
Total Sample Volume (ft^3)	82.541	56.412	56.204	9.113
Average Gas Velocity in Dilution Tunnel (ft/sec)	18.3			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11833.0			
Average Gas Meter Temperature (°F)	72.2	90.7	95.6	82.5
Total Sample Volume (dscf)	82.397	54.311	54.486	8.982
Average Tunnel Temperature (°F)	105.7			
Total Time of Test (min)	360			
Total Particulate Catch (mg)	0.1	1.9	1.7	0.6
Particulate Concentration, dry-standard (g/dscf)	0.0000012	0.0000350	0.0000312	0.0000668
Total PM Emissions (g)	0.09	2.40	2.13	0.78
Particulate Emission Rate (g/hr)	0.01	0.40	0.35	0.78
Emissions Factor (g/kg)	-	0.31	0.28	0.39
Difference from Average Total Particulate Emissions (g)	-	0.13	0.13	-
Difference from Average Total Particulate Emissions (%)	-	5.9%	5.9%	-
Difference from Average Emissions Factor (g/kg)	-	0.02	0.02	-

Final Average Results	
Total Particulate Emissions (g)	2.26
Particulate Emission Rate (g/hr)	0.38
Emissions Factor (g/kg)	0.30
HHV Efficiency (%)	74.7%
LHV Efficiency (%)	80.1%
CO Emissions (g/min)	0.25

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	81.6	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	70.7 / 73	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
Medium Burn Rate	< midpoint of the high and low burn rates	1.55	Not Acceptable

Overall Pellet Test Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/13/24
Run: 1
Control #: 24-265
Test Duration: 360
Output Category: Integrated

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.7%	80.1%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75.1%	80.5%

Output Rate (kJ/h)	19,077	18,096	**(Btu/h)**
Burn Rate (kg/h)	1.27	2.81	**(lb/h)**
Input (kJ/h)	25,534	24,222	**(Btu/h)**

Test Load Weight (dry kg)	7.64	16.84	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	2.26		
CO (g)	88		
Test Duration (h)	6.00		

Emissions	**Particulate**	**CO**
g/MJ Output	0.02	0.77
g/kg Dry Fuel	0.30	11.57
g/h	0.38	14.74
g/min	0.01	0.25
lb/MM Btu Output	0.05	1.80

Air/Fuel Ratio (A/F)	13.57

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

Max Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/13/24
Run: 1
Control #: 24-265
Test Duration: 60
Output Category: Maximum

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	73.9%	79.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74.3%	79.6%

Output Rate (kJ/h)	29,310	27,803	**(Btu/h)**
Burn Rate (kg/h)	1.98	4.36	**(lb/h)**
Input (kJ/h)	39,638	37,601	**(Btu/h)**

Test Load Weight (dry kg)	1.98	4.36	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	10		
Test Duration (h)	1.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.33
g/kg Dry Fuel	N/A	4.95
g/h	N/A	9.79
g/min	N/A	0.16
lb/MM Btu Output	N/A	0.78

Air/Fuel Ratio (A/F)	10.19

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

Medium Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/13/24
Run: 1
Control #: 24-265
Test Duration: 120
Output Category: Medium

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.8%	80.2%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75.2%	80.6%

Output Rate (kJ/h)	23,293	22,096	**(Btu/h)**
Burn Rate (kg/h)	1.55	3.42	**(lb/h)**
Input (kJ/h)	31,131	29,531	**(Btu/h)**

Test Load Weight (dry kg)	3.10	6.84	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	30		
Test Duration (h)	2.00		

Emissions	**Particulate**	**CO**
g/MJ Output	N/A	0.64
g/kg Dry Fuel	N/A	9.53
g/h	N/A	14.80
g/min	N/A	0.25
lb/MM Btu Output	N/A	1.48

Air/Fuel Ratio (A/F)	11.37

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

Minimum Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/13/24
Run: 1
Control #: 24-265
Test Duration: 180
Output Category: Minimum

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.5%	79.8%
Combustion Efficiency	99.2%	99.2%
Heat Transfer Efficiency	75.1%	80.5%

Output Rate (kJ/h)	12,743	12,088	**(Btu/h)**
Burn Rate (kg/h)	0.85	1.88	**(lb/h)**
Input (kJ/h)	17,102	16,223	**(Btu/h)**

Test Load Weight (dry kg)	2.56	5.64	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	49		
Test Duration (h)	3.00		

Emissions	Particulate	CO
g/MJ Output	N/A	1.28
g/kg Dry Fuel	N/A	19.18
g/h	N/A	16.36
g/min	N/A	0.27
lb/MM Btu Output	N/A	2.98

Air/Fuel Ratio (A/F)	17.76

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

DILUTION TUNNEL & MISC. DATA - ASTM E2779 / E2515

Client:	509 Fabrications	Job #:	24-265
Model:	Mini Me	Tracking #:	212
Run #:	1	Technician:	AK
Test Start Time:	9:28	Date:	8/13/2024

High Burn End Time (min):	60
Medium Burn End Time (min):	180
Total Sampling Time (min):	360
Recording Interval (min):	1

Meter Box γ Factor:	0.996	(A)
Meter Box γ Factor:	1.012	(B)
Meter Box γ Factor:	1.008	(C)
Meter Box γ Factor:	1.004	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	8/12/2024	
Platform Scale Audit (lbs)	10.0	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	30.01	29.98	30.00
Relative Humidity (%)	41.8	33.9	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	

Ambient Sample Volume: 82.541 ft^3

Sample Train Leak Checks

	Pre-test	Post-test			
(A)	0.000	0.001	cfm @	-6	in. Hg
(B)	0.000	0.000	cfm @	-7	in. Hg
(C)	0.001	0.001	cfm @	-6	in. Hg
(Ambient)	0.000	0.000	cfm @	-14	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.052	74
2	0.090	74
3	0.090	74
4	0.052	74
5	0.054	74
6	0.092	74
7	0.092	74
8	0.054	74
Center	0.096	74

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}:	17.701	ft/sec
V_{scent}:	20.624	ft/sec
F_p:	0.858	[ratio]
Initial Tunnel Flow:	202.5	scf/min

Static Pressure: -0.160 in. H_2O

TEST FUEL PROPERTIES

Default Fuel Values

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

Actual Fuel Used Properties

Pellet Brand:	Lignetics
Pellet Fuel Grade:	PFI Premium
HHV (BTU/lb)	8627
%C	49.48
%H	6.22
%O	44.13
%Ash	0.17
MC (%WB)	2.1

PELLET STOVE PREBURN DATA - ASTM E2779

Client: 509 Fabrications
Job #: 24-265
Model: Mini Me
Tracking #: 212
Run #: 1
Technician: AK
Date: 8/13/2024

Recording Interval (min): 1
Run Time (min): 60

		Average:	-0.095	572	70
Elapsed Time (min)	**Scale Reading (lbs)**	**Weight Change (lbs)**	**Flue Draft (in H_2O)**	**Flue (°F)**	**Ambient (°F)**
0	34.4	-	-0.085	490	70
1	34.3	-0.04	-0.087	514	70
2	34.3	-0.05	-0.083	494	70
3	34.2	-0.05	-0.086	499	70
4	34.2	-0.06	-0.088	510	70
5	34.1	-0.05	-0.086	494	70
6	34.1	-0.05	-0.084	483	70
7	34.0	-0.05	-0.089	510	70
8	33.9	-0.07	-0.089	533	70
9	33.9	-0.08	-0.092	526	70
10	33.8	-0.07	-0.094	550	70
11	33.7	-0.06	-0.094	553	70
12	33.7	-0.06	-0.090	543	70
13	33.6	-0.09	-0.092	552	70
14	33.5	-0.08	-0.093	549	70
15	33.5	-0.02	-0.091	530	70
16	33.4	-0.08	-0.094	548	70
17	33.3	-0.06	-0.093	558	70
18	33.3	-0.06	-0.091	538	70
19	33.2	-0.07	-0.095	552	70
20	33.2	-0.06	-0.092	565	70
21	33.1	-0.07	-0.093	567	70
22	33.0	-0.06	-0.095	569	70
23	32.9	-0.09	-0.094	571	70
24	32.9	-0.05	-0.095	580	70
25	32.8	-0.05	-0.095	576	71
26	32.8	-0.07	-0.093	573	71
27	32.7	-0.05	-0.096	579	71
28	32.6	-0.08	-0.100	596	71
29	32.5	-0.09	-0.096	595	70
30	32.5	-0.07	-0.098	610	71
31	32.4	-0.08	-0.100	625	71
32	32.3	-0.07	-0.096	622	71
33	32.2	-0.11	-0.095	590	70
34	32.2	-0.05	-0.097	582	70
35	32.1	-0.06	-0.097	587	70
36	32.0	-0.08	-0.095	594	71
37	32.0	-0.07	-0.096	577	71
38	31.9	-0.07	-0.095	575	71
39	31.8	-0.05	-0.095	573	71
40	31.7	-0.1	-0.098	590	71
41	31.7	-0.05	-0.096	597	71
42	31.6	-0.06	-0.099	612	71
43	31.6	-0.07	-0.099	617	71
44	31.4	-0.12	-0.099	615	71
45	31.4	-0.02	-0.098	604	71
46	31.3	-0.08	-0.097	600	71

PELLET STOVE PREBURN DATA - ASTM E2779

Client: 509 Fabrications
Job #: 24-265
Model: Mini Me
Tracking #: 212
Run #: 1
Technician: AK
Date: 8/13/2024

47	31.2	-0.09	-0.098	600	71
48	31.2	-0.04	-0.097	591	71
49	31.1	-0.07	-0.098	588	71
50	31.1	-0.08	-0.098	595	71
51	31.0	-0.05	-0.097	604	71
52	30.9	-0.06	-0.098	596	71
53	30.9	-0.05	-0.098	599	71
54	30.8	-0.08	-0.099	623	71
55	30.7	-0.1	-0.100	619	71
56	30.6	-0.08	-0.100	608	71
57	30.6	-0.06	-0.099	616	71
58	30.5	-0.12	-0.097	602	71
59	30.4	-0.06	-0.097	595	71
60	30.3	-0.06	-0.094	584	71

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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		0.093	0.01	74.7	0.07		17.2		114	585	72	71
1	0.092	0.092	0.095	2.03	74.5	0.88	-	17.1	-0.1	114	586	74	71.3
2	0.234	0.142	0.096	2.09	74.6	0.88	-	17.1	-0.1	114	612	74	71.2
3	0.381	0.147	0.092	2.14	74.6	0.91	-	17.0	-0.1	114	605	75	71.2
4	0.522	0.141	0.096	2.18	74.6	0.93	-	16.9	-0.1	114	609	75	71.2
5	0.671	0.149	0.095	2.22	74.7	0.88	-	16.8	-0.1	114	608	75	71.4
6	0.815	0.144	0.096	2.24	74.8	0.89	-	16.8	-0.1	114	596	76	71.4
7	0.966	0.151	0.096	2.28	74.9	0.87	-	16.7	-0.1	114	595	76	71.3
8	1.111	0.145	0.094	2.29	75	0.87	-	16.7	-0.1	114	587	76	71.5
9	1.263	0.152	0.098	2.31	75.2	0.93	-	16.6	-0.1	113	587	77	71.3
10	1.410	0.147	0.095	2.32	75.3	0.89	94	16.5	-0.1	113	591	77	71.3
11	1.564	0.154	0.095	2.34	75.5	0.93	-	16.4	-0.1	114	621	77	71.1
12	1.712	0.148	0.095	2.36	75.6	0.88	-	16.4	-0.1	115	640	78	71.4
13	1.866	0.154	0.096	2.36	75.9	0.88	-	16.3	-0.1	116	649	78	71.5
14	2.014	0.148	0.097	2.36	76.1	0.91	-	16.2	-0.1	117	665	78	71.3
15	2.169	0.155	0.097	2.37	76.3	0.9	-	16.1	-0.1	117	653	78	71.4
16	2.317	0.148	0.097	2.37	76.5	0.94	-	16.0	-0.1	118	661	78	71.5
17	2.473	0.156	0.095	2.39	76.7	0.91	-	16.0	0.0	118	659	79	71.5
18	2.622	0.149	0.095	2.38	77	0.91	-	15.8	-0.1	118	639	79	71.4
19	2.778	0.156	0.095	2.40	77.3	0.93	-	15.8	-0.1	117	626	79	71.2
20	2.928	0.150	0.095	2.40	77.5	0.92	101	15.7	-0.1	117	620	79	71.1
21	3.083	0.155	0.094	2.40	77.8	0.92	-	15.7	-0.1	116	613	79	71.1
22	3.233	0.150	0.094	2.41	78	0.91	-	15.6	0.0	116	617	79	71.2
23	3.389	0.156	0.096	2.42	78.3	0.91	-	15.6	-0.1	116	606	79	71.2
24	3.541	0.152	0.094	2.42	78.6	0.93	-	15.5	0.0	115	597	79	71.3
25	3.696	0.155	0.094	2.42	78.9	0.92	-	15.4	-0.1	115	604	79	71.2
26	3.851	0.155	0.094	2.44	79.2	0.94	-	15.3	-0.1	115	605	79	71.3
27	4.004	0.153	0.095	2.44	79.5	0.91	-	15.3	-0.1	116	626	80	71.8
28	4.160	0.156	0.095	2.45	79.8	0.91	-	15.2	-0.1	116	616	80	71.6
29	4.311	0.151	0.095	2.46	80.1	0.94	-	15.1	-0.1	116	632	80	71.4
30	4.469	0.158	0.094	2.45	80.3	0.94	102	15.0	-0.1	116	627	80	71.5
31	4.621	0.152	0.094	2.46	80.7	0.92	-	15.0	-0.1	116	604	80	71.2
32	4.779	0.158	0.093	2.46	80.9	0.97	-	14.9	-0.1	115	601	80	71.1

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
33	4.931	0.152	0.095	2.46	81.2	0.94	-	14.8	-0.1	115	597	80	71.1
34	5.088	0.157	0.094	2.47	81.5	0.92	-	14.7	-0.1	115	596	80	71.2
35	5.244	0.156	0.093	2.47	81.7	0.94	-	14.7	-0.1	116	631	80	71.3
36	5.399	0.155	0.095	2.48	82	0.95	-	14.6	-0.1	116	647	80	71.3
37	5.557	0.158	0.094	2.47	82.3	0.95	-	14.5	-0.1	116	628	80	71.1
38	5.710	0.153	0.094	2.48	82.5	0.94	-	14.4	-0.1	116	614	80	71
39	5.869	0.159	0.093	2.49	82.8	0.94	-	14.3	-0.1	116	612	80	71
40	6.023	0.154	0.097	2.49	83	0.95	102	14.3	-0.1	116	630	80	71.2
41	6.181	0.158	0.095	2.49	83.3	0.94	-	14.2	-0.1	115	601	80	71.1
42	6.336	0.155	0.095	2.51	83.5	0.96	-	14.1	-0.1	115	598	80	70.8
43	6.493	0.157	0.095	2.50	83.7	0.95	-	14.0	-0.1	115	612	80	70.8
44	6.651	0.158	0.096	2.49	84	0.95	-	14.0	-0.1	115	613	80	70.9
45	6.805	0.154	0.097	2.50	84.2	0.95	-	13.9	-0.1	115	603	80	71.2
46	6.964	0.159	0.096	2.50	84.4	0.95	-	13.9	-0.1	116	609	80	71.1
47	7.119	0.155	0.097	2.50	84.7	0.95	-	13.7	-0.1	116	646	80	71.2
48	7.279	0.160	0.095	2.51	84.9	0.94	-	13.7	0.0	117	642	80	71.1
49	7.433	0.154	0.095	2.51	85	0.96	-	13.6	-0.1	116	636	80	71.2
50	7.591	0.158	0.095	2.51	85.3	0.95	102	13.6	0.0	117	636	80	71.4
51	7.750	0.159	0.094	2.51	85.4	0.95	-	13.5	-0.1	117	639	80	71.1
52	7.904	0.154	0.097	2.52	85.7	0.94	-	13.4	-0.1	118	643	80	71.2
53	8.064	0.160	0.093	2.51	85.9	0.96	-	13.3	-0.1	118	627	80	71.4
54	8.220	0.156	0.095	2.52	86.1	0.97	-	13.3	0.0	117	624	80	71.4
55	8.380	0.160	0.095	2.51	86.3	0.97	-	13.2	-0.1	117	635	80	71.6
56	8.535	0.155	0.097	2.52	86.5	0.97	-	13.1	-0.1	118	655	80	71.5
57	8.693	0.158	0.096	2.51	86.7	0.95	-	13.0	-0.1	119	678	81	71.4
58	8.853	0.160	0.096	2.53	86.9	0.96	-	12.9	-0.1	120	670	81	71.5
59	9.007	0.154	0.097	2.53	87.1	0.95	-	12.8	-0.1	119	667	80	71.4
60	9.169	0.162	0.096	2.51	87.2	0.96	103	12.8	-0.1	119	688	80	71.2
61	9.324	0.155	0.094	2.52	87.3	0.98	-	12.7	0.0	116	590	80	70.7
62	9.482	0.158	0.096	2.53	87.5	0.96	-	12.7	0.0	112	489	80	71.3
63	9.640	0.158	0.094	2.51	87.6	0.98	-	12.6	-0.1	112	569	80	71.6
64	9.798	0.158	0.096	2.50	87.8	0.99	-	12.5	-0.1	112	594	80	71.5
65	9.956	0.158	0.095	2.51	87.9	1	-	12.4	-0.1	113	598	80	71.3

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
66	10.111	0.155	0.096	2.50	88.1	1.02	-	12.3	-0.1	113	598	80	71.3
67	10.272	0.161	0.096	2.51	88.3	0.99	-	12.3	-0.1	113	583	80	71.1
68	10.427	0.155	0.094	2.51	88.4	1.01	-	12.2	-0.1	113	585	80	71.1
69	10.586	0.159	0.094	2.51	88.5	0.98	-	12.1	-0.1	113	589	80	71.2
70	10.745	0.159	0.095	2.52	88.6	1	102	12.1	0.0	112	579	80	71.5
71	10.901	0.156	0.094	2.52	88.7	1.01	-	12.0	-0.1	112	583	80	71.7
72	11.061	0.160	0.095	2.51	88.9	1	-	12.0	-0.1	112	580	80	71.3
73	11.216	0.155	0.095	2.52	89.1	1	-	11.9	-0.1	112	581	80	71.7
74	11.377	0.161	0.095	2.52	89.1	0.99	-	11.8	-0.1	112	591	80	71.4
75	11.532	0.155	0.094	2.52	89.2	0.99	-	11.8	0.0	112	605	80	71.3
76	11.691	0.159	0.097	2.50	89.4	0.99	-	11.7	-0.1	113	634	80	71.4
77	11.852	0.161	0.095	2.52	89.4	1.02	-	11.6	-0.1	114	634	80	71.3
78	12.006	0.154	0.096	2.53	89.5	1	-	11.5	-0.1	114	620	80	71.3
79	12.167	0.161	0.095	2.52	89.6	0.99	-	11.5	-0.1	114	610	80	71.3
80	12.323	0.156	0.095	2.52	89.7	0.99	102	11.4	-0.1	114	618	80	71.3
81	12.482	0.159	0.097	2.52	89.8	1.01	-	11.3	-0.1	113	580	80	71.5
82	12.640	0.158	0.095	2.51	89.9	1	-	11.3	0.0	112	570	80	71.8
83	12.798	0.158	0.096	2.51	90.1	1.01	-	11.2	-0.1	113	593	80	71.4
84	12.957	0.159	0.096	2.53	90.2	0.99	-	11.1	-0.1	113	596	80	71.5
85	13.112	0.155	0.096	2.51	90.2	1.01	-	11.1	-0.1	113	583	80	71.3
86	13.274	0.162	0.095	2.52	90.3	1.01	-	11.0	-0.1	113	583	80	71.3
87	13.428	0.154	0.096	2.52	90.4	1.02	-	10.9	-0.1	112	567	80	71.4
88	13.588	0.160	0.096	2.51	90.4	1.04	-	10.9	-0.1	112	572	80	71.3
89	13.748	0.160	0.096	2.51	90.5	1	-	10.8	-0.1	112	578	80	71.4
90	13.902	0.154	0.095	2.52	90.6	0.99	102	10.8	0.0	112	589	80	71.4
91	14.064	0.162	0.095	2.52	90.7	1.02	-	10.7	-0.1	112	558	80	71.5
92	14.220	0.156	0.096	2.51	90.7	1.02	-	10.7	0.0	111	528	80	71.6
93	14.378	0.158	0.095	2.52	90.8	1.03	-	10.6	-0.1	110	504	80	71.5
94	14.537	0.159	0.095	2.52	90.9	1	-	10.6	0.0	109	526	80	71.4
95	14.695	0.158	0.096	2.52	91	1.04	-	10.5	-0.1	109	542	80	71.6
96	14.854	0.159	0.094	2.53	91	1.01	-	10.4	-0.1	110	556	80	71.5
97	15.010	0.156	0.095	2.51	91.1	1.02	-	10.4	0.0	110	542	80	71.7
98	15.172	0.162	0.095	2.52	91.1	1	-	10.4	-0.1	109	539	80	71.5

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
99	15.327	0.155	0.096	2.53	91.2	1.03	-	10.3	-0.1	109	534	80	71.6
100	15.487	0.160	0.095	2.51	91.3	1.03	102	10.2	0.0	109	529	80	71.6
101	15.648	0.161	0.094	2.52	91.3	1.02	-	10.2	0.0	109	536	80	71.5
102	15.803	0.155	0.095	2.53	91.4	1.02	-	10.1	-0.1	110	555	80	71.6
103	15.964	0.161	0.095	2.51	91.5	1.01	-	10.1	-0.1	109	533	80	71.5
104	16.121	0.157	0.096	2.53	91.5	1.02	-	10.0	-0.1	109	542	79	71.6
105	16.280	0.159	0.096	2.53	91.6	0.99	-	10.0	0.0	109	552	79	71.6
106	16.439	0.159	0.095	2.51	91.7	1.03	-	9.9	-0.1	110	572	80	71.4
107	16.596	0.157	0.094	2.53	91.7	1.02	-	9.8	-0.1	110	588	80	71.5
108	16.756	0.160	0.095	2.53	91.8	1.01	-	9.8	0.0	111	594	80	71.6
109	16.913	0.157	0.096	2.53	91.8	1.03	-	9.7	0.0	111	599	80	71.7
110	17.074	0.161	0.094	2.53	91.8	1.02	103	9.6	-0.1	112	603	80	71.8
111	17.230	0.156	0.095	2.52	91.9	1.04	-	9.6	-0.1	112	592	80	71.9
112	17.390	0.160	0.097	2.53	92	1.03	-	9.5	0.0	112	593	80	71.8
113	17.550	0.160	0.094	2.53	92	1.02	-	9.4	-0.1	112	577	80	71.9
114	17.705	0.155	0.096	2.52	92	1.02	-	9.3	-0.1	112	595	80	72.1
115	17.867	0.162	0.095	2.52	92.2	1.04	-	9.2	-0.1	113	605	80	71.9
116	18.023	0.156	0.093	2.52	92.1	1.04	-	9.2	-0.1	114	610	80	72.3
117	18.182	0.159	0.096	2.51	92.2	1.04	-	9.1	-0.1	114	599	80	72.1
118	18.342	0.160	0.096	2.51	92.2	1.03	-	9.1	0.0	113	594	80	72.2
119	18.498	0.156	0.096	2.52	92.4	1.04	-	9.0	-0.1	112	574	80	72.2
120	18.659	0.161	0.098	2.52	92.4	1.05	102	9.0	-0.1	112	563	80	72
121	18.816	0.157	0.095	2.51	92.4	1.03	-	8.9	-0.1	112	573	80	72.1
122	18.975	0.159	0.095	2.52	92.5	1.05	-	8.8	-0.1	113	587	80	72.3
123	19.133	0.158	0.097	2.51	92.5	1.03	-	8.8	-0.1	113	571	80	72.2
124	19.292	0.159	0.094	2.51	92.5	1.03	-	8.7	0.0	112	550	80	72.5
125	19.451	0.159	0.096	2.52	92.5	1.03	-	8.7	-0.1	112	558	80	72.4
126	19.607	0.156	0.096	2.51	92.6	1.02	-	8.6	-0.1	112	554	80	72.4
127	19.769	0.162	0.095	2.52	92.6	1.06	-	8.5	-0.1	112	562	80	72.5
128	19.925	0.156	0.095	2.52	92.7	1.03	-	8.5	-0.1	112	560	80	72.7
129	20.084	0.159	0.095	2.51	92.8	1.06	-	8.4	0.0	111	562	80	72.9
130	20.245	0.161	0.095	2.52	92.8	1.07	101	8.4	0.0	112	582	80	72.8
131	20.399	0.154	0.098	2.53	92.8	1.05	-	8.3	-0.1	112	573	80	72.8

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
132	20.561	0.162	0.096	2.51	92.9	1.03	-	8.2	-0.1	112	550	80	72.7
133	20.717	0.156	0.095	2.52	92.9	1.05	-	8.2	-0.1	111	523	80	72.7
134	20.876	0.159	0.095	2.53	92.9	1.04	-	8.1	0.0	110	503	80	72.3
135	21.035	0.159	0.096	2.51	93	1.03	-	8.1	-0.1	110	513	80	72.4
136	21.193	0.158	0.096	2.52	93	1.05	-	8.0	0.0	110	547	80	72.7
137	21.353	0.160	0.095	2.53	93.1	1.03	-	8.0	0.0	110	527	80	72.5
138	21.508	0.155	0.095	2.51	93	1.05	-	8.0	-0.1	109	518	80	72.7
139	21.670	0.162	0.094	2.52	93.1	1.04	-	7.9	-0.1	109	509	80	72.7
140	21.826	0.156	0.095	2.51	93.1	1.03	102	7.9	-0.1	109	519	80	72.6
141	21.985	0.159	0.094	2.51	93.2	1.05	-	7.8	-0.1	109	523	80	72.8
142	22.146	0.161	0.095	2.52	93.2	1.05	-	7.7	0.0	110	546	80	72.7
143	22.300	0.154	0.096	2.52	93.2	1.04	-	7.7	0.0	111	547	80	72.9
144	22.463	0.163	0.095	2.52	93.2	1.05	-	7.6	-0.1	111	550	80	72.5
145	22.618	0.155	0.096	2.52	93.3	1.04	-	7.5	-0.1	111	567	80	72.8
146	22.777	0.159	0.094	2.51	93.4	1.07	-	7.5	0.0	112	569	80	72.8
147	22.937	0.160	0.095	2.50	93.4	1.06	-	7.4	-0.1	112	562	80	72.5
148	23.093	0.156	0.097	2.50	93.4	1.06	-	7.3	-0.1	112	549	80	72.6
149	23.253	0.160	0.097	2.50	93.4	1.06	-	7.3	-0.1	111	526	80	72.8
150	23.410	0.157	0.097	2.50	93.5	1.06	101	7.3	0.0	111	542	80	72.8
151	23.570	0.160	0.096	2.50	93.5	1.06	-	7.2	-0.1	112	545	80	72.9
152	23.726	0.156	0.095	2.50	93.5	1.07	-	7.1	-0.1	111	517	80	72.7
153	23.886	0.160	0.097	2.50	93.5	1.06	-	7.1	0.0	110	471	80	72.5
154	24.045	0.159	0.095	2.51	93.5	1.06	-	7.1	0.0	108	439	80	72.7
155	24.200	0.155	0.098	2.50	93.5	1.07	-	7.0	0.0	107	434	80	72.8
156	24.363	0.163	0.097	2.51	93.6	1.04	-	7.0	0.0	107	479	80	72.4
157	24.518	0.155	0.095	2.51	93.6	1.06	-	7.0	0.0	107	480	80	72.5
158	24.677	0.159	0.097	2.51	93.6	1.06	-	6.9	-0.1	108	480	80	72.4
159	24.837	0.160	0.097	2.50	93.6	1.08	-	6.9	0.0	108	508	80	72.3
160	24.993	0.156	0.097	2.51	93.7	1.08	101	6.8	-0.1	108	509	80	72.6
161	25.154	0.161	0.098	2.50	93.7	1.06	-	6.8	-0.1	109	522	80	72.4
162	25.311	0.157	0.098	2.50	93.6	1.06	-	6.7	-0.1	109	521	80	72.4
163	25.470	0.159	0.097	2.51	93.7	1.09	-	6.6	-0.1	110	551	80	72.5
164	25.628	0.158	0.097	2.51	93.8	1.08	-	6.6	0.0	110	517	80	72.7

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
165	25.787	0.159	0.097	2.50	93.7	1.05	-	6.5	-0.1	109	500	80	72.7
166	25.946	0.159	0.096	2.50	93.8	1.11	-	6.5	0.0	110	515	80	72.5
167	26.102	0.156	0.098	2.50	93.8	1.07	-	6.4	-0.1	110	513	80	72.7
168	26.264	0.162	0.096	2.51	93.9	1.08	-	6.4	-0.1	110	524	80	72.8
169	26.419	0.155	0.095	2.52	93.8	1.05	-	6.3	-0.1	110	518	80	72.5
170	26.579	0.160	0.096	2.51	93.8	1.05	101	6.3	0.0	110	529	80	72.7
171	26.740	0.161	0.097	2.50	93.9	1.09	-	6.2	-0.1	111	543	80	72.5
172	26.895	0.155	0.098	2.52	93.9	1.07	-	6.2	-0.1	111	540	80	72.7
173	27.057	0.162	0.095	2.50	93.9	1.07	-	6.1	-0.1	111	527	80	72.7
174	27.213	0.156	0.096	2.51	93.9	1.05	-	6.1	-0.1	111	519	80	72.5
175	27.372	0.159	0.097	2.51	94	1.09	-	6.0	-0.1	111	526	80	72.8
176	27.531	0.159	0.098	2.50	94	1.09	-	6.0	0.0	110	507	80	72.8
177	27.688	0.157	0.097	2.51	94.1	1.1	-	5.9	0.0	109	498	80	72.8
178	27.848	0.160	0.097	2.51	94.1	1.07	-	5.9	-0.1	110	511	80	72.8
179	28.004	0.156	0.096	2.50	94.1	1.09	-	5.8	-0.1	110	514	80	72.6
180	28.166	0.162	0.097	2.51	94.1	1.11	101	5.8	-0.1	110	515	80	72.7
181	28.322	0.156	0.095	2.52	94.1	1.08	-	5.7	-0.1	109	494	80	72.8
182	28.481	0.159	0.096	2.52	94.1	1.08	-	5.7	-0.1	108	475	80	73
183	28.641	0.160	0.096	2.51	94.2	1.07	-	5.6	0.0	107	468	80	72.8
184	28.796	0.155	0.096	2.51	94.2	1.06	-	5.6	0.0	107	462	80	72.5
185	28.959	0.163	0.097	2.51	94.2	1.09	-	5.6	0.0	107	474	80	72.6
186	29.114	0.155	0.096	2.52	94.3	1.08	-	5.5	-0.1	106	461	80	72.8
187	29.273	0.159	0.095	2.52	94.3	1.06	-	5.5	0.0	106	448	80	72.6
188	29.434	0.161	0.097	2.51	94.3	1.08	-	5.4	-0.1	105	428	80	72.4
189	29.589	0.155	0.099	2.52	94.3	1.1	-	5.4	0.0	104	418	80	72.5
190	29.750	0.161	0.098	2.51	94.3	1.07	100	5.4	0.0	103	406	80	72.7
191	29.907	0.157	0.098	2.50	94.3	1.1	-	5.3	-0.1	103	401	80	72.7
192	30.067	0.160	0.095	2.51	94.4	1.09	-	5.3	0.0	103	406	80	72.6
193	30.225	0.158	0.096	2.52	94.4	1.07	-	5.3	-0.1	102	411	80	72.6
194	30.384	0.159	0.096	2.50	94.4	1.09	-	5.2	0.0	102	412	80	72.5
195	30.543	0.159	0.095	2.51	94.4	1.1	-	5.2	0.0	102	430	80	72.4
196	30.699	0.156	0.098	2.50	94.4	1.08	-	5.2	0.0	103	437	79	72.4
197	30.861	0.162	0.096	2.50	94.5	1.09	-	5.2	0.0	103	419	79	72.4

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
198	31.017	0.156	0.098	2.52	94.5	1.05	-	5.1	0.0	102	410	79	72.3
199	31.177	0.160	0.097	2.51	94.5	1.08	-	5.1	-0.1	102	437	79	72.5
200	31.338	0.161	0.098	2.50	94.5	1.06	100	5.0	-0.1	103	466	79	72.5
201	31.492	0.154	0.097	2.51	94.5	1.07	-	5.0	0.0	103	466	79	72.6
202	31.654	0.162	0.098	2.51	94.5	1.09	-	4.9	0.0	104	468	79	72.5
203	31.811	0.157	0.097	2.51	94.6	1.1	-	4.9	0.0	104	451	79	72.3
204	31.815	0.004	0.098	2.51	92.3	1.09	-	4.9	0.0	103	463	75	72.1
205	31.968	0.153	0.097	2.36	91.2	1.04	-	4.8	0.0	102	443	76	72.4
206	32.121	0.153	0.097	2.37	90.7	1.08	-	4.8	0.0	102	439	76	72.3
207	32.279	0.158	0.096	2.38	90.4	1.1	-	4.8	0.0	102	407	76	72.4
208	32.432	0.153	0.097	2.39	90.2	1.04	-	4.7	0.0	101	383	77	72.4
209	32.588	0.156	0.097	2.41	90	1.05	-	4.7	0.0	100	387	77	72.4
210	32.740	0.152	0.099	2.42	89.9	1.09	88	4.7	0.0	100	407	77	72.5
211	32.897	0.157	0.098	2.41	89.8	1.09	-	4.6	0.0	100	405	77	72.5
212	33.050	0.153	0.098	2.41	89.8	1.06	-	4.6	0.0	100	404	77	72.5
213	33.206	0.156	0.098	2.42	89.7	1.08	-	4.6	0.0	100	387	77	72.5
214	33.359	0.153	0.097	2.43	89.7	1.09	-	4.6	0.0	99	374	77	72.5
215	33.514	0.155	0.098	2.44	89.7	1.03	-	4.5	0.0	98	363	77	72.6
216	33.669	0.155	0.096	2.43	89.6	1.03	-	4.5	-0.1	99	404	77	72.5
217	33.826	0.157	0.098	2.43	89.7	1.07	-	4.5	0.0	99	404	78	72.3
218	33.986	0.160	0.098	2.43	89.7	1.06	-	4.4	0.0	99	403	78	72.3
219	34.138	0.152	0.098	2.44	89.7	1.09	-	4.4	-0.1	99	400	78	72.1
220	34.297	0.159	0.098	2.44	89.8	1.07	98	4.4	0.0	99	391	78	72.3
221	34.451	0.154	0.097	2.43	89.8	1.09	-	4.4	0.0	100	435	78	72.3
222	34.610	0.159	0.099	2.44	89.9	1.06	-	4.3	-0.1	101	477	78	72.1
223	34.762	0.152	0.096	2.45	89.9	1.06	-	4.2	0.0	101	458	78	72.2
224	34.919	0.157	0.097	2.44	90	1.11	-	4.2	-0.1	102	477	78	72.1
225	35.078	0.159	0.098	2.45	90.1	1.1	-	4.2	0.0	102	471	78	72.4
226	35.230	0.152	0.097	2.44	90.1	1.06	-	4.1	0.0	102	446	78	72.1
227	35.387	0.157	0.098	2.45	90.2	1.04	-	4.1	0.0	102	433	78	72.3
228	35.541	0.154	0.097	2.46	90.3	1.07	-	4.1	0.0	101	415	78	72.3
229	35.701	0.160	0.098	2.45	90.3	1.1	-	4.0	0.0	101	408	78	72.2
230	35.856	0.155	0.097	2.45	90.4	1.04	98	4.0	0.0	100	389	78	72.3

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
231	36.013	0.157	0.098	2.46	90.5	1.06	-	4.0	0.0	100	377	78	72.4
232	36.173	0.160	0.097	2.45	90.7	1.06	-	3.9	0.0	99	378	79	72.4
233	36.329	0.156	0.098	2.45	90.7	1.08	-	3.9	-0.1	99	404	79	72.3
234	36.487	0.158	0.097	2.46	90.8	1.09	-	3.9	0.0	99	403	79	72.4
235	36.640	0.153	0.098	2.46	90.9	1.09	-	3.8	0.0	99	394	79	72.4
236	36.801	0.161	0.097	2.46	91	1.07	-	3.8	0.0	99	384	79	72.3
237	36.956	0.155	0.097	2.47	91.1	1.08	-	3.8	0.0	99	388	79	72.3
238	37.114	0.158	0.096	2.48	91.2	1.09	-	3.7	0.0	99	409	79	72.3
239	37.267	0.153	0.097	2.46	91.3	1.07	-	3.7	0.0	99	421	79	72.3
240	37.427	0.160	0.096	2.46	91.3	1.08	100	3.7	-0.1	100	448	79	72.3
241	37.586	0.159	0.097	2.47	91.5	1.07	-	3.6	0.0	101	450	79	72.4
242	37.740	0.154	0.096	2.46	91.5	1.11	-	3.6	-0.1	101	443	79	72.1
243	37.898	0.158	0.097	2.47	91.6	1.07	-	3.5	0.0	101	441	79	72.3
244	38.053	0.155	0.097	2.47	91.7	1.09	-	3.5	0.0	101	422	79	72.3
245	38.211	0.158	0.097	2.47	91.7	1.08	-	3.5	0.0	100	415	79	72.3
246	38.368	0.157	0.097	2.47	91.9	1.05	-	3.5	0.0	100	401	79	72.2
247	38.526	0.158	0.096	2.46	91.9	1.09	-	3.4	0.0	99	408	79	72.4
248	38.684	0.158	0.098	2.48	92	1.08	-	3.4	0.0	99	399	79	72.2
249	38.841	0.157	0.096	2.48	92.1	1.06	-	3.4	0.0	99	385	79	72.3
250	39.002	0.161	0.096	2.48	92.2	1.09	100	3.3	0.0	98	374	79	72.2
251	39.157	0.155	0.097	2.49	92.3	1.08	-	3.3	0.0	98	375	79	72.5
252	39.315	0.158	0.098	2.48	92.3	1.08	-	3.3	0.0	98	373	79	72.2
253	39.474	0.159	0.097	2.48	92.4	1.08	-	3.3	0.0	98	377	79	72.4
254	39.630	0.156	0.097	2.48	92.4	1.1	-	3.3	0.0	98	358	79	72.4
255	39.790	0.160	0.098	2.49	92.5	1.07	-	3.2	-0.1	97	362	78	72.3
256	39.941	0.151	0.097	2.48	92.5	1.08	-	3.2	0.0	97	358	78	72.5
257	40.103	0.162	0.098	2.48	92.6	1.07	-	3.1	0.0	97	360	78	72.4
258	40.257	0.154	0.098	2.49	92.7	1.1	-	3.1	0.0	97	359	78	72.2
259	40.416	0.159	0.097	2.47	92.7	1.09	-	3.1	0.0	97	363	78	72.4
260	40.576	0.160	0.099	2.49	92.8	1.09	99	3.1	0.0	96	362	78	72.3
261	40.731	0.155	0.097	2.49	92.9	1.07	-	3.0	0.0	97	368	78	72.4
262	40.895	0.164	0.097	2.49	92.9	1.09	-	3.0	-0.1	97	401	78	72.4
263	41.050	0.155	0.095	2.48	93	1.1	-	2.9	0.0	98	412	78	72.6

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
264	41.209	0.159	0.095	2.49	93.1	1.1	-	2.9	0.0	98	424	78	72.6
265	41.367	0.158	0.097	2.49	93.1	1.06	-	2.9	0.0	98	429	78	72.6
266	41.525	0.158	0.097	2.49	93.2	1.11	-	2.9	0.0	99	422	78	72.4
267	41.684	0.159	0.097	2.49	93.3	1.08	-	2.8	0.0	99	416	78	72.3
268	41.839	0.155	0.098	2.48	93.3	1.06	-	2.8	-0.1	98	394	78	72.4
269	42.001	0.162	0.098	2.48	93.3	1.1	-	2.7	0.0	98	382	78	72.4
270	42.153	0.152	0.099	2.49	93.4	1.07	98	2.7	0.0	98	391	78	72.5
271	42.312	0.159	0.098	2.49	93.4	1.1	-	2.7	0.0	97	386	78	72.5
272	42.472	0.160	0.099	2.50	93.5	1.07	-	2.7	0.0	97	370	78	72.4
273	42.628	0.156	0.098	2.49	93.5	1.11	-	2.6	0.0	97	367	78	72.4
274	42.788	0.160	0.097	2.50	93.6	1.09	-	2.6	0.0	97	374	78	72.5
275	42.944	0.156	0.097	2.49	93.6	1.08	-	2.6	0.0	97	380	78	72.6
276	43.106	0.162	0.098	2.49	93.7	1.1	-	2.6	0.0	97	388	78	72.5
277	43.263	0.157	0.098	2.49	93.8	1.07	-	2.5	0.0	98	401	78	72.3
278	43.422	0.159	0.099	2.50	93.8	1.05	-	2.5	-0.1	99	439	78	72.6
279	43.581	0.159	0.098	2.49	93.8	1.08	-	2.4	0.0	98	406	78	72.5
280	43.736	0.155	0.098	2.49	93.9	1.07	99	2.4	0.0	98	375	78	72.5
281	43.899	0.163	0.097	2.49	93.9	1.08	-	2.4	0.0	97	361	78	72.5
282	44.054	0.155	0.098	2.49	94	1.09	-	2.4	0.0	97	364	78	72.6
283	44.210	0.156	0.099	2.50	94	1.11	-	2.3	0.0	97	380	78	72.3
284	44.370	0.160	0.098	2.49	94.1	1.08	-	2.3	0.0	97	383	78	72.5
285	44.527	0.157	0.098	2.50	94.1	1.08	-	2.3	0.0	97	365	79	72.3
286	44.687	0.160	0.098	2.50	94.1	1.09	-	2.3	0.0	97	362	78	72.5
287	44.843	0.156	0.098	2.50	94.2	1.07	-	2.2	0.0	96	349	78	72.6
288	45.005	0.162	0.097	2.49	94.1	1.1	-	2.2	0.0	96	362	78	72.6
289	45.162	0.157	0.097	2.50	94.2	1.06	-	2.2	0.0	97	386	78	72.6
290	45.321	0.159	0.098	2.50	94.3	1.1	99	2.1	0.0	98	401	79	72.6
291	45.480	0.159	0.097	2.51	94.3	1.09	-	2.1	0.0	97	391	79	72.7
292	45.636	0.156	0.096	2.49	94.3	1.11	-	2.1	0.0	97	378	78	72.7
293	45.798	0.162	0.098	2.49	94.4	1.1	-	2.0	-0.1	97	389	78	72.7
294	45.953	0.155	0.099	2.49	94.4	1.05	-	2.0	0.0	97	376	78	72.5
295	46.110	0.157	0.097	2.49	94.4	1.06	-	2.0	0.0	96	367	78	72.7
296	46.271	0.161	0.096	2.49	94.5	1.1	-	2.0	0.0	96	349	78	72.6

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
297	46.428	0.157	0.097	2.50	94.4	1.06	-	2.0	0.0	96	346	78	72.6
298	46.587	0.159	0.097	2.50	94.5	1.09	-	1.9	0.0	96	366	78	72.5
299	46.743	0.156	0.098	2.50	94.5	1.09	-	1.9	0.0	96	377	78	72.3
300	46.903	0.160	0.097	2.51	94.6	1.1	99	1.9	0.0	96	372	78	72.5
301	47.060	0.157	0.098	2.49	94.6	1.11	-	1.8	0.0	96	370	78	72.6
302	47.219	0.159	0.099	2.50	94.6	1.07	-	1.8	0.0	96	382	78	72.5
303	47.379	0.160	0.098	2.50	94.7	1.08	-	1.8	0.0	97	392	78	72.5
304	47.538	0.159	0.097	2.49	94.6	1.08	-	1.7	0.0	96	382	78	72.4
305	47.699	0.161	0.097	2.50	94.6	1.08	-	1.7	0.0	96	379	78	72.5
306	47.855	0.156	0.098	2.51	94.7	1.07	-	1.7	0.0	96	363	78	72.5
307	48.014	0.159	0.098	2.49	94.7	1.08	-	1.7	0.0	96	352	78	72.5
308	48.172	0.158	0.097	2.49	94.8	1.12	-	1.7	0.0	95	346	78	72.4
309	48.326	0.154	0.098	2.50	94.8	1.08	-	1.7	0.0	95	356	78	72.5
310	48.488	0.162	0.099	2.50	94.8	1.13	99	1.6	0.0	95	372	78	72.4
311	48.645	0.157	0.098	2.49	94.8	1.1	-	1.6	0.0	96	390	78	72.4
312	48.804	0.159	0.098	2.50	94.8	1.1	-	1.6	0.0	97	425	78	72.6
313	48.966	0.162	0.098	2.49	94.8	1.1	-	1.5	0.0	98	448	78	72.6
314	49.123	0.157	0.098	2.49	94.8	1.1	-	1.5	0.0	99	453	78	72.6
315	49.283	0.160	0.097	2.50	94.9	1.09	-	1.4	0.0	98	418	78	72.5
316	49.439	0.156	0.098	2.49	94.9	1.07	-	1.4	-0.1	98	391	78	72.4
317	49.600	0.161	0.099	2.50	94.9	1.06	-	1.4	0.0	97	365	78	72.5
318	49.756	0.156	0.099	2.51	94.9	1.11	-	1.3	0.0	96	366	78	72.6
319	49.913	0.157	0.096	2.49	95	1.08	-	1.3	0.0	96	372	78	72.6
320	50.074	0.161	0.097	2.50	95	1.09	99	1.3	0.0	96	368	78	72.7
321	50.228	0.154	0.098	2.50	95	1.12	-	1.2	-0.1	96	377	78	72.6
322	50.390	0.162	0.098	2.49	95	1.08	-	1.2	0.0	96	380	78	72.7
323	50.548	0.158	0.096	2.50	95.1	1.07	-	1.2	0.0	96	376	78	72.5
324	50.708	0.160	0.099	2.50	95.1	1.07	-	1.2	0.0	96	377	78	72.6
325	50.868	0.160	0.097	2.49	95	1.13	-	1.1	0.0	96	384	78	72.6
326	51.024	0.156	0.097	2.50	95.1	1.11	-	1.1	0.0	96	380	78	72.5
327	51.185	0.161	0.099	2.49	95.1	1.11	-	1.1	0.0	96	365	78	72.7
328	51.339	0.154	0.099	2.49	95.1	1.12	-	1.0	0.0	96	366	78	72.7
329	51.499	0.160	0.098	2.50	95.1	1.08	-	1.0	0.0	97	408	78	72.8

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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
330	51.656	0.157	0.099	2.49	95.1	1.1	99	1.0	0.0	97	424	79	72.8
331	51.818	0.162	0.098	2.50	95.1	1.09	-	0.9	0.0	98	419	79	72.7
332	51.977	0.159	0.097	2.50	95.1	1.14	-	0.9	0.0	98	412	78	72.8
333	52.133	0.156	0.098	2.49	95.2	1.12	-	0.9	0.0	98	392	79	72.7
334	52.296	0.163	0.097	2.50	95.2	1.06	-	0.9	0.0	97	401	79	72.7
335	52.448	0.152	0.098	2.50	95.2	1.1	-	0.8	0.0	98	403	79	72.8
336	52.607	0.159	0.097	2.49	95.2	1.09	-	0.8	0.0	98	419	79	72.8
337	52.771	0.164	0.097	2.49	95.2	1.08	-	0.8	0.0	98	422	79	72.6
338	52.926	0.155	0.098	2.50	95.2	1.07	-	0.7	-0.1	99	428	79	72.7
339	53.088	0.162	0.096	2.49	95.3	1.13	-	0.7	0.0	98	414	79	72.8
340	53.244	0.156	0.097	2.49	95.2	1.11	99	0.6	0.0	98	420	79	72.7
341	53.400	0.156	0.097	2.51	95.3	1.08	-	0.6	0.0	99	415	79	72.6
342	53.559	0.159	0.097	2.50	95.3	1.08	-	0.6	0.0	99	411	79	72.7
343	53.718	0.159	0.097	2.50	95.3	1.12	-	0.6	0.0	98	398	79	72.7
344	53.877	0.159	0.097	2.51	95.3	1.1	-	0.5	0.0	98	391	79	72.6
345	54.033	0.156	0.099	2.50	95.3	1.08	-	0.5	0.0	98	387	79	72.7
346	54.195	0.162	0.098	2.50	95.3	1.09	-	0.5	0.0	97	382	79	72.8
347	54.351	0.156	0.098	2.50	95.4	1.1	-	0.4	0.0	97	370	79	72.7
348	54.513	0.162	0.094	2.49	95.3	1.08	-	0.4	0.0	97	377	79	72.8
349	54.673	0.160	0.098	2.50	95.4	1.1	-	0.4	0.0	97	369	79	72.9
350	54.827	0.154	0.098	2.49	95.4	1.08	99	0.4	0.0	97	379	79	72.9
351	54.990	0.163	0.097	2.49	95.4	1.08	-	0.3	0.0	97	389	79	72.8
352	55.144	0.154	0.097	2.50	95.4	1.12	-	0.3	-0.1	97	400	79	73
353	55.303	0.159	0.098	2.51	95.4	1.14	-	0.3	0.0	97	380	79	72.8
354	55.465	0.162	0.097	2.49	95.5	1.12	-	0.3	0.0	96	348	79	72.8
355	55.621	0.156	0.098	2.49	95.5	1.11	-	0.2	0.0	96	330	79	72.9
356	55.782	0.161	0.097	2.49	95.5	1.11	-	0.2	0.0	96	352	79	72.8
357	55.938	0.156	0.098	2.49	95.4	1.08	-	0.2	0.0	96	362	79	72.7
358	56.096	0.158	0.098	2.49	95.5	1.08	-	0.1	-0.1	97	393	79	72.8
359	56.253	0.157	0.097	2.49	95.5	1.1	-	0.1	0.0	98	433	79	73
360	56.412	0.159	0.095	2.49	95.5	1.09	100	0.0	-0.1	99	466	79	73
Avg/Tot	56.412	0.157	0.096	2.48	91	1.04	100			106	488	79	72

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	75.4	0.69		74	-0.098	9.53	0.08
1	0.107	0.107	2.43	75.3	1.6	-	76	-0.098	10.72	0.06
2	0.260	0.153	2.43	75.2	1.84	-	76	-0.099	13.70	0.03
3	0.412	0.152	2.44	75.3	1.84	-	77	-0.098	11.94	0.07
4	0.566	0.154	2.45	75.3	2.08	-	77	-0.099	11.64	0.06
5	0.716	0.150	2.46	75.3	1.53	-	78	-0.098	10.59	0.06
6	0.870	0.154	2.45	75.4	1.96	-	78	-0.098	10.52	0.07
7	1.020	0.150	2.44	75.6	1.58	-	78	-0.097	10.27	0.05
8	1.176	0.156	2.45	75.7	1.94	-	79	-0.096	9.12	0.10
9	1.327	0.151	2.46	75.8	1.69	-	79	-0.098	11.98	0.04
10	1.482	0.155	2.45	76	1.8	100	79	-0.099	11.93	0.04
11	1.633	0.151	2.46	76.2	2.12	-	79	-0.101	11.44	0.05
12	1.787	0.154	2.46	76.4	2.04	-	80	-0.102	13.30	0.03
13	1.938	0.151	2.44	76.7	1.89	-	80	-0.100	12.90	0.04
14	2.093	0.155	2.46	76.8	1.72	-	80	-0.104	14.20	0.04
15	2.247	0.154	2.46	77.1	1.64	-	80	-0.102	11.68	0.04
16	2.399	0.152	2.46	77.3	2.07	-	80	-0.102	13.95	0.04
17	2.553	0.154	2.46	77.6	1.58	-	80	-0.102	13.38	0.04
18	2.704	0.151	2.46	77.9	1.57	-	81	-0.098	11.80	0.05
19	2.860	0.156	2.46	78.1	1.79	-	81	-0.102	10.37	0.06
20	3.012	0.152	2.46	78.5	1.74	103	81	-0.098	10.35	0.06
21	3.168	0.156	2.47	78.8	1.82	-	81	-0.101	11.95	0.04
22	3.319	0.151	2.46	79.1	2.06	-	81	-0.101	10.37	0.07
23	3.474	0.155	2.46	79.4	2.02	-	81	-0.097	11.05	0.07
24	3.627	0.153	2.46	79.7	1.71	-	81	-0.097	10.11	0.08
25	3.782	0.155	2.47	80	1.89	-	81	-0.096	11.63	0.04
26	3.938	0.156	2.47	80.4	1.85	-	81	-0.098	11.95	0.04
27	4.090	0.152	2.47	80.7	2.04	-	81	-0.100	13.24	0.04
28	4.246	0.156	2.46	81	1.68	-	81	-0.100	11.08	0.07
29	4.399	0.153	2.47	81.4	1.89	-	81	-0.101	12.79	0.04
30	4.556	0.157	2.48	81.7	1.98	104	81	-0.100	11.90	0.04
31	4.708	0.152	2.47	82	1.71	-	81	-0.097	11.43	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	4.864	0.156	2.47	82.3	1.95	-	81	-0.097	12.38	0.04
33	5.020	0.156	2.48	82.7	2.04	-	81	-0.096	12.34	0.05
34	5.175	0.155	2.48	83	1.67	-	81	-0.098	10.73	0.04
35	5.330	0.155	2.48	83.3	1.59	-	81	-0.100	12.32	0.05
36	5.483	0.153	2.47	83.6	1.79	-	81	-0.102	12.82	0.04
37	5.642	0.159	2.49	84	1.59	-	81	-0.100	12.77	0.03
38	5.795	0.153	2.49	84.3	1.57	-	81	-0.097	10.27	0.07
39	5.952	0.157	2.48	84.6	2.08	-	81	-0.097	9.52	0.09
40	6.106	0.154	2.49	84.9	1.85	103	81	-0.099	12.37	0.06
41	6.263	0.157	2.48	85.2	2.06	-	81	-0.099	10.90	0.05
42	6.419	0.156	2.48	85.5	1.7	-	81	-0.096	11.53	0.05
43	6.573	0.154	2.48	85.9	1.9	-	81	-0.100	13.80	0.07
44	6.732	0.159	2.49	86.1	1.86	-	81	-0.098	11.58	0.05
45	6.886	0.154	2.50	86.4	1.66	-	81	-0.099	10.71	0.07
46	7.043	0.157	2.49	86.7	2.11	-	81	-0.098	10.93	0.07
47	7.199	0.156	2.49	87	1.59	-	81	-0.103	12.00	0.04
48	7.356	0.157	2.50	87.3	2.01	-	81	-0.100	11.67	0.05
49	7.513	0.157	2.49	87.5	1.56	-	81	-0.102	14.03	0.07
50	7.667	0.154	2.49	87.9	1.68	103	81	-0.102	11.91	0.04
51	7.826	0.159	2.49	88.1	1.65	-	81	-0.103	14.92	0.04
52	7.980	0.154	2.49	88.4	1.57	-	81	-0.102	12.14	0.04
53	8.138	0.158	2.49	88.7	2.11	-	81	-0.101	11.77	0.04
54	8.295	0.157	2.49	88.9	1.74	-	81	-0.101	12.82	0.03
55	8.450	0.155	2.49	89.2	1.61	-	81	-0.103	12.31	0.05
56	8.609	0.159	2.49	89.4	1.64	-	82	-0.105	13.52	0.04
57	8.764	0.155	2.49	89.7	1.73	-	82	-0.104	14.13	0.03
58	8.923	0.159	2.49	89.9	1.92	-	82	-0.103	13.59	0.05
59	9.078	0.155	2.49	90.2	1.87	-	82	-0.102	12.44	0.04
60	9.236	0.158	2.49	90.4	2.03	103	82	-0.106	15.03	0.03
61	9.394	0.158	2.50	90.7	1.56	-	81	-0.092	12.08	0.05
62	9.549	0.155	2.50	90.9	1.8	-	81	-0.082	5.14	0.43
63	9.709	0.160	2.48	91.1	1.94	-	81	-0.099	18.87	2.41

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	9.862	0.153	2.48	91.3	2.07	-	81	-0.100	13.51	0.05
65	10.020	0.158	2.47	91.5	2.07	-	81	-0.099	12.43	0.05
66	10.178	0.158	2.48	91.7	1.79	-	81	-0.100	12.08	0.05
67	10.333	0.155	2.48	91.8	1.59	-	81	-0.098	10.69	0.05
68	10.491	0.158	2.47	92	1.78	-	81	-0.099	10.71	0.06
69	10.647	0.156	2.48	92.3	1.85	-	81	-0.098	12.30	0.04
70	10.806	0.159	2.48	92.5	1.92	103	81	-0.099	10.90	0.06
71	10.960	0.154	2.47	92.6	2	-	81	-0.098	11.83	0.03
72	11.119	0.159	2.48	92.8	2.04	-	81	-0.097	11.01	0.04
73	11.277	0.158	2.48	93	1.79	-	81	-0.100	11.77	0.03
74	11.431	0.154	2.48	93.2	1.92	-	81	-0.097	13.31	0.03
75	11.591	0.160	2.49	93.4	2.04	-	81	-0.100	11.54	0.04
76	11.746	0.155	2.49	93.5	2	-	81	-0.106	13.23	0.04
77	11.904	0.158	2.48	93.7	1.72	-	81	-0.104	12.46	0.03
78	12.062	0.158	2.48	93.8	1.73	-	81	-0.100	11.77	0.04
79	12.218	0.156	2.48	94	1.81	-	81	-0.099	10.95	0.05
80	12.377	0.159	2.48	94.1	1.71	102	81	-0.102	14.09	0.05
81	12.532	0.155	2.47	94.3	2.09	-	81	-0.097	13.62	0.08
82	12.691	0.159	2.48	94.4	1.91	-	81	-0.096	11.62	0.05
83	12.846	0.155	2.48	94.5	1.76	-	81	-0.100	11.69	0.05
84	13.005	0.159	2.47	94.7	1.82	-	81	-0.097	13.06	0.03
85	13.162	0.157	2.48	94.8	2.14	-	81	-0.098	11.85	0.06
86	13.318	0.156	2.48	95	1.95	-	81	-0.098	10.28	0.08
87	13.478	0.160	2.47	95.1	2.1	-	81	-0.095	9.78	0.06
88	13.632	0.154	2.48	95.2	1.79	-	81	-0.097	11.35	0.04
89	13.791	0.159	2.47	95.3	1.98	-	81	-0.098	10.84	0.05
90	13.950	0.159	2.48	95.4	1.64	102	81	-0.097	11.62	0.05
91	14.105	0.155	2.48	95.5	1.96	-	81	-0.095	9.81	0.05
92	14.264	0.159	2.48	95.6	1.88	-	81	-0.093	8.02	0.12
93	14.420	0.156	2.48	95.8	2.14	-	81	-0.091	8.98	0.11
94	14.578	0.158	2.48	95.9	1.58	-	81	-0.096	10.83	0.06
95	14.736	0.158	2.48	95.9	1.9	-	81	-0.094	11.39	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	14.893	0.157	2.48	96	1.67	-	81	-0.097	11.26	0.03
97	15.051	0.158	2.47	96.2	1.95	-	81	-0.093	9.41	0.05
98	15.207	0.156	2.48	96.3	2.09	-	81	-0.095	9.92	0.06
99	15.367	0.160	2.48	96.4	2.13	-	81	-0.095	8.92	0.09
100	15.522	0.155	2.48	96.4	1.6	102	80	-0.094	9.28	0.08
101	15.681	0.159	2.48	96.6	1.67	-	80	-0.095	8.53	0.10
102	15.840	0.159	2.48	96.6	1.97	-	81	-0.094	10.60	0.06
103	15.996	0.156	2.48	96.8	1.96	-	81	-0.094	9.66	0.07
104	16.156	0.160	2.48	96.8	1.61	-	81	-0.094	10.34	0.06
105	16.311	0.155	2.48	97	1.63	-	81	-0.098	13.10	0.04
106	16.470	0.159	2.47	97	1.87	-	81	-0.099	12.41	0.04
107	16.628	0.158	2.48	97.1	1.78	-	81	-0.101	12.95	0.03
108	16.783	0.155	2.47	97.1	1.63	-	81	-0.099	12.95	0.03
109	16.944	0.161	2.48	97.2	1.92	-	81	-0.100	13.41	0.05
110	17.099	0.155	2.48	97.3	1.64	102	81	-0.099	12.91	0.05
111	17.258	0.159	2.48	97.4	1.61	-	81	-0.099	11.17	0.05
112	17.417	0.159	2.47	97.4	1.62	-	81	-0.099	10.33	0.05
113	17.573	0.156	2.48	97.6	1.6	-	81	-0.097	12.83	0.06
114	17.733	0.160	2.47	97.5	1.89	-	81	-0.101	12.57	0.06
115	17.889	0.156	2.47	97.6	2.1	-	81	-0.100	13.82	0.05
116	18.047	0.158	2.47	97.7	1.92	-	81	-0.100	13.16	0.05
117	18.204	0.157	2.47	97.8	2.05	-	81	-0.101	13.04	0.05
118	18.362	0.158	2.47	97.8	2.14	-	81	-0.101	11.43	0.05
119	18.520	0.158	2.47	98	1.77	-	81	-0.098	10.52	0.06
120	18.676	0.156	2.47	98	1.91	101	81	-0.096	9.86	0.08
121	18.836	0.160	2.47	98.1	1.72	-	81	-0.098	13.58	0.06
122	18.991	0.155	2.46	98.2	1.66	-	81	-0.100	13.02	0.04
123	19.150	0.159	2.47	98.2	1.61	-	81	-0.094	10.06	0.07
124	19.308	0.158	2.47	98.3	1.92	-	81	-0.094	10.31	0.05
125	19.463	0.155	2.47	98.2	1.87	-	81	-0.097	10.93	0.06
126	19.624	0.161	2.46	98.3	2.14	-	81	-0.096	10.45	0.05
127	19.779	0.155	2.46	98.4	1.99	-	81	-0.097	11.05	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	19.938	0.159	2.47	98.4	1.69	-	81	-0.097	11.52	0.04
129	20.097	0.159	2.47	98.5	1.62	-	81	-0.096	10.96	0.06
130	20.252	0.155	2.46	98.6	2.08	101	82	-0.101	11.95	0.04
131	20.412	0.160	2.46	98.6	1.67	-	82	-0.097	10.33	0.07
132	20.567	0.155	2.47	98.7	1.66	-	82	-0.095	9.06	0.08
133	20.725	0.158	2.46	98.8	1.78	-	82	-0.092	8.23	0.07
134	20.884	0.159	2.46	98.8	1.66	-	82	-0.090	7.67	0.08
135	21.040	0.156	2.46	98.8	1.92	-	81	-0.093	9.37	0.06
136	21.199	0.159	2.46	98.9	1.65	-	81	-0.095	10.82	0.03
137	21.355	0.156	2.45	98.9	1.72	-	81	-0.092	8.91	0.07
138	21.514	0.159	2.46	99	1.73	-	81	-0.092	9.52	0.05
139	21.671	0.157	2.46	99	1.69	-	81	-0.092	8.84	0.09
140	21.830	0.159	2.46	99	1.8	102	81	-0.093	10.16	0.09
141	21.988	0.158	2.46	99	2.05	-	81	-0.094	9.11	0.07
142	22.144	0.156	2.46	99.1	1.8	-	81	-0.096	9.83	0.05
143	22.304	0.160	2.46	99.2	1.8	-	81	-0.097	10.25	0.05
144	22.459	0.155	2.46	99.2	2.13	-	81	-0.095	11.47	0.06
145	22.618	0.159	2.45	99.2	1.75	-	81	-0.096	13.75	0.11
146	22.776	0.158	2.46	99.3	1.68	-	81	-0.097	11.09	0.06
147	22.931	0.155	2.45	99.3	1.68	-	81	-0.094	11.47	0.07
148	23.092	0.161	2.45	99.4	1.92	-	81	-0.097	9.56	0.07
149	23.246	0.154	2.45	99.4	1.67	-	81	-0.090	11.04	0.09
150	23.405	0.159	2.45	99.4	1.72	101	81	-0.096	10.68	0.05
151	23.563	0.158	2.45	99.5	1.75	-	81	-0.094	10.18	0.05
152	23.719	0.156	2.45	99.6	2.09	-	81	-0.090	9.25	0.07
153	23.879	0.160	2.45	99.5	1.64	-	81	-0.084	7.04	0.11
154	24.034	0.155	2.45	99.6	1.68	-	81	-0.082	6.47	0.12
155	24.193	0.159	2.46	99.6	1.87	-	81	-0.081	6.40	0.12
156	24.350	0.157	2.45	99.6	1.88	-	81	-0.088	9.00	0.09
157	24.508	0.158	2.45	99.6	1.84	-	81	-0.090	7.18	0.13
158	24.666	0.158	2.45	99.6	2.17	-	81	-0.088	8.87	0.08
159	24.822	0.156	2.45	99.8	1.59	-	81	-0.090	10.57	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	24.982	0.160	2.46	99.8	1.6	100	81	-0.091	9.56	0.06
161	25.137	0.155	2.45	99.8	1.6	-	81	-0.094	10.67	0.06
162	25.296	0.159	2.45	99.8	2.14	-	81	-0.093	9.84	0.10
163	25.454	0.158	2.45	99.8	1.87	-	81	-0.096	13.32	0.04
164	25.609	0.155	2.45	99.8	1.61	-	81	-0.089	9.23	0.07
165	25.770	0.161	2.45	99.9	2.16	-	81	-0.089	7.76	0.11
166	25.924	0.154	2.45	99.8	1.78	-	81	-0.092	8.74	0.07
167	26.084	0.160	2.45	99.9	1.72	-	81	-0.089	8.15	0.09
168	26.242	0.158	2.45	99.9	1.88	-	81	-0.092	9.13	0.07
169	26.398	0.156	2.45	99.9	2.09	-	81	-0.095	8.45	0.08
170	26.557	0.159	2.45	99.9	1.64	100	81	-0.094	9.69	0.06
171	26.713	0.156	2.45	100	1.6	-	81	-0.097	10.42	0.04
172	26.871	0.158	2.45	100	1.92	-	81	-0.092	9.77	0.05
173	27.029	0.158	2.45	100.1	1.67	-	81	-0.091	8.77	0.06
174	27.186	0.157	2.46	100	1.8	-	81	-0.093	9.53	0.05
175	27.344	0.158	2.44	100.2	1.92	-	81	-0.091	9.65	0.07
176	27.500	0.156	2.45	100.1	1.66	-	81	-0.089	8.27	0.11
177	27.659	0.159	2.45	100.2	1.61	-	81	-0.089	9.12	0.08
178	27.815	0.156	2.45	100.2	1.73	-	81	-0.092	9.05	0.09
179	27.974	0.159	2.44	100.3	1.82	-	81	-0.092	8.27	0.10
180	28.132	0.158	2.45	100.3	1.74	100	81	-0.090	10.79	0.06
181	28.288	0.156	2.45	100.3	1.94	-	81	-0.087	9.78	0.07
182	28.448	0.160	2.44	100.3	1.67	-	81	-0.085	8.42	0.09
183	28.603	0.155	2.45	100.3	1.73	-	81	-0.087	8.59	0.10
184	28.762	0.159	2.44	100.3	1.7	-	81	-0.087	10.21	0.07
185	28.920	0.158	2.45	100.3	1.91	-	81	-0.089	9.33	0.06
186	29.075	0.155	2.45	100.4	2.1	-	81	-0.084	8.54	0.06
187	29.235	0.160	2.44	100.4	1.79	-	81	-0.083	6.88	0.08
188	29.390	0.155	2.45	100.5	1.83	-	81	-0.081	6.70	0.08
189	29.549	0.159	2.44	100.5	1.67	-	81	-0.082	6.50	0.09
190	29.707	0.158	2.45	100.5	1.8	100	81	-0.078	7.11	0.09
191	29.863	0.156	2.45	100.5	2.18	-	81	-0.076	6.67	0.12

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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	30.022	0.159	2.44	100.6	1.86	-	81	-0.079	6.51	0.10
193	30.178	0.156	2.44	100.6	2.18	-	80	-0.081	6.97	0.09
194	30.337	0.159	2.45	100.6	1.6	-	80	-0.082	6.37	0.09
195	30.493	0.156	2.45	100.6	1.95	-	80	-0.083	7.51	0.08
196	30.652	0.159	2.44	100.6	1.91	-	80	-0.082	6.62	0.10
197	30.810	0.158	2.45	100.8	2.17	-	80	-0.077	6.29	0.10
198	30.966	0.156	2.45	100.7	1.63	-	80	-0.082	5.77	0.13
199	31.127	0.161	2.45	100.7	1.62	-	80	-0.086	8.59	0.11
200	31.281	0.154	2.45	100.7	1.69	99	80	-0.086	10.83	0.06
201	31.440	0.159	2.45	100.8	1.96	-	80	-0.085	9.40	0.07
202	31.599	0.159	2.45	100.7	1.69	-	80	-0.085	8.76	0.07
203	31.754	0.155	2.44	100.7	1.85	-	80	-0.083	7.19	0.09
204	31.762	0.008	0.02	97.6	0.74	-	76	-0.086	8.24	0.08
205	31.867	0.105	2.47	96.9	1.87	-	77	-0.083	7.75	0.10
206	32.026	0.159	2.46	96.5	2.04	-	77	-0.083	7.34	0.10
207	32.186	0.160	2.46	96.2	1.83	-	78	-0.077	5.68	0.13
208	32.340	0.154	2.45	96	1.81	-	78	-0.075	5.32	0.11
209	32.500	0.160	2.45	95.8	2.15	-	78	-0.078	7.06	0.11
210	32.654	0.154	2.45	95.7	1.62	86	78	-0.082	7.38	0.10
211	32.812	0.158	2.45	95.6	1.62	-	78	-0.080	6.64	0.13
212	32.968	0.156	2.44	95.5	2.17	-	79	-0.079	6.38	0.10
213	33.122	0.154	2.43	95.5	2.19	-	79	-0.078	5.84	0.11
214	33.279	0.157	2.44	95.4	2.18	-	79	-0.074	5.31	0.12
215	33.433	0.154	2.43	95.4	2.01	-	79	-0.075	4.69	0.14
216	33.592	0.159	2.44	95.3	1.6	-	79	-0.084	7.66	0.09
217	33.746	0.154	2.44	95.4	2.2	-	79	-0.078	6.88	0.12
218	33.906	0.160	2.43	95.3	1.72	-	79	-0.079	6.97	0.09
219	34.063	0.157	2.44	95.4	1.98	-	79	-0.075	6.61	0.09
220	34.218	0.155	2.44	95.4	1.64	99	79	-0.082	6.08	0.10
221	34.375	0.157	2.43	95.4	1.94	-	79	-0.084	8.07	0.07
222	34.530	0.155	2.43	95.4	2.09	-	79	-0.088	10.98	0.06
223	34.689	0.159	2.44	95.5	1.68	-	79	-0.083	8.33	0.08

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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 (%)
224	34.842	0.153	2.43	95.5	2.05	-	79	-0.091	9.57	0.09
225	35.000	0.158	2.43	95.7	1.7	-	79	-0.085	9.76	0.06
226	35.154	0.154	2.43	95.6	1.79	-	79	-0.084	7.38	0.14
227	35.309	0.155	2.44	95.7	1.8	-	79	-0.080	7.30	0.10
228	35.466	0.157	2.43	95.8	1.82	-	79	-0.079	6.45	0.10
229	35.621	0.155	2.44	95.8	1.61	-	79	-0.079	6.11	0.09
230	35.780	0.159	2.44	95.9	1.61	99	79	-0.074	5.55	0.08
231	35.934	0.154	2.43	96	1.66	-	79	-0.074	5.61	0.07
232	36.094	0.160	2.43	96.1	1.67	-	79	-0.075	6.84	0.12
233	36.251	0.157	2.43	96.1	1.62	-	79	-0.082	7.28	0.09
234	36.405	0.154	2.43	96.2	1.89	-	80	-0.079	6.40	0.11
235	36.564	0.159	2.43	96.3	2.14	-	79	-0.076	6.20	0.09
236	36.719	0.155	2.44	96.4	1.74	-	79	-0.075	5.57	0.09
237	36.876	0.157	2.43	96.5	2.15	-	79	-0.081	5.30	0.09
238	37.032	0.156	2.43	96.6	1.62	-	79	-0.083	7.55	0.08
239	37.186	0.154	2.43	96.7	1.9	-	80	-0.083	7.51	0.11
240	37.346	0.160	2.44	96.8	1.64	100	80	-0.087	7.92	0.08
241	37.500	0.154	2.43	96.9	1.87	-	80	-0.085	7.50	0.09
242	37.660	0.160	2.43	97	1.91	-	80	-0.082	7.53	0.09
243	37.811	0.151	2.44	97	2.08	-	80	-0.081	6.49	0.11
244	37.968	0.157	2.43	97.2	1.88	-	80	-0.079	6.22	0.08
245	38.126	0.158	2.43	97.2	1.94	-	80	-0.081	7.77	0.08
246	38.282	0.156	2.44	97.3	1.71	-	80	-0.075	7.14	0.12
247	38.439	0.157	2.43	97.4	2.09	-	80	-0.080	7.59	0.12
248	38.594	0.155	2.43	97.4	1.66	-	80	-0.078	7.21	0.11
249	38.755	0.161	2.44	97.5	1.81	-	80	-0.074	6.20	0.12
250	38.909	0.154	2.43	97.6	1.78	99	79	-0.075	5.22	0.14
251	39.067	0.158	2.43	97.7	1.63	-	79	-0.075	5.68	0.10
252	39.225	0.158	2.43	97.7	1.83	-	79	-0.077	5.60	0.10
253	39.379	0.154	2.44	97.9	1.82	-	79	-0.073	5.91	0.12
254	39.538	0.159	2.44	97.9	1.67	-	79	-0.070	5.59	0.15
255	39.693	0.155	2.44	98	1.78	-	79	-0.073	6.18	0.14

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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 (%)
256	39.848	0.155	2.44	98.1	1.71	-	79	-0.068	6.06	0.15
257	40.004	0.156	2.44	98.1	2.02	-	79	-0.072	5.87	0.12
258	40.162	0.158	2.43	98.3	1.95	-	79	-0.074	5.52	0.11
259	40.319	0.157	2.44	98.3	1.87	-	79	-0.073	7.33	0.12
260	40.474	0.155	2.44	98.3	1.61	99	79	-0.073	6.78	0.14
261	40.634	0.160	2.43	98.5	1.9	-	79	-0.075	6.04	0.14
262	40.791	0.157	2.44	98.5	1.61	-	79	-0.081	8.02	0.11
263	40.949	0.158	2.44	98.6	1.63	-	79	-0.078	7.17	0.11
264	41.107	0.158	2.44	98.7	1.76	-	79	-0.082	6.63	0.10
265	41.262	0.155	2.44	98.7	2	-	79	-0.080	6.75	0.10
266	41.421	0.159	2.44	98.8	1.74	-	79	-0.079	6.48	0.11
267	41.576	0.155	2.44	98.9	1.69	-	79	-0.079	8.50	0.06
268	41.734	0.158	2.44	98.9	2.13	-	79	-0.075	7.17	0.13
269	41.890	0.156	2.43	99	1.98	-	79	-0.076	6.70	0.12
270	42.045	0.155	2.43	99.1	2.2	98	79	-0.081	6.92	0.10
271	42.202	0.157	2.44	99.1	1.68	-	79	-0.075	6.17	0.09
272	42.357	0.155	2.44	99.2	1.71	-	79	-0.071	5.47	0.13
273	42.518	0.161	2.43	99.3	1.77	-	79	-0.072	5.42	0.10
274	42.672	0.154	2.44	99.2	2.17	-	79	-0.077	5.79	0.11
275	42.830	0.158	2.44	99.3	2.04	-	79	-0.076	6.40	0.13
276	42.991	0.161	2.44	99.3	2.05	-	79	-0.078	7.10	0.13
277	43.146	0.155	2.44	99.4	2.05	-	79	-0.081	6.35	0.10
278	43.306	0.160	2.44	99.5	1.78	-	79	-0.083	7.81	0.08
279	43.461	0.155	2.44	99.6	2.13	-	79	-0.076	6.18	0.13
280	43.619	0.158	2.44	99.6	1.78	98	79	-0.072	5.38	0.11
281	43.776	0.157	2.44	99.6	2.11	-	79	-0.071	6.21	0.10
282	43.933	0.157	2.45	99.7	1.76	-	79	-0.074	6.47	0.15
283	44.089	0.156	2.44	99.7	1.61	-	79	-0.074	6.71	0.13
284	44.244	0.155	2.44	99.7	1.61	-	79	-0.073	6.88	0.09
285	44.404	0.160	2.44	99.8	1.6	-	79	-0.072	5.52	0.12
286	44.558	0.154	2.44	99.8	2.17	-	79	-0.071	5.24	0.11
287	44.716	0.158	2.43	99.9	2.05	-	79	-0.068	5.71	0.13

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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 (%)
288	44.877	0.161	2.44	99.9	1.92	-	79	-0.077	6.84	0.10
289	45.031	0.154	2.43	100	1.63	-	79	-0.076	6.74	0.13
290	45.192	0.161	2.44	100	2.06	98	79	-0.078	6.79	0.13
291	45.346	0.154	2.44	100.1	2.1	-	79	-0.078	5.85	0.13
292	45.504	0.158	2.43	100.1	2.16	-	79	-0.079	5.48	0.12
293	45.662	0.158	2.44	100.2	2.16	-	79	-0.075	6.58	0.10
294	45.818	0.156	2.44	100.1	1.89	-	79	-0.073	5.64	0.15
295	45.974	0.156	2.44	100.3	2.16	-	79	-0.073	5.02	0.14
296	46.130	0.156	2.44	100.3	1.76	-	79	-0.069	4.73	0.14
297	46.292	0.162	2.44	100.3	1.78	-	79	-0.073	5.46	0.16
298	46.444	0.152	2.43	100.4	2.03	-	79	-0.076	6.63	0.09
299	46.603	0.159	2.44	100.4	1.8	-	79	-0.073	6.67	0.10
300	46.761	0.158	2.44	100.4	1.89	98	79	-0.074	6.36	0.11
301	46.916	0.155	2.43	100.5	1.74	-	79	-0.076	5.55	0.17
302	47.076	0.160	2.44	100.5	1.91	-	79	-0.076	6.36	0.12
303	47.231	0.155	2.43	100.6	1.77	-	79	-0.077	6.35	0.12
304	47.392	0.161	2.43	100.6	1.7	-	79	-0.077	6.18	0.12
305	47.551	0.159	2.43	100.6	1.7	-	79	-0.076	5.75	0.12
306	47.706	0.155	2.44	100.6	1.71	-	79	-0.072	4.78	0.14
307	47.865	0.159	2.44	100.7	2.1	-	79	-0.071	4.47	0.11
308	48.018	0.153	2.43	100.7	2.16	-	79	-0.072	4.55	0.09
309	48.177	0.159	2.45	100.8	1.65	-	79	-0.074	7.18	0.09
310	48.333	0.156	2.44	100.7	1.8	98	79	-0.074	6.83	0.13
311	48.491	0.158	2.44	100.7	1.63	-	79	-0.080	6.93	0.12
312	48.649	0.158	2.44	100.8	1.9	-	79	-0.085	7.57	0.11
313	48.807	0.158	2.44	100.9	1.63	-	79	-0.085	9.82	0.07
314	48.967	0.160	2.44	100.8	1.76	-	79	-0.083	9.14	0.08
315	49.121	0.154	2.43	100.9	2.14	-	79	-0.078	6.50	0.13
316	49.280	0.159	2.43	100.9	2.05	-	79	-0.074	5.85	0.13
317	49.438	0.158	2.44	100.9	2.17	-	79	-0.072	5.46	0.15
318	49.593	0.155	2.43	101	1.84	-	79	-0.074	6.58	0.13
319	49.751	0.158	2.44	101	2.04	-	79	-0.076	6.66	0.15

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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 (%)
320	49.906	0.155	2.44	101.1	2	98	79	-0.074	6.03	0.17
321	50.064	0.158	2.43	101.1	2.21	-	79	-0.075	6.82	0.19
322	50.222	0.158	2.44	101.1	2.18	-	79	-0.074	6.12	0.17
323	50.381	0.159	2.44	101	1.94	-	79	-0.074	5.94	0.16
324	50.541	0.160	2.44	101.1	2.11	-	79	-0.077	5.48	0.16
325	50.696	0.155	2.44	101	2.16	-	79	-0.076	6.53	0.13
326	50.855	0.159	2.44	101.1	2.19	-	79	-0.075	6.06	0.11
327	51.011	0.156	2.44	101.2	1.61	-	79	-0.071	5.74	0.15
328	51.167	0.156	2.44	101.1	1.62	-	79	-0.073	5.68	0.12
329	51.325	0.158	2.44	101.2	2.06	-	79	-0.083	8.37	0.10
330	51.480	0.155	2.43	101.2	2.19	98	79	-0.082	8.22	0.11
331	51.643	0.163	2.44	101.2	2.04	-	79	-0.083	6.88	0.10
332	51.797	0.154	2.43	101.2	2.01	-	79	-0.078	6.42	0.14
333	51.956	0.159	2.43	101.2	2.19	-	80	-0.077	5.87	0.17
334	52.114	0.158	2.44	101.2	1.7	-	80	-0.079	7.29	0.09
335	52.267	0.153	2.44	101.2	1.64	-	80	-0.080	7.86	0.10
336	52.427	0.160	2.44	101.3	2.2	-	80	-0.081	7.48	0.13
337	52.584	0.157	2.43	101.4	1.93	-	80	-0.083	7.08	0.16
338	52.743	0.159	2.44	101.3	1.8	-	80	-0.083	6.97	0.13
339	52.901	0.158	2.43	101.3	1.81	-	80	-0.078	7.83	0.17
340	53.057	0.156	2.44	101.4	2.19	98	80	-0.081	8.15	0.08
341	53.213	0.156	2.43	101.3	1.61	-	80	-0.082	6.88	0.12
342	53.369	0.156	2.43	101.4	1.6	-	80	-0.077	6.32	0.13
343	53.528	0.159	2.43	101.3	1.64	-	80	-0.077	5.79	0.11
344	53.684	0.156	2.43	101.4	2.19	-	80	-0.076	5.53	0.14
345	53.842	0.158	2.43	101.3	2.06	-	80	-0.074	6.16	0.10
346	54.000	0.158	2.44	101.4	1.81	-	80	-0.077	6.35	0.11
347	54.156	0.156	2.43	101.5	1.67	-	80	-0.076	5.44	0.15
348	54.319	0.163	2.44	101.4	1.62	-	80	-0.076	5.98	0.12
349	54.473	0.154	2.44	101.5	2.13	-	80	-0.073	5.38	0.12
350	54.632	0.159	2.43	101.5	2.2	99	80	-0.077	6.24	0.10
351	54.790	0.158	2.44	101.5	1.61	-	80	-0.078	6.12	0.11

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

	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 (%)
352	54.943	0.153	2.43	101.4	1.97	-	80	-0.080	8.35	0.09
353	55.103	0.160	2.44	101.5	1.69	-	80	-0.071	7.48	0.14
354	55.260	0.157	2.44	101.5	2.11	-	80	-0.068	4.82	0.29
355	55.418	0.158	2.42	101.6	1.69	-	80	-0.066	4.21	0.27
356	55.577	0.159	2.43	101.6	2.09	-	80	-0.073	6.44	0.14
357	55.732	0.155	2.43	101.5	2.18	-	80	-0.075	5.68	0.14
358	55.889	0.157	2.43	101.7	1.65	-	80	-0.086	6.70	0.10
359	56.045	0.156	2.43	101.7	2.18	-	80	-0.086	10.45	0.05
360	56.204	0.159	2.44	101.6	1.98	99	80	-0.089	10.88	0.04
Avg/Tot	56.204	0.156	2.44	96	1.85	100			8.93	0.09

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 1

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/13/2024

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01125	245.5	247.1	1.6
	B	G01126	245.5	246.9	1.4
	C - 1st Hour	G01127	244.1	244.1	0.0
	Amb	G01128	245.6	245.7	0.1
Probes	**A**	18A	117501.0	117501.0	0.0
	B	18B	117333.0	117333.0	0.0
	C - 1st Hour	18C	114335.8	114335.9	0.1
O-rings	**A**	18A	3602.7	3603.0	0.3
	B	18B	3546.1	3546.4	0.3
	C - 1st Hour	18C	3528.5	3529.0	0.5

Placed in Dessicator on:	8/13/2024

		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**		247.3	8/19 9:00	247.1	8/21 14:45				
	B		246.8	8/19 9:00	246.9	8/21 14:45				
	C - 1st Hour		244.1	8/19 9:00	244.1	8/21 14:45				
	Amb		245.9	8/19 9:00	245.7	8/21 14:45				
Probes	**A**		117501.2	8/19 9:00	117501.0	8/21 14:45				
	B		117333.0	8/19 9:00	117333.0	8/21 14:45				
	C - 1st Hour		114335.8	8/19 9:00	114335.9	8/21 14:45				
O-Rings	**A**		3603.2	8/19 9:00	3603.0	8/21 14:45				
	B		3546.8	8/19 9:00	3546.4	8/21 14:45				
	C - 1st Hour		3529.5	8/19 9:00	3529.0	8/21 14:45				

Train A Aggregate, mg:	**1.9**
Train B Aggregate, mg:	**1.7**
Train C Aggregate, mg:	**0.6**
Ambient Aggregate, mg:	**0.1**

ASTM E2779 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-265 Tracking #: 212
Model: Mini Me Run Number: 1 Test Date: 8/13/24

Pellet Heater Control Settings

High Burn Rate Settings: Fully Open

Medium Burn Rate Settings: Open 3/32”

Low Burn Rate Settings: Fully closed

Preburn Notes

Preburn Start Time: 08:28

Time	Notes
	-None-

Test Notes

Test Burn Start Time: 09:28

Time	Notes
	-None-

Test Burn End Time: 15:28

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 16.98 CO (%): 4.300

Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Span	Mid	Zero	Span	Mid
Time	08:44	08:45	08:46	8/14 08:56	8/14 08:57	8/14 08:58
CO_2	0.00	16.97	10.13	0.00	17.06	10.13
CO	0.000	4.302	2.509	-0.001	4.315	2.522

Flue Gas Probe Leak Check: Initial: 0 Final: 0

Technician Signature: Date: 8/28/2024

PELLET TEST DATA PACKET
ASTM E2779/E2515

Run 2 Data Summary

Client:	509 Fabrications
Model:	Mini Me
Job #:	24-265
Tracking #:	212
Test Date:	8/14/2024

Techician Signature — Date: 9/3/2024

TEST RESULTS - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

Burn Rate Summary	
High Burn Rate (dry kg/hr)	2.07
Medium Burn Rate (dry kg/hr)	1.34
Low Burn Rate (dry kg/hr)	0.86
Overall Burn Rate (dry kg/hr)	1.22

Medium Burn Rate Target: < 1.47 dry kg/hr

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter - Train C
Total Sample Volume (ft^3)	84.753	57.378	56.636	9.131
Average Gas Velocity in Dilution Tunnel (ft/sec)	18.2			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11860.5			
Average Gas Meter Temperature (°F)	73.7	92.8	97.6	83.1
Total Sample Volume (dscf)	84.214	54.944	54.624	8.976
Average Tunnel Temperature (°F)	102.8			
Total Time of Test (min)	360			
Total Particulate Catch (mg)	0.1	1.8	1.7	0.9
Particulate Concentration, dry-standard (g/dscf)	0.0000012	0.0000328	0.0000311	0.0001003
Total PM Emissions (g)	0.08	2.25	2.13	1.18
Particulate Emission Rate (g/hr)	0.01	0.37	0.36	1.18
Emissions Factor (g/kg)	-	0.31	0.29	0.57
Difference from Average Total Particulate Emissions (g)	-	0.06	0.06	-
Difference from Average Total Particulate Emissions (%)	-	2.7%	2.7%	-
Difference from Average Emissions Factor (g/kg)	-	0.01	0.01	-

Final Average Results	
Total Particulate Emissions (g)	2.19
Particulate Emission Rate (g/hr)	0.36
Emissions Factor (g/kg)	0.30
HHV Efficiency (%)	75.6%
LHV Efficiency (%)	81.0%
CO Emissions (g/min)	0.22

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	OK
Face Velocity	< 30 ft/min	13.3	OK
Leakage Rate	Less than 4% of average sample rate	0.001 cfm	OK
Ambient Temp	55-90 °F	70.5 / 76	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
Medium Burn Rate	< midpoint of the high and low burn rates	1.34	OK

Overall Pellet Test Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/14/24
Run: 2
Control #: 24-265
Test Duration: 360
Output Category: Integrated

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	75.6%	81.0%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	76.0%	81.4%

Output Rate (kJ/h)	18,563	17,609	**(Btu/h)**
Burn Rate (kg/h)	1.22	2.70	**(lb/h)**
Input (kJ/h)	24,555	23,293	**(Btu/h)**

Test Load Weight (dry kg)	7.35	16.19	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	2.19		
CO (g)	78		
Test Duration (h)	6.00		

Emissions	**Particulate**	**CO**
g/MJ Output	0.02	0.70
g/kg Dry Fuel	0.30	10.61
g/h	0.36	12.99
g/min	0.01	0.22
lb/MM Btu Output	0.05	1.63

Air/Fuel Ratio (A/F)	13.47

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

Max Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/14/24
Run: 2
Control #: 24-265
Test Duration: 60
Output Category: Maximum

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	74.5%	79.8%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	74.8%	80.2%

Output Rate (kJ/h)	30,980	29,388	**(Btu/h)**
Burn Rate (kg/h)	2.07	4.57	**(lb/h)**
Input (kJ/h)	41,597	39,460	**(Btu/h)**

Test Load Weight (dry kg)	2.07	4.57	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	10		
Test Duration (h)	1.00		

Emissions	**Particulate**	**CO**
g/MJ Output	N/A	0.32
g/kg Dry Fuel	N/A	4.85
g/h	N/A	10.07
g/min	N/A	0.17
lb/MM Btu Output	N/A	0.76

Air/Fuel Ratio (A/F)	9.49

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

Medium Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/14/24
Run: 2
Control #: 24-265
Test Duration: 120
Output Category: Medium

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	75.0%	80.4%
Combustion Efficiency	99.5%	99.5%
Heat Transfer Efficiency	75.4%	80.8%

Output Rate (kJ/h)	20,206	19,167	**(Btu/h)**
Burn Rate (kg/h)	1.34	2.96	**(lb/h)**
Input (kJ/h)	26,945	25,560	**(Btu/h)**

Test Load Weight (dry kg)	2.69	5.92	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	27		
Test Duration (h)	2.00		

Emissions	Particulate	CO
g/MJ Output	N/A	0.67
g/kg Dry Fuel	N/A	10.13
g/h	N/A	13.62
g/min	N/A	0.23
lb/MM Btu Output	N/A	1.57

Air/Fuel Ratio (A/F)	12.77

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

Minimum Burn Rate Segment Efficiency Results

Manufacturer: 509 Fabrications
Model: Mini Me
Date: 08/14/24
Run: 2
Control #: 24-265
Test Duration: 180
Output Category: Minimum

Test Results in Accordance with CSA B415.1-10

	HHV Basis	LHV Basis
Overall Efficiency	76.7%	82.2%
Combustion Efficiency	99.4%	99.4%
Heat Transfer Efficiency	77.2%	82.7%

Output Rate (kJ/h)	13,248	12,567	**(Btu/h)**
Burn Rate (kg/h)	0.86	1.90	**(lb/h)**
Input (kJ/h)	17,280	16,392	**(Btu/h)**

Test Load Weight (dry kg)	2.59	5.70	**dry lb**
MC wet (%)	2.10		
MC dry (%)	2.15		
Particulate (g)	N/A		
CO (g)	41		
Test Duration (h)	3.00		

Emissions	**Particulate**	**CO**
g/MJ Output	N/A	1.02
g/kg Dry Fuel	N/A	15.70
g/h	N/A	13.53
g/min	N/A	0.23
lb/MM Btu Output	N/A	2.37

Air/Fuel Ratio (A/F)	16.37

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

DILUTION TUNNEL & MISC. DATA - ASTM E2779 / E2515

Client:	509 Fabrications	Job #:	24-265
Model:	Mini Me	Tracking #:	212
Run #:	2	Technician:	AK
Test Start Time:	9:29	Date:	8/14/2024

High Burn End Time (min):	60
Medium Burn End Time (min):	180
Total Sampling Time (min):	360
Recording Interval (min):	1

Meter Box γ Factor:	0.996	(A)
Meter Box γ Factor:	1.012	(B)
Meter Box γ Factor:	1.008	(C)
Meter Box γ Factor:	1.004	(Ambient)
Induced Draft Check (in. H_2O):	0	
Smoke Capture Check (%):	100%	
Date Flue Pipe Last Cleaned:	8/12/2024	
Platform Scale Audit (lbs)	10.0	

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.96	29.93	29.95
Relative Humidity (%)	39.7	37.2	
Room Air Velocity (ft/min)	<50	<50	
Pitot Tube Leak Check	0	0	
Ambient Sample Volume:		84.753	ft^3

Sample Train Leak Checks

	Pre-test	Post-test			
(A)	0.000	0.000	cfm @	-7	in. Hg
(B)	0.000	0.000	cfm @	-7	in. Hg
(C)	0.001	0.001	cfm @	-7	in. Hg
(Ambient)	0.000	0.000	cfm @	-14	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.054	80
2	0.090	80
3	0.092	80
4	0.052	80
5	0.054	80
6	0.092	80
7	0.094	80
8	0.056	80
Center	0.097	80

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}:	17.942	ft/sec
V_{scent}:	20.864	ft/sec
F_p:	0.860	[ratio]
Initial Tunnel Flow:	202.7	scf/min

Static Pressure: -0.160 in. H_2O

TEST FUEL PROPERTIES

Default Fuel Values

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

Actual Fuel Used Properties

Pellet Brand:	Lignetics
Pellet Fuel Grade:	PFI Premium
HHV (BTU/lb)	8627
%C	49.48
%H	6.22
%O	44.13
%Ash	0.17
MC (%WB)	2.1

PELLET STOVE PREBURN DATA - ASTM E2779

Client: 509 Fabrications
Job #: 24-265
Model: Mini Me
Tracking #: 212
Run #: 2
Technician: AK
Date: 8/14/2024

Recording Interval (min): 1
Run Time (min): 60

		Average:	-0.096	572	72
Elapsed Time (min)	**Scale Reading (lbs)**	**Weight Change (lbs)**	**Flue Draft (in H_2O)**	**Flue (°F)**	**Ambient (°F)**
0	35.9	-	-0.094	552	71
1	35.8	-0.06	-0.097	581	71
2	35.8	-0.08	-0.095	572	71
3	35.7	-0.07	-0.096	565	71
4	35.7	-0.03	-0.089	545	71
5	35.6	-0.06	-0.091	537	71
6	35.5	-0.07	-0.097	552	71
7	35.4	-0.11	-0.100	573	71
8	35.3	-0.08	-0.102	615	71
9	35.3	-0.06	-0.096	597	72
10	35.2	-0.09	-0.095	576	72
11	35.2	-0.04	-0.096	569	72
12	35.1	-0.06	-0.099	563	72
13	35.0	-0.05	-0.091	552	72
14	35.0	-0.06	-0.094	556	72
15	34.9	-0.07	-0.097	554	72
16	34.9	-0.04	-0.093	547	72
17	34.8	-0.08	-0.098	567	72
18	34.7	-0.08	-0.099	589	72
19	34.6	-0.07	-0.100	588	72
20	34.6	-0.04	-0.097	598	72
21	34.6	-0.05	-0.094	566	72
22	34.5	-0.07	-0.097	575	72
23	34.4	-0.07	-0.095	567	73
24	34.3	-0.07	-0.099	596	73
25	34.3	-0.08	-0.098	596	73
26	34.2	-0.05	-0.095	584	72
27	34.1	-0.07	-0.094	570	72
28	34.1	-0.07	-0.091	553	72
29	34.0	-0.05	-0.092	536	72
30	34.0	-0.06	-0.091	533	72
31	33.9	-0.09	-0.093	537	72
32	33.9	-0.02	-0.098	572	72
33	33.8	-0.09	-0.092	570	72
34	33.7	-0.08	-0.095	563	72
35	33.6	-0.06	-0.093	558	72
36	33.6	-0.03	-0.097	570	72
37	33.5	-0.08	-0.097	571	72
38	33.5	-0.06	-0.098	595	72
39	33.4	-0.1	-0.097	587	72
40	33.3	-0.03	-0.097	593	72
41	33.2	-0.1	-0.093	580	72
42	33.2	-0.05	-0.095	568	72
43	33.1	-0.07	-0.093	564	72
44	33.1	-0.05	-0.095	542	71
45	33.0	-0.05	-0.091	526	71
46	32.9	-0.06	-0.091	523	71

PELLET STOVE PREBURN DATA - ASTM E2779

Client: 509 Fabrications
Job #: 24-265
Model: Mini Me
Tracking #: 212
Run #: 2
Technician: AK
Date: 8/14/2024

47	32.9	-0.07	-0.094	509	71
48	32.8	-0.06	-0.098	568	71
49	32.7	-0.09	-0.102	611	71
50	32.6	-0.08	-0.101	627	70
51	32.5	-0.1	-0.100	599	71
52	32.5	-0.06	-0.099	610	70
53	32.4	-0.08	-0.096	597	71
54	32.4	-0.05	-0.096	591	70
55	32.3	-0.06	-0.099	588	71
56	32.2	-0.06	-0.101	603	70
57	32.1	-0.09	-0.100	603	71
58	32.1	-0.06	-0.097	593	71
59	32.0	-0.05	-0.097	574	71
60	32.0	-0.05	-0.098	570	71

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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		0.095	0.00	75.8	0.05		16.5		111	577	73	71
1	0.098	0.098	0.096	2.07	75.7	0.86	-	16.5	-0.1	111	602	74	70.7
2	0.239	0.141	0.097	2.14	75.7	0.9	-	16.4	-0.1	112	642	75	70.5
3	0.384	0.145	0.097	2.18	75.7	0.92	-	16.3	0.0	114	650	76	70.9
4	0.531	0.147	0.097	2.20	75.7	0.86	-	16.2	-0.1	115	663	76	70.7
5	0.677	0.146	0.097	2.24	75.8	0.89	-	16.1	-0.1	116	648	76	70.5
6	0.828	0.151	0.095	2.26	75.8	0.86	-	16.1	-0.1	116	633	77	70.5
7	0.973	0.145	0.096	2.29	75.9	0.91	-	16.0	-0.1	116	656	77	70.7
8	1.125	0.152	0.096	2.30	76.1	0.91	-	15.9	-0.1	116	657	77	70.7
9	1.272	0.147	0.097	2.32	76.1	0.87	-	15.8	-0.1	115	638	78	70.9
10	1.425	0.153	0.096	2.33	76.2	0.92	93	15.7	-0.1	116	648	78	71.1
11	1.573	0.148	0.093	2.34	76.4	0.88	-	15.7	-0.1	116	632	78	70.9
12	1.727	0.154	0.095	2.37	76.6	0.92	-	15.6	-0.1	116	624	79	71.2
13	1.876	0.149	0.094	2.38	76.8	0.91	-	15.5	-0.1	115	623	79	71.2
14	2.029	0.153	0.094	2.39	77	0.89	-	15.4	-0.1	115	626	79	71.2
15	2.179	0.150	0.096	2.39	77.2	0.87	-	15.4	-0.1	116	630	79	71.1
16	2.334	0.155	0.093	2.41	77.4	0.9	-	15.3	-0.1	115	627	79	71.1
17	2.486	0.152	0.092	2.41	77.6	0.92	-	15.2	-0.1	114	642	79	71.4
18	2.640	0.154	0.097	2.42	77.9	0.89	-	15.2	-0.1	115	659	80	71.6
19	2.795	0.155	0.093	2.43	78.1	0.89	-	15.1	-0.1	117	665	80	71.3
20	2.947	0.152	0.096	2.43	78.3	0.92	100	15.0	-0.1	118	679	80	70.9
21	3.103	0.156	0.094	2.44	78.6	0.9	-	14.9	-0.1	117	620	80	71.2
22	3.253	0.150	0.096	2.44	78.9	0.9	-	14.8	-0.1	116	616	80	71
23	3.410	0.157	0.095	2.45	79.2	0.9	-	14.8	-0.1	117	611	80	71.3
24	3.562	0.152	0.095	2.45	79.3	0.93	-	14.7	-0.1	116	619	80	71.4
25	3.720	0.158	0.094	2.47	79.7	0.89	-	14.6	-0.1	117	644	80	71.2
26	3.873	0.153	0.094	2.47	79.9	0.89	-	14.5	-0.1	117	661	81	71.6
27	4.029	0.156	0.094	2.47	80.2	0.9	-	14.4	-0.1	118	652	81	71.5
28	4.183	0.154	0.097	2.47	80.5	0.88	-	14.4	0.0	118	646	81	71.5
29	4.339	0.156	0.095	2.47	80.8	0.91	-	14.3	-0.1	118	636	81	71.4
30	4.497	0.158	0.094	2.47	81	0.93	102	14.2	-0.1	117	623	81	71.6
31	4.650	0.153	0.096	2.48	81.3	0.91	-	14.1	-0.1	117	658	81	71.6
32	4.808	0.158	0.095	2.49	81.6	0.95	-	14.0	-0.1	118	680	81	71.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
33	4.960	0.152	0.095	2.49	81.8	0.96	-	13.9	-0.1	119	705	81	71.5
34	5.120	0.160	0.098	2.50	82.1	0.94	-	13.8	-0.1	120	701	81	71.4
35	5.274	0.154	0.097	2.49	82.4	0.94	-	13.7	-0.1	120	690	81	71.6
36	5.431	0.157	0.098	2.50	82.6	0.95	-	13.7	0.0	119	677	81	72.2
37	5.588	0.157	0.097	2.50	82.9	0.92	-	13.6	-0.1	119	663	81	71.7
38	5.744	0.156	0.096	2.50	83.2	0.92	-	13.5	-0.1	120	654	81	71.6
39	5.902	0.158	0.098	2.51	83.4	0.94	-	13.4	0.0	119	650	81	71.7
40	6.056	0.154	0.096	2.50	83.7	0.92	102	13.4	-0.1	118	629	81	71.5
41	6.217	0.161	0.097	2.51	83.9	0.93	-	13.3	-0.1	118	622	81	71.2
42	6.372	0.155	0.095	2.53	84.2	0.95	-	13.2	-0.1	117	619	81	71.2
43	6.529	0.157	0.098	2.52	84.3	0.96	-	13.1	-0.1	118	636	81	71.5
44	6.686	0.157	0.094	2.52	84.6	0.95	-	13.0	-0.1	118	638	81	71.7
45	6.843	0.157	0.096	2.52	84.8	0.95	-	12.9	-0.1	118	622	81	71.3
46	7.002	0.159	0.095	2.52	85	0.95	-	12.9	-0.1	118	627	81	71.5
47	7.156	0.154	0.093	2.52	85.2	0.93	-	12.8	-0.1	117	628	81	71.5
48	7.318	0.162	0.096	2.53	85.4	0.94	-	12.8	-0.1	117	645	81	71.4
49	7.473	0.155	0.098	2.53	85.6	0.97	-	12.7	-0.1	117	644	81	71.4
50	7.631	0.158	0.097	2.54	85.8	0.95	101	12.6	-0.1	116	611	81	72.1
51	7.791	0.160	0.097	2.53	86	0.93	-	12.6	-0.1	116	604	81	72.2
52	7.947	0.156	0.095	2.54	86.3	0.95	-	12.5	-0.1	116	598	81	71.9
53	8.107	0.160	0.094	2.55	86.4	0.94	-	12.4	-0.1	116	605	81	72.3
54	8.262	0.155	0.093	2.53	86.6	0.95	-	12.4	-0.1	116	625	81	71.9
55	8.423	0.161	0.095	2.54	86.8	0.93	-	12.3	0.0	115	552	81	71.8
56	8.579	0.156	0.095	2.53	87	0.97	-	12.2	-0.1	115	655	81	72
57	8.737	0.158	0.093	2.51	87.1	0.98	-	12.1	-0.1	116	657	81	71.8
58	8.898	0.161	0.094	2.52	87.3	0.97	-	12.0	-0.1	117	656	81	72.2
59	9.052	0.154	0.097	2.54	87.5	0.96	-	12.0	-0.1	116	623	81	72.1
60	9.213	0.161	0.095	2.52	87.7	0.97	102	11.9	-0.1	117	624	81	72
61	9.369	0.156	0.091	2.53	87.8	0.97	-	11.8	-0.1	116	626	81	72.3
62	9.528	0.159	0.094	2.54	88	0.97	-	11.7	-0.1	116	611	81	71.9
63	9.687	0.159	0.098	2.52	88.1	0.97	-	11.7	0.0	114	605	81	72.6
64	9.844	0.157	0.093	2.53	88.3	0.96	-	11.6	-0.1	113	597	81	72.2
65	10.004	0.160	0.096	2.54	88.5	0.98	-	11.5	-0.1	114	600	81	72

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
66	10.160	0.156	0.096	2.54	88.6	0.98	-	11.5	-0.1	113	594	81	72.2
67	10.321	0.161	0.096	2.54	88.8	0.98	-	11.4	-0.1	113	597	81	72.4
68	10.477	0.156	0.096	2.54	88.9	0.97	-	11.3	-0.1	113	588	81	72.2
69	10.636	0.159	0.095	2.55	89	0.96	-	11.3	-0.1	113	600	81	72.2
70	10.797	0.161	0.095	2.54	89.2	0.94	102	11.2	-0.1	114	578	81	72.1
71	10.952	0.155	0.094	2.54	89.3	0.98	-	11.1	-0.1	113	553	81	72.2
72	11.115	0.163	0.097	2.54	89.4	0.99	-	11.1	-0.1	111	554	81	72.3
73	11.271	0.156	0.095	2.54	89.6	0.98	-	11.0	0.0	111	551	81	72.3
74	11.430	0.159	0.098	2.54	89.7	1	-	11.0	-0.1	109	555	81	72.2
75	11.591	0.161	0.096	2.55	89.8	0.98	-	10.9	-0.1	110	565	81	72.1
76	11.747	0.156	0.097	2.55	89.9	0.98	-	10.8	-0.1	111	561	81	72.2
77	11.909	0.162	0.094	2.55	90.1	0.97	-	10.8	-0.1	111	540	81	72.2
78	12.066	0.157	0.095	2.55	90.2	0.97	-	10.7	0.0	110	551	81	72.3
79	12.226	0.160	0.096	2.55	90.3	0.97	-	10.7	-0.1	111	578	81	72
80	12.386	0.160	0.094	2.54	90.4	0.99	102	10.6	-0.1	111	595	81	72.1
81	12.544	0.158	0.093	2.55	90.5	0.98	-	10.5	-0.1	112	599	81	72.2
82	12.704	0.160	0.097	2.55	90.6	0.99	-	10.4	-0.1	111	587	81	72.4
83	12.862	0.158	0.097	2.55	90.7	0.97	-	10.4	0.0	111	553	81	72.5
84	13.022	0.160	0.095	2.55	90.8	0.96	-	10.4	0.0	108	483	81	72.8
85	13.180	0.158	0.095	2.55	90.9	0.99	-	10.3	-0.1	108	502	81	72.5
86	13.340	0.160	0.097	2.55	91	0.99	-	10.2	-0.1	109	573	81	72.5
87	13.500	0.160	0.096	2.55	91.1	0.98	-	10.2	-0.1	110	582	81	72.9
88	13.657	0.157	0.097	2.54	91.2	0.99	-	10.1	-0.1	110	585	81	73.2
89	13.819	0.162	0.097	2.54	91.3	1	-	10.0	-0.1	111	609	81	72.7
90	14.067	0.248	0.096	2.55	91.4	0.99	107	9.9	-0.1	112	609	81	73
91	14.228	0.161	0.095	2.55	91.5	1	-	9.8	-0.1	113	595	81	73
92	14.388	0.160	0.096	2.54	91.6	1	-	9.7	-0.1	112	596	81	72.7
93	14.544	0.156	0.096	2.54	91.6	1.01	-	9.7	-0.1	112	603	81	73.3
94	14.707	0.163	0.096	2.54	91.7	0.99	-	9.6	-0.1	111	582	81	72.9
95	14.863	0.156	0.098	2.54	91.8	0.99	-	9.6	0.0	111	584	81	72.9
96	15.024	0.161	0.097	2.54	91.9	1	-	9.5	-0.1	111	592	81	73
97	15.185	0.161	0.096	2.56	92	1	-	9.4	-0.1	111	574	81	72.8
98	15.341	0.156	0.096	2.55	92.1	1	-	9.4	-0.1	111	562	81	73.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
99	15.504	0.163	0.097	2.55	92.1	0.98	-	9.3	-0.1	111	550	81	72.8
100	15.660	0.156	0.097	2.55	92.2	0.99	101	9.2	0.0	110	552	81	73
101	15.820	0.160	0.097	2.56	92.3	1	-	9.2	-0.1	110	551	81	72.9
102	15.982	0.162	0.095	2.55	92.3	0.99	-	9.1	-0.1	110	534	81	72.6
103	16.138	0.156	0.098	2.56	92.4	1	-	9.1	-0.1	109	528	81	73.1
104	16.301	0.163	0.098	2.54	92.4	0.99	-	9.0	0.0	107	513	81	73.4
105	16.458	0.157	0.099	2.55	92.5	1	-	9.0	-0.1	107	506	81	73
106	16.617	0.159	0.096	2.55	92.6	1	-	8.9	-0.1	108	512	81	72.9
107	16.779	0.162	0.097	2.55	92.6	0.99	-	8.8	0.0	108	529	81	72.7
108	16.935	0.156	0.096	2.56	92.7	0.99	-	8.8	-0.1	108	528	81	72.9
109	17.099	0.164	0.090	2.55	92.7	1.01	-	8.7	-0.1	108	530	81	73.1
110	17.256	0.157	0.095	2.55	92.8	1	101	8.7	0.0	107	527	81	73.3
111	17.416	0.160	0.096	2.56	92.9	1	-	8.7	-0.1	107	513	81	73.4
112	17.577	0.161	0.093	2.55	92.9	1.01	-	8.6	-0.1	107	501	81	72.9
113	17.734	0.157	0.095	2.55	93	0.98	-	8.5	-0.1	106	505	81	73.2
114	17.896	0.162	0.098	2.55	93	1.03	-	8.5	0.0	106	498	81	73.1
115	18.054	0.158	0.092	2.56	93.1	0.97	-	8.4	-0.1	106	502	81	73
116	18.215	0.161	0.096	2.57	93.2	1.01	-	8.3	0.0	107	512	81	72.7
117	18.376	0.161	0.095	2.56	93.2	1	-	8.3	0.0	107	511	81	73.2
118	18.533	0.157	0.096	2.56	93.3	1	-	8.3	-0.1	106	508	81	73.2
119	18.695	0.162	0.095	2.57	93.3	1	-	8.2	0.0	105	496	80	73
120	18.853	0.158	0.098	2.56	93.3	0.99	100	8.2	-0.1	105	482	80	72.8
121	19.014	0.161	0.095	2.56	93.4	1	-	8.2	0.0	105	467	80	73
122	19.175	0.161	0.096	2.55	93.5	1.03	-	8.1	0.0	104	472	80	73.4
123	19.332	0.157	0.097	2.56	93.5	1.04	-	8.1	-0.1	105	493	80	73.2
124	19.495	0.163	0.096	2.56	93.5	1.02	-	8.0	-0.1	104	496	80	73.2
125	19.653	0.158	0.096	2.56	93.5	1	-	8.0	-0.1	104	498	80	73.3
126	19.814	0.161	0.097	2.58	93.6	1	-	7.9	0.0	105	495	80	73.4
127	19.975	0.161	0.095	2.56	93.6	1	-	7.9	-0.1	105	471	81	73.5
128	20.132	0.157	0.098	2.56	93.7	1.01	-	7.8	-0.1	103	462	80	73.9
129	20.295	0.163	0.098	2.56	93.7	1.01	-	7.8	0.0	103	471	80	73.8
130	20.453	0.158	0.097	2.57	93.7	1.01	100	7.7	0.0	103	454	80	74.1
131	20.613	0.160	0.096	2.57	93.8	1.01	-	7.7	0.0	102	432	80	73.8

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
132	20.775	0.162	0.096	2.56	93.8	1.02	-	7.7	0.0	102	419	80	73.5
133	20.932	0.157	0.093	2.57	93.9	1.01	-	7.6	0.0	101	405	80	73.7
134	21.096	0.164	0.096	2.56	93.9	1.01	-	7.6	0.0	100	412	80	73.4
135	21.253	0.157	0.097	2.55	94	1.01	-	7.6	0.0	100	410	80	73.2
136	21.414	0.161	0.096	2.56	93.9	1.02	-	7.6	0.0	100	414	80	73.5
137	21.575	0.161	0.098	2.57	94	0.99	-	7.6	0.0	99	415	80	73.5
138	21.732	0.157	0.094	2.57	94	1.01	-	7.5	0.0	100	409	80	73.6
139	21.896	0.164	0.096	2.56	94.1	1.02	-	7.5	0.0	99	413	80	73.7
140	22.054	0.158	0.098	2.57	94.2	1.01	99	7.5	0.0	99	415	80	73.7
141	22.214	0.160	0.095	2.56	94.2	1.02	-	7.4	0.0	100	433	80	73.3
142	22.376	0.162	0.096	2.56	94.2	1.02	-	7.4	-0.1	100	442	80	73.2
143	22.533	0.157	0.096	2.57	94.3	1.01	-	7.3	0.0	100	442	80	73.7
144	22.697	0.164	0.099	2.56	94.3	1.01	-	7.3	0.0	100	438	80	73.6
145	22.854	0.157	0.098	2.57	94.3	1.01	-	7.3	0.0	100	439	80	73.4
146	23.016	0.162	0.099	2.57	94.4	1	-	7.2	0.0	100	442	80	73.6
147	23.179	0.163	0.096	2.57	94.4	1.04	-	7.2	-0.1	101	450	80	73.4
148	23.335	0.156	0.095	2.57	94.5	1	-	7.2	0.0	101	466	80	73.4
149	23.499	0.164	0.093	2.56	94.5	1.01	-	7.1	-0.1	101	471	80	73.3
150	23.656	0.157	0.095	2.57	94.6	1.03	100	7.1	0.0	101	460	80	73.7
151	23.818	0.162	0.096	2.56	94.6	1.01	-	7.0	0.0	102	475	80	73.6
152	23.980	0.162	0.098	2.57	94.6	1.02	-	7.0	0.0	102	463	80	73.5
153	24.136	0.156	0.095	2.56	94.6	1.01	-	7.0	0.0	101	459	80	73.8
154	24.301	0.165	0.096	2.56	94.7	1.03	-	6.9	-0.1	101	452	80	73.8
155	24.458	0.157	0.097	2.58	94.7	1.02	-	6.9	-0.1	101	432	80	73.5
156	24.620	0.162	0.096	2.56	94.7	1.01	-	6.9	0.0	100	416	80	73.4
157	24.781	0.161	0.095	2.57	94.7	1.01	-	6.8	-0.1	101	429	80	73.6
158	24.939	0.158	0.095	2.57	94.8	1.02	-	6.7	-0.1	102	492	80	73.5
159	25.103	0.164	0.094	2.57	94.8	1.02	-	6.7	-0.1	102	489	80	73.4
160	25.260	0.157	0.092	2.57	94.9	1.03	102	6.6	-0.1	101	481	80	73.8
161	25.422	0.162	0.095	2.56	94.8	1.06	-	6.6	0.0	102	479	80	73.7
162	25.584	0.162	0.097	2.58	94.9	1.01	-	6.6	0.0	102	468	80	73.8
163	25.742	0.158	0.098	2.56	94.9	0.99	-	6.5	0.0	101	449	80	73.8
164	25.904	0.162	0.098	2.57	94.9	1.03	-	6.5	0.0	101	440	80	74

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
165	26.063	0.159	0.098	2.56	94.9	0.99	-	6.5	0.0	102	477	80	73.5
166	26.224	0.161	0.097	2.57	95	1.03	-	6.4	0.0	102	480	80	73.3
167	26.386	0.162	0.097	2.59	95.1	1.03	-	6.4	0.0	102	458	80	73.4
168	26.544	0.158	0.098	2.57	95	1.02	-	6.4	0.0	101	448	80	73.7
169	26.706	0.162	0.097	2.58	95.1	1.03	-	6.3	-0.1	101	470	80	73.8
170	26.867	0.161	0.096	2.57	95.1	1	101	6.3	0.0	102	484	80	73.6
171	27.026	0.159	0.095	2.58	95.1	1.01	-	6.2	0.0	102	486	80	73.9
172	27.188	0.162	0.096	2.56	95.2	1.02	-	6.1	-0.1	103	494	80	73.5
173	27.347	0.159	0.097	2.57	95.2	1.04	-	6.1	0.0	103	500	80	73.3
174	27.508	0.161	0.093	2.57	95.3	1.02	-	6.0	-0.1	104	505	80	73.7
175	27.670	0.162	0.099	2.57	95.3	1.03	-	6.0	0.0	104	486	80	73.8
176	27.827	0.157	0.098	2.57	95.3	1.02	-	6.0	0.0	103	454	80	74.1
177	27.992	0.165	0.096	2.56	95.3	1.02	-	5.9	0.0	103	449	80	74.1
178	28.150	0.158	0.099	2.56	95.4	1.01	-	5.9	0.0	102	433	80	74.3
179	28.310	0.160	0.098	2.56	95.4	1.03	-	5.9	0.0	101	424	80	74.2
180	28.473	0.163	0.098	2.56	95.4	1.01	100	5.8	0.0	101	438	80	74.5
181	28.630	0.157	0.095	2.57	95.4	1.02	-	5.8	0.0	102	455	80	74.3
182	28.795	0.165	0.095	2.56	95.5	1.01	-	5.8	0.0	101	451	80	74
183	28.951	0.156	0.095	2.58	95.5	1.02	-	5.7	0.0	101	437	80	74
184	29.114	0.163	0.096	2.56	95.5	1.03	-	5.7	0.0	101	441	80	73.8
185	29.276	0.162	0.096	2.57	95.5	1.01	-	5.7	0.0	100	425	80	73.9
186	29.433	0.157	0.097	2.56	95.6	1.04	-	5.6	0.0	100	411	80	73.9
187	29.597	0.164	0.094	2.56	95.6	1.04	-	5.6	-0.1	99	415	80	74.3
188	29.755	0.158	0.096	2.58	95.6	1.02	-	5.6	0.0	99	402	80	74.3
189	29.917	0.162	0.098	2.57	95.6	1.02	-	5.5	0.0	98	402	80	74
190	30.078	0.161	0.097	2.56	95.6	1.03	99	5.5	0.0	99	422	80	74
191	30.236	0.158	0.097	2.56	95.6	1.02	-	5.4	-0.1	99	427	80	74.2
192	30.400	0.164	0.094	2.57	95.6	1.02	-	5.4	0.0	98	425	80	74.4
193	30.558	0.158	0.098	2.56	95.7	1.02	-	5.4	0.0	98	420	80	74.5
194	30.719	0.161	0.096	2.57	95.7	1	-	5.3	0.0	98	422	80	74.3
195	30.881	0.162	0.095	2.58	95.7	1.04	-	5.3	0.0	97	400	80	74.4
196	31.040	0.159	0.098	2.56	95.7	1.03	-	5.2	-0.1	98	446	80	74.2
197	31.201	0.161	0.096	2.56	95.7	1.03	-	5.2	-0.1	99	471	80	74

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
198	31.362	0.161	0.097	2.55	95.8	0.99	-	5.1	0.0	100	479	80	74.2
199	31.522	0.160	0.097	2.57	95.8	1.02	-	5.1	-0.1	100	468	80	74.1
200	31.683	0.161	0.098	2.56	95.8	1.02	99	5.1	0.0	100	446	80	74.1
201	31.842	0.159	0.095	2.55	95.9	1.05	-	5.0	0.0	99	429	80	74.2
202	32.004	0.162	0.097	2.57	95.9	1.01	-	5.0	0.0	99	420	80	74.3
203	32.165	0.161	0.098	2.56	95.9	1.02	-	4.9	0.0	99	409	80	74.1
204	32.323	0.158	0.097	2.56	95.9	1.03	-	4.9	0.0	98	404	80	74.4
205	32.486	0.163	0.094	2.56	96	1.02	-	4.9	0.0	98	399	80	74.2
206	32.645	0.159	0.094	2.56	96	1.02	-	4.9	0.0	98	403	80	74.2
207	32.806	0.161	0.096	2.56	95.9	1.03	-	4.8	-0.1	99	429	80	74.4
208	32.968	0.162	0.098	2.56	96	1.04	-	4.8	0.0	98	424	80	74.4
209	33.125	0.157	0.098	2.57	96	1.01	-	4.7	0.0	97	403	80	74.4
210	33.289	0.164	0.097	2.56	96	1.02	99	4.7	0.0	97	395	80	74.4
211	33.447	0.158	0.097	2.57	96	1.01	-	4.7	0.0	97	401	80	74.3
212	33.608	0.161	0.099	2.56	96	1.03	-	4.6	-0.1	98	412	80	74.4
213	33.771	0.163	0.100	2.57	96	1.04	-	4.6	0.0	98	401	80	74.4
214	33.927	0.156	0.097	2.56	96	1.02	-	4.6	-0.1	98	401	80	74.3
215	34.092	0.165	0.091	2.56	96	1.03	-	4.5	0.0	98	401	80	74.5
216	34.249	0.157	0.095	2.57	96	1.02	-	4.5	-0.1	98	407	80	74.5
217	34.411	0.162	0.098	2.55	96	1.02	-	4.4	0.0	99	413	80	74.3
218	34.573	0.162	0.094	2.57	96	1.03	-	4.4	0.0	99	406	80	74.4
219	34.730	0.157	0.096	2.55	96.1	1.04	-	4.4	-0.1	98	395	80	74.5
220	34.894	0.164	0.094	2.55	96	1.01	100	4.3	0.0	97	388	80	74.6
221	35.052	0.158	0.094	2.57	96.1	1.03	-	4.3	0.0	96	384	80	74.5
222	35.213	0.161	0.099	2.56	96.1	1.03	-	4.3	0.0	97	399	80	74.4
223	35.374	0.161	0.095	2.56	96.1	1.01	-	4.2	0.0	97	403	80	74.3
224	35.533	0.159	0.099	2.55	96.1	1.04	-	4.2	0.0	97	403	80	74.4
225	35.696	0.163	0.096	2.55	96.1	1.04	-	4.2	0.0	97	408	80	74.6
226	35.854	0.158	0.098	2.56	96.2	1.04	-	4.2	0.0	96	411	80	74.6
227	36.015	0.161	0.098	2.55	96.2	1.03	-	4.1	0.0	96	401	80	74.5
228	36.177	0.162	0.097	2.57	96.2	1.04	-	4.1	0.0	96	395	80	74.4
229	36.336	0.159	0.097	2.56	96.2	1.02	-	4.1	0.0	96	397	80	74.3
230	36.497	0.161	0.094	2.56	96.2	1.03	101	4.0	0.0	97	419	80	74.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
231	36.658	0.161	0.098	2.55	96.2	1.03	-	4.0	0.0	96	404	80	74.3
232	36.818	0.160	0.099	2.56	96.3	1.02	-	4.0	0.0	96	382	80	74.2
233	36.980	0.162	0.095	2.56	96.3	1.03	-	3.9	-0.1	96	395	80	74
234	37.139	0.159	0.095	2.55	96.4	1.03	-	3.9	0.0	97	403	80	74
235	37.300	0.161	0.096	2.58	96.4	1.03	-	3.9	0.0	97	411	80	74.2
236	37.462	0.162	0.096	2.56	96.4	1.04	-	3.8	0.0	97	411	80	74.1
237	37.619	0.157	0.098	2.55	96.4	1.03	-	3.8	0.0	97	415	80	74.3
238	37.783	0.164	0.094	2.56	96.5	1.03	-	3.7	-0.1	97	406	80	74.1
239	37.942	0.159	0.097	2.55	96.4	1.02	-	3.7	0.0	97	411	80	74.2
240	38.102	0.160	0.099	2.56	96.4	1.04	99	3.7	0.0	97	404	80	74.3
241	38.265	0.163	0.096	2.55	96.5	1.04	-	3.6	-0.1	97	410	80	74.5
242	38.422	0.157	0.098	2.57	96.5	1.04	-	3.6	0.0	97	409	80	74.4
243	38.586	0.164	0.098	2.56	96.5	1.01	-	3.6	0.0	97	409	80	74.7
244	38.743	0.157	0.097	2.56	96.5	1.01	-	3.6	0.0	97	402	80	74.8
245	38.905	0.162	0.096	2.55	96.5	1.03	-	3.5	-0.1	98	405	80	74.6
246	39.068	0.163	0.097	2.56	96.5	1.03	-	3.5	0.0	98	406	80	74.7
247	39.224	0.156	0.098	2.56	96.5	1.04	-	3.5	0.0	97	391	80	74.8
248	39.389	0.165	0.099	2.55	96.6	1.03	-	3.4	0.0	97	384	80	74.8
249	39.546	0.157	0.098	2.56	96.6	1.05	-	3.4	0.0	97	405	80	74.7
250	39.708	0.162	0.096	2.55	96.6	1.05	99	3.3	0.0	98	419	80	74.4
251	39.870	0.162	0.090	2.56	96.6	1.03	-	3.3	-0.1	97	428	80	74.7
252	40.027	0.157	0.098	2.55	96.6	1.05	-	3.3	0.0	98	423	80	74.7
253	40.192	0.165	0.095	2.57	96.6	1.04	-	3.2	0.0	97	400	80	74.8
254	40.349	0.157	0.099	2.56	96.6	1.03	-	3.2	0.0	96	391	80	74.8
255	40.510	0.161	0.095	2.55	96.7	1.03	-	3.2	0.0	96	400	80	74.8
256	40.672	0.162	0.094	2.57	96.7	1.04	-	3.2	0.0	97	407	80	74.8
257	40.830	0.158	0.097	2.55	96.7	1.03	-	3.1	0.0	97	401	80	74.7
258	40.993	0.163	0.097	2.56	96.7	1.03	-	3.1	0.0	97	382	80	75
259	41.152	0.159	0.097	2.55	96.7	1.03	-	3.1	0.0	96	386	80	74.9
260	41.313	0.161	0.098	2.55	96.7	1.04	99	3.0	-0.1	97	408	80	75
261	41.474	0.161	0.099	2.57	96.8	1.05	-	3.0	0.0	97	409	80	75.1
262	41.633	0.159	0.096	2.56	96.8	1.05	-	2.9	0.0	97	402	80	75.1
263	41.794	0.161	0.099	2.56	96.8	1.04	-	2.9	0.0	97	421	80	74.9

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
264	41.955	0.161	0.098	2.55	96.8	1.06	-	2.9	0.0	97	418	80	75
265	42.115	0.160	0.096	2.56	96.9	1.06	-	2.8	0.0	97	405	80	74.9
266	42.277	0.162	0.097	2.55	96.8	1.04	-	2.8	0.0	97	405	80	74.8
267	42.436	0.159	0.097	2.55	96.9	1.06	-	2.8	0.0	97	397	80	74.8
268	42.597	0.161	0.098	2.56	96.9	1.04	-	2.8	0.0	97	383	80	74.6
269	42.759	0.162	0.097	2.55	96.9	1.03	-	2.7	0.0	96	370	80	75
270	42.916	0.157	0.098	2.55	96.9	1.05	98	2.7	0.0	96	362	80	75
271	43.081	0.165	0.097	2.56	96.9	1.05	-	2.7	0.0	95	346	80	75.1
272	43.239	0.158	0.096	2.56	96.9	1.06	-	2.7	0.0	95	341	80	75
273	43.400	0.161	0.096	2.56	96.9	1.03	-	2.6	0.0	94	348	80	75.1
274	43.563	0.163	0.094	2.56	96.9	1.03	-	2.6	0.0	95	362	80	74.6
275	43.720	0.157	0.094	2.56	97	1.04	-	2.6	0.0	96	388	80	74.8
276	43.885	0.165	0.098	2.55	96.9	1.04	-	2.5	0.0	96	384	80	75
277	44.041	0.156	0.096	2.56	96.9	1.03	-	2.5	-0.1	96	384	80	75
278	44.204	0.163	0.095	2.55	97	1.05	-	2.4	0.0	94	374	80	75
279	44.366	0.162	0.093	2.56	97	1.04	-	2.4	0.0	94	366	80	75
280	44.523	0.157	0.091	2.56	97	1.04	100	2.4	0.0	94	364	80	75.1
281	44.688	0.165	0.094	2.55	97	1.03	-	2.3	0.0	95	385	80	75.1
282	44.846	0.158	0.098	2.56	96.9	1.04	-	2.3	0.0	95	399	80	75.2
283	45.007	0.161	0.097	2.56	97	1.03	-	2.3	0.0	96	389	80	75.2
284	45.169	0.162	0.098	2.56	97	1.04	-	2.3	0.0	95	403	80	75.1
285	45.327	0.158	0.098	2.55	97	1.05	-	2.3	0.0	96	403	80	75.1
286	45.490	0.163	0.099	2.56	97	1.05	-	2.2	0.0	95	394	80	74.9
287	45.649	0.159	0.099	2.55	97	1.05	-	2.2	0.0	94	381	80	75
288	45.811	0.162	0.096	2.55	97	1.05	-	2.1	0.0	95	370	80	75
289	45.972	0.161	0.093	2.56	97.1	1.03	-	2.1	0.0	95	353	80	74.8
290	46.131	0.159	0.095	2.55	97.1	1.03	101	2.1	0.0	94	328	80	74.7
291	46.292	0.161	0.095	2.56	97.1	1.03	-	2.1	0.0	94	335	80	74.8
292	46.454	0.162	0.097	2.55	97.1	1.03	-	2.0	0.0	94	347	80	74.9
293	46.612	0.158	0.098	2.56	97.1	1.04	-	2.0	-0.1	95	392	80	74.9
294	46.775	0.163	0.098	2.55	97.1	1.06	-	1.9	-0.1	96	415	80	75
295	46.934	0.159	0.096	2.55	97.1	1.03	-	1.9	0.0	97	433	80	75
296	47.095	0.161	0.096	2.56	97.2	1.06	-	1.9	0.0	98	415	80	75.2

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
297	47.257	0.162	0.097	2.55	97.2	1.05	-	1.8	0.0	97	388	81	75.2
298	47.414	0.157	0.094	2.56	97.2	1.04	-	1.8	0.0	96	378	80	75.1
299	47.579	0.165	0.099	2.54	97.2	1.05	-	1.8	0.0	96	381	80	75.3
300	47.737	0.158	0.096	2.57	97.2	1.07	100	1.8	0.0	95	358	80	75.3
301	47.898	0.161	0.096	2.56	97.2	1.05	-	1.7	0.0	95	366	80	75.1
302	48.061	0.163	0.098	2.55	97.2	1.05	-	1.7	0.0	95	376	80	75.2
303	48.218	0.157	0.095	2.56	97.2	1.06	-	1.7	-0.1	95	380	80	75.2
304	48.382	0.164	0.092	2.55	97.3	1.05	-	1.6	0.0	96	390	80	75.3
305	48.540	0.158	0.091	2.56	97.3	1.06	-	1.6	0.0	95	381	80	75.2
306	48.702	0.162	0.097	2.56	97.3	1.04	-	1.6	0.0	94	366	80	75.4
307	48.864	0.162	0.098	2.56	97.3	1.05	-	1.6	0.0	95	362	80	75.2
308	49.021	0.157	0.096	2.55	97.4	1.04	-	1.5	-0.1	95	359	80	75.3
309	49.186	0.165	0.097	2.56	97.3	1.05	-	1.5	0.0	95	352	80	75.2
310	49.343	0.157	0.095	2.56	97.4	1.04	100	1.4	0.0	95	367	80	75.5
311	49.505	0.162	0.099	2.55	97.4	1.07	-	1.4	0.0	95	387	80	75.5
312	49.667	0.162	0.096	2.56	97.4	1.04	-	1.4	0.0	96	405	81	75.4
313	49.825	0.158	0.098	2.56	97.5	1.04	-	1.3	0.0	96	406	81	75.4
314	49.988	0.163	0.100	2.55	97.5	1.05	-	1.3	0.0	96	406	81	75.6
315	50.147	0.159	0.098	2.54	97.5	1.05	-	1.3	0.0	96	408	81	75.6
316	50.308	0.161	0.099	2.56	97.5	1.05	-	1.2	-0.1	96	400	81	75.7
317	50.470	0.162	0.098	2.55	97.6	1.04	-	1.2	0.0	96	388	81	75.8
318	50.628	0.158	0.098	2.55	97.6	1.03	-	1.2	0.0	95	375	81	75.6
319	50.790	0.162	0.095	2.57	97.6	1.05	-	1.2	0.0	95	366	81	75.5
320	50.952	0.162	0.095	2.55	97.6	1.07	100	1.1	-0.1	94	354	80	75.6
321	51.110	0.158	0.098	2.55	97.6	1.05	-	1.1	0.0	94	347	80	75.3
322	51.273	0.163	0.095	2.55	97.6	1.05	-	1.1	0.0	94	347	80	75.5
323	51.432	0.159	0.097	2.55	97.7	1.06	-	1.1	0.0	94	350	81	75.7
324	51.593	0.161	0.098	2.56	97.7	1.05	-	1.0	0.0	94	361	81	75.5
325	51.755	0.162	0.098	2.54	97.7	1.05	-	1.0	0.0	94	367	80	75.6
326	51.913	0.158	0.096	2.56	97.7	1.05	-	1.0	0.0	94	366	80	75.5
327	52.077	0.164	0.089	2.55	97.7	1.05	-	0.9	0.0	94	369	80	75.2
328	52.234	0.157	0.099	2.56	97.7	1.06	-	0.9	0.0	93	371	80	75.5
329	52.396	0.162	0.097	2.55	97.7	1.04	-	0.9	-0.1	94	403	80	75.5

BOX A TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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
330	52.559	0.163	0.098	2.55	97.7	1.07	99	0.8	0.0	95	411	80	75.7
331	52.715	0.156	0.096	2.55	97.8	1.06	-	0.8	-0.1	95	397	80	75.7
332	52.880	0.165	0.093	2.54	97.8	1.03	-	0.8	0.0	95	381	80	75.8
333	53.038	0.158	0.098	2.56	97.8	1.05	-	0.7	0.0	95	407	81	75.6
334	53.199	0.161	0.096	2.55	97.8	1.05	-	0.7	0.0	96	409	81	75.7
335	53.361	0.162	0.099	2.55	97.8	1.07	-	0.7	-0.1	97	397	81	75.7
336	53.519	0.158	0.095	2.54	97.8	1.04	-	0.6	0.0	95	381	81	75.8
337	53.683	0.164	0.097	2.55	97.8	1.05	-	0.6	0.0	95	375	81	75.5
338	53.841	0.158	0.095	2.55	97.8	1.06	-	0.6	-0.1	94	362	81	75.8
339	54.002	0.161	0.094	2.54	97.8	1.06	-	0.5	0.0	95	361	81	75.6
340	54.164	0.162	0.099	2.55	97.8	1.06	98	0.5	0.0	95	361	81	75.6
341	54.323	0.159	0.098	2.55	97.8	1.05	-	0.5	0.0	95	368	81	75.8
342	54.485	0.162	0.098	2.55	97.8	1.06	-	0.5	0.0	96	400	81	75.8
343	54.645	0.160	0.098	2.55	97.8	1.05	-	0.4	-0.1	95	381	81	75.7
344	54.805	0.160	0.098	2.54	97.8	1.06	-	0.4	0.0	95	359	81	75.8
345	54.967	0.162	0.098	2.55	97.8	1.07	-	0.4	0.0	94	340	81	75.8
346	55.126	0.159	0.093	2.54	97.8	1.04	-	0.3	0.0	93	328	81	75.7
347	55.288	0.162	0.096	2.56	97.8	1.04	-	0.3	0.0	93	325	81	75.6
348	55.449	0.161	0.093	2.54	97.8	1.08	-	0.3	0.0	94	336	81	75.6
349	55.607	0.158	0.098	2.55	97.9	1.06	-	0.3	0.0	93	334	81	75.5
350	55.771	0.164	0.099	2.55	97.8	1.05	98	0.3	0.0	94	334	81	75.6
351	55.929	0.158	0.096	2.55	97.9	1.06	-	0.2	0.0	94	347	81	75.9
352	56.090	0.161	0.097	2.55	97.8	1.05	-	0.2	0.0	94	361	81	75.7
353	56.253	0.163	0.098	2.55	97.9	1.03	-	0.2	0.0	95	357	81	76
354	56.410	0.157	0.098	2.55	97.9	1.06	-	0.1	-0.1	94	355	81	76
355	56.575	0.165	0.094	2.54	97.9	1.04	-	0.1	0.0	93	353	81	76
356	56.732	0.157	0.092	2.56	97.9	1.05	-	0.1	0.0	93	357	81	76
357	56.894	0.162	0.096	2.55	98	1.06	-	0.1	0.0	93	347	81	75.9
358	57.057	0.163	0.100	2.55	98	1.04	-	0.0	0.0	92	342	80	75.8
359	57.213	0.156	0.098	2.54	98	1.06	-	0.0	0.0	93	351	80	75.8
360	57.378	0.165	0.098	2.55	98	1.04	98	0.0	0.0	92	347	80	75.8
Avg/Tot	57.378	0.159	0.096	2.53	93	1.00	100			103	471	80	74

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	76.6	0.69		74	-0.099	9.33	0.09
1	0.116	0.116	2.44	76.4	1.75	-	77	-0.100	11.91	0.05
2	0.267	0.151	2.45	76.4	1.91	-	78	-0.104	14.11	0.03
3	0.422	0.155	2.45	76.5	1.55	-	79	-0.102	13.59	0.04
4	0.572	0.150	2.45	76.5	2.07	-	79	-0.103	13.38	0.04
5	0.728	0.156	2.46	76.5	1.94	-	80	-0.104	12.50	0.04
6	0.879	0.151	2.46	76.6	2	-	80	-0.100	11.74	0.08
7	1.035	0.156	2.46	76.7	1.78	-	81	-0.103	16.10	0.03
8	1.185	0.150	2.45	76.9	1.64	-	81	-0.103	17.61	0.02
9	1.339	0.154	2.46	76.9	1.81	-	81	-0.100	15.47	0.04
10	1.491	0.152	2.45	77.1	1.61	100	81	-0.104	13.74	0.04
11	1.645	0.154	2.45	77.3	1.83	-	82	-0.103	16.12	0.02
12	1.799	0.154	2.45	77.5	1.92	-	82	-0.099	12.58	0.04
13	1.952	0.153	2.46	77.7	1.6	-	82	-0.101	14.60	0.04
14	2.106	0.154	2.45	77.9	1.77	-	82	-0.101	12.67	0.05
15	2.257	0.151	2.45	78.3	1.6	-	82	-0.099	12.31	0.04
16	2.413	0.156	2.46	78.4	2.12	-	82	-0.103	12.54	0.04
17	2.564	0.151	2.46	78.7	1.57	-	82	-0.105	13.76	0.02
18	2.721	0.157	2.46	79	1.62	-	83	-0.105	12.58	0.03
19	2.871	0.150	2.46	79.2	1.79	-	83	-0.104	13.60	0.02
20	3.026	0.155	2.46	79.4	1.57	102	83	-0.105	15.25	0.04
21	3.180	0.154	2.46	79.8	1.95	-	83	-0.099	10.80	0.05
22	3.335	0.155	2.46	80.1	1.6	-	83	-0.100	12.03	0.04
23	3.490	0.155	2.47	80.4	1.94	-	83	-0.099	11.21	0.05
24	3.642	0.152	2.46	80.6	1.96	-	83	-0.101	11.45	0.03
25	3.798	0.156	2.46	81	1.81	-	83	-0.106	12.22	0.03
26	3.951	0.153	2.47	81.3	1.84	-	83	-0.103	14.14	0.03
27	4.108	0.157	2.47	81.6	1.81	-	83	-0.105	13.17	0.03
28	4.259	0.151	2.47	81.9	2.14	-	84	-0.102	11.71	0.03
29	4.415	0.156	2.46	82.2	1.79	-	84	-0.102	11.84	0.04
30	4.570	0.155	2.48	82.5	1.95	103	84	-0.098	11.00	0.04
31	4.725	0.155	2.47	82.8	1.7	-	84	-0.105	16.56	0.06

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	4.881	0.156	2.47	83.1	1.58	-	84	-0.107	16.32	0.04
33	5.033	0.152	2.46	83.5	2.11	-	84	-0.110	15.62	0.03
34	5.191	0.158	2.47	83.7	1.64	-	84	-0.107	14.81	0.04
35	5.344	0.153	2.48	84.1	2.12	-	84	-0.106	13.36	0.03
36	5.500	0.156	2.47	84.3	2.11	-	84	-0.105	14.50	0.03
37	5.654	0.154	2.47	84.7	1.57	-	84	-0.106	13.32	0.04
38	5.811	0.157	2.47	84.9	1.62	-	84	-0.105	12.70	0.04
39	5.968	0.157	2.48	85.2	2.09	-	84	-0.101	11.60	0.04
40	6.121	0.153	2.48	85.5	2.09	103	84	-0.103	9.34	0.07
41	6.279	0.158	2.48	85.8	1.66	-	84	-0.099	11.30	0.05
42	6.432	0.153	2.47	86.2	1.66	-	84	-0.102	11.21	0.05
43	6.590	0.158	2.48	86.5	2.1	-	84	-0.104	11.53	0.04
44	6.743	0.153	2.47	86.7	1.58	-	84	-0.104	10.61	0.05
45	6.901	0.158	2.48	87	1.88	-	84	-0.101	11.96	0.04
46	7.058	0.157	2.49	87.3	2.01	-	84	-0.102	10.99	0.04
47	7.212	0.154	2.48	87.6	1.6	-	84	-0.103	11.36	0.04
48	7.370	0.158	2.49	87.9	2	-	84	-0.105	12.37	0.03
49	7.524	0.154	2.48	88.1	1.62	-	84	-0.101	12.42	0.03
50	7.681	0.157	2.48	88.4	1.78	102	84	-0.099	10.19	0.08
51	7.836	0.155	2.48	88.7	1.6	-	84	-0.098	9.55	0.07
52	7.994	0.158	2.49	88.9	1.84	-	84	-0.097	10.43	0.04
53	8.151	0.157	2.48	89.1	1.61	-	84	-0.097	10.74	0.05
54	8.305	0.154	2.48	89.4	1.89	-	84	-0.102	12.71	0.06
55	8.465	0.160	2.49	89.6	1.68	-	84	-0.086	9.04	0.12
56	8.619	0.154	2.48	89.9	1.62	-	84	-0.109	19.08	0.84
57	8.776	0.157	2.47	90.1	1.63	-	84	-0.109	14.93	0.03
58	8.933	0.157	2.47	90.3	1.65	-	84	-0.101	16.41	0.05
59	9.089	0.156	2.47	90.6	1.99	-	84	-0.101	11.21	0.05
60	9.247	0.158	2.48	90.8	1.67	102	84	-0.099	12.22	0.03
61	9.401	0.154	2.48	91.1	1.6	-	84	-0.102	10.76	0.04
62	9.561	0.160	2.48	91.2	1.7	-	84	-0.099	13.22	0.03
63	9.714	0.153	2.47	91.4	1.85	-	84	-0.101	11.47	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	9.872	0.158	2.48	91.7	2.12	-	83	-0.102	12.83	0.03
65	10.030	0.158	2.48	91.9	1.81	-	84	-0.101	11.73	0.03
66	10.185	0.155	2.47	92.1	1.71	-	83	-0.100	12.84	0.02
67	10.344	0.159	2.48	92.3	2.09	-	84	-0.101	13.16	0.03
68	10.499	0.155	2.48	92.5	1.98	-	83	-0.097	12.87	0.02
69	10.657	0.158	2.48	92.7	1.92	-	83	-0.102	12.65	0.03
70	10.813	0.156	2.48	92.9	1.77	102	83	-0.098	10.66	0.05
71	10.971	0.158	2.48	93.1	2.04	-	83	-0.095	8.88	0.08
72	11.129	0.158	2.48	93.2	2.15	-	83	-0.100	9.33	0.07
73	11.284	0.155	2.48	93.4	2.06	-	83	-0.097	10.43	0.07
74	11.444	0.160	2.48	93.6	1.59	-	83	-0.099	13.27	0.02
75	11.599	0.155	2.48	93.8	1.58	-	83	-0.100	11.04	0.03
76	11.757	0.158	2.48	94	2.03	-	83	-0.096	10.13	0.04
77	11.916	0.159	2.48	94.1	1.76	-	83	-0.096	9.08	0.09
78	12.070	0.154	2.48	94.3	1.66	-	83	-0.098	8.90	0.06
79	12.231	0.161	2.49	94.5	2.05	-	83	-0.099	11.13	0.04
80	12.386	0.155	2.48	94.7	1.84	102	83	-0.101	12.61	0.02
81	12.544	0.158	2.48	94.8	1.92	-	83	-0.098	11.72	0.03
82	12.702	0.158	2.48	95	1.66	-	83	-0.099	13.14	0.03
83	12.858	0.156	2.48	95.1	1.64	-	83	-0.089	10.02	0.04
84	13.017	0.159	2.47	95.3	1.66	-	83	-0.086	6.02	0.16
85	13.173	0.156	2.47	95.4	1.82	-	83	-0.099	6.99	0.13
86	13.332	0.159	2.47	95.6	1.84	-	83	-0.101	18.00	0.71
87	13.488	0.156	2.48	95.7	1.66	-	83	-0.098	13.80	0.04
88	13.646	0.158	2.47	95.9	1.97	-	83	-0.098	13.47	0.03
89	13.805	0.159	2.47	96	2.07	-	83	-0.104	14.01	0.03
90	13.957	0.152	2.47	96.1	1.64	102	83	-0.100	16.19	0.07
91	14.117	0.160	2.48	96.2	1.99	-	83	-0.099	14.94	0.10
92	14.271	0.154	2.48	96.4	2.06	-	83	-0.102	12.84	0.02
93	14.430	0.159	2.47	96.4	1.74	-	83	-0.102	13.27	0.04
94	14.588	0.158	2.48	96.6	1.62	-	83	-0.099	11.40	0.04
95	14.743	0.155	2.47	96.7	1.85	-	83	-0.102	11.31	0.05

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	14.903	0.160	2.48	96.9	1.73	-	83	-0.101	13.18	0.03
97	15.058	0.155	2.48	97	2.13	-	83	-0.098	11.91	0.04
98	15.217	0.159	2.47	97.1	2.05	-	83	-0.096	12.89	0.03
99	15.374	0.157	2.47	97.2	1.66	-	83	-0.095	11.23	0.03
100	15.531	0.157	2.47	97.3	2.11	101	83	-0.097	11.66	0.06
101	15.689	0.158	2.47	97.4	1.64	-	83	-0.094	10.03	0.06
102	15.846	0.157	2.47	97.5	2.09	-	83	-0.093	9.24	0.08
103	16.005	0.159	2.47	97.7	2	-	83	-0.094	9.51	0.08
104	16.160	0.155	2.47	97.8	1.76	-	83	-0.092	9.99	0.10
105	16.319	0.159	2.47	97.8	2.09	-	83	-0.093	9.29	0.09
106	16.477	0.158	2.47	97.9	1.84	-	83	-0.096	10.45	0.05
107	16.633	0.156	2.47	98	1.73	-	83	-0.095	11.58	0.03
108	16.794	0.161	2.48	98.1	2.09	-	83	-0.093	10.53	0.05
109	16.949	0.155	2.47	98.2	1.75	-	83	-0.095	10.10	0.04
110	17.108	0.159	2.47	98.2	1.72	101	82	-0.094	9.55	0.06
111	17.267	0.159	2.48	98.4	1.75	-	82	-0.089	8.81	0.07
112	17.422	0.155	2.47	98.4	1.71	-	82	-0.092	9.24	0.06
113	17.583	0.161	2.48	98.6	2.12	-	82	-0.093	10.85	0.06
114	17.738	0.155	2.47	98.5	1.65	-	82	-0.093	10.58	0.05
115	17.897	0.159	2.48	98.7	2.06	-	82	-0.091	10.28	0.08
116	18.055	0.158	2.47	98.7	1.75	-	82	-0.090	10.27	0.05
117	18.212	0.157	2.48	98.8	2.14	-	82	-0.095	9.80	0.08
118	18.372	0.160	2.47	98.9	2.02	-	82	-0.092	9.22	0.07
119	18.528	0.156	2.48	98.9	1.61	-	82	-0.090	8.26	0.10
120	18.687	0.159	2.48	99	2.01	100	82	-0.089	7.70	0.11
121	18.845	0.158	2.48	99.1	2.02	-	82	-0.091	7.36	0.11
122	19.002	0.157	2.48	99.1	1.64	-	82	-0.089	7.36	0.13
123	19.161	0.159	2.47	99.2	1.78	-	82	-0.093	9.20	0.07
124	19.317	0.156	2.47	99.2	1.93	-	82	-0.093	8.99	0.06
125	19.477	0.160	2.48	99.3	1.81	-	82	-0.093	9.11	0.06
126	19.634	0.157	2.47	99.4	2.13	-	82	-0.088	9.25	0.06
127	19.793	0.159	2.47	99.4	1.67	-	82	-0.086	7.93	0.12

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	19.951	0.158	2.47	99.4	1.85	-	82	-0.089	9.16	0.06
129	20.107	0.156	2.47	99.5	2.06	-	82	-0.089	9.20	0.06
130	20.267	0.160	2.47	99.6	1.69	100	82	-0.084	7.13	0.14
131	20.423	0.156	2.47	99.6	1.86	-	82	-0.081	7.03	0.13
132	20.583	0.160	2.47	99.6	2.04	-	82	-0.081	6.56	0.14
133	20.741	0.158	2.48	99.8	1.68	-	82	-0.077	6.01	0.15
134	20.898	0.157	2.47	99.8	1.92	-	82	-0.081	6.29	0.11
135	21.059	0.161	2.48	99.9	1.89	-	82	-0.082	7.53	0.09
136	21.214	0.155	2.48	99.9	1.69	-	82	-0.081	6.49	0.14
137	21.374	0.160	2.47	99.8	1.84	-	82	-0.083	7.81	0.09
138	21.532	0.158	2.47	100	1.68	-	82	-0.079	6.74	0.16
139	21.688	0.156	2.47	100	2.05	-	81	-0.081	6.26	0.16
140	21.850	0.162	2.47	100	1.75	99	81	-0.081	6.65	0.15
141	22.005	0.155	2.47	100	1.71	-	81	-0.086	7.52	0.10
142	22.165	0.160	2.47	100.1	2.12	-	81	-0.084	8.08	0.09
143	22.323	0.158	2.48	100.2	1.87	-	81	-0.086	7.18	0.15
144	22.479	0.156	2.47	100.2	2.14	-	81	-0.084	7.16	0.12
145	22.640	0.161	2.47	100.3	2.03	-	81	-0.086	6.78	0.15
146	22.795	0.155	2.48	100.3	1.94	-	81	-0.088	6.75	0.13
147	22.955	0.160	2.47	100.4	1.61	-	81	-0.088	7.11	0.11
148	23.115	0.160	2.48	100.3	1.8	-	81	-0.092	7.42	0.13
149	23.270	0.155	2.47	100.3	1.78	-	81	-0.086	8.66	0.10
150	23.432	0.162	2.48	100.4	1.61	100	81	-0.087	7.36	0.12
151	23.587	0.155	2.47	100.5	1.79	-	81	-0.090	7.84	0.11
152	23.746	0.159	2.48	100.5	1.67	-	82	-0.084	8.13	0.11
153	23.906	0.160	2.48	100.5	1.74	-	81	-0.087	7.68	0.09
154	24.062	0.156	2.48	100.6	2.15	-	81	-0.082	7.86	0.07
155	24.223	0.161	2.47	100.6	1.66	-	81	-0.081	6.44	0.15
156	24.379	0.156	2.48	100.6	1.64	-	81	-0.082	6.18	0.13
157	24.538	0.159	2.47	100.6	2.13	-	81	-0.087	6.15	0.14
158	24.697	0.159	2.47	100.7	1.64	-	81	-0.092	11.04	0.05
159	24.854	0.157	2.48	100.7	1.95	-	82	-0.091	9.27	0.08

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	25.014	0.160	2.47	100.8	1.63	101	81	-0.089	9.34	0.07
161	25.171	0.157	2.48	100.9	2.09	-	81	-0.089	9.35	0.08
162	25.329	0.158	2.47	100.9	2.13	-	82	-0.085	7.96	0.12
163	25.488	0.159	2.48	100.8	1.61	-	82	-0.083	8.00	0.10
164	25.645	0.157	2.47	101	1.64	-	81	-0.086	7.46	0.12
165	25.806	0.161	2.48	100.9	1.66	-	81	-0.092	8.57	0.08
166	25.962	0.156	2.48	100.9	1.66	-	82	-0.090	7.90	0.12
167	26.121	0.159	2.48	100.9	1.83	-	82	-0.084	6.74	0.15
168	26.280	0.159	2.47	101	1.82	-	82	-0.084	6.30	0.13
169	26.437	0.157	2.47	101	1.72	-	81	-0.088	8.70	0.11
170	26.596	0.159	2.48	101.1	2.06	101	81	-0.089	9.22	0.09
171	26.753	0.157	2.47	101	2.1	-	81	-0.094	8.47	0.09
172	26.913	0.160	2.47	101	2.13	-	82	-0.090	10.98	0.04
173	27.070	0.157	2.47	101	2.11	-	82	-0.088	10.41	0.05
174	27.229	0.159	2.47	101.1	2.09	-	82	-0.093	9.89	0.05
175	27.387	0.158	2.47	101.1	2.05	-	82	-0.087	8.22	0.09
176	27.544	0.157	2.47	101.2	2.02	-	82	-0.083	6.43	0.12
177	27.704	0.160	2.48	101.2	1.64	-	82	-0.085	6.60	0.12
178	27.862	0.158	2.47	101.2	1.96	-	82	-0.084	6.43	0.11
179	28.021	0.159	2.47	101.2	2.14	-	82	-0.083	6.67	0.11
180	28.179	0.158	2.47	101.2	2.1	99	82	-0.084	6.93	0.10
181	28.336	0.157	2.47	101.3	1.79	-	82	-0.088	8.37	0.08
182	28.496	0.160	2.47	101.2	1.79	-	82	-0.084	8.40	0.08
183	28.652	0.156	2.47	101.2	2.13	-	82	-0.082	7.81	0.12
184	28.812	0.160	2.47	101.3	1.63	-	82	-0.084	8.02	0.08
185	28.971	0.159	2.47	101.3	2.05	-	82	-0.080	7.22	0.07
186	29.128	0.157	2.47	101.3	1.9	-	82	-0.080	7.39	0.06
187	29.288	0.160	2.48	101.4	1.81	-	82	-0.082	7.76	0.07
188	29.444	0.156	2.46	101.3	2.13	-	82	-0.079	7.09	0.09
189	29.604	0.160	2.47	101.3	1.65	-	82	-0.080	9.17	0.07
190	29.762	0.158	2.47	101.4	2.1	99	82	-0.085	9.48	0.08
191	29.919	0.157	2.47	101.4	1.67	-	82	-0.083	8.99	0.07

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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	30.080	0.161	2.47	101.5	1.83	-	82	-0.083	7.89	0.09
193	30.235	0.155	2.47	101.4	2.14	-	82	-0.083	8.56	0.07
194	30.395	0.160	2.47	101.4	1.69	-	81	-0.082	9.18	0.11
195	30.554	0.159	2.47	101.4	1.68	-	81	-0.078	7.98	0.10
196	30.710	0.156	2.47	101.4	1.66	-	81	-0.090	9.51	0.05
197	30.872	0.162	2.47	101.5	1.79	-	81	-0.089	13.18	0.05
198	31.027	0.155	2.47	101.5	1.79	-	81	-0.088	12.43	0.03
199	31.187	0.160	2.46	101.4	2.1	-	81	-0.085	9.19	0.07
200	31.345	0.158	2.47	101.5	1.7	99	82	-0.083	8.53	0.06
201	31.501	0.156	2.46	101.5	1.87	-	82	-0.085	8.03	0.10
202	31.662	0.161	2.46	101.6	1.81	-	81	-0.079	8.27	0.05
203	31.817	0.155	2.46	101.6	1.7	-	81	-0.080	7.60	0.07
204	31.977	0.160	2.46	101.6	1.68	-	81	-0.081	6.57	0.08
205	32.137	0.160	2.46	101.7	2.05	-	81	-0.076	6.81	0.06
206	32.292	0.155	2.46	101.6	1.85	-	81	-0.087	6.79	0.10
207	32.453	0.161	2.46	101.6	2.01	-	81	-0.082	9.76	0.09
208	32.608	0.155	2.46	101.7	1.72	-	81	-0.082	7.69	0.09
209	32.768	0.160	2.46	101.7	1.65	-	81	-0.079	6.38	0.11
210	32.927	0.159	2.46	101.7	2.15	99	81	-0.079	6.82	0.09
211	33.084	0.157	2.46	101.8	1.65	-	81	-0.083	6.50	0.09
212	33.244	0.160	2.46	101.7	2.01	-	81	-0.081	7.35	0.10
213	33.400	0.156	2.47	101.8	1.75	-	81	-0.076	7.92	0.11
214	33.559	0.159	2.46	101.7	1.81	-	81	-0.078	8.26	0.09
215	33.718	0.159	2.45	101.8	1.76	-	81	-0.081	7.68	0.10
216	33.875	0.157	2.46	101.8	1.63	-	81	-0.079	7.39	0.10
217	34.035	0.160	2.46	101.8	2.01	-	82	-0.080	9.31	0.06
218	34.192	0.157	2.46	101.8	1.68	-	82	-0.080	8.53	0.07
219	34.350	0.158	2.46	101.8	2.02	-	82	-0.075	7.84	0.11
220	34.509	0.159	2.46	101.8	1.84	100	82	-0.076	7.37	0.11
221	34.666	0.157	2.46	101.9	1.82	-	81	-0.076	6.07	0.11
222	34.825	0.159	2.46	101.9	2.13	-	81	-0.078	6.99	0.07
223	34.982	0.157	2.46	101.9	2.01	-	81	-0.077	6.99	0.11

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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 (%)
224	35.142	0.160	2.46	101.9	1.83	-	81	-0.082	6.00	0.11
225	35.299	0.157	2.46	101.8	1.74	-	81	-0.079	7.89	0.11
226	35.457	0.158	2.46	101.9	1.67	-	81	-0.080	7.38	0.11
227	35.616	0.159	2.45	101.9	1.7	-	81	-0.078	7.71	0.09
228	35.773	0.157	2.45	102	1.71	-	81	-0.078	8.03	0.08
229	35.932	0.159	2.46	101.9	2.07	-	81	-0.081	6.69	0.10
230	36.090	0.158	2.46	102	2.14	100	81	-0.081	8.19	0.07
231	36.249	0.159	2.46	102	1.66	-	81	-0.081	6.78	0.13
232	36.407	0.158	2.46	102	1.83	-	81	-0.073	6.27	0.10
233	36.564	0.157	2.45	102	1.71	-	81	-0.082	6.76	0.09
234	36.724	0.160	2.46	102	1.65	-	81	-0.084	8.10	0.10
235	36.880	0.156	2.45	102	2.12	-	81	-0.084	7.61	0.11
236	37.040	0.160	2.45	102	1.76	-	81	-0.081	7.40	0.08
237	37.198	0.158	2.47	102	1.96	-	81	-0.082	8.39	0.08
238	37.355	0.157	2.46	102	1.89	-	81	-0.078	7.74	0.10
239	37.516	0.161	2.45	102	1.68	-	81	-0.080	7.01	0.08
240	37.671	0.155	2.45	102	1.89	99	81	-0.077	7.24	0.07
241	37.831	0.160	2.46	102.1	2.04	-	81	-0.081	8.29	0.07
242	37.989	0.158	2.46	102	2.12	-	81	-0.079	7.80	0.10
243	38.145	0.156	2.46	102.1	1.75	-	81	-0.077	7.56	0.09
244	38.307	0.162	2.46	102	2.13	-	81	-0.082	7.36	0.07
245	38.462	0.155	2.46	102	1.66	-	81	-0.083	7.68	0.10
246	38.622	0.160	2.46	102.1	2.13	-	82	-0.077	7.85	0.07
247	38.780	0.158	2.46	102.1	1.78	-	82	-0.077	6.69	0.12
248	38.936	0.156	2.45	102.1	1.97	-	82	-0.076	6.54	0.14
249	39.097	0.161	2.45	102.1	2.12	-	81	-0.083	7.31	0.08
250	39.252	0.155	2.45	102.1	1.73	99	82	-0.082	7.36	0.08
251	39.412	0.160	2.45	102.1	1.65	-	82	-0.081	9.45	0.08
252	39.571	0.159	2.46	102.2	2.02	-	82	-0.081	7.75	0.09
253	39.727	0.156	2.45	102.2	1.68	-	81	-0.077	6.66	0.14
254	39.888	0.161	2.45	102.1	2.12	-	81	-0.080	7.93	0.07
255	40.043	0.155	2.46	102.2	1.82	-	81	-0.082	6.79	0.14

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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 (%)
256	40.202	0.159	2.44	102.1	1.84	-	81	-0.081	8.02	0.10
257	40.361	0.159	2.45	102.2	1.71	-	81	-0.075	7.15	0.12
258	40.517	0.156	2.45	102.2	1.7	-	81	-0.075	6.93	0.13
259	40.677	0.160	2.45	102.2	1.74	-	81	-0.083	7.11	0.15
260	40.834	0.157	2.45	102.2	1.99	99	81	-0.081	9.24	0.09
261	40.992	0.158	2.46	102.2	1.92	-	81	-0.081	8.44	0.11
262	41.150	0.158	2.46	102.2	1.93	-	81	-0.077	7.68	0.10
263	41.307	0.157	2.46	102.2	1.9	-	81	-0.081	8.52	0.06
264	41.466	0.159	2.45	102.3	1.73	-	82	-0.082	8.11	0.06
265	41.623	0.157	2.44	102.3	2.04	-	82	-0.078	7.32	0.12
266	41.783	0.160	2.46	102.2	1.84	-	81	-0.080	7.16	0.09
267	41.940	0.157	2.45	102.3	1.86	-	82	-0.078	6.54	0.08
268	42.099	0.159	2.45	102.2	1.7	-	82	-0.073	6.76	0.06
269	42.257	0.158	2.45	102.3	1.8	-	81	-0.074	6.91	0.09
270	42.414	0.157	2.45	102.3	1.86	98	81	-0.074	6.20	0.07
271	42.573	0.159	2.46	102.2	1.77	-	81	-0.071	5.27	0.07
272	42.729	0.156	2.45	102.3	2.17	-	81	-0.070	5.27	0.07
273	42.889	0.160	2.45	102.3	2.01	-	81	-0.073	7.09	0.09
274	43.048	0.159	2.45	102.3	2.02	-	81	-0.073	7.29	0.13
275	43.204	0.156	2.45	102.3	1.89	-	81	-0.077	7.82	0.10
276	43.365	0.161	2.46	102.3	1.9	-	81	-0.077	7.36	0.10
277	43.520	0.155	2.45	102.4	1.68	-	81	-0.077	7.64	0.08
278	43.680	0.160	2.46	102.4	2.05	-	81	-0.074	6.83	0.17
279	43.838	0.158	2.45	102.4	1.67	-	81	-0.072	6.46	0.14
280	43.994	0.156	2.46	102.4	1.98	100	81	-0.072	6.59	0.09
281	44.156	0.162	2.45	102.4	1.99	-	81	-0.079	7.06	0.10
282	44.311	0.155	2.45	102.4	1.83	-	81	-0.081	8.51	0.13
283	44.470	0.159	2.45	102.4	1.62	-	81	-0.076	7.10	0.10
284	44.629	0.159	2.46	102.4	1.78	-	81	-0.081	9.33	0.05
285	44.785	0.156	2.44	102.4	1.76	-	81	-0.078	8.11	0.08
286	44.946	0.161	2.44	102.5	2.12	-	81	-0.080	7.27	0.09
287	45.101	0.155	2.45	102.5	2.16	-	81	-0.077	6.88	0.11

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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 (%)
288	45.261	0.160	2.45	102.5	1.83	-	81	-0.073	6.54	0.11
289	45.420	0.159	2.45	102.5	1.72	-	81	-0.071	5.76	0.10
290	45.576	0.156	2.45	102.6	1.65	101	81	-0.068	4.55	0.24
291	45.736	0.160	2.45	102.5	2.05	-	81	-0.072	6.88	0.12
292	45.892	0.156	2.45	102.5	1.99	-	81	-0.075	6.02	0.17
293	46.050	0.158	2.44	102.5	1.66	-	81	-0.081	8.38	0.08
294	46.209	0.159	2.45	102.5	1.73	-	81	-0.082	9.22	0.12
295	46.366	0.157	2.44	102.6	2.01	-	82	-0.087	8.56	0.08
296	46.526	0.160	2.44	102.5	2.11	-	82	-0.077	8.38	0.07
297	46.682	0.156	2.45	102.5	1.64	-	82	-0.073	6.04	0.11
298	46.841	0.159	2.45	102.6	2.07	-	82	-0.075	6.64	0.12
299	46.999	0.158	2.45	102.7	1.81	-	82	-0.079	6.43	0.13
300	47.156	0.157	2.45	102.7	1.62	99	82	-0.073	6.54	0.13
301	47.315	0.159	2.45	102.6	1.92	-	82	-0.080	7.81	0.11
302	47.472	0.157	2.44	102.6	1.95	-	82	-0.077	7.48	0.13
303	47.632	0.160	2.45	102.7	1.8	-	81	-0.078	7.21	0.12
304	47.789	0.157	2.44	102.7	1.62	-	82	-0.079	6.86	0.10
305	47.948	0.159	2.45	102.7	2.18	-	82	-0.077	7.17	0.09
306	48.106	0.158	2.45	102.7	1.63	-	81	-0.074	7.29	0.15
307	48.263	0.157	2.44	102.8	2.16	-	81	-0.073	7.36	0.13
308	48.422	0.159	2.45	102.8	2.16	-	81	-0.072	7.34	0.09
309	48.578	0.156	2.44	102.7	1.64	-	81	-0.071	7.06	0.11
310	48.738	0.160	2.44	102.8	2.15	99	82	-0.077	7.74	0.09
311	48.896	0.158	2.45	102.8	2.18	-	81	-0.081	7.09	0.10
312	49.053	0.157	2.44	102.7	1.71	-	82	-0.083	7.73	0.09
313	49.214	0.161	2.45	102.7	1.71	-	82	-0.081	7.53	0.09
314	49.368	0.154	2.45	102.8	1.69	-	82	-0.078	8.73	0.07
315	49.528	0.160	2.44	102.8	1.98	-	82	-0.079	8.74	0.10
316	49.686	0.158	2.45	102.8	1.99	-	82	-0.078	6.92	0.13
317	49.842	0.156	2.44	102.8	1.98	-	82	-0.077	7.11	0.09
318	50.003	0.161	2.43	103	1.8	-	82	-0.077	6.70	0.09
319	50.158	0.155	2.45	102.9	1.82	-	82	-0.073	6.71	0.13

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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 (%)
320	50.318	0.160	2.44	102.9	1.65	99	82	-0.072	6.27	0.13
321	50.477	0.159	2.44	103	2.05	-	82	-0.073	5.84	0.11
322	50.632	0.155	2.45	103	2.07	-	82	-0.070	5.85	0.13
323	50.793	0.161	2.44	103	2.15	-	82	-0.075	5.92	0.14
324	50.948	0.155	2.44	103	1.77	-	82	-0.077	6.14	0.08
325	51.107	0.159	2.44	103	2.18	-	82	-0.074	6.01	0.09
326	51.266	0.159	2.43	102.9	1.91	-	81	-0.076	7.57	0.09
327	51.422	0.156	2.44	103	2.13	-	81	-0.077	6.66	0.15
328	51.583	0.161	2.44	102.9	1.71	-	81	-0.079	6.95	0.19
329	51.739	0.156	2.44	103	1.98	-	81	-0.082	9.14	0.07
330	51.897	0.158	2.44	102.9	2.03	99	82	-0.078	8.54	0.10
331	52.055	0.158	2.44	103	2.05	-	82	-0.076	7.16	0.10
332	52.213	0.158	2.44	103	2.08	-	82	-0.076	6.08	0.12
333	52.371	0.158	2.44	103	1.71	-	82	-0.083	8.46	0.07
334	52.528	0.157	2.44	103	1.93	-	82	-0.080	7.46	0.16
335	52.687	0.159	2.44	102.9	2	-	82	-0.078	6.83	0.16
336	52.844	0.157	2.44	103	2.11	-	82	-0.075	7.06	0.10
337	53.003	0.159	2.44	103	1.7	-	82	-0.073	6.92	0.12
338	53.161	0.158	2.44	103.1	1.81	-	82	-0.073	6.79	0.13
339	53.317	0.156	2.44	103.1	1.7	-	82	-0.072	6.16	0.10
340	53.478	0.161	2.44	103.1	1.99	98	82	-0.071	6.25	0.10
341	53.633	0.155	2.43	103.1	1.96	-	82	-0.078	7.81	0.11
342	53.792	0.159	2.44	103	2.16	-	82	-0.079	8.76	0.07
343	53.950	0.158	2.44	103.1	1.85	-	82	-0.075	7.26	0.12
344	54.106	0.156	2.44	103	2.09	-	82	-0.072	6.01	0.10
345	54.267	0.161	2.44	103.1	1.66	-	82	-0.068	5.44	0.09
346	54.423	0.156	2.44	103.1	1.68	-	82	-0.068	5.28	0.10
347	54.582	0.159	2.44	103.2	1.86	-	82	-0.071	5.29	0.08
348	54.741	0.159	2.44	103.1	2.12	-	82	-0.072	6.72	0.15
349	54.896	0.155	2.44	103.1	2.04	-	82	-0.071	5.97	0.18
350	55.057	0.161	2.44	103.1	1.91	97	82	-0.072	5.83	0.15
351	55.212	0.155	2.44	103	1.98	-	82	-0.075	6.43	0.10

BOX B TEST DATA - ASTM E2779 / ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

	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 (%)
352	55.371	0.159	2.44	103.1	1.65	-	82	-0.072	7.10	0.10
353	55.530	0.159	2.44	103.2	1.94	-	82	-0.070	6.52	0.12
354	55.687	0.157	2.44	103.2	1.95	-	82	-0.076	6.62	0.14
355	55.847	0.160	2.43	103.2	1.96	-	82	-0.075	7.47	0.08
356	56.003	0.156	2.44	103.3	1.68	-	82	-0.074	7.08	0.09
357	56.161	0.158	2.44	103.3	1.82	-	82	-0.070	6.02	0.11
358	56.320	0.159	2.44	103.3	2.08	-	82	-0.072	7.21	0.09
359	56.477	0.157	2.44	103.3	2.15	-	82	-0.070	7.42	0.12
360	56.636	0.159	2.44	103.3	1.76	97	82	-0.072	6.75	0.14
Avg/Tot	56.636	0.157	2.46	98	1.86	100			9.00	0.09

LAB SAMPLE DATA - ASTM E2515

Client: 509 Fabrications
Model: Mini Me
Run #: 2

Job #: 24-265
Tracking #: 212
Technician: AK
Date: 8/14/2024

		Sample ID	Tare, mg	Final, mg	Catch, mg
Filters	**A**	G01129	244.4	245.9	1.5
	B	G01130	244.8	246.4	1.6
	C - 1st Hour	G01131	244.6	245.4	0.8
	Amb	G01132	243.7	243.8	0.1
Probes	**A**	19A	117027.0	117027.0	0.0
	B	19B	117014.1	117014.1	0.0
	C - 1st Hour	19C	114231.9	114232.0	0.1
O-rings	**A**	19A	3586.0	3586.3	0.3
	B	19B	3633.1	3633.2	0.1
	C - 1st Hour	19C	3615.3	3615.3	0.0

Placed in Dessicator on:	8/14/2024

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**	245.9	8/19 9:00	245.9	8/21 14:45				
	B	246.3	8/19 9:00	246.4	8/21 14:45				
	C - 1st Hour	245.4	8/19 9:00	245.4	8/21 14:45				
	Amb	244.0	8/19 9:00	243.8	8/21 14:45				
Probes	**A**	117027.0	8/19 9:00	117027.0	8/21 14:45				
	B	117014.2	8/19 9:00	117014.1	8/21 14:45				
	C - 1st Hour	114232.0	8/19 9:00	114232.0	8/21 14:45				
O-Rings	**A**	3586.5	8/19 9:00	3586.3	8/21 14:45				
	B	3633.2	8/19 9:00	3633.2	8/21 14:45				
	C - 1st Hour	3615.4	8/19 9:00	3615.3	8/21 14:45				

Train A Aggregate, mg:	**1.8**
Train B Aggregate, mg:	**1.7**
Train C Aggregate, mg:	**0.9**
Ambient Aggregate, mg:	**0.1**

ASTM E2779 Wood Heater Run Sheets

Client: 509 Fabrications Job Number: 24-265 Tracking #: 212
Model: Mini Me Run Number: 2 Test Date: 8/14/24

Pellet Heater Control Settings

High Burn Rate Settings: Fully Open

Medium Burn Rate Settings: Open 1/16”

Low Burn Rate Settings: Fully closed

Preburn Notes

Preburn Start Time: 08:28

Time	Notes
	-None-

Test Notes

Test Burn Start Time: 09:29

Time	Notes
	-None-

Test Burn End Time: 15:29

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 16.98 CO (%): 4.300

Mid Gas CO_2 (%): 10.00 CO (%): 2.500

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	08:56	08:57	08:58	15:39	15:40	15:41
CO_2	0.00	17.06	10.13	-0.01	17.02	10.08
CO	-0.001	4.315	2.522	-0.004	4.309	2.502

Flue Gas Probe Leak Check: Initial: 0 Final: 0

Technician Signature: Date: 8/28/2024

ASTM E2515 - Glass Fiber Filters

	Date:	Time:	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G01125	7/30/24	3:00p	245.4	245.5	–	–		24-265	#1
G01126			245.6	245.5	–	–		↓	↓
G01127			244.2	244.1	–	–			
G01128			245.6	245.6	–	–			
G01129			244.4	244.4	–	–			#2
G01130			244.9	244.8	–	–			↓
G01131			244.8	244.6	–	–			
G01132			243.7	243.7	–	–			
G01133	7/31/24	4:30	245.4	245.3	–	–		24-321	#1
G01134			245.1	245.2	–	–		↓	↓
G01135			244.3	244.2	–	–			
G01136			244.2	244.0	–	–			
G01137			244.0	243.8	–	–			#2
G01138			244.9	244.7	–	–			↓
G01139			244.7	244.7	–	–			
G01140			244.1	243.6				↓	↓

	Date:	Time:	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
G01141									
G01142									
G01143									
G01144									
G01145									
G01146									
G01147									
G01148									
G01149									
G01150									
G01151									
G01152									
G01153									
G01154									
G01155									
G01156									

ASTM E2515 - Probe Samples 11-20

Date:	6/25/24	6/26/24					
Time:	0900	0900					
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
11A	116868.4	116868.6	-	-	A	24-309	#3 4
11B	117342.3	117342.4	-	-	A		
11C	116188.1	116188.2	-	-	A		
12A	116708.9	116708.9	-	-	A	24-309	#3
12B	117775.1	117775.2	-	-	A		
12C	117174.0	117174.1	-	-	A		
13A	117316.6	117316.8	-	-	A	24-309	#5
13B	116943.0	116943.1	-	-	A		
13C	115651.6	115651.4	-	-	A		
14A	116634.9	116635.1	-	-	A	24-330	#1
14B	116620.9	116621.1	-	-	A		
14C	116531.6	116531.6	-	-	A		
15A	117241.5	117241.5	-	-	A	24-330	#2
15B	116754.3	116754.2	-	-	A		
15C	116848.3	116848.3	-	-	A		

Date:	7/30/24	8/1/24	8/2/24	8/3/24			
Time:	3:30 pm	13:30	15:00	13:30			
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
16A	116380.1	116379.9	-	-	A	24-330	#3
16B	115862.7	115862.5	-	-	A		
16C	114148.1	114148.2	-	-	A		
17A	116811.0	116811.2	-	-	A	24-330	#4
17B	117140.9	117141.1	-	-	A		
17C	113141.3	113141.9	113141.4	113141.86	A		
18A	117501.2	117501.0	-	-	A	24-265	#1
18B	117333.1	117333.0	-	-	A		
18C	114335.7	114335.8	-	-	A		
19A	117027.2	117027.0	-	-	A	24-265	#1 2
19B	117014.3	117014.1	-	-	A		
19C	114231.7	114231.9	-	-	A		
20A	115628.3	115627.9	115627.8	-	A	24-321	#1
20B	115967.6	115967.5	-	-	A		
20C	113776.2	113776.1	-	-	A		

ASTM E2515 - O-Ring Samples 11-20

Date:	6/25/24	6/26/24					
Time:	09:00	10:00					
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
11A	3423.6	3423.5	-	-	A	24-309	#3
11B	4233.9	4233.9	-	-	A		
11C	3588.2	3588.3	-	-	A		
12A	3586.0	3585.9	-	-	A	24-309	#4
12B	3550.7	3550.8	-	-	A		
12C	3615.9	3615.9	-	-	A		
13A	3596.4	3596.5	-	-	A	24-309	#5
13B	3642.3	3642.3	-	-	A		
13C	4409.7	4409.7	-	-	A		
14A	3342.7	3342.7	-	-	A	24-330	#1
14B	3367.4	3367.4	-	-	A		
14C	3444.7	3444.7	-	-	A		
15A	3570.0	3570.0	-	-	A	24-330	#2
15B	3571.0	3571.1	-	-	A		
15C	3397.5	3397.5	-	-	N		

Date:	7/30/24	8/1/24					
Time:	3:00 pm	13:00					
	Weight 1	Weight 2	Weigth 3	Weight 4	Initial	Project	Run
16A	3573.0	3573.1	-	-	A	24-330	#3
16B	3638.0	3638.1	-	-	A		
16C	3601.9	3601.9	-	-	A		
17A	3613.0	3612.9	-	-	A	24-330	#4
17B	3569.1	3569.0	-	-	A		
17C	3597.3	3597.2	-	-	A		
18A	3602.8	3602.7	-	-	A	24-265	#1
18B	3546.1	3546.1	-	-	A		
18C	3528.6	3528.5	-	-	A		
19A	3586.2	3586.1	-	-	A	24-265	#2
19B	3633.1	3633.1	-	-	A		
19C	3615.1	3615.3	-	-	A		
20A	3559.0	3558.9	-	-	A	24-321	#1
20B	3614.7	3614.7	-	-	A		
20C	3610.9	3611.0	-	-	A		

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

Analytical Test Report

Report No: USR:W224-0189-01
Issue No: 1

Client: PFS-TECO
11785 SE Hwy 212, Ste 305
Clackamas, OR 97015
Attention: Sebastian Button

PO No:

Signed: Katy Jahr
Katy Jahr
Chemistry Lab Supervisor
Date of Issue: 5/13/2024

Sample Details

Sample Log No:	W224-0189-01	**Sample Date:**	
Sample Designation:	Lignetics Pellets (Mill # 16036)	**Sample Time:**	
Sample Recognized As:	Wood Pellets	**Arrival Date:**	4/26/2024

Test Results

	METHOD	UNITS	MOISTURE FREE	AS RECEIVED
Moisture Total	ASTM E871	wt. %		2.10
Ash	ASTM D1102	wt. %	0.17	0.17
Volatile Matter	ASTM D3175	wt. %	80.51	78.82
Fixed Carbon by Difference	ASTM D3172	wt. %	19.31	18.91
Sulfur	ASTM D4239	wt. %	0.070	0.069
SO_2	Calculated	lb/mmbtu		0.163
Net Cal. Value at Const. Pressure	ISO 1928	GJ/tonne	18.71	18.27
Gross Cal. Value at Const. Vol.	ASTM E711	Btu/lb	8627	8445
Carbon	ASTM D5373	wt. %	49.48	48.44
Hydrogen*	ASTM D5373	wt. %	6.22	6.09
Nitrogen	ASTM D5373	wt. %	< 0.20	< 0.20
Oxygen*	ASTM D3176	wt. %	> 43.86	> 42.94
*Note: As received values do not include hydrogen and oxygen in the total moisture.				
Chlorine	ASTM D6721	mg/kg		
Fluorine	ASTM D3761	mg/kg		
Mercury	ASTM D6722	mg/kg		
Bulk Density	ASTM E873	lbs/ft^3		
Fines (Less than 1/8")	TPT CH-P-06	wt.%		
Durability Index	Kansas State	PDI		
Sample Above 1.50"	TPT CH-P-06	wt.%		
Maximum Length (Single Pellet)	TPT CH-P-06	inch		
Diameter, Range	TPT CH-P-05	inch		to
Diameter, Average	TPT CH-P-05	inch		
Stated Bag Weight	TPT CH-P-01	lbs		
Actual Bag Weight	TPT CH-P-01	lbs		

Comments:

PJLA Testing
Accreditation #60243

Pre-Conditioning Data

Client: 509 Fabrications, Inc
Model: Mini Me Pellet
Date(s): 6/5/2024-6/11/2024

Job #:
Tracking #:
Technician:

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	55	N/A	6/5/2024 40 lbs pellets
1	888	N/A	
2	786	N/A	
3	757	N/A	
4	713	N/A	
5	538	N/A	
6	531	N/A	
7	614	N/A	
8	550	N/A	
9	518	N/A	
10	547	N/A	
11	601	N/A	
12	633	N/A	
13	787	N/A	Cleaned Fire Pot Morning Start '6/6/2024 40 lbs pellets Medium Setting
14	766	N/A	
15	688	N/A	
16	590	N/A	
17	557	N/A	
18	528	N/A	
19	570	N/A	
20	533	N/A	
21	504	N/A	
22	541	N/A	
23	494	N/A	
24	502	N/A	
25	444	N/A	
26	853	N/A	Cleaned Fire Pot Morning Start 6/7/2024 40 lbs pellets Medium Setting
27	771	N/A	
28	658	N/A	
29	580	N/A	
30	576	N/A	
31	515	N/A	
32	565	N/A	
33	540	N/A	
34	748	N/A	Cleaned Fire Pot Morning Start 6/10/2024 30 lbs pellets Medium Setting
35	735	N/A	
36	714	N/A	
37	663	N/A	
38	583	N/A	
39	553	N/A	
40	740	N/A	
41	555	N/A	
42	691	N/A	
43	627	N/A	
44	551	N/A	
45	560	N/A	
46	683	N/A	Cleaned Fire Pot Morning Start 6/11/2024 Medium Setting
47	824	N/A	
48	848	N/A	
49	829	N/A	
50	789	N/A	

Signature/Date: Patrick D. Henderson 6/19/2024

Equations and Sample Calculations – ASTM E2779 & E2515

Client 509 Fabrications
Model: Mini Me
Tracking #: 212
Run: 2

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_{Bdb} – Weight of test fuel burned during test run, dry basis, kg

M_{BSidb} – Weight of test fuel burned during test run segment *i* , dry basis, kg

BR – Average dry burn rate over full integrated test run, kg/hr

BR_{Si} – Average dry burn rate over test run segment *i* , 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 – Average particulate emissions for full integrated test run, g/hr

PM_F – Average particulate emission factor for full integrated test run, g/dry kg of fuel burned

M_{Bdb} – Weight of test fuel burned during test run, dry basis, kg
ASTM E2779 equation (1)

$$M_{Bdb} = (M_{Swb} - M_{Ewb})(100/(100 + FM))$$

Where,

FM = average fuel moisture of test fuel, % dry basis
M_{Swb} = weight of test fuel in hopper at start of test run, wet basis, kg
M_{Ewb} = weight of test fuel in hopper at end of test run, wet basis, kg

Sample Calculation:

FM = 2.15 %
M_{Swb} = 16.5 lbs
M_{Ewb} = 0.0 lbs
0.4536 = Conversion factor from lbs to kg

M_{Bdb} = [(16.5 x 0.4536) - (0.0 x 0.4536)] (100/(100 + 2.145)

M_{Bdb} = **7.34** kg

M_{BSidb} – Weight of test fuel burned during test run segment *i* , dry basis, kg
ASTM E2779 equation (2)

$$M_{BSidb} = (MS_{Siwb} - M_{ESiwb})(100/(100 + FM))$$

Where,

M_{SSiwb} = weight of test fuel in hopper at start of test run segment *i* , wet basis, kg

M_{ESiwb} = weight of test fuel in hopper at end of test run segment *i* , wet basis, kg

Sample Calculation (from medium burn rate segment):

FM = 2.15 %

M_{SSiwb} = 11.9 lbs

M_{ESiwb} = 5.8 lbs

0.4536 = Conversion factor from lbs to kg

M_{BSidb} = [(11.9 x 0.4536) - (5.8 x 0.4536)] (100/(100 + 2)

M_{BSidb} = **2.69** kg

BR – Average dry burn rate over full integrated test run, kg/hr
ASTM E2779 equation (3)

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

Where,

θ = Total length of full integrated test run, min

Sample Calculation:

M_{Bdb} = 7.34 kg
θ = 360 min

$$BR = \frac{60 \times 7.34}{360}$$

BR = **1.22** kg/hr

BR_{Si} – Average dry burn rate over test run segment *i* , kg/hr
ASTM E2779 equation (4)

$$BR_{Si} = \frac{60\ M_{BSidb}}{\theta_{Si}}$$

Where,

θ_{Si} = Total length of test run segment *i* , min

Sample Calculation (from medium burn rate segment):

M_{BSidb} = 2.69 kg

θ = 120 min

$$BR = \frac{60 \times 2.69}{120}$$

BR = **1.34** kg/hr

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

$$V_s = F_p \times K_p \times C_P \times \left(\sqrt{\Delta P}\right)_{avg} \times \sqrt{\frac{T_s}{P_s \times M_s}}$$

Where:

F_p = Adjustment factor for center of tunnel pitot tube placement, Fp = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)

v_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec

v_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec

k_p = Pitot tube constant, 85.49

C_p = Pitot tube coefficient: 0.99, unitless

ΔP* = Velocity pressure in the dilution tunnel, in H_2O

T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)

P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg

P_{bar} = Barometric pressure at test site, in. Hg

P_g = Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)

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

Sample calculation:

$$Fp = \frac{17.94}{20.86} = 0.860$$

$$V_s = 0.860 \times 85.49 \times 0.99 \times 0.310 \times \left(\frac{102.8 + 460}{\left(29.95 + \frac{-0.16}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **18.24** 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)

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

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	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 18.24 \times 0.1963 \times \frac{528}{102.8 + 460} \times \frac{29.95 + \frac{-0.16}{13.6}}{29.92}$$

Q_{sd} = **11860.5** dscf/hr

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

ASTM E2515 equation (6)

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

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:

$$V_{m(std)} = 17.64 \times 57.378 \times 0.996 \times \frac{\left(29.95 + \frac{2.53}{13.6}\right)}{(92.8 + 460)}$$

$V_{m(std)}$ = **54.944** dscf

Using equation for Train B:

$$V_{m(std)} = 17.64 \times 56.636 \times 1.012 \times \frac{\left(29.95 + \frac{2.46}{13.6}\right)}{(97.6 + 460)}$$

$V_{m(std)}$ = **54.624** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 84.75 \times 1.004 \times \frac{\left(29.95 + \frac{0.00}{13.6}\right)}{(73.7 + 460)}$$

$V_{m(std)}$ = **84.214** 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 + 1.5 + 0.3
m_n = **1.8** mg

Using equation for Train B:

m_n = 0.0 + 1.6 + 0.1
m_n = **1.7** mg

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

$$C_s = 0.001 \times \frac{1.8}{54.944}$$

C_s = **0.00003** g/dscf

For Train B:

$$C_s = 0.001 \times \frac{1.7}{54.624}$$

C_s = **0.00003** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.1}{84.214}$$

C_r = **0.000001** 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 = (0.000033 - 0.000001) x 11860.5 x 360 /60

E_T = **2.25** g

For Train B

E_T = (0.000031 - 0.000001) x 11860.5 x 360 /60

E_T = **2.13** g

Average

E = **2.19** g

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

7.5% of the average =	0.16
Train A difference (%) =	**2.7%**
Train B difference (%)=	**2.7%**

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 minute interval of Train A):

$$PR = \left(\frac{360 \times 1.425 \times 18.24 \times (92.8 + 460) \times (\#\#\#\# + 460)}{10 \times 57.378 \times 18.43 \times (102.8 + 460) \times (76.2 + 460)} \right) \times 100$$

PR = **93** %

PM_R – Average particulate emissions for full integrated test run, g/hr
ASTM E2779 equation (5)

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

Where,

E_T = Total particulate emissions, grams

θ = Total length of full integrated test run, min

Sample Calculation:

E_T (Dual train average) = 2.19 g

θ = 360 min

$PM_R = 60 \times (2.19 / 360)$

PM_R = **0.36** g/hr

PM_F – Average particulate emission factor for full integrated test run, g/dry kg of fuel burned
ASTM E2779 equation (6)

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

Where,

E_T = Total particulate emissions, grams

M_{Bdb} = Weight of test fuel burned during test run, dry basis, kg

Sample Calculation:

E_T (Dual train average) = 2.19 g

M_{Bdb} = 7.34 kg

PM_F = 2.19 / 7.34)

PM_F = **0.30** 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: 509 Fabrications
Model: Mini Me
Date: 08/14/24
Run: 2
Control #: 24-265
Test Duration: 360 min

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.

	HHV	LHV
Eff	75.60%	81.02%
Comb Eff	99.50%	99.50%
HT Eff	75.98%	81.42%
Output	18,563	kJ/h
Burn Rate	1.22	kg/h
Grams CO	78	g
Input	24,555	kJ/h
MC wet	2.10	

Ultimate CO_2
$CO_{2\text{-ult}}$ 20.28
F_0 1.028

Overall Heating Efficiency:	75.60%	Air Fuel Ratio (A/F)			
Combustion Efficiency:	99.50%	Dry Molecular Weight (M_d)	29.90		
Heat Transfer Efficiency:	75.98%	Dry Moles Exhaust Gas (N_d):	467.58	%HC	
		Air Fuel Ratio (A/F)	13.47	0.8	

Heat Output:	17,609	Btu/h	18,563	kJ/h
Heat Input:	23,293	Btu/h	24,555	kJ/h
Burn Duration:	6.00	h		
Burn Rate:	2.70	lb/h	1.224	kg/h
Stack Temp:	470.5	Deg. F	243.6	Deg. C

Averages	0.09	9.00	1.40	20.64	11.60	243.76	23.18	99.5%	76.1%	75.7%	14.15	2.98	60.26	2.94	59.97	147418	4.12
INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry		
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	Consumed x	Now Wt_{dn}	Comsumed y	Total Input	Carbon /12= [a]
0	7.50	0.09	9.33	115.2%	20.63	11.26	302.5	21.7	99.5%	72.3%	72.0%	12.7	7.50	0.00	7.35	0.00	0	4.12
1	7.48	0.05	11.91	69.5%	20.55	8.61	316.4	21.7	99.8%	75.4%	75.3%	10.0	7.48	0.36	7.32	0.36	1024	4.12
2	7.43	0.03	14.11	43.5%	20.48	6.36	339.1	21.5	100.0%	76.5%	76.5%	8.5	7.43	1.03	7.27	1.03	713	4.12
3	7.40	0.04	13.59	48.8%	20.50	6.89	343.3	21.4	99.9%	75.8%	75.7%	8.8	7.40	1.33	7.25	1.33	624	4.12
4	7.36	0.04	13.38	51.2%	20.50	7.11	350.7	21.6	99.9%	75.1%	75.1%	8.9	7.36	1.87	7.21	1.87	802	4.12
5	7.32	0.04	12.50	61.8%	20.53	8.02	342.4	21.5	99.9%	74.6%	74.5%	9.6	7.32	2.42	7.17	2.42	757	4.12
6	7.29	0.08	11.74	71.7%	20.56	8.78	333.8	21.4	99.7%	74.1%	73.8%	10.1	7.29	2.90	7.13	2.90	757	4.12
7	7.25	0.03	16.10	25.8%	20.42	4.31	346.4	21.4	99.9%	77.9%	77.8%	7.4	7.25	3.45	7.09	3.45	668	4.12
8	7.22	0.02	17.61	15.0%	20.37	2.75	347.0	21.5	99.9%	78.9%	78.9%	6.8	7.22	3.81	7.07	3.81	579	4.12
9	7.19	0.04	15.47	30.7%	20.44	4.94	336.4	21.5	99.9%	77.9%	77.8%	7.7	7.19	4.23	7.04	4.23	802	4.12
10	7.14	0.04	13.74	47.2%	20.49	6.73	342.1	21.6	99.9%	76.0%	75.9%	8.7	7.14	4.90	6.99	4.90	802	4.12
11	7.11	0.02	16.12	25.7%	20.42	4.29	333.4	21.7	100.0%	78.5%	78.5%	7.4	7.11	5.32	6.96	5.32	534	4.12
12	7.08	0.04	12.58	60.7%	20.53	7.93	328.8	21.6	99.9%	75.5%	75.4%	9.5	7.08	5.62	6.93	5.62	624	4.12
13	7.04	0.04	14.60	38.5%	20.46	5.84	328.1	21.8	99.9%	77.6%	77.5%	8.2	7.04	6.17	6.89	6.17	757	4.12
14	7.01	0.05	12.67	59.5%	20.53	7.83	329.7	21.8	99.9%	75.5%	75.4%	9.4	7.01	6.65	6.86	6.65	668	4.12
15	6.97	0.04	12.31	64.3%	20.54	8.21	332.1	21.8	99.9%	75.0%	74.9%	9.7	6.97	7.07	6.83	7.07	624	4.12
16	6.94	0.04	12.54	61.2%	20.53	7.97	330.6	21.7	99.9%	75.3%	75.3%	9.5	6.94	7.50	6.80	7.50	579	4.12
17	6.91	0.02	13.76	47.2%	20.49	6.72	339.1	21.7	100.0%	76.2%	76.2%	8.7	6.91	7.86	6.77	7.86	624	4.12
18	6.88	0.03	12.58	60.8%	20.53	7.93	348.1	21.9	100.0%	74.4%	74.4%	9.5	6.88	8.34	6.73	8.34	713	4.12
19	6.84	0.02	13.60	48.9%	20.50	6.89	351.7	22.0	100.0%	75.3%	75.3%	8.8	6.84	8.83	6.70	8.83	846	4.12
20	6.79	0.04	15.25	32.7%	20.44	5.17	359.3	21.8	99.9%	76.6%	76.5%	7.8	6.79	9.49	6.65	9.49	757	4.12
21	6.76	0.05	10.80	87.0%	20.59	9.76	326.6	21.6	99.9%	73.2%	73.1%	11.0	6.76	9.85	6.62	9.85	624	4.12
22	6.73	0.04	12.03	68.0%	20.55	8.50	324.3	21.8	99.9%	75.1%	75.0%	9.9	6.73	10.34	6.59	10.34	713	4.12
23	6.69	0.05	11.21	80.1%	20.57	9.34	321.4	21.7	99.9%	74.2%	74.1%	10.6	6.69	10.82	6.55	10.82	668	4.12
24	6.66	0.03	11.45	76.6%	20.57	9.10	326.1	21.8	100.0%	74.2%	74.2%	10.4	6.66	11.25	6.52	11.25	624	4.12
25	6.63	0.03	12.22	65.6%	20.54	8.31	339.9	21.9	100.0%	74.4%	74.4%	9.8	6.63	11.67	6.49	11.67	668	4.12
26	6.59	0.03	14.14	43.1%	20.48	6.32	349.7	21.8	100.0%	76.0%	76.0%	8.5	6.59	12.15	6.45	12.15	891	4.12
27	6.54	0.03	13.17	53.7%	20.51	7.33	344.7	22.0	100.0%	75.3%	75.3%	9.1	6.54	12.88	6.40	12.88	713	4.12
28	6.52	0.03	11.71	72.8%	20.56	8.84	341.1	21.9	100.0%	73.6%	73.6%	10.2	6.52	13.12	6.38	13.12	713	4.12
29	6.47	0.04	11.84	70.7%	20.55	8.69	335.7	21.9	99.9%	74.1%	74.1%	10.1	6.47	13.85	6.33	13.85	757	4.12
30	6.44	0.04	11.00	83.7%	20.58	9.56	328.1	21.9	99.9%	73.4%	73.4%	10.8	6.44	14.15	6.31	14.15	668	4.12
31	6.40	0.06	16.56	22.0%	20.40	3.81	347.9	22.0	99.8%	78.2%	78.0%	7.2	6.40	14.75	6.26	14.75	1024	4.12
32	6.34	0.04	16.32	24.0%	20.41	4.07	359.8	22.0	99.9%	77.4%	77.3%	7.3	6.34	15.54	6.21	15.54	802	4.12

Moisture Content M_{Cwb}: 2.1

Combustion Efficiency:	99.50%		Moisture of Wood (wet basis):	2.1	Dry kg : 7.35
Total Input (kJ):	147,328	139,733 (Btu)	Initial Dry Weight Wt_{do} (kg):	7.35	CA: 49
Total Output (kJ):	111,378	105,637 (Btu)	Moisture Content Dry	2.15	HY: 6
Efficiency:	75.60%				OX: 44.13
Total CO (g):	77.94				

Load Weight (kg):	**7.50**				
Fuel Heating	**HHV**	**LHV**		**HHV**	**LHV**
Value in kj/kg - CV:	**20,053**	**18,712**	Btu/lb	**8627.0**	**8050.0**

6.22	2.76	20052.95	2.10	79.31	21.04	2.20	6.86	-0.01	0.22	40.88	59.97	0.45	-0.03	387.80	31.21	1.19	516.91	9162.10	6728.76	6502.33	6438.85
Fuel Properties			**Mw**	**Mass Balance**					**kg Wood per**								**Stack**	**Heat Content Change - Ambient to Stack T**			
Hydrogen	**Oxygen**	**Calorific**	**Moisture**	**(moles/100 mole dry flue gas)**					**100 mole dfp**	**Moles per kg of Dry Wood**						**Moisture**	**Temp**	**Flue Gas Constituent**			
/1= [b]	**/16= [c]**	**Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**	**CO_2**	**O_2**	**CO**	**HC**	**N_2**	**H_2O**	**Present**	**K**	**CO_2**	**O_2**	**CO**	**N_2**
6.22	2.76	20052.95	2.10	79.32	21.04	2.28	7.11	0.00	0.23	40.92	49.37	0.40	-0.02	347.89	31.19	1.19	575.65	11840.43	8621.33	8312.47	8235.28
6.22	2.76	20052.95	2.10	79.42	21.07	2.90	9.03	-0.01	0.29	41.14	29.76	0.18	-0.02	274.38	31.19	1.19	589.59	12487.95	9067.91	8736.73	8656.94
6.22	2.76	20052.95	2.10	79.51	21.09	3.43	10.67	-0.01	0.34	41.24	18.58	0.08	-0.02	232.38	31.19	1.19	612.26	13558.89	9802.46	9433.48	9349.65
6.22	2.76	20052.95	2.10	79.48	21.08	3.30	10.29	-0.01	0.33	41.21	20.88	0.11	-0.02	240.98	31.19	1.19	616.48	13763.07	9942.16	9565.89	9481.32
6.22	2.76	20052.95	2.10	79.48	21.08	3.25	10.12	-0.01	0.32	41.21	21.90	0.11	-0.02	244.85	31.19	1.19	623.82	14103.12	10172.95	9784.14	9698.45
6.22	2.76	20052.95	2.10	79.45	21.07	3.04	9.46	-0.01	0.30	41.19	26.42	0.14	-0.02	261.85	31.20	1.19	615.54	13714.07	9908.36	9533.78	9449.40
6.22	2.76	20052.95	2.10	79.41	21.06	2.86	8.91	0.00	0.29	41.04	30.71	0.27	-0.01	277.70	31.17	1.19	606.98	13313.91	9635.43	9275.31	9192.34
6.22	2.76	20052.95	2.10	79.57	21.11	3.91	12.16	0.00	0.39	41.24	11.03	0.07	-0.01	203.86	31.17	1.19	619.59	13910.73	10042.79	9661.16	9576.08
6.22	2.76	20052.95	2.10	79.62	21.12	4.28	13.30	0.00	0.43	41.25	6.43	0.05	0.00	186.52	31.16	1.19	620.15	13932.90	10057.49	9674.98	9589.84
6.22	2.76	20052.95	2.10	79.54	21.10	3.76	11.70	0.00	0.38	41.19	13.16	0.12	0.00	211.79	31.16	1.19	609.54	13430.24	9714.59	9350.23	9266.86
6.22	2.76	20052.95	2.10	79.49	21.08	3.34	10.40	-0.01	0.33	41.21	20.19	0.11	-0.02	238.40	31.18	1.19	615.26	13696.67	9896.11	9522.07	9437.79
6.22	2.76	20052.95	2.10	79.57	21.11	3.91	12.18	0.00	0.39	41.26	10.97	0.06	-0.01	203.68	31.17	1.19	606.54	13280.26	9611.29	9252.12	9169.35
6.22	2.76	20052.95	2.10	79.45	21.07	3.06	9.53	-0.01	0.31	41.19	25.95	0.14	-0.02	260.10	31.19	1.19	601.93	13067.48	9465.99	9114.47	9032.46
6.22	2.76	20052.95	2.10	79.52	21.09	3.55	11.05	0.00	0.35	41.21	16.49	0.10	-0.01	224.40	31.18	1.19	601.26	13029.81	9439.62	9089.32	9007.48
6.22	2.76	20052.95	2.10	79.45	21.07	3.08	9.60	-0.01	0.31	41.16	25.45	0.16	-0.02	258.15	31.19	1.19	602.87	13105.53	9491.49	9138.51	9056.39
6.22	2.76	20052.95	2.10	79.44	21.07	2.99	9.32	-0.01	0.30	41.21	27.48	0.12	-0.03	265.92	31.20	1.19	605.26	13217.95	9568.46	9211.48	9128.95
6.22	2.76	20052.95	2.10	79.45	21.07	3.05	9.50	-0.01	0.30	41.19	26.16	0.13	-0.02	260.91	31.20	1.19	603.76	13149.46	9521.76	9167.26	9084.97
6.22	2.76	20052.95	2.10	79.50	21.09	3.34	10.40	-0.01	0.33	41.26	20.17	0.07	-0.02	238.44	31.20	1.19	612.26	13550.42	9795.92	9427.08	9343.33
6.22	2.76	20052.95	2.10	79.46	21.08	3.06	9.52	-0.01	0.31	41.24	25.99	0.09	-0.03	260.39	31.21	1.19	621.21	13968.27	10080.21	9696.11	9610.94
6.22	2.76	20052.95	2.10	79.49	21.09	3.30	10.28	-0.01	0.33	41.25	20.91	0.07	-0.02	241.21	31.20	1.19	624.82	14135.95	10193.90	9803.60	9717.88
6.22	2.76	20052.95	2.10	79.54	21.10	3.71	11.53	0.00	0.37	41.21	13.98	0.10	-0.01	214.93	31.17	1.19	632.43	14505.88	10445.71	10041.93	9954.94
6.22	2.76	20052.95	2.10	79.39	21.06	2.63	8.19	-0.01	0.26	41.16	37.20	0.18	-0.03	302.52	31.22	1.19	599.71	12963.12	9394.45	9046.64	8965.01
6.22	2.76	20052.95	2.10	79.43	21.07	2.93	9.11	-0.01	0.29	41.18	29.09	0.15	-0.02	271.95	31.20	1.19	597.48	12852.55	9318.06	8974.03	8892.86
6.22	2.76	20052.95	2.10	79.40	21.06	2.73	8.50	-0.01	0.27	41.16	34.27	0.17	-0.03	291.46	31.21	1.19	594.59	12721.51	9228.46	8889.12	8808.42
6.22	2.76	20052.95	2.10	79.42	21.07	2.78	8.67	-0.01	0.28	41.23	32.74	0.11	-0.03	285.85	31.22	1.19	599.26	12933.80	9373.61	9026.67	8945.21
6.22	2.76	20052.95	2.10	79.44	21.07	2.97	9.25	-0.01	0.30	41.23	28.03	0.10	-0.03	268.05	31.21	1.19	613.09	13583.50	9817.93	9447.77	9363.94
6.22	2.76	20052.95	2.10	79.51	21.09	3.43	10.69	-0.01	0.34	41.24	18.44	0.08	-0.02	231.86	31.19	1.19	622.82	14049.15	10135.65	9748.69	9663.22
6.22	2.76	20052.95	2.10	79.48	21.08	3.20	9.96	-0.01	0.32	41.25	22.97	0.08	-0.02	249.00	31.20	1.19	617.82	13803.04	9967.29	9589.11	9504.53
6.22	2.76	20052.95	2.10	79.43	21.07	2.84	8.86	-0.01	0.28	41.24	31.13	0.10	-0.03	279.79	31.22	1.19	614.26	13636.61	9853.98	9481.87	9397.86
6.22	2.76	20052.95	2.10	79.43	21.07	2.88	8.97	-0.01	0.29	41.19	30.25	0.14	-0.03	276.35	31.21	1.19	608.87	13381.84	9680.00	9317.04	9233.95
6.22	2.76	20052.95	2.10	79.40	21.06	2.68	8.34	-0.01	0.27	41.18	35.81	0.16	-0.03	297.31	31.22	1.19	601.26	13025.58	9436.34	9086.12	9004.32
6.22	2.76	20052.95	2.10	79.57	21.11	4.03	12.53	0.00	0.40	41.14	9.46	0.15	0.01	197.70	31.14	1.19	621.09	13958.75	10073.35	9689.51	9604.40
6.22	2.76	20052.95	2.10	79.57	21.11	3.97	12.34	0.00	0.40	41.20	10.27	0.10	0.00	200.91	31.16	1.19	632.93	14523.47	10457.04	10052.48	9965.47

			SUMS							AVERAGE	SUMS						
9184.27	7768.08	296.33	135380.59	131034.17	47301.75	849306.57	-9404.71	582918.42	22257.52	4872.01	35837.30	624.45	35212.9	111581.0	620.1	77.9	-2.9
emperature		Room Temp	Energy Losses (kJ/kg of Dry Fuel) Flue Gas Constituent							Total Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CH_4	H_2O	K	CO_2	O_2	CO	N_2	CH_4	H_2O Comb	H_2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
12032.04	9924.60	294.82	484.57	425.65	116.23	2865.00	-18.33	1681.13	64.23	5618.49	0.00	0	0.00	0	0	0.00	0.00
12744.57	10429.11	294.82	513.81	269.87	52.41	2375.27	-18.72	1696.92	64.83	4954.38	253.08	2	251.43	771	2	0.26	-0.02
13931.86	11257.31	294.65	559.11	182.16	24.79	2172.69	-15.16	1722.31	65.81	4711.71	167.43	0	167.11	545	0	0.08	-0.01
14159.00	11414.67	294.54	567.15	207.57	32.82	2284.80	-14.90	1727.19	66.00	4870.63	151.44	1	150.91	472	1	0.10	-0.01
14541.35	11673.89	294.76	581.15	222.80	33.37	2374.63	-16.10	1735.42	66.31	4997.59	199.79	1	199.13	602	1	0.13	-0.01
14105.08	11376.49	294.65	564.83	261.76	40.49	2474.37	-19.29	1726.54	65.96	5114.65	193.11	1	192.35	564	1	0.15	-0.01
13658.08	11069.39	294.54	546.46	295.91	78.70	2552.74	-8.77	1715.68	65.59	5246.31	198.08	3	195.53	559	3	0.28	-0.01
14324.14	11527.86	294.54	573.66	110.78	20.99	1952.21	-6.30	1729.66	66.14	4447.15	148.15	0	147.68	520	0	0.07	0.00
14349.80	11544.24	294.65	574.76	64.67	15.77	1788.67	-2.15	1729.67	66.16	4237.54	122.35	0	121.97	457	0	0.04	0.00
13788.45	11158.38	294.65	553.20	127.87	34.25	1962.62	-3.54	1717.81	65.70	4457.90	178.21	1	177.03	623	1	0.13	0.00
14086.49	11362.55	294.76	564.46	199.83	31.58	2250.01	-14.47	1725.51	65.94	4822.86	192.81	1	192.15	609	1	0.12	-0.01
13623.11	11041.73	294.87	547.89	105.44	16.46	1867.62	-8.16	1714.74	65.56	4309.55	114.86	0	114.65	420	0	0.04	0.00
13385.80	10878.17	294.76	538.21	245.67	40.16	2349.31	-18.75	1710.93	65.36	4930.89	153.32	1	152.68	470	1	0.12	-0.01
13345.19	10848.22	294.93	537.00	155.62	29.67	2021.31	-10.11	1708.95	65.33	4507.76	170.20	1	169.49	587	1	0.11	-0.01
13429.27	10906.69	294.93	539.44	241.60	46.51	2337.90	-15.32	1711.40	65.40	4926.92	164.14	1	163.14	504	1	0.15	-0.01
13554.21	10993.42	294.93	544.69	262.94	35.21	2427.58	-23.01	1715.04	65.50	5027.94	156.34	0	155.98	467	0	0.10	-0.01
13477.67	10940.88	294.87	541.68	249.11	38.38	2370.35	-19.81	1713.01	65.44	4958.16	143.15	1	142.64	436	1	0.11	-0.01
13924.08	11249.64	294.87	559.08	197.59	19.30	2227.84	-19.73	1722.63	65.80	4772.51	148.39	0	148.42	475	0	0.06	-0.01
14392.38	11569.23	295.04	576.04	262.02	26.86	2502.55	-24.59	1733.20	66.19	5142.26	182.73	0	182.67	530	0	0.09	-0.02
14581.18	11696.87	295.15	583.15	213.13	21.32	2344.03	-19.90	1736.61	66.34	4944.66	208.66	0	208.61	638	0	0.09	-0.01
14995.53	11979.99	294.98	597.76	146.04	30.09	2139.57	-6.51	1743.78	66.67	4717.40	178.11	1	177.26	579	1	0.11	0.00
13269.98	10797.54	294.76	533.58	349.46	51.19	2712.05	-29.61	1709.73	65.27	5391.66	167.65	1	167.01	456	1	0.15	-0.02
13148.61	10711.18	294.93	529.28	271.10	42.98	2418.41	-21.88	1706.10	65.16	5011.15	178.07	1	177.36	535	1	0.15	-0.01
13002.71	10610.28	294.82	523.61	316.30	50.36	2567.34	-25.89	1703.44	65.04	5200.20	173.24	1	172.47	495	1	0.16	-0.02
13239.08	10773.74	294.98	533.22	306.92	32.58	2557.00	-31.44	1709.21	65.24	5172.74	160.84	0	160.82	463	0	0.10	-0.02
13962.24	11274.17	295.04	560.07	275.17	29.60	2509.99	-26.21	1724.19	65.83	5138.64	171.19	0	171.10	497	0	0.09	-0.02
14482.15	11631.72	294.93	579.37	186.93	23.90	2240.54	-15.36	1734.02	66.26	4815.66	213.91	0	213.55	677	0	0.10	-0.01
14208.33	11442.07	295.15	569.32	228.99	23.83	2366.62	-21.68	1728.88	66.03	4961.99	176.33	0	176.27	536	0	0.08	-0.01
14021.93	11314.67	295.09	562.31	306.77	29.88	2629.40	-30.41	1725.97	65.88	5289.79	187.97	0	188.01	525	0	0.10	-0.02
13737.84	11118.81	295.09	551.22	292.83	40.68	2551.79	-24.52	1719.14	65.65	5196.79	196.21	1	195.64	561	1	0.15	-0.02
13341.31	10844.39	295.04	536.39	337.91	45.94	2677.11	-29.95	1711.23	65.32	5343.95	178.03	0	177.53	490	0	0.15	-0.02
14382.57	11561.35	295.15	574.30	95.34	45.09	1898.78	6.25	1729.17	66.18	4415.10	225.53	3	222.99	799	3	0.22	0.01
15016.65	11992.47	295.15	598.43	107.43	29.60	2002.20	-1.56	1743.56	66.69	4546.34	181.75	1	180.67	620	1	0.11	0.00

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

MISE EN GARDE: CHAUD EN FONCTIONNEMENT NE TOUCHEZ PAS, GARDEZ LES ENFANTS ET LES VÊTEMENTS À L'ÉCART. LE CONTACT PEUT CAUSER DES BRÛLURES DE LA PEAU. GARDER L'AMEUBLEMENT ET AUTRES COMBUSTIBLES MATÉRIEL LOIN DE L'APPAREIL. VOIR PLAQUE NOM ET INSTRUCTIONS.

PFS C US

Report Number: 24-266

UL 1482-2022
CAN/ULC-S627:2023
ASTM E2779, 40CFR60 AAA
Emissions rate 0.36 g/hr
Tested in accordance with ASTM E2779
U.S. ENVIRONMENTAL PROTECTION AGENCY: Certified to comply with 2020 particulate emissions standards.

SERIAL / EN SÉRIE #

Model / Modèle **Mini Me Pellet**

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.

WARNING - NOT SUITABLE FOR MOBILE HOME INSTALLATION

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

DANGER: Risk of electrical shock. Disconnect power supply before servicing.

Replace glass only with 3/16" Neo-Ceram available from your dealer.

Do not overfire - if heater or chimney connector glows, you are overfiring.
OPERATE ONLY WITH DOORS CLOSED

Do **NOT** operate before fully assembling components. **WARNING**: Only use approved fuel listed in owners manual.

Follow cleaning procedures in the manual carefully.

Stove has detachable legs. Never install the stove without legs attached. Refer to owner's manual.

DO NOT OBSTRUCT THE SPACE BENEATH THE HEATER.

PRÉVENTION DES INCENDIES DE MAISON

Installer et n'utiliser qu'en conformité avec du fabricant installation et mode d'emploi. Contact local fonctionnaires de bâtiment ou d'incendie sur les restrictions et inspection des installations dans votre région.
Ne pas obstruer l'espace sous le chauffe-eau.

AVERTISSEMENT -PAS ADAPTÉ À L'INSTALLATION D'UNE MAISON MOBILE

Inspecter et nettoyer la cheminée fréquemment - Sous Certain Conditions d'utilisation, l'accumulation de créosote peut se produire rapidement. Ne pas connecter cette unité à une cheminée desservant une autre appareil.
N'utilisez pas de grille ni de feu surélevé. Faire un feu de bois directement sur foyer.

DANGER: Risque de choc électrique. Déconnecter l'alimentation fournir avant l'entretien. Remplacer la vitre seulement avec 3/16 po de Neo-Ceram disponible de votre revendeur.
Ne pas surchauffer - si le chauffage ou le connecteur de cheminée brille, vous êtes surfait.
FONCTIONNER UNIQUEMENT AVEC LES PORTES FERMÉES

Ne **PAS** utiliser avant d'assembler complètement les composants.
AVERTISSEMENT: N'utilisez que du carburant approuvé répertorié dans les propriétaires manuel.

Suivez les procédures de nettoyage du manuel attentivement.

Le poêle a des pieds amovibles. Ne jamais installer le poêle sans jambes attachées. Reportez-vous au manuel du propriétaire.

NE PAS OBSTRUER L'ESPACE SOUS LE RADIATEUR.

VENT SPECIFICATIONS:

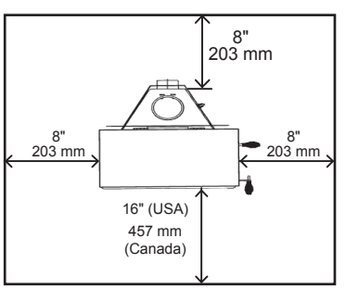
SINGLE WALL: 6 in (6 inches) (152 mm) diameter, minimum 24 MSG black or blued steel connector pipe, with a listed factory-built UL103HT* Class "A" chimney, suitable for use with solid fuels, or a masonry chimney, and the referenced clearances.
DOUBLE WALL: 6 inch (6 inches) (152 mm) diameter, Class "A" chimney, or a masonry chimney and the referenced clearances.

SPÉCIFICATIONS DE VENTILATION:

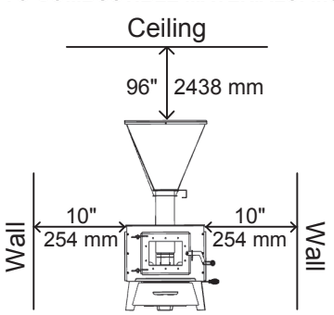
MUR SIMPLE: 6 po (6 po) (152 mm) de diamètre, Tuyau de raccordement en acier au moins 24 MSG noir ou bleui, avec une classe UL103HT * classée en usine, classée "A" cheminée, utilisable avec des combustibles solides, ou une maçonnerie cheminée, et les dégagements référencés.
DOUBLE MUR: 6 pouces (6 pouces) (152 mm) de diamètre, systèmes de ventilation à basse température "A" cheminée, ou une cheminée en maçonnerie et le espaces libres référencés.

FLOOR PROTECTION:
Floor protector must be 1/2 in. minimum non-combustible material extending beneath heater and to front/sides/rear as indicated on the diagram below. Exception: Non-combustible floor protections must extend beneath the flue pipe when installed with horizontal venting and extend 2 inches (51mm) beyond each side.

PROTECTION DE PLANCHER:
Le protecteur de plancher doit être de 1/2 po minimum. matériau non combustible s'étendant sous le réchauffeur et à l'avant / côtés / arrière comme indiqué sur le schéma ci-dessous. Exception: Les protections de plancher incombustibles doivent s'étendre sous le conduit de fumée lorsqu'il est installé avec ventilation horizontale et étendre 2 pouces (51mm) de chaque côté.



MIN CLEARANCES TO COMBUSTIBLE MATERIALS: Inches & (Millimeters)



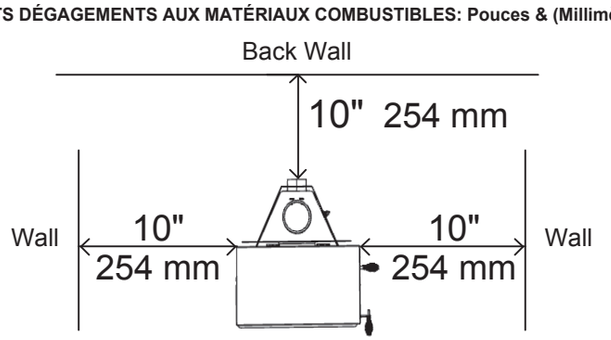
Front View Floor Installation

CAUTION: Hot Parts.

Do Not Operate Unit with Shield Removed.

A non combustible floor protector must be used if mounting the stove on the floor. See Clearances on this decal. Listed factory-built Class "A" chimney, or a masonry chimney. Maximum depth of Alcove shall be no more than 48 inches (1219mm) with a minimum height of 84.0 inches (2134mm) from floor to bottom of ceiling and the referenced clearances.
(**In Canada must comply with Standard CAN/ULC-S629-M87 for the 650°C Factory-built chimney.)

PETITS DÉGAGEMENTS AUX MATÉRIAUX COMBUSTIBLES: Pouces & (Millimètres)



Top View Floor Installation

ATTENTION: Pièces chaudes.

Ne pas utiliser l'unité avec le bouclier retiré.

Un protecteur de sol incombustible doit être utilsé si le poêle est monté sur le sol.
Voir les dégagements sur cet autocollant.
Cheminée de classe «A» construite en usine une cheminée de maçonnerie. La profondeur maximale de l'alcôve ne doit pas dépasser 1219 mm (48 po) avec un minimum de hauteur de 84,0 pouces (2134 mm) du plancher au plafond et des dégagements référencés.
(** Au Canada doit être conforme à la norme CAN / ULC-S629-M87 pour la cheminée de 650°C fabriquée en usine.)

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.

Ce poêle à bois a besoin d'une inspection et d'une réparation périodiques pour fonctionner correctement. Consultez le manuel du propriétaire pour plus d'informations. C'est contre le fédéral règlements pour faire fonctionner ce poêle à bois d'une manière incompatible avec instructions d'utilisation dans le manuel du propriétaire.

Manufactured by:
509 Fabrication, Inc.
dba Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854
509-993-3767
Info@509Fab.com
Developed by Ryan Baker
and Dusty Henderson

2024 ☐ 2025 ☐ 2026 ☐ 2027 ☐ 2028 ☐ 2029 ☐ JAN ☐ FEB ☐ MAR ☐ APR ☐ MAY ☐ JUN ☐ JUL ☐ AUG ☐ SEP ☐ OCT ☐ NOV ☐ DEC ☐

DO NOT REMOVE THIS LABEL / NE PAS ENLEVER CETTE ÉTIQUETTE

FLAME INNOVATION

C US UL 1482-2022 CAN/ULC-S627:2023
ASTM E2779, 40 CFR 60 AAA
Project # 24-266

Mini Me Pellet

Mini Me Pellet Tiny Stove Installation and Operation Manual

Run Number	Date	Segments		Run Time (min)	Heat Output (BTU/hr)	1st Hr Emissions (g/hr)	Integrated Total (g/hr)	CO Emissions (g/min)	Overall CO Emissions (g/min)	Heating Efficiency (%HHV)	Overall Heating Efficiency (%HHV)
		Setting	BR								
2	8/14/2024	OA	1.22	360	17609	1.2	0.36	0.22	0.22	76%	76%
		H	2.07	60	29388			0.17		74%	
		M	1.34	120	19167			0.23		75%	
		L	0.86	180	12567			0.23		77%	

EPA UL / CSA MOBILE HOME APPROVED USA / CANADA

This stove needs to be installed with the correct pipe as tested and listed below. Failure to do so will void the warranty of the stove.

Mini Me Non-Electric, Gravity Fed Pellet Stove w/ 38-40 lb. Hopper and removable pellet adapter. Pellet Feed Shut off Tool.
Brick Fire Pot and Removable Ash Pan.

Manufactured by 509 Fabrications, Inc.
DBA, Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854 USA info@509Fab.com

Proudly Made in the USA Rev. 7.1 03/2025

CAUTION: This unit must be installed in accordance with these instructions and must comply with local building and fire codes. Failure to do so could result in a chimney or house fire. Keep children, furniture, fixtures, and all combustible materials away from any heating appliance. Refer to this owner's manual for all clearances to combustible materials.

This pellet heater needs periodic inspection and repair for proper operation. This pellet 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 pellet heater in a manner inconsistent with the operating instructions in this manual.

Disclaimer: All Pellet stoves burn differently in how they are controlled, Type and BTU content of pellets used, Elevation and height of chimney, etc. Pellets Tested are soft wood pellets with a moisture content of approx. 9% produced consistent burn times of 10 plus hours. Hardwood Pellets were not tested.

It is the consumer's responsibility to ensure the chimney system is safe and in good operating condition***. The manufacturer will not be held responsible for an accident attributed to a unit connected to a faulty chimney system or improper chimney parts.***

WARRANTY

This stove carries a 5-year warranty on the stove body. No warranty on paint, glass, or consumable parts such as bricks and pellet adapter OR AIR PORTS THAT ARE CONSUMABLE. Any shipping damage must be reported immediately upon receiving shipment to ensure replacement or repair from a warranty claim through the shipping company.
Any AND ALL warranty claims must be submitted in writing with pictures to our email info@509fab.com. WE WILL TAKE CARE OF YOU AS SOON AS POSSIBLE BY SENDING REPLACEMENT PARTS OR HAVE YOU PURCHASE PARTS THAT ARE CONSUMABLE, NOT WARRANTY DAMAGED.

IMPROPER INSTALLATION: The manufacturer will not be held responsible for damage caused by the malfunction of a stove due to improper installation, CHIMNEY FIRES OR OVER-FIRING THE STOVE. It is especially important to use only specified Components when installing. Do not use makeshift methods or material which may compromise the installation. Improper Parts used can cause chimney fire and poor stove performance including exposure to carbon Monoxide. 509 Fabrications, Inc. DBA Flame Innovation will not be liable for consequential or indirect damage to property or persons resulting from the use of this product. Consult a professional installer if you have any questions.

SAVE THESE INSTRUCTIONS

ANY AND ALL SAFETY PRECAUTIONS MUST BE TAKEN AT ALL TIMES DURING OPERATION AND MAINTENANCE OF YOUR STOVE. Read this entire manual before you install and use your new room heater. If this heater is not professionally installed, a structure 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.

CAUTION***: Stove is heavy (107 #) In addition, when handling any sheet metal products, be aware that there may be sharp edges or burrs. Although we make every effort to eliminate any sharp edges, please use caution when handling any metal parts. Remember to always allow the stove to completely cool down before performing any maintenance.***

CAUTION: If you have any doubt concerning your ability to complete your installation in a professional-like manner after reading these instructions, you should obtain the services of an installer who is versed in all aspects as to the correct and safe installation. Do not use temporary, makeshift compromises during installation.

Precautionary Statements

Flame Innovation highly recommends the use of ***Smoke Detectors and Carbon Monoxide Detectors*** with any hearth product, including this unit. Follow all manufacturer's instructions when using smoke or Carbon Monoxide detectors. DO NOT INSTALL THIS STOVE IN A SLEEPING ROOM

CAUTION ***ONCE AGAIN PLEASE READ AND FOLLOW.*** If you have any doubt concerning your ability to complete your installation in a professional-like manner after reading these instructions, you should obtain the services of an installer who is versed in all aspects as to the correct and safe installation. Do not use temporary, makeshift components during installation.

WARNING: THINGS TO REMEMBER IN CASE OF A CHIMNEY FIRE: 1. CLOSE DRAFT CONTROL 2. PUT IN THE PELLET STOP TOOL 3. CALL THE FIRE DEPARTMENT

BEFORE INSTALLATION OF YOUR APPLIANCE

HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS.

1. Check with the building inspector's office for compliance with local codes; a permit may be required.
2. A 4" diameter Class A Flue pipe is required for proper performance. 2' to 3' Single wall Stainless Steel pipe can be installed off the top of the stove if you can maintain 12" Clearance to combustibles until the use of Class A HT Insulated pipe is required.
3. Always connect this unit to a chimney and up through and NEVER vent to another room or inside a building.
4. DO NOT connect to any duct work to which another appliance is connected, such as a furnace.
5. DO NOT connect this unit to a Chimney Flue serving another appliance.
6. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
7. The connector pipe and chimney should be inspected periodically and cleaned if necessary.
8. Remember the clearance distances when you place furniture or other objects within the area. (DO NOT store wood, flammable liquids or other combustible materials too close to the unit.)
9. Contact your local fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire. In a chimney fire, turn the air control to a closed position, SLIDE IN THE PELLET SHUTOFF TOOL and CALL THE FIRE DEPARTMENT.
10. DO NOT tamper with the combustion air control beyond normal adjustment.
11. Once the required draw is obtained, operate only with door closed; open feed lid slowly when refueling.
12. Clean the stove glass before lighting the stove.
13. Visit our web site at FlameInnovation.com or email us at Cody@509Fab.com / Dusty@509Fab.com

ALWAYS PROVIDE A SOURCE OF FRESH AIR INTO THE ROOM WHERE THE UNIT IS INSTALLED. FAILURE TO DO SO MAY RESULT IN AIR STARVATION OF OTHER FUEL BURNING APPLIANCES AND THE POSSIBLE DEVELOPMENT OF HAZARDOUS CONDITIONS IN SMALL AREAS.

Note on Outside Air Hookup: The Mini Me Pellet Stove comes with an ash pan with a 3" Fresh air outlet on the rear bottom of the stove. We highly recommend fresh air for tiny spaces. This involves connecting an aluminum flex pipe (usually three inches (3") in diameter from the air inlet pipe located on the back leg and to the ash Pan adapter through your floor or wall. The outside end of this pipe should be covered in some manner (i.e., with a screen) to keep it clear of foreign matter. Be sure to keep it above the snowdrift line and clear of leaves and other debris. It is not recommended to use a screen with openings smaller than: ¼"x ¼" DO **NOT USE A SCREEN SO FINE IT INHIBITS AIR FLOW.**

FLUE SYSTEM

The Mini Me Pellet Stove is designed for use with a 4" Flue System. DO NOT USE BIGGER PIPE. Use a Minimum 24ga. Stainless Steel pipe, up until Minimum 18" from the ceiling, before transitioning to Class A 4" Pipe for 2" Clearance to combustibles around the pipe only, not the stove at any time.

(The black or non-painted single wall connector pipe should be at least 24ga. Stainless Steel and a minimum of 12 inches (12.0") from a combustible wall and eighteen inches (18.0") from ceiling before transitioning to the Class A pipe to go through the wall or ceiling.

MINIMUM OF 7 TO 10 FT OF PIPE WITH AT LEAST ½ BEING INSULATED PIPE IS REQUIRED TO BURN.

It is permissible to use single wall pipe and Class A pipe both if you follow your counties rules and regulations with no single wall pipe penetrating any surface without 18" Clearance to combustibles around it. It is recommended in this situation to convert to Class A pipe at the ceiling box transition.

Canada: A Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a 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.

It is not permissible to connect this unit to a chimney that is servicing another unit.

Flue Size-The proper flue size is determined by measuring the inside diameter of the flue collar on the unit. This stove is equipped with a four-inch (4") TOP EXHAUST FLUE COLLAR. Therefore, the connector pipe should be four inches (4") only and never less in diameter than the collar on the stove. Your unit may require an adapter which will reduce the 4" connector pipe by 1/8". This is necessary to accommodate pipe variation from different manufacturers and maintain a good seal. All Joints should be sealed and checked for leaks.

ALL CHIMNEY PIPES AFTER BURNING AND INSTALLING SHOULD BE CLEANED AND INSPECTED ON A REGULAR BASIS DEPENDING ON HOW MUCH YOU ARE BURNING.

It is the consumer's responsibility to ensure the chimney system is safe and in good operating condition. ***The manufacturer will not be held responsible for an accident attributed to a unit connected to a***

faulty chimney system. Shipping damage must be reported within 10 days of receiving shipment to ensure replacement or repair from a warranty claim through the shipping company.

****IMPROPER INSTALLATION***: The manufacturer will not be held responsible for damage caused by the malfunction of a stove due to improper installation, CHIMNEY FIRES OR OVER-FIRING THE STOVE. It is especially important to use only specified Components when installing. Do not use makeshift methods or material which may compromise the installation. Improper Parts used can cause chimney fire and poor stove performance including exposure to carbon Monoxide. Flame Innovation will not be liable for consequential or indirect damage to property or persons resulting from the use of this product. Consult a professional installer if you have any questions.

INSTALLATION

1. Remove all parts from inside the stove body including touch up paint, fire poker, etc.
2. Select the proper location for the stove. These appliances must not be installed any closer than the minimum clearance to combustibles noted on the decal on the stove.
3. The stove must be installed on a non-combustible surface.
4. If non-combustible materials have been installed on the walls, obtain the minimum clearances from either the manufacturer of these materials or the local building inspector's office.
5. Install the first section of single wall stovepipe INSIDE the Flue collar on the top of the stove, between the stove and the chimney. We recommend sealing with high-temp., 2000-degree stove pipe sealant. Attach mounting screws in holes provided in Flue collar, Or Install the Chimney Pipe Adapter Part into the stove collar and use 4" Class A HT Pipe from stove to chimney cap.
6. Remember to Pre-drill your fastening points even if you are using a self-drilling screw
7. A clearance of 12 inches (12") between the 4" single wall stovepipe and combustible materials is required. A clearance of 2" can be maintained when using the UL approved Class A Insulated pipe. Check with authorities having legal control in your area with any questions and to verify clearances.
8. All the pipe sections ***MUST BE*** connected with the male (crimped single wall pipe) end toward the stove.
9. Fasten the stove pipe to the flue collar using three sheet metal screws. Do the same at each additional joint to make the entire installation rigid.
10. Maintain the required diameter flue for the entire installation according to local rules and regulations.
11. It is not recommended to use 90-degree elbows. If you must go out a side wall, then plan to use 45-degree elbows. One inside and one outside. This will not slow the draft as much as 2 90-degree elbows. 90 Degree elbows will slow the amount of draw, and possibly cause smoke spillage. ***45-degree elbows are preferred***. It is recommended that no more than two 90-degree bends be used in the stovepipe installation if 90-degree elbows are used.
12. An In-Line damper is not required in this installation in the stove pipe above the stove. Remove the damper plate in the chimney or secure it in the OPEN position if you buy a

chimney pipe with a damper inside. FAILURE TO FOLLOW THE MINIMUM CLEARANCE REQUIREMENTS MAY RESULT IN AN UNSAFE INSTALLATION.
13. Single wall flue pipe assemblies must not exceed 12 feet (12') in overall length. Single wall flue pipe assemblies for wall tents, camping, etc. must not exceed 12 feet (12') in overall length and pass through a wall or ceiling without the proper clearances to combustibles (most areas 18") and proper metal box separators to surround the pipe and protect the wall and ceiling. Some cases at higher elevations above 5000 ft (about 1.52 km). may need additional Pipe sections.
14. ALWAYS Check for Leaks
15. Minimum stove pipe required at 2000 ft (about 609.6 m. Elevation) is 7 FT.
Higher elevations require more exhaust pipe lengths to draft correctly.

INSTALLATION Cont'd

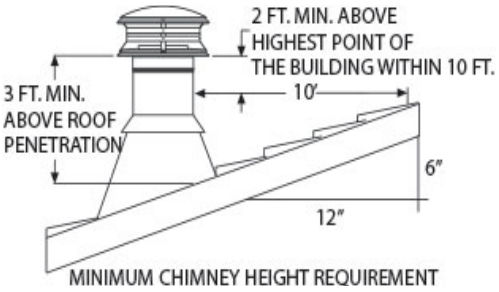
THIS ROOM HEATER MUST BE CONNECTED TO:

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.**
3.) **DO NOT INSTALL IN AN ALCOVE.**
4.) **DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.**
5.) **DO NOT INSTALL IN ANY FIREPLACE.**

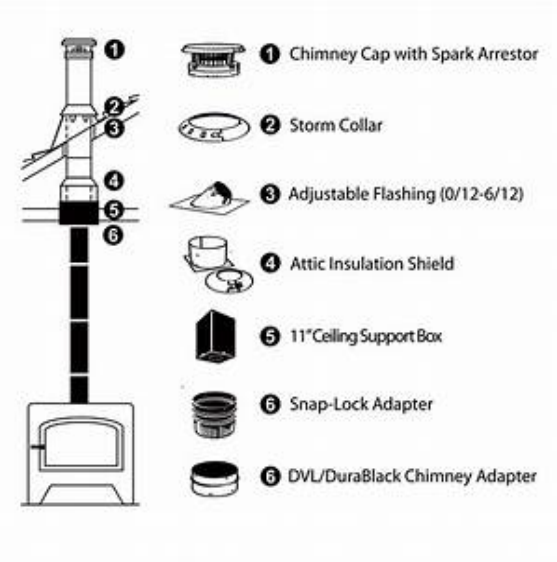
Canada: A Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a wall or partition of combustible construction is desired. The installation shall conform to CAN/CSA-B365. Installation code for Solid-Fuel-Burning Appliances and equipment.

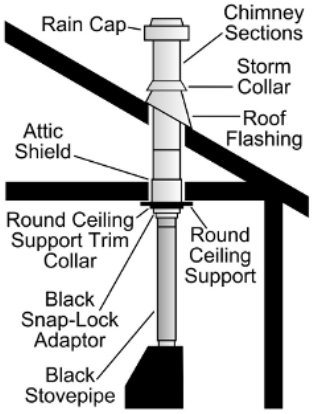
CANADA
Chimney Must be Labeled CAN/ULC-S629 or Code Compliant Chimney or Single Wall Stainless Steel Chimney where Clearance to Combustibles is Met

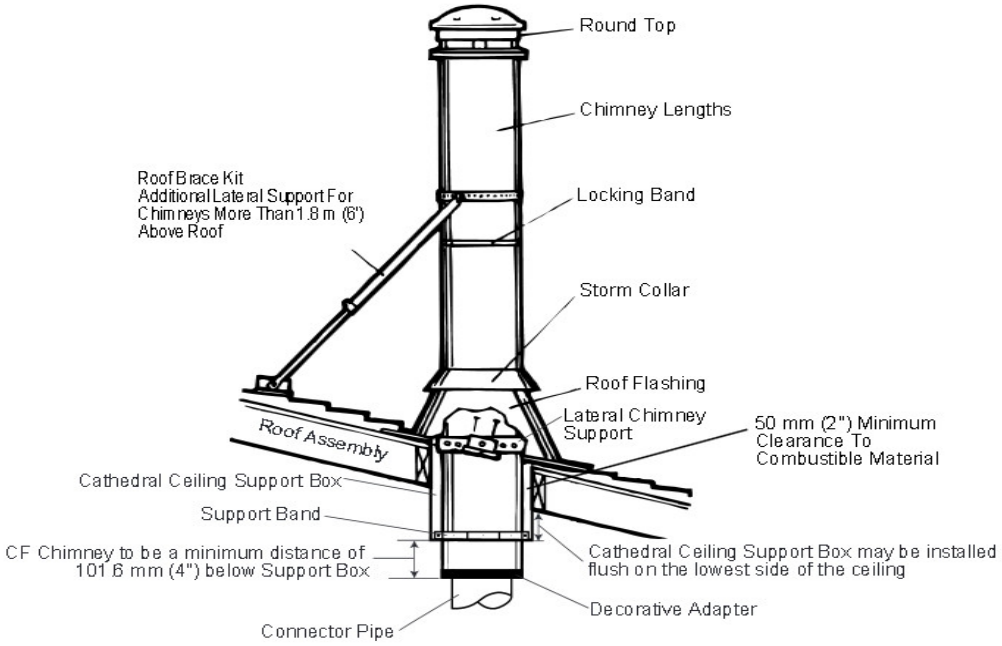
IT IS RECOMMENDED TO USE 4" CLASS A INSULATED STOVE PIPE. OPTIONAL 2 FT SECTION OF SINGLE WALL PIPE CAN BE USED DIRECTLY OFF THE STOVE AS LONG AS THE WALL IS PROTECTED AND CORRECT CLEARANCES CAN BE MAINTAINED.



MINIMUM CHIMNEY HEIGHT REQUIREMENT

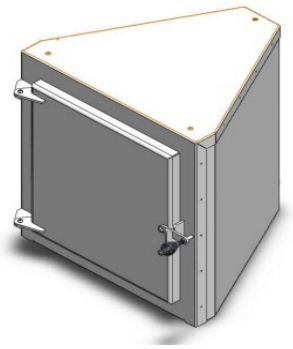






Examples of single wall 4” to Class A 4” Chimney at ceiling

Note: You must Maintain 18” From Ceiling with single wall Pipe and minimum 12” From walls with 1” Air Gap behind Non-Flammable wall boards.



Corner Storage Cabinet / Pedestal

FLOOR AND WALL PROTECTION

1. You will not need any floor protection if your floor is constructed of a non-combustible material such as brick, metal, or concrete. If your floor is constructed with a combustible material such as hardwood, carpet, or linoleum, you must place protection between the stove and the combustible material. There are many floor and wall board manufacturers. The type of board you choose should be U.L. rated and a listed Fiber Board. After examining the area you plan to place your stove and determining it requires a board, the next step is to select the proper size. The stove you choose will determine the size board that is required. The approved protector board should be large enough to provide a minimum of eight inches (8") behind the unit, eight inches (8") on either side and sixteen inches (16") in the front (18" Canada) where the door is located. This stove requires a minimum of 42.0" D x 36.25" W for floor protection.
2. **Installation on a Concrete Floor** An appliance mounted on a concrete floor does not require floor protection. Carpeting and any other combustible material must not cover the Floor Protector. If a combustible surface is applied to the concrete floor, a clearance must be maintained equivalent to the area reserved for the floor protector. Floor Protection Foot-Print Minimum Size 42.0" x 36.25"

Installation on a Combustible Floor If the appliance is to be installed on a combustible floor or a combustible floor covering, it must be installed on a 1" thick non-combustible millboard floor protector or a durable equivalent, with a "R" factor of no less than "2." The pad must be installed beneath the unit, extending 16" (U.S.) on the side equipped with a door, and 8" on all other sides. The pad must cover any horizontal chimney connector flue runs and extend 2" beyond each side.

An R-2 Hearth Pad is Required for Free-Standing Installation

Type 2 – Traditional Hearth Pads

Fully non-combustible, with an R-value of **2.24 or 1.592** (R-value information), it provides protection well above the minimum requirements for Type 2 hearth pads (minimum requirement of R-value=1.0).

Your hearth pad is the layer of material that sits between your stove or fireplace and the floor or subfloor under it. Often made of natural stone tile, ceramic tile, thin set cement

board and other building materials, the hearth pad protects the subfloor from the heat of the fire above it. Its R-value, or thermal resistance, tells you how well it insulates the subfloor. To find the R-value, you need to know what materials the hearth pad is made of and their relative R-values, K-values, or C-values. These other two values measure thermal conductivity.

Look at the edge of the hearth pad, so you can see a cross-section of all its materials. If you have already installed the hearth pad, you might have to remove a decorative tile bevel or some other sort of edging to see the cross-section.

Measure the height in inches of each material used in the hearth pad. For example, if the hearth pad has a layer of cement board on the bottom, a layer of thin set in the middle and a layer of ceramic or stone tile on top, measure the height of each layer.

Consult an R-value chart to determine the R-value of each layer. Hearth manufacturers, insulation manufacturers and utility companies may have these charts on their websites or in their stores or offices.

Add the R-values of all the layers in the hearth pad to find the hearth pad's total R-value.

Measure the thickness of any layers of the hearth pad for which you know the K-value. You do not need to measure the layers for which you know the C-value.

Divide 1 by the K-value of the layer. Multiply the result by the thickness of the layer. This gives you, its R-value. For example, if you have a 1/2-inch layer of a material with a K-value of 0.3, divide 1 by 0.3 to get 3.333, then multiply that by 0.5 to get an R-value of 1.667.

Divide 1 by the C-value of a layer. This gives you the R-value. For example, if you have a layer with a C-value of 1.15, divide 1 by 1.15 to get an R-value of 0.87.

Repeat these calculations for any remaining layers. Add the R-values together to get the total R-value for the hearth pad.

MASONRY CHIMNEY

Ensure that a masonry chimney meets the minimum standards of the National Fire Protection Association (NFPA) by having it inspected by a professional. Make sure there are no cracks, loose mortar or other signs of deterioration and blockage. Have the chimney cleaned before the stove is installed and operated. When connecting the stove through a combustible wall to a masonry chimney, special methods are needed. Refer to Combustible Wall Chimney Connector Pass-Throughs.

MASONRY FIREPLACE

There are listed kits available to connect a stove to a masonry fi replace. The kit is an adapter that is installed at the location of the fi replace damper. The existing damper may have to be removed to allow installation.

METHOD A.

12” (304.8 mm) Clearance to Combustible Wall Member: Using a minimum thickness 3.5” (89 mm) brick and a 5/8” (15.9 mm) minimum wall thickness clay liner, construct a wall pass-through. The clay liner must conform to ASTM C315 (Standard Specification for Clay Fire Linings) or its equivalent. Keep a minimum of 12” (304.8 mm) of brick masonry between the clay liner and wall combustibles. The clay liner shall run from the brick masonry outer surface to the inner surface of the chimney flue liner but not past the inner surface. Firmly grout or cement the clay liner in place to the chimney flue liner.

METHOD B.

9” (228.6 mm) Clearance to Combustible Wall Member: Using a 6” (152.4 mm) inside diameter, listed, factory-built Solid-Pak chimney section with insulation of 1” (25.4 mm) or more, build a wall passthrough with a minimum 9” (228.6 mm) air space between the outer wall of the chimney length and wall combustibles. Use sheet metal supports fastened securely to wall surfaces on all sides, to maintain the 9” (228.6 mm) air space. When fastening supports to chimney length, do not penetrate the chimney liner (the inside wall of the Solid-Pak chimney). The inner end of the Solid-Pak chimney section shall be flush with the inside of the masonry chimney flue, and sealed with a non-water-soluble refractory cement. Use this cement to seal to the brick masonry penetration.

METHOD C.

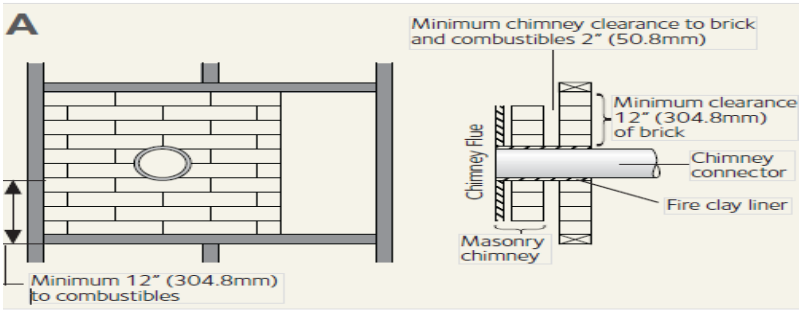
6” (152.4 mm) Clearance to Combustible Wall Member: Starting with a minimum 24 gage (.024” [.61 mm (about 0.02 in)]) 6” (152.4 mm) metal chimney connector, and a minimum 24 gage ventilated wall thimble which has two air channels of 1” (25.4 mm) each, construct a wall pass-through. There shall be a minimum 6” (152.4) mm separation area containing fiberglass insulation, from the outer surface of the wall thimble to wall combustibles. Support the wall thimble, and cover its opening with a 24- gage minimum sheet metal support. Maintain the 6” (152.4 mm) space. There should also be a support sized to fit and hold the metal chimney connector. See that the supports are fastened securely to wall surfaces on all sides. Make sure fasteners used to secure the metal chimney connector does not penetrate chimney flue liner.

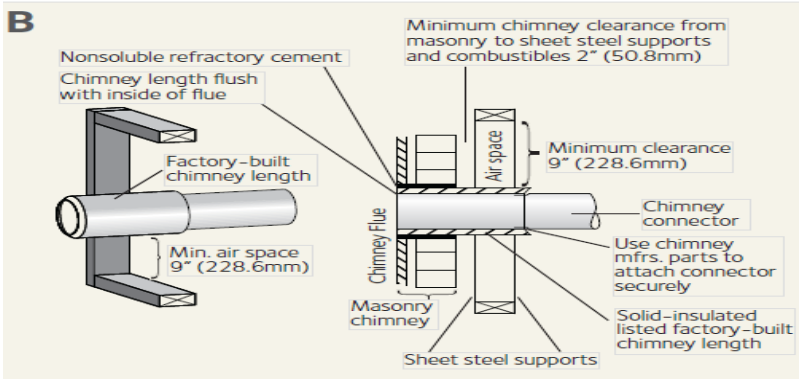
METHOD D.

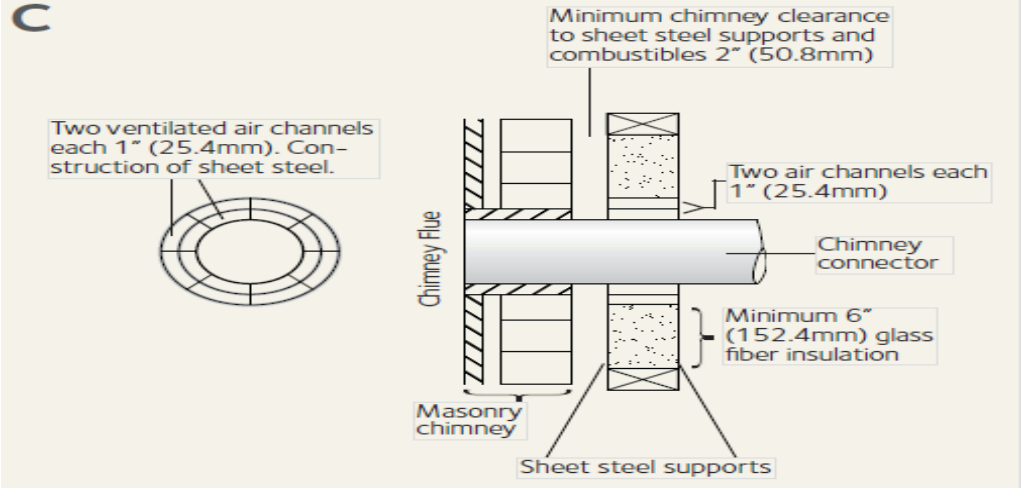
2” (50.8 mm) Clearance to Combustible Wall Member: Start with a solid-pack listed factory-built chimney section at least 12” (304 mm) long, with insulation of 1” (25.4 mm) or more, and an inside diameter of 8” [51 mm (about 2.01 in)] larger than the [152.4 mm (about 6 in)] chimney connector). Use this as a pass-through for a minimum 24-gage single wall steel chimney connector. Keep solid-pack section concentric with and spaced 1” (25.4 mm) off the chimney connector by way of sheet metal support plates at both ends of chimney section. Cover opening with and support chimney section on both sides with 24 ga. minimum sheet metal supports. See that the supports are fastened securely to wall surfaces on all sides. Make sure fasteners used to secure chimney Flue liner.

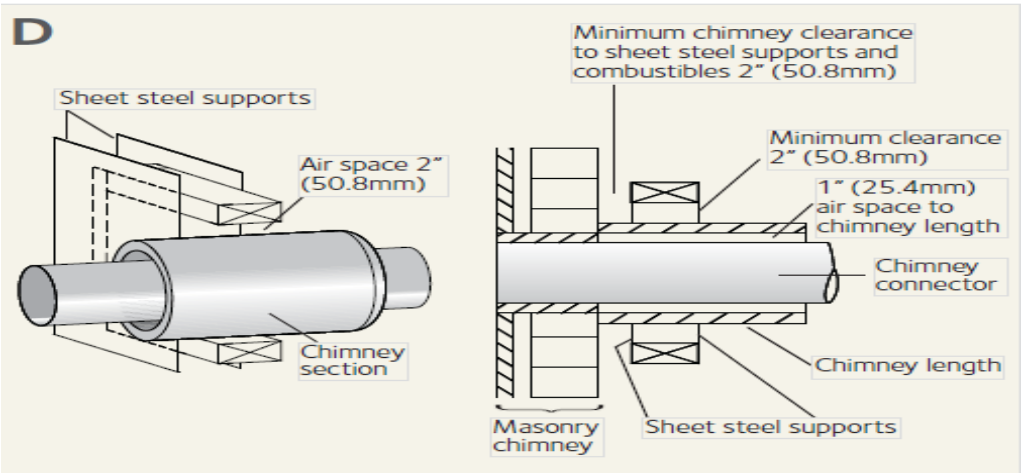
NOTES:

1. Connectors to a masonry chimney, excepting method B, shall extend in one continuous section through the wall pass-through system and the chimney wall, to but not past the inner flue liner face.
    1. A chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling.
    2. **THE Mini Me Pellet Model DOES NOT HAVE A REAR EXHAUST OUTLET, THEREFOR DO NOT INSTALL IN OR UP A BUILT IN FIREPLACE / HEARTH FIREPLACE. DO NOT MOUNT THE STOVE IN FRONT OF A BUILT IN FIREPLACE AND RUN THE CHIMNEY UP THROUGH THE OPENING AT GROUND LEVEL. ONLY INSTALL AS DESCRIBED ABOVE BY A THROUGH WALL PENETRATION TO THE CHIMNEY LINER.**



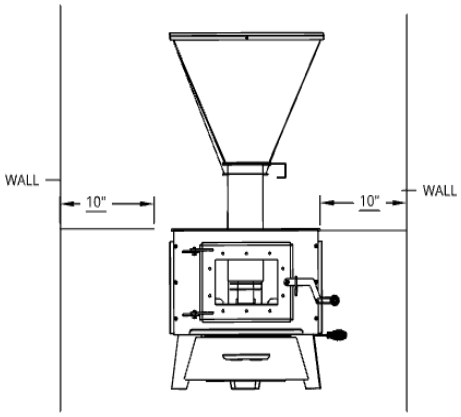


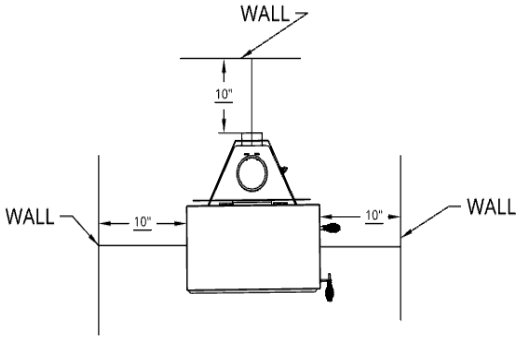


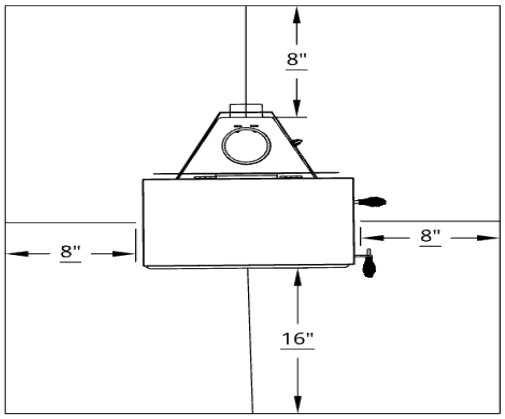


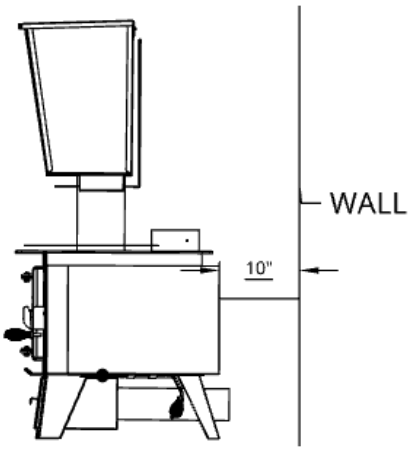
Class A Pipe from 18" before ceiling or wall penetration above 2 ft single wall pipe off stove. Continue use of Class A pipe through ceiling and outside. Wall Exit use 45-degree elbow inside, Class A through wall and 45 class A degree elbow outside and class A Vertical to Chimney Cap.

Clearance to Combustibles USA



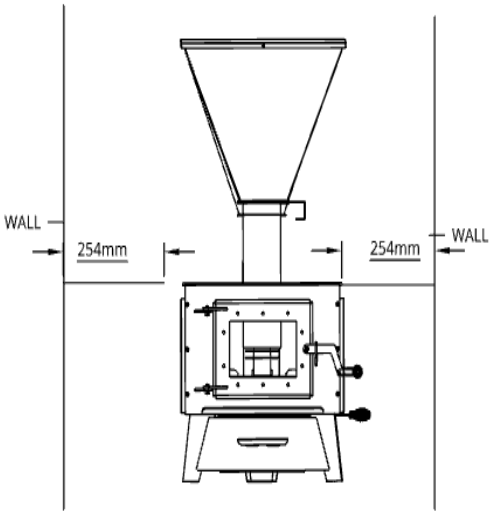


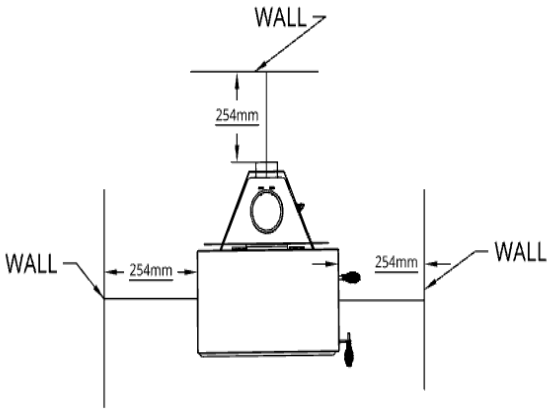


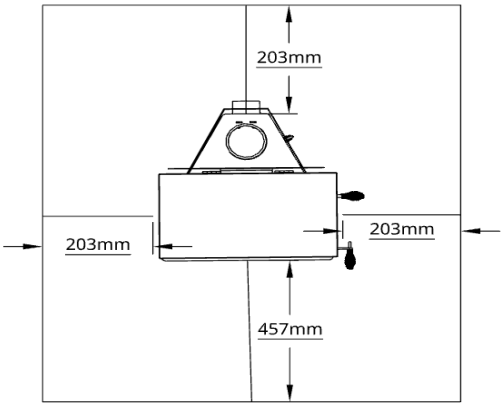


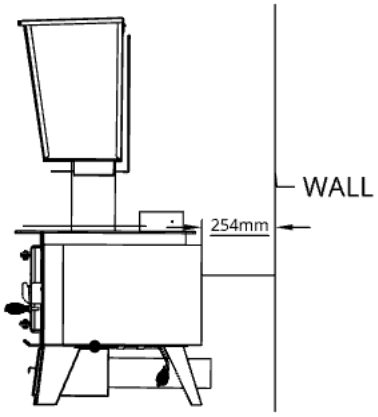
Floor Protection R-2

Clearance To Combustibles Canada









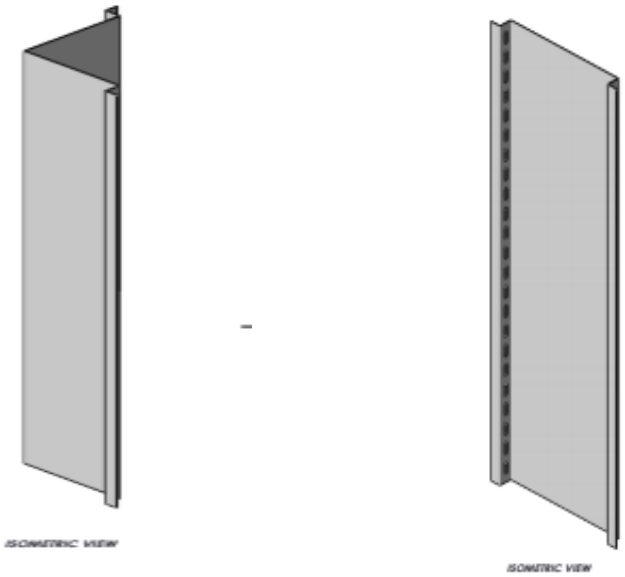
Canada: **To comply with CSA B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment, any combustible covering beneath the appliance and/or within the area extending horizontally at least 450 mm (18 in) beyond the appliance on any side equipped with a door, and at least 200 mm (8 in) beyond the appliance on other sides, shall be protected by a continuous, durable, non-combustible pad that will provide ember protection. The 450 mm (18 in) ember protection required on any side with a door shall extend for the full width of the appliance plus the 200 mm (8 in) required on each side of the appliance without a door. Where an appliance is installed less than 200 mm (8 in) from a wall, the ember pad needs only extend to the base of the wall. An ember pad shall not be placed on top of a carpet unless the pad is structurally supported to prevent displacement and distortion.**

NOTE: Do not install the chimney directly at the outlet of the appliance. A chimney connector (flue pipe) is required unless the appliance is specifically approved for that type of installation.

- **If the stove is installed in a transportable building, the chimney must be removed.**
- **Completely seal all penetrations with high temp. sealant of the chimney and silicone sealant for fresh air holes to maintain continuity of the air barrier system.**

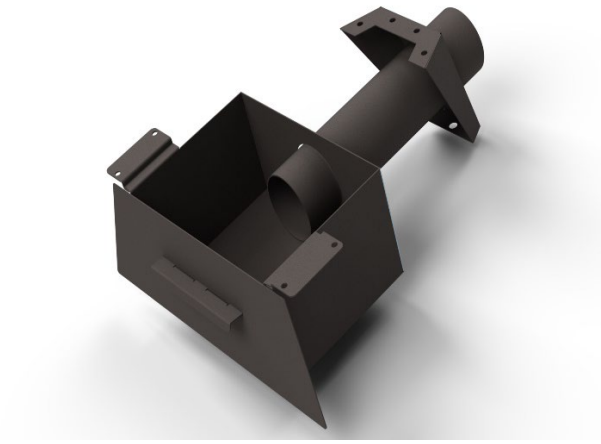
Wall Protection for "Free Standing" Installation

In some areas local codes may require thirty-six inches (36") from a combustible, therefore it is important that you check with local officials. If you need to place your unit closer to a combustible wall, some protection will be necessary. A one-inch (1") air space must be between the board and the wall. If you have a ceiling flue hook-up, you will need protection from the floor to the ceiling if you do not meet the normal clearances. If you have a wall flue hook up, you will need wall protection at least twelve inches (12") above the wall thimble.



Outside Air Connection

The stove can accept a 3-inch aluminum flex tube for outside air under the stove draft. Make sure when connecting the fresh air tube to the outside that you cover the end with a screen of some sort, but not a screen that would restrict air in-flow. Utilize a screen with wider openings. The firepot air inlets are removable to clean the stove, and come standard with a built-in ash pan and fresh air inlet / outlet in the back leg of the stove.

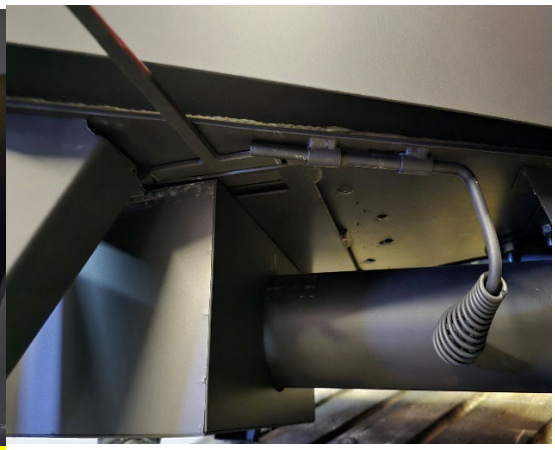


BUILDING A FIRE

To start the fire, make sure the ash is out of the pot by removing the front bricks and pushing the ash to the side or remove air inlets and push ash through the openings with the damper all the way out so it will land in the ash pan below.

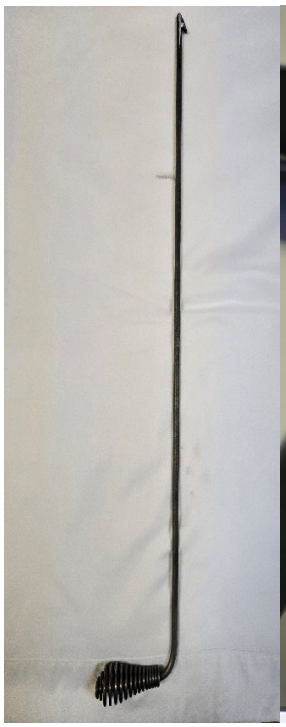
BUILDING A FIRE Cont'd

1.Replace the front bricks and air inlets you removed.
2.Pull the locking handle under stove out and slide towards the front of the stove into the locking position for your damper to set up against to set the EPA Mandated lowest setting on the stove.
3.Pull out damper handle to the second line on the handle (HIGH Setting.)
4.Fill up the hopper with the number of pellets you want to burn.
5.Use breaching tool. (See note)

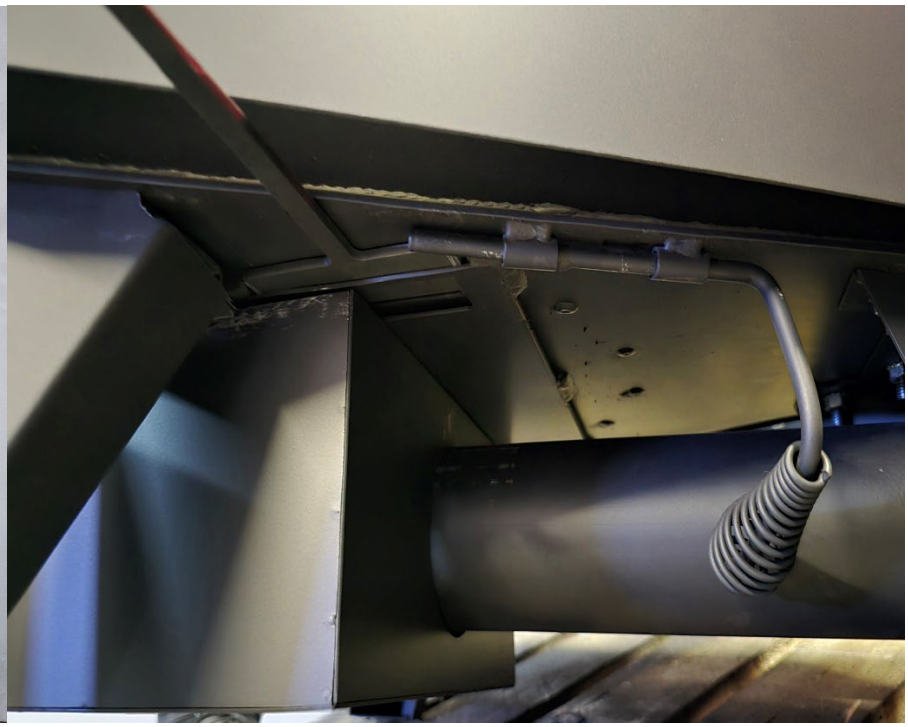


USE PROVIDED PELLET BREACH TOOL WITH THE SPRING END UP. RUN DOWN THROUGH THE PELLETS WITH THE ROD AND INTO THE AREA OF THE PELLET ADAPTER AFTER FILLING TO THE BOTTOM OF THE HOPPER TO ENSURE THAT YOU DID NOT GET A BREACH IN PELLETS BEFORE LIGHTING THE FIRE AND FILLING THE HOPPER WITH DESIRED AMOUNT OF PELLETS YOU WANT TO BURN.

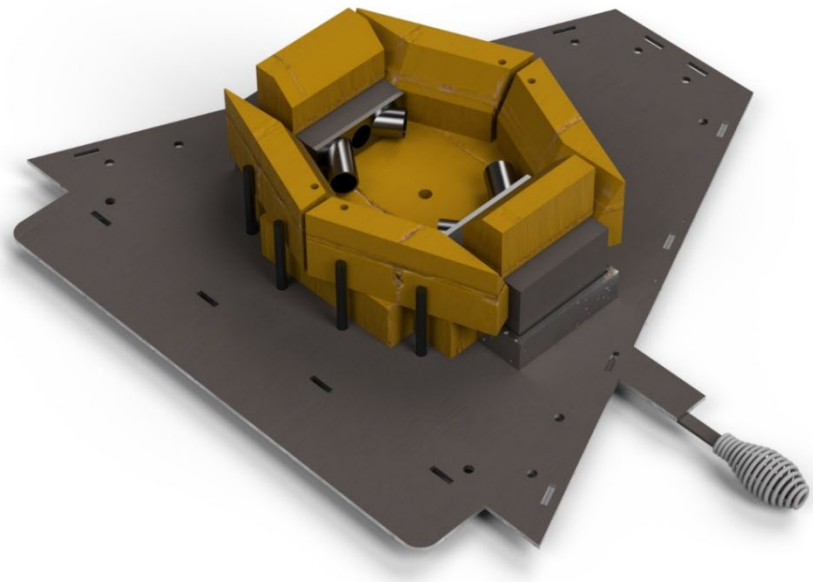
Open the door of the stove and use a propane torch to light the pellets on the left and right and center of the pot moving back and forth. Hold the torch on each section for about 20 to 30 seconds and repeat. Close the door and see if you have a flame. If you do, then the stove will continue to light on its own. If you do not have a flame after closing the door, then repeat the lighting procedure. Make sure to close the door immediately after starting the fire. After a couple of times lighting the stove, you will figure out what works best for you. Slide the damper to the medium position between the 2 lines on the damper slide. The stove burns best with the damper in the center position between the 2 lines on the damper slide for a medium burn.



Pellet Breach Tool

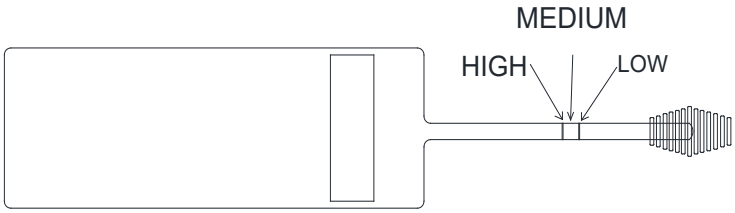


Damper Lock / Stop Position @ lowest setting. Move to slide closed.



AIR PORTS AND REPLACEMENT

Pellet air ports seen in picture with extended round tubes are welded to the 1x3” tube steel. They must be placed in their holes leading to the ash pan / Fresh air box to burn correctly. If the round tubes in the air ports are burned out to the flat surface, you must purchase these consumable parts from us at flameinnovation.com.



(Damper can be moved slightly to the first mark under the indicator for lower burning, but it is only recommended for short periods. Risk of burning up the feed tube after extended periods of burn time unless you scoop the ash out of the pot regularly using the ash scoop provided. The second mark on the damper handle is the high setting. The damper stop pull rod under the stove must always be in the locked position so the stove can not be turned down lower than the EPA Mandated setting. Different lengths of chimney, and the 2 types of chimneys used for configuration, elevation, and temperature play roles in how the fire will burn.

FIRST FIRE

Remember to ventilate well. The stove paint will "cure" as you burn and smell some. Flat spots on the painted surface are normal. Shiny spots on the painted surface (before burning) are normal.

1.Do not use a grate or elevate the fire inside the firebox.

2. Use only Natural pellets, preferrable soft wood blends with low ash content marked on the bag. You will find a brand you like the best. (Hardwood pellets burn cooler and are not recommended)

3. When the stove is used for the first time, solvents in the paint will smoke off as the stove "cures." As well as smoke coming off the stove pipe.

NEVER USE PELLETS THAT HAVE ADDITIVES IN THEM LIKE WAX, OILS, OR OTHER BINDING AGENTS. PURE SAWDUST PELLETS ONLY. THE USE OF THESE OTHER TYPES OF PELLETS CAN CAUSE A FIRE THAT IS OUT OF CONTROL VERY QUICKLY DUE TO THE ADDITIVES.

CLEAN AND INSPECT YOUR CHIMNEY REGULARILY AND WATCH OUTSIDE FREQUENTLY TO LOOK FOR SMOKE TO INSURE CORRECT DRAFT PLACEMENT FOR EFFECTIVE CLEAN EFFICIENT BURNING.

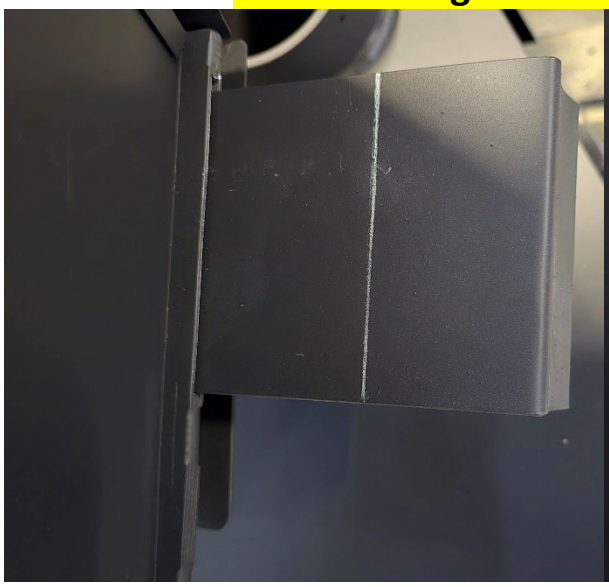
ALWAYS STORE YOUR PELLETS IN A WELL-VENTILATED AREA AWAY FROM DIRECT MOISTURE.

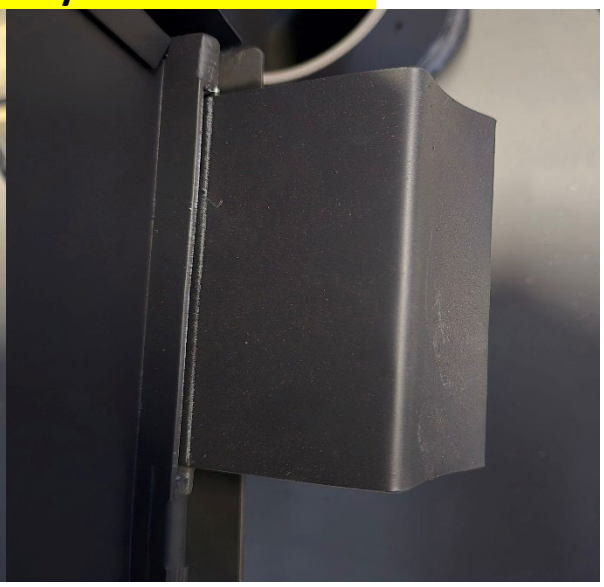
DO NOT BURN: Pellets with Additives, Treated Wood, Regular Wood, Garbage, Solvents, Trash, Cardboard, Colored Paper, or Coal. Just Pellets. (spiders are ok)

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.

SHUTTING DOWN THE STOVE WITH PELLETS IN THE HOPPER

Note: It is always best to let the stove burn out of pellets instead of using the tool to stop the pellet feed. Only put in enough pellets to burn the length of time you want to burn.





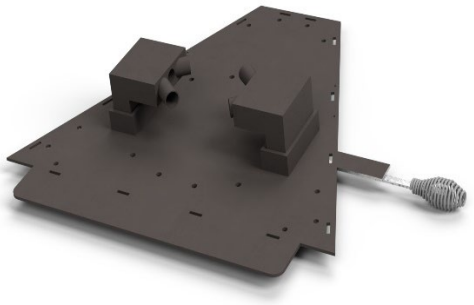
The Mini Me can be shut down with pellets still inside the hopper. Do not touch the damper setting. The damper must be left open to let the stove burn while it finishes the pellets inside the feed tube. Slide the pellet shutoff tool into the slot at the bottom right side of the hopper and push in until the tool reaches the shutoff line scribed into the tool. You may have to wiggle it and slide it side to side to get it to go into the slot, but it will work. Leave the stove running as-is without moving the damper to the closed position. If you slide the damper lock out of the way and slide the damper closed, it will smoke and not burn correctly.

CLEANING THE STOVE

The Mini Me Pellet has a removeable pellet adapter and bricks.

1. The pellet adapter must be removed using the provided tool w/ hook. Clean and inspect the adapter at least once a week.
2. Use a wire brush to remove any debris inside of the adapter. Keeping the surface smooth will help with breaching of the pellets.
3. Remove the top bricks and pull the damper slide tool out from under the stove to remove the damper.
4. Scrape the ash into the air inlet holes to land in the ash pan below. If you can vacuum the stove out with an approved ash vac it will be easier and faster. (See ash disposal)
5. Replace the damper and move the damper slide / stop to the locking position and pull the damper back to the stop to be ready for the next burn
6. Replace the bricks in the firebox.
7. Replace the pellet adapter making sure the 2 leg posts on the corners are facing the door with the center post in the back.

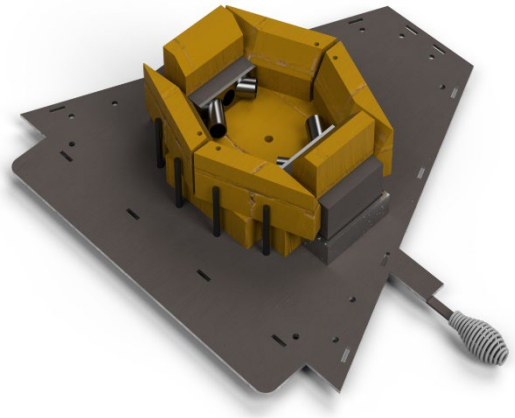
NOTE: You can use the tool provided to clean out the pot while in operation to lift some ash out. Make sure to slide in the pellet stop tool below the hopper before opening the door to eliminate smoke rising through the hopper or pellets burning up the tube.




Pellet Adapter

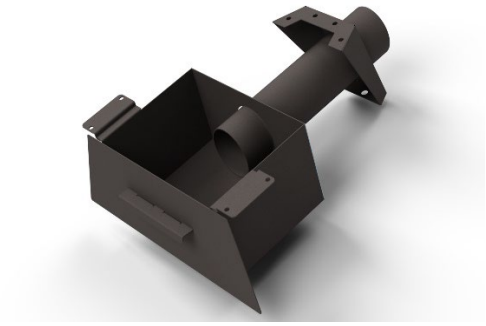
1. Reach under the cooled down stove and pull up on the damper lock spring.
2. Slide the spring handle towards the rear of the stove to the stopped position.
3. Pull out the damper handle and remove it from the stove.
4. Remove the front and side bricks.
5. Pull out the air inlet tubes including the round tube inserts and place outside the stove.
6. Slide the ash in the burn pot area into the air inlet holes emptying the ash into the ash pan below the stove.
7. If a full cleanout is required, remove the back 2 bricks, and use an approved ash vacuum to remove all the rest of the ash from the stove.
8. Replace the back 2 bricks making sure they are installed without any gaps in between them.
9. Set the air inlets back into the air chamber holders.
10. Place the round tube inserts back into the air inlets, making sure the longer tubes on each are opposite. See Pics
11. Place front bricks and side bricks back into position making sure there are no gaps.
12. Empty Ash Pan and vacuum contents into an approved metal container to dispose of any hot ashes.

13. Inspect ashes before dumping them out of your approved container for heat, and live coals.



(See Ash Disposal Section)

ALWAYS INSPECT THE PELLET ADAPTER WHEN THE STOVE IS OUT OF PELLETS AND COOLED. LOOK FOR ANY HARD ASH DEBRIS INSIDE THE ADAPTER IN THE LOWER SECTION. USE METAL BRISTLE BRUSH TO CLEAN OUT THE ADPATER AND RE-INSTALL AS DESCRIBED IN THE MANUAL.



Ash Pan is shown with mounting brackets, and fresh air intake in the back leg of the stove.

ASH DISPOSAL Regularly inspect the ash build-up in your unit and remove, as necessary. Ashes can be removed from the unit by shoveling out bottom to ash pan after removing the front firebrick. Use an ASH VACUUM if desired when the stove is completely out.
Caution: **The ashes can be extremely hot!! Never remove red-hot ashes from the appliance; allow ashes to cool before cleaning. Ashes should be placed in a metal container with an airtight lid. The ashes should be placed outside on a noncombustible surface and completely away from any combustible materials. The ashes should remain in the airtight container until they have completely cooled.**

MINI ME PELLET ADAPTER INSTALL INSTRUCTIONS

Remove pellet adapter from packaging and make sure there is nothing in the center to obstruct the pellets after installation.

Place your fire poker tool across the fire pot to catch the pellet adapter when it slides down the tube.

Open the lid on your Mini Me Pellet stove and insert the pellet adapter into the tube with the 3 prongs facing down and the round disc with the round hole facing up.

Slide the pellet adapter down as far as you can by hand and then let it go. The pellet adapter will stop when it hits the fire rod tool. Lift and slide the tool out of the stove. You may have to lift the pellet adapter up slightly to slide the tool out. The 2 legs that are on the corners of the pellet adapter should face the door with the other leg being center in the back.

Make sure the fire pot is clean and then fill the hopper with the desired number of pellets. Remember to use the pellet breach tool before filling up the hopper.

Close the lid and set the damper to the medium position and use a torch (**BY FAR THE BEST WAY TO LIGHT THE STOVE**) or gel or preferred lighting method to light the pellets. If you are lighting it with a torch, make sure to close the door and look for flames. If there are not visible flames, open the door and continue to light with the torch until it stays lit when you close the door. Leave the damper in the middle setting.

Let the stove get to temperature. Do not let the flame be lazy in movement. You want the flame to be active and vibrant to keep creosote levels down and avoid burning up into the tube.

Keep the fire pot clean between burns. This really helps with how the stove will perform. Depending on the size of your ash vac you can clean the pot out by using the tool provided or removing a couple of the bricks and pushing the ash out of the pot. Only vacuum when the stove is out and cold.

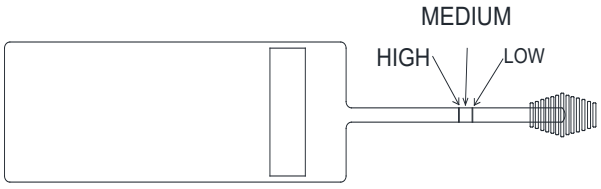
Note: When buying pellets, look at the size of them. If there are a lot of really long pellets visible in the bag, then look at another brand of pellets with shorter length pellets. This will help the stove not to clog. If it does clog you can tap on the tube, open the door, and tap on the feet of the pellet adapter, or run the pellet breach tool down through the center of the hopper and into the pellet adapter area.

INSPECT THE PELLET ADAPTER FOR WEAR ON THE EDGES AND THE FEET OF THE ADAPTER. If any feet are broken off or burned through or there are holes near the bottom on the sqare portion by the fee, it is time to purchase another pellet adapter.

***** SPECIAL NOTE: LEAVE THE DAMPER OPEN TO BURN THE PELLETS THAT ARE LEFT IN THE FIREPOT AND LET THE STOVE BURN OUT. ***DO NOT CLOSE THE DAMPER***

DRAFT / AIR CONTROLS

1. Pull the damper handle out past the high mark under stove out and slide the other handle under the stove up and forward towards the front of the stove until it stops. This will lock the damper into the lowest setting when you slide the damper back in so it cannot be run lower than the EPA mandated setting.
2. Pulling the damper out runs the stove on high. See marks on damper and align with the indicator plate for correct adjustment.
3. We suggest to run the damper in the spot located between the high mark and the low mark for full time burning.



EPA Efficiency

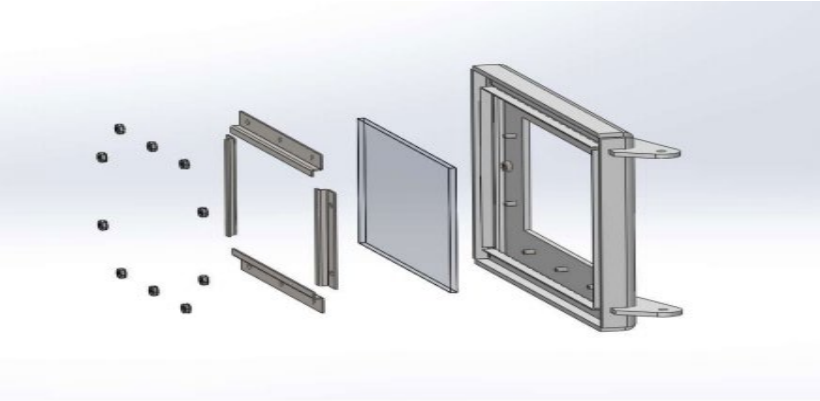
EPA Testing Efficiency was determined in accordance with CSA B415.1 using HHV at maximum, medium, and minimum burn rates. This pellet heater burns efficiently, (See Chart page 1), on all settings, however using pellets that are not dry or are poor quality will directly affect how the stove performs and can significantly reduce efficiency. Locating the stove in the most central location of the structure for more even heating will result in the best efficiency of the fuel that you put in this pellet heater. This pellet heater has been tested and found to produce minimal smoke and CO, but under certain conditions both will be produced. A CO / “Carbon Monoxide” detector is recommended in the area of the heater and or fuel storage areas. Areas containing hydronic heaters, or other burning devices should have Carbon Monoxide detectors.

GLASS CARE

The following use and safety tips should be observed: NEVER POUR WATER ON HOT GLASS

1. Inspect the glass regularly for cracks or breaks. Surface scratches are acceptable and normal, but if this glass becomes cracked in any area, the unit should be shut down and the window replaced with high-temperature Neo-Ceram glass ONLY. (5.50” x 8.50”)
2. Do not slam the door or otherwise impact the glass. When closing doors, make sure that foreign objects do not protrude and impact the glass.

3. Do not clean the glass with materials which may scratch (or otherwise damage) the glass. Scratches on the glass can develop into cracks or breaks.
4. Never attempt to clean the glass while the unit is hot. If the deposit is not very heavy, normal glass cleaners are adequate with a plain, non-abrasive scouring pad. Heavier deposits may be removed with a razor blade scraper.
5. NEVER put substances that can ignite explosively inside the unit, since even small explosions in confined areas can blow out the glass.
6. Inspect the glass and door seal periodically to ensure proper seal. If the gaskets become frayed or worn, replace them immediately. Contact your dealer or Customer Service at (509)-993-3767 OR (208)-660-3109 OR Info@509Fab.com for approved replacement parts.



Glass Gasket Replacement

After extensive use, the sealing material which provides glass and door seal may need to be replaced if it does not sustain its resilience. Inspect the glass and door seal periodically to ensure proper seal. If the gaskets become frayed or worn, replace them immediately.

The following steps should be followed for replacement of the glass gasket:
1. Ensure that the appliance is not in operation and is thoroughly cooled.
2. Remove the screws and glass clip Brackets.
3. Lift glass out from glass clips.
4. Remove the old gasket and clean the glass.
5. Replace the new gasket, starting at the bottom of the glass and working along the edges. Be sure to center the gasket channel on the glass.
6. Trim the gasket to length and butt the ends together.
7. Replace the glass in the door, being sure not to overtighten the nuts, this will break the glass. REPLACE GLASS ONLY WITH HIGH-TEMPERATURE NEO-CERAM OF THE PROPER SIZE AND THICKNESS. 5.50" X 8.50" You may order parts and options on our web site: FlameInnovation.com or by calling (509) 993-3767 OR (208) 660-3109 OR Info@509Fab.com

Door Gasket

The door gasket is ¾" Rope Gasket. You will have to dig the gasket out of the channel and then clean all the old gasket cement out of the channel for the new sealant to adhere correctly when putting in new fire rope. Use only ¾" Fire Rope to replace the door gasket. You can find it on our website if you cannot find it locally. Use high Temp Stove Gasket Sealer on all 3 sides of the channels to secure rope in place. Place a weight, like a big book, over the gasket overnight and then re-install the door. IMPORTANT NOTE: A clean surface is crucial to sealing your new gasket properly. DO NOT Try and re-seal over old gasketing Cement.

CREOSOTE

When Pellets are burned slowly, they produce tar and other organic vapors. These combine with moisture to form creosote. Creosote vapors condense in the relatively cool chimney flue of a slow-burning fire – as a result, creosote residue accumulates on the lining of the flue. If ignited, this creosote makes an extremely hot fire. The chimney should be inspected regularly during the heating season to determine if a creosote build-up has accumulated. If it has, the creosote should be removed to reduce the risk of chimney fire**.**

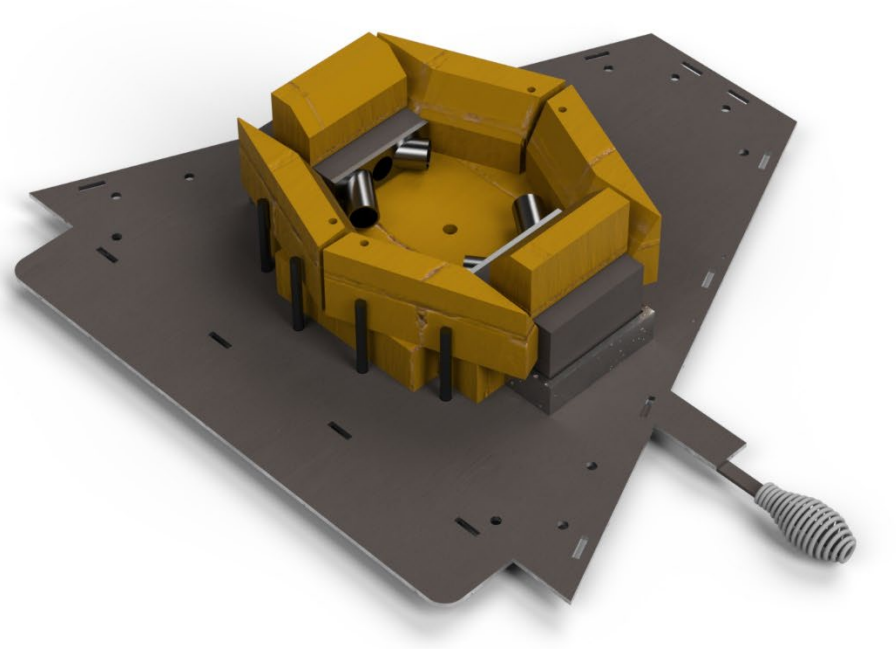
WAYS TO PREVENT AND KEEP UNIT FREE OF CREOSOTE

1. Burn with the air control at the set position between the high and low mark or towards the high mark if wanting more heat. **REMEMBER IT TAKES ABOUT AN HOUR FOR THE STOVE TO SPEED UP OR SLOW DOWN BECAUSE WE ARE HEATING UP THE METAL OR COOLING IT DOWN.**
2. Do not over fire the stove OR RAISE THE PELLET ADAPTER FOR MORE FUEL.
3. BURN DRY PELLETS ONLY.
4. Establish a routine for fuel, burning and firing technique. Check daily for creosote build-up until experience shows you how often you need to clean to be safe. Keep in mind that the hotter the fire, the less creosote is deposited, and weekly cleanings may be necessary in milder weather, although monthly cleanings may be enough in the coldest months. Contact your local authority for information on how to handle a chimney fire and have a clearly understood plan to handle a chimney fire.

WARNING: THINGS TO REMEMBER IN CASE OF A CHIMNEY FIRE:

1. CLOSE DRAFT CONTROL.
1. a. SLIDE IN THE PELLET STOPPER IMMEDIATELY.
2. CALL THE FIRE DEPARTMENT.

BRICK CARE AND LAYOUT



Inspect your bricks each time you start a fire for correct placement, checking for broken or dislodged bricks. If broken or dislodged bricks are found, they need to be replaced in position or replaced entirely if damaged.

What can cause a poor draft?

There are several common factors that can contribute to poor draft in a stove.

A. Atmospheric Pressure and Air Supply

Atmospheric pressure affecting the draft from a chimney can be outside the home, inside the home, or both. Outside the home, a high-pressure (clear and cool) day creates a better draft in the chimney than a low-pressure (overcast and damp) day. Inside the home, household appliances, such as forced-air furnaces or clothes dryers, compete for air, often resulting in inadequate amounts of air available to fuel a fire and creating a condition known as negative pressure. Extreme conditions of negative pressure can cause the combustion by-products to be drawn from the chimney and into the house. This condition is commonly known as “down drafting.”

B. Air Availability

There are several factors that can affect the amount of air available in the home. Increased amounts of insulation, vinyl windows, extra caulking in various places and door seals can all keep heat in but may also make a home too airtight. If you are in doubt as to whether there is sufficient air in your home for your stove, refrain from using those appliances known to consume air when possible or open a door or a window to allow some air to enter the home.

C. Environmental Conditions

Towering trees, a low-lying house location (such as in a valley), tall buildings or structures surrounding your house and even windy conditions can cause poor draft or down drafting.

C. Cold Chimney Temperature

Avoid cold chimney temperatures by burning a hot fire for the first fifteen to forty minutes after building a fire, being careful not to over-fire. If any part of the chimney or parts of the stove start to glow, you are over-firing the stove. Where possible, install a temperature gauge on the chimney so temperature drops can be seen.

D. Chimney Installation and Maintenance

Avoid using too many elbows or long horizontal runs. If in doubt, contact a chimney expert and/or chimney manufacturer for help. Clean your chimney, rain cap(s) and especially the spark arrester regularly to prevent creosote build-up – which can significantly reduce chimney draw and possibly create a chimney fire.

Should I close or open the air control fully when shutting down the stove?

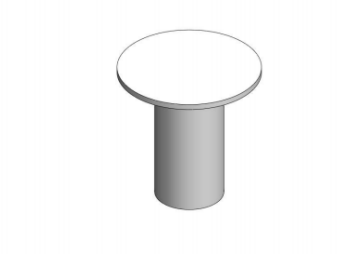
When shutting down the stove. Leave the damper in the MEDIUM position. This will allow chimney temperatures to remain as high as possible for as long as possible. Remember, cold chimney temperatures create creosote. Burning all the fuel out of the stove is the best way to leave your stove between fires.

NEVER POUR WATER ON THE FIRE, IN THE FIRE, OR ON THE STOVE TO EXTINGUISH FLAMES. TURN THE DAMPER TO THE OFF POSITION BY SLIDING THE HANGING HANDLE UNDER THE STOVE UP AND TOWARDS THE BACK OF THE STOVE TO UNLOCK THE LOW SETTING SO THE DAMPER WILL SLIDE PAST IT AND COMPLETELY SHUT OFF THE AIR TO THE FIRE AND INSTALL THE PELLET SHUT OFF SLIDE PLATE AS SOON AS POSSIBLE.

NOTE: This Manual is intended as an aid and does not supersede any local, state or like requirements. Check with officials or authorities having legal control in your area.

IF INSTALLED IN A MOVING STRUCTURE, IT IS HIGHLY RECCOMMENDED TO TAKE OFF YOUR CHIMNEY CAP AND INSTALL A PLUG BEFORE BEING MOBILE IN YOUR STRUCTURE TO AVOID ASH BLOWING INSIDE THE STRUCTURE.

NEVER MOVE THE STRUCTURE WITH A LIT FIRE.



Chimney Plug Shown for Reference

NOTE:
Parts and accessories are also available on our web site: Flameinnovation.com

If you have any questions or problems, contact the Manufacturer or Dealer.

FLAME INNOVATION

509 Fabrications, Inc.
DBA, Flame Innovation
6512 W. Seltice Way
Post Falls, ID 83854
509-993-3767
208-660-3109
Info@509Fab.com

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: DIRI0182484A0912013i231228

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**
lbs	0.01	QC033	12/28/23	12/14/22	12/2024

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: 19.3°C
As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	As-Left: Pass:☑ Fail:☐	

CALIBRATION DATA

Standard	As-Found	As-Left	Expanded Uncertainty
400	399.87	400.01	0.006
200	200.00	200.00	0.005
100	100.02	100.02	0.005
75	75.02	75.02	0.005
50	50.02	50.02	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	7/18/22	7/2024	20221688

Permanent Information Concerning this Equipment:

Comments/Information Concerning this Calibration

12/28/23: RH-42.5%

Report prepared/reviewed by: R.B. **Date:** 12-28-23 **Technician:** C.Call

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:	8/1/2024
Calibration Expiration:	2/1/2025
Barometric Pressure:	29.93 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fuke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	W17AE
Lab ID#:	47	196	202	124
Calibration Expiration Date:	5/1/2025	1/3/2025	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)	196.683	150.909	260.397
Standard DGM Temperature (°F)	76.0	77.0	77.0
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)	7.090	5.446	9.498
DGM Temperature (°F)	90.0	92.0	95.0
DGM Pressure (in H_2O)	3.34	1.59	2.35
Net Volume for Standard DGM (ft^3)	6.946	5.329	9.196
Net Volume for DGM (ft^3)	7.090	5.446	9.498

Dry Gas Meter γ Factor	0.995	1.000	0.993
γ Factor Deviation From Average	0.995	1.000	0.993

Average Gas Meter γ Factor: 0.996

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

Calculations:

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

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	54
Serial #:	1902133
Calibration Date:	8/1/2024
Calibration Expiration:	2/1/2025
Barometric Pressure:	29.93 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fuke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	W17AE
Lab ID#:	47	196	202	124
Calibration Expiration Date:	5/1/2025	1/3/2025	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)	156.724	182.210	191.576
Standard DGM Temperature (°F)	73.0	74.0	75.0
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)	5.412	6.423	6.840
DGM Temperature (°F)	77.0	82.0	88.0
DGM Pressure (in H_2O)	2.83	3.29	1.54
Net Volume for Standard DGM (ft^3)	5.535	6.435	6.765
Net Volume for DGM (ft^3)	5.412	6.423	6.840

Dry Gas Meter γ Factor	1.021	1.007	1.007
γ Factor Deviation From Average	1.021	1.007	1.007

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

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 #:	33086-203325-4525		**Customer PO#:** 1109		
Customer Name:	PFS TECO				
Customer Address:	1507 Matt Pass				
City:	Cottage Grove		**State:** WI	**Zip:** 53527	
Contact:	Ethan Frederick				
Service Address:	11785 SE Highway 212, Suite 305		Clackamas, OR 97015		

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/26/2024 | Due: 01/31/2025 | Vendor: Fluke | Report #: EVL943251
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date:	February 26, 2024	**Reference:**	ASME B40.100
Recommended Due Date:	February 26, 2025	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Newport Industries	**Temperature:**	64 °F
Type:	Pressure Transducer	**Humidity:**	36% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	54B
Capacity:	1 PSI	**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 PSI	Standard As Found PSI	Standard Verification Reading #1 PSI	Error PSI	Standard Verification Reading #2 PSI	Error PSI	Tolerance PSI	Expanded Uncertainty ± PSI
0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.005
0.10	0.10	0.10	0.00	0.10	0.00	0.01	0.005
0.25	0.25	0.25	0.00	0.25	0.00	0.01	0.006
0.50	0.50	0.50	0.00	0.50	0.00	0.01	0.014
0.75	0.75	0.75	0.00	0.74	-0.01	0.01	0.018
1.00	1.00	1.00	0.00	0.99	-0.01	0.01	0.013
0.75	0.76	0.76	0.01	0.76	0.01	0.01	0.005
0.50	0.50	0.50	0.00	0.51	0.01	0.01	0.015
0.25	0.25	0.25	0.00	0.26	0.01	0.01	0.017
0.10	0.11	0.11	0.01	0.11	0.01	0.01	0.008
0.00	0.00	0.00	0.00	0.00	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).

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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-203325-4525

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

ACCREDITED CERT #4986.01

Report #: 33086-203326-4525 **Customer PO#:** 1109
Customer Name: PFS TECO
Customer Address: 1507 Matt Pass
City: Cottage Grove **State:** WI **Zip:** 53527
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/26/2024 | Due: 01/31/2025 | Vendor: Fluke | Report #: EVL943251
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date: February 26, 2024
Recommended Due Date: February 26, 2025
Calibration Frequency: 12 Months
Manufacturer: Newport Industries
Type: Pressure Transducer
Model Number: Unknown
Serial #: Unknown
Capacity: 5 In H2O
Tolerance: ± 1.00% of Span
Gauge Class: A

Reference: ASME B40.100
Cal-Cert Procedure: CP-003
Indicating System: Digital
Temperature: 64 °F
Humidity: 36% RH
Cal Factor: None
Asset #: 54C
Service Location: Service Address
As Found: Pass
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	0.50	0.50	0.00	0.48	-0.02	0.05	0.045
1.25	1.25	1.25	0.00	1.23	-0.02	0.05	0.036
2.50	2.49	2.49	-0.01	2.49	-0.01	0.05	0.006
3.75	3.74	3.74	-0.01	3.74	-0.01	0.05	0.007
5.00	4.98	4.98	-0.02	4.99	-0.01	0.05	0.026
3.75	3.74	3.74	-0.01	3.74	-0.01	0.05	0.023
2.50	2.50	2.50	0.00	2.49	-0.01	0.05	0.014
1.25	1.26	1.26	0.01	1.24	-0.01	0.05	0.042
0.50	0.51	0.51	0.01	0.50	0.00	0.05	0.04
0.00	0.00	0.00	0.00	0.01	0.01	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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-203326-4525

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-50-DIR
Lab ID #:	203
Serial #:	A2204292
Calibration Date:	8/2/2024
Calibration Expiration:	2/2/2025
Barometric Pressure:	29.96 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fuke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	W17AE
Lab ID#:	47	196	202	124
Calibration Expiration Date:	5/1/2025	1/3/2025	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)	176.263	245.171	145.418
Standard DGM Temperature (°F)	79.0	80.0	81.0
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)	6.331	8.851	5.233
DGM Temperature (°F)	96.0	98.0	98.0
DGM Pressure (in H_2O)	1.10	0.81	1.41
Net Volume for Standard DGM (ft^3)	6.225	8.658	5.135
Net Volume for DGM (ft^3)	6.331	8.851	5.233

Dry Gas Meter γ Factor	1.009	1.007	1.007
γ Factor Deviation From Average	1.009	1.007	1.007

Average Gas Meter γ Factor: 1.008

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

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 #:	33086-203319-4525	**Customer PO#:** 1109		
Customer Name:	PFS TECO			
Customer Address:	1507 Matt Pass			
City:	Cottage Grove	**State:** WI	**Zip:** 53527	
Contact:	Ethan Frederick			
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015		

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/26/2024 | Due: 01/31/2025 | Vendor: Fluke | Report #: EVL943251
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date:	February 26, 2024	**Reference:**	ASME B40.100
Recommended Due Date:	February 26, 2025	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	65 °F
Type:	Pressure Transducer	**Humidity:**	36% 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	0.000	0.000	0.00	0.000	0.00	0.01	0.0005
0.100	0.098	0.098	0.00	0.099	0.00	0.01	0.0036
0.250	0.252	0.252	0.00	0.250	0.00	0.01	0.0055
0.500	0.502	0.502	0.00	0.499	0.00	0.01	0.0065
0.750	0.751	0.751	0.00	0.748	0.00	0.01	0.0086
1.000	1.001	1.001	0.00	0.998	0.00	0.01	0.0068
0.750	0.752	0.752	0.00	0.749	0.00	0.01	0.0073
0.500	0.501	0.501	0.00	0.499	0.00	0.01	0.0065
0.250	0.251	0.251	0.00	0.250	0.00	0.01	0.0024
0.100	0.103	0.103	0.00	0.101	0.00	0.01	0.0057
0.000	0.001	0.001	0.00	0.000	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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-203319-4525

Report and Certificate of Calibration

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Toll Free 800-356-4662

Address 5777 SE International Way Milwaukie, OR 97222

Local 503-654-9620

A2LA ACCREDITED CERT #4986.01

Report #:	33086-203320-4525	**Customer PO#:**	1109		
Customer Name:	PFS TECO				
Customer Address:	1507 Matt Pass				
City:	Cottage Grove	**State:**	WI	**Zip:**	53527
Contact:	Ethan Frederick				
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015			

Calibration Standards

10-01442 | Compound Gauge | Fluke | SN: 4582643 | Cal: 01/26/2024 | Due: 01/31/2025 | Vendor: Fluke | Report #: EVL943251
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date:	February 26, 2024	**Reference:**	ASME B40.100
Recommended Due Date:	February 26, 2025	**Cal-Cert Procedure:**	CP-003
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Red Lion	**Temperature:**	66 °F
Type:	Pressure Transducer	**Humidity:**	38% RH
Model Number:	Unknown	**Cal Factor:**	None
Serial #:	Unknown	**Asset #:**	203C
Capacity:	5 In H2O	**Service Location:**	Service Address
Tolerance:	± 1.00% of Span	**As Found:**	Pass
Gauge Class:	A	**As Left:**	Pass

Instrument Range: 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	0.50	0.50	0.00	0.49	-0.01	0.05	0.038
1.25	1.25	1.25	0.00	1.22	-0.03	0.05	0.067
2.50	2.48	2.48	-0.02	2.47	-0.03	0.05	0.021
3.75	3.72	3.72	-0.03	3.71	-0.04	0.05	0.043
5.00	5.00	5.00	0.00	4.99	-0.01	0.05	0.045
3.75	3.72	3.72	-0.03	3.71	-0.04	0.05	0.034
2.50	2.49	2.49	-0.01	2.47	-0.03	0.05	0.05
1.25	1.23	1.23	-0.02	1.23	-0.02	0.05	0.008
0.50	0.50	0.50	0.00	0.49	-0.01	0.05	0.018
0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.005

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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-203320-4525

Dry Gas Meter Calibration

DUT	
Manufacturer:	Apex
Model:	XC-60
Lab ID #:	55
Serial #:	810016
Calibration Date:	8/3/2024
Calibration Expiration:	2/3/2025
Barometric Pressure:	29.98 in. Hg

Equipment Used:	Ref. Std. DGM	Thermometer	Barometer	Manometer
Manufacturer:	Apex	Fuke	Aquatech	Dwyer
Model:	SK25DA	52 II	DBX2	W17AE
Lab ID#:	47	196	202	124
Calibration Expiration Date:	5/1/2025	1/3/2025	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)	226.392	146.151	296.953
Standard DGM Temperature (°F)	81.0	82.0	82.0
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)	8.064	5.174	10.408
DGM Temperature (°F)	85.0	86.0	86.0
DGM Pressure (in H_2O)	0.00	0.00	0.00
Net Volume for Standard DGM (ft^3)	7.995	5.161	10.487
Net Volume for DGM (ft^3)	8.064	5.174	10.408

Dry Gas Meter γ Factor	0.997	1.003	1.013
γ Factor Deviation From Average	0.997	1.003	1.013

Average Gas Meter γ Factor: 1.004

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

CAL-CERT
CALIBRATION CERTIFICATION

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 #: 30452-28785-3646 **Customer PO#:** 1100
Customer Name: PFS TECO
Customer Address: 11785 SE Highway 212, Suite 305
City: Clackamas **State:** OR **Zip:** 97015
Contact: John Steinert
Service Address: 5777 SE International Way Milwaukie, OR 97222

Calibration Standards

LP-00051 | Electrical Meter | Fluke | SN: 9663004 | Cal: 01/10/2023 | Due: 01/10/2024 | Vendor: Fluke | Report #: EVL861119
LP-01333 | Electrical Meter | IET Labs, Inc. | SN: E3-1842499 | Cal: 01/19/2023 | Due: 01/31/2024 | Vendor: Transcat Calibration Lab | Report #: 5-G584Z-20-1
LP-01347 | Thermo-Hygrometer | Comark | SN: 06210350163 | Cal: 04/18/2023 | Due: 04/30/2024 | Vendor: Cal-Cert | Range: 122 °F 95 %RH | Report #: 28945-67214-3646

Instrument Data

Calibration Date: August 9, 2023
Recommended Due Date: August 9, 2024
Calibration Frequency: 12 Months
Manufacturer: Delmhorst
Type: Resistivity Meter
Model Number: MCS-1
Serial #: #094
Capacity: 120 Megaohms
Tolerance: 3.00 % of indication

Reference: Manufactures Tolerances
Cal-Cert Procedure: CP-080
Indicating System: Digital
Temperature: 74 °F
Humidity: 36% RH
Asset #: #094
Service Location: Cal-Cert Lab
As Found: Pass
As Left: Pass

Instrument Range: 120 Megaohms **Resolution:** 0.001 **Mode Verified:** Resistance

Standard Reading	UUT As Found	UUT Reading #1	Error	UUT Reading #2	Error
0.000	0.000	0.000	0.000	0.000	0.000
1.100	1.095	1.095	-0.005	1.095	-0.005
54.545	54.719	54.719	0.173	54.719	0.173
0.000	0.000	0.000	0.000	0.000	0.000

Expanded Uncertainty± **2.50 Megaohms**

Remarks:
100Mohm std Parallel with 120Mohm UUT= 54.545Mohms

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:** August 9, 2023

Technical Manager: Marshall Doyle **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

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ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0134307497240612

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	6/12/24	12/28/23	12/2024

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. 99.9999	5. 99.9999	9. 100.0000
2. 99.9999	6. 100.0000	10. 100.0001
3. 100.0000	7. 100.0000	Result
4. 100.0000	8. 100.0000	0.00006

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 23.1°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	199.9984	200.0000	0.00018
100	99.9991	99.9999	0.00018
50	49.9996	50.0001	0.00017
20	19.9998	20.0000	0.00017
0.1	0.1000	0.1000	0.00017
0.05	0.0499	0.0500	0.00017

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	R.L./Troemner	10kg to 1mg	G782	4/27/24	4/2025	20240900

Permanent Information Concerning this Equipment:
6 month calibration cycle

Comments/Info Concerning this Calibration:
06/12/2024: Cleaned, leveled, and adjusted span. RH=37.8%

Report prepared/reviewed by: TLP **Date:** 06-12-2024 **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 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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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

Established 1974

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

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

Calibration Certificate ID
072731-239-041621-ACC-USI

METTLER TOLEDO

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, OH 43240
1-800-523-5123

Accredited by the American Association for Laboratory Accreditation (A2LA)
CALIBRATION CERT #1902.01

ISO 17025 Registered
ANSI/NCSL Z540-1 Accredited

Accuracy Calibration Certificate

Customer

Company:	PFS-TECO		
Address:	11785 SE Hwy 212; Ste 305		
City:	Clackamas	**Contact:**	John Steinert
Zip / Postal:	97015-9050		
State / Province:	Oregon		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	PFD774-US11	**Asset Number:**	1
Serial No.:	C112381341	**Terminal Model:**	IND570
Building:	N/A	**Terminal Serial No.:**	C101887027
Floor:	N/A	**Terminal Asset No.:**	N/A
Room:	N/A		

Range	Max. Capacity	Readability (d)
1	1000 lb	0.02 lb

Procedure

Calibration Guideline: ASTM E898 - 20
METTLER TOLEDO Work Instruction: 30260953

This calibration certificate including procedures and uncertainty estimation also complies with EURAMET cg-18 v 4.0.

This calibration certificate contains measurements for As Found and As Left calibrations.

The sensitivity/span of the weighing instrument was adjusted before As Left calibration with an external weight.

	Temperature		Humidity	
As Found	Start: 20.0 °C	End: 20.0 °C	Start: 44.0 %	End: 44.0 %
As Left	Start: 20.0 °C	End: 20.0 °C	Start: 44.0 %	End: 28.0 %

Environmental conditions have been verified to ensure the accuracy of the calibration.

This certificate is issued in accordance with the conditions of accreditation granted by A2LA, which is based on ISO/IEC 17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards.

As Found Calibration Date:	16-Apr-2021	**Authorized A2LA Signatory:**	Gary Sargent
As Left Calibration Date:	16-Apr-2021		
Issue Date:	16-Apr-2021		
Requested Next Calibration Date:	30-Apr-2022		

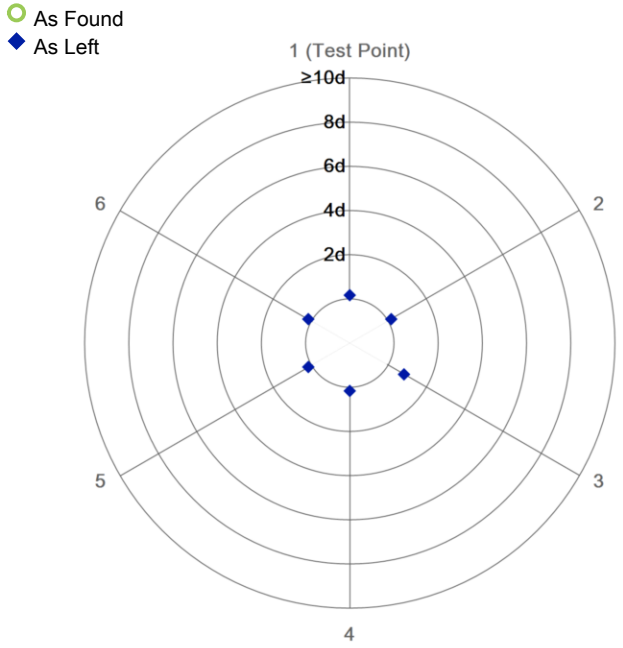
Measurement Results

Repeatability

Test Load: 500 lb

	As Found	As Left
1	N/A	500.00 lb
2	N/A	500.00 lb
3	N/A	500.02 lb
4	N/A	500.00 lb
5	N/A	500.00 lb
6	N/A	500.00 lb

Standard Deviation	**N/A**	**0.008 lb**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

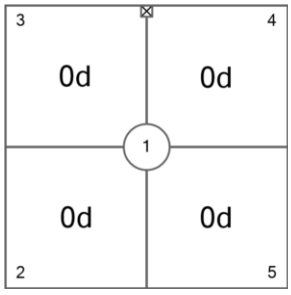
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

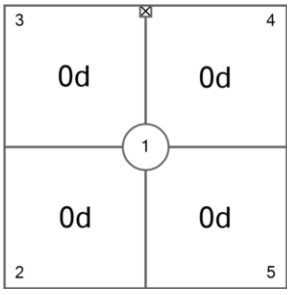
Test Load: 325 lb

Position	As Found	As Left
1	325.00 lb	325.00 lb
2	325.00 lb	325.00 lb
3	325.00 lb	325.00 lb
4	325.00 lb	325.00 lb
5	325.00 lb	325.00 lb

Maximum Deviation	**0.00 lb**	**0.00 lb**



As Found



As Left

The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

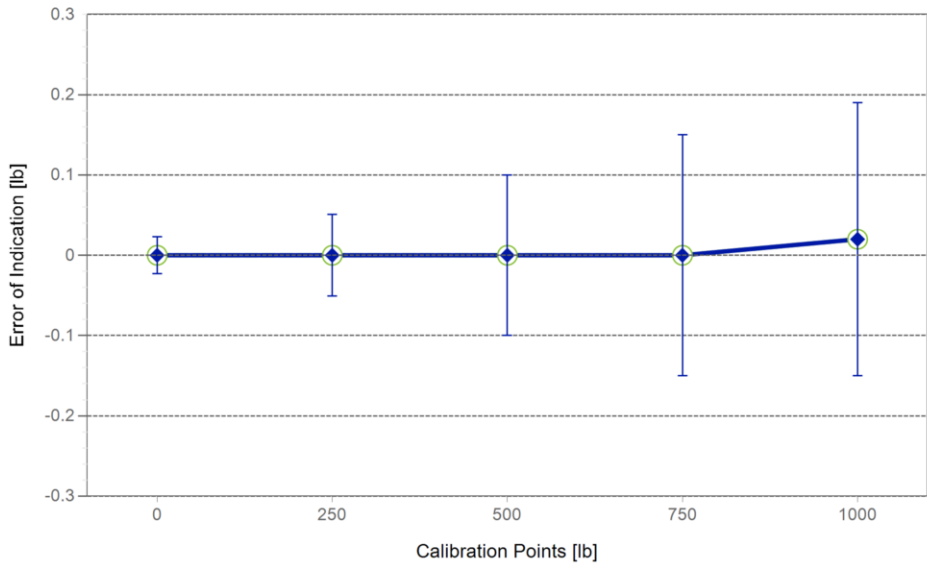
As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 lb	0.00 lb	0.00 lb	N/A	N/A
2 [1]	250 lb	250.00 lb	0.00 lb	N/A	N/A
3 [1]	500 lb	500.00 lb	0.00 lb	N/A	N/A
4 [1]	750 lb	750.00 lb	0.00 lb	N/A	N/A
5	1000 lb	1000.02 lb	0.02 lb	N/A	N/A
6 [1]	750 lb	750.00 lb	0.00 lb	N/A	N/A
7 [1]	500 lb	500.00 lb	0.00 lb	N/A	N/A
8 [1]	250 lb	250.00 lb	0.00 lb	N/A	N/A
9	0 lb	0.00 lb	0.00 lb	N/A	N/A

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0 lb	0.00 lb	0.00 lb	0.023 lb	2.28
2 [1]	250 lb	250.00 lb	0.00 lb	0.051 lb	2
3 [1]	500 lb	500.00 lb	0.00 lb	0.10 lb	2
4 [1]	750 lb	750.00 lb	0.00 lb	0.15 lb	2
5	1000 lb	1000.02 lb	0.02 lb	0.17 lb	2.05
6 [1]	750 lb	750.00 lb	0.00 lb	0.15 lb	2
7 [1]	500 lb	500.00 lb	0.00 lb	0.10 lb	2
8 [1]	250 lb	250.00 lb	0.00 lb	0.051 lb	2
9	0 lb	0.00 lb	0.00 lb	0.023 lb	2.28

[1]The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k - which can be larger than 2 according to ASTM E898 and EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: NIST NIST-F

Weight Set No.:	182 50's & 25's	Date of Issue:	25-Jun-2019
Certificate Number:	OR-19-186-F	Calibration Due Date:	30-Jun-2021

Remarks

Equipment condition: Good

Calibration after installation

The recording of false fictitius or fradulent statements or entries on this document may be punishable as a felony under fedral Statue

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $10.0 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 10 K

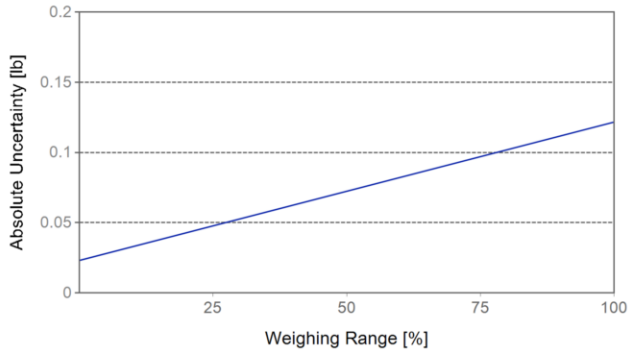
Linearization of Uncertainty Equation

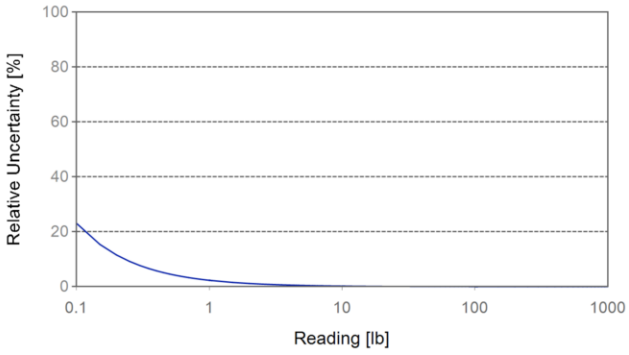
	Range		As Found	As Left
	d	Max		
1	0.02 lb	1000 lb	N/A	U_1 = 0.023 lb + 0.0000986 lb/lb · R

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
1.00 lb	N/A	N/A	0.023 lb	2.3%
10.00 lb	N/A	N/A	0.024 lb	0.24%
100.00 lb	N/A	N/A	0.033 lb	0.033%
500.00 lb	N/A	N/A	0.072 lb	0.014%
1000.00 lb	N/A	N/A	0.12 lb	0.012%





As Found As Left

METTLER TOLEDO Service

Handbook 44 Tolerance Assessment (Acceptance)

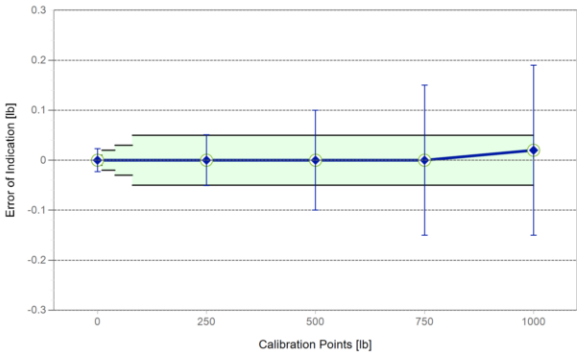
Assessment done without considering measurement uncertainty.
The measurements from the attached calibration certificate were assessed against the Tolerances defined by NIST Handbook 44.
The range of measurements for both Eccentricity and Repeatability (if performed) tests is assessed against Maintenance Tolerances.

	As Found	As Left
Overall	✓	✓

✓ = Passed
✗ = Failed

Weighing Device

Range	Max. Capacity	Readability (d)	Verification Scale Interval (e)	Class
1	1000 lb	0.02 lb	0.02 lb	III



Tolerances according to NIST Handbook 44

Test Load		Tolerance
From	To	
0.00 lb	0.00 lb	0.005 lb
0.02 lb	10.00 lb	0.01 lb
10.02 lb	40.00 lb	0.02 lb
40.02 lb	80.00 lb	0.03 lb
80.02 lb	1000.00 lb	0.05 lb

○ As Found
◆ As Left
— Tolerance

Eccentricity and Repeatability

Test	Test Load	Tolerance	As Found		As Left	
			Max. Error / Range	Result	Max. Error / Range	Result
Eccentricity (Max. Error)	325 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
Eccentricity (Range)	325 lb	0.1 lb	0.00 lb	✓	0.00 lb	✓
Repeatability (Max. Error)	500 lb	0.05 lb	N/A	N/A	0.02 lb	✓
Repeatability (Range)	500 lb	0.10 lb	N/A	N/A	0.02 lb	✓

Max. Error: Maximum of the absolute values of the individual errors.
Range: Difference between largest and smallest measurement value.

Error of Indication

	Reference Value	Tolerance	As Found		As Left	
			Error of Indication	Result	Error of Indication	Result
1	0 lb	0.01 lb	0.00 lb	✓	0.00 lb	✓
2	250 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
3	500 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
4	750 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
5	1000 lb	0.05 lb	0.02 lb	✓	0.02 lb	✓
6	750 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
7	500 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
8	250 lb	0.05 lb	0.00 lb	✓	0.00 lb	✓
9	0 lb	0.01 lb	0.00 lb	✓	0.00 lb	✓

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 #: 32102-201251-4686 **Customer PO#:** 1102
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

10-00954 | Gage Block Set | Shars | SN: 120018 | Cal: 05/26/2023 | Due: 05/26/2025 | Vendor: American Gage | Report #: 109141
LP-00397 | Gage Block Set | Mitutoyo | SN: 509020 | Cal: 12/28/2022 | Due: 12/28/2024 | Vendor: BHD Test and Measurement | Report #: 99826
LP-01757 | Thermo-Hygrometer | Comark | SN: 06257740560 | Cal: 04/28/2023 | Due: 04/28/2024 | Report #: 29096-209333-4201

Instrument Data

Calibration Date: December 6, 2023
Calibration Due Date: December 6, 2024
Calibration Frequency: 12 Months
Manufacturer: Starrett
Type: Tape Measure
Model Number: Exact
Serial #: 138054-2203-00002249
Capacity: 192.00 Inches

Reference: Manufacturer's Spec
Cal-Cert Procedure: CP-115
Indicating System: Stamped
Temperature: 69 °F
Humidity: 51% RH
Asset #: 207
Service Location: Cal-Cert Lab
As Found: Pass
As Left: Pass

Instrument Range: 192.000 Inches **Range Resolution:** 0.06250 Inches

Calibration Standard	As Found Reading	Verification Reading #1	Verification Reading #2
0.2500	0.2500	0.2500	0.2500
1.0000	1.0000	1.0000	1.0000
6.0000	6.0000	6.0000	6.0000
12.0000	12.0000	12.0000	12.0000
64.0000	64.0000	64.0000	64.0000
128.0000	128.0000	128.0000	128.0000
192.0000	192.0000	192.0000	192.0000

Expanded Uncertainty ± 0.07217 Inches

Remarks:
Metric scale not calibrated.

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: Scott McGuire **Date:** December 6, 2023

Technical Manager: Marshall Doyle **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 #: 31621-201253-5 **Customer PO#:** 1102
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

LP-00397 | Gage Block Set | Mitutoyo | SN: 509020 | Cal: 12/28/2022 | Due: 12/28/2024 | Vendor: BHD Test and Measurement | Report #: 99826
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/30/2023 | Due: 01/31/2024 | Range: 122 °F 95 %RH | Report #: 27747-205513-4239

Instrument Data

Calibration Date:	October 23, 2023	**Reference:**	ASME B89.1.14 2018
Calibration Due Date:	October 23, 2024	**Cal-Cert Procedure:**	CP-008
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Mitutoyo	**Temperature:**	66 °F
Type:	Digital Caliper	**Humidity:**	51% RH
Model Number:	CD-P6"S	**Asset #:**	208
Serial #:	B22159310	**Service Location:**	Cal-Cert Lab
Capacity:	6 Inches	**As Found:**	PASS
Resolution:	0.0005 Inches	**As Left:**	PASS

Instrument Range: 6.0000 Inches **Range Resolution:** 0.0005 Inches

Outside Jaws / Linearity

Calibration Standard Inches	As Found Inches	As Left Reading 1 Inches	As Left Reading 2 Inches	Tolerance ± Inches
0.0000	0.0000	0.0000	0.0000	0.0000
0.0500	0.0495	0.0495	0.0495	0.0010
0.3000	0.3000	0.3000	0.3000	0.0010
0.6000	0.6000	0.6000	0.6000	0.0010
1.2000	1.1995	1.1995	1.1995	0.0010
2.4000	2.4000	2.4000	2.4000	0.0010
3.5000	3.5000	3.5000	3.5000	0.0010
5.0000	5.0000	5.0000	5.0000	0.0010
6.0000	5.9995	5.9995	5.9995	0.0010

Expanded Uncertainty ± 0.00036 Inches

Scale Shift Verification

	Target	Measured	Tolerance ±
Resolution Check	0.1005	0.10050	N/A
Depth	1.000	1.00000	0.001
Step	1.000	1.00000	0.001
Inside Jaws	1.000	0.99950	0.001

Inspections

Jaws Parallel	Acceptable

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: Cameron Walling **Date:** October 23, 2023

Technical Manager: Marshall Doyle **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 #: 33086-206391-4525 **Customer PO#:** 1109
Customer Name: PFS TECO
Customer Address: 1507 Matt Pass
City: Cottage Grove **State:** WI **Zip:** 53527
Contact: Ethan Frederick
Service Address: 11785 SE Highway 212, Suite 305 Clackamas, OR 97015

Calibration Standards

13-01811 | Thermocouple Meter/Calibrator | Tegam | SN: 2454186 | Cal: 10/04/2023 | Due: 02/28/2024 | Range: 2400 °F | Report #: 31363-217443-3646
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date:	February 26, 2024	**Reference:**	Navair 17-20ST-95
Recommended Due Date:	February 26, 2025	**Cal-Cert Procedure:**	CP-013
Calibration Frequency:	12 Months	**Indicating System:**	Computer
Manufacturer:	National Instruments	**Temperature:**	64 °F
Type:	Data Logger	**Humidity:**	39% 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 METER 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	1.10	1.10	1.10	1.10	0.346
	500.00	501.10	501.10	501.10	1.10	
	1000.00	1001.10	1001.10	1001.10	1.10	
	1500.00	1501.20	1501.20	1501.20	1.20	
	2000.00	2001.30	2001.30	2001.30	1.30	
	2400.00	2401.40	2401.40	2401.40	1.40	
	0.00	1.20	1.20	1.20	1.20	

Thermocouple LOGGING FUNCTION

Channel	Calibration Standard	UUT As Found	UUT As Left Reading 1	UUT As Left Reading 2	As Left Error	Expanded Uncertainty±
Flue	0.00	0.80	0.80	0.80	0.80	0.346
	500.00	500.80	500.80	500.80	0.80	
	1000.00	1000.80	1000.80	1000.80	0.80	
	1500.00	1500.90	1500.90	1500.90	0.90	
	2000.00	2001.00	2001.00	2001.00	1.00	
	2400.00	2401.10	2401.10	2401.10	1.10	
	0.00	0.80	0.80	0.80	0.80	

	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 A	0.00	0.60	0.60	0.60	0.60	0.346
	500.00	500.60	500.60	500.60	0.60	
	1000.00	1000.70	1000.70	1000.70	0.70	
	1500.00	1500.70	1500.70	1500.70	0.70	
	2000.00	2000.80	2000.80	2000.80	0.80	
	2400.00	2400.00	2400.00	2400.00	0.00	
	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±**
Back	0.00	0.40	0.40	0.40	0.40	0.346
	500.00	500.40	500.40	500.40	0.40	
	1000.00	1000.50	1000.50	1000.50	0.50	
	1500.00	1500.50	1500.50	1500.50	0.50	
	2000.00	2000.60	2000.60	2000.60	0.60	
	2400.00	2400.70	2400.70	2400.70	0.70	
	0.00	0.50	0.50	0.50	0.50	

	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	0.346
	500.00	500.20	500.20	500.20	0.20	
	1000.00	1000.30	1000.30	1000.30	0.30	
	1500.00	1500.40	1500.40	1500.40	0.40	
	2000.00	2000.40	2000.40	2000.40	0.40	
	2400.00	2400.40	2400.40	2400.40	0.40	
	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±**
Meter A	0.00	0.10	0.10	0.10	0.10	0.346
	500.00	500.10	500.10	500.10	0.10	
	1000.00	1000.20	1000.20	1000.20	0.20	
	1500.00	1500.20	1500.20	1500.20	0.20	
	2000.00	2000.30	2000.30	2000.30	0.30	
	2400.00	2400.30	2400.30	2400.30	0.30	
	0.00	0.10	0.10	0.10	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±**
Left	0.00	0.10	0.10	0.10	0.10	0.346
	500.00	500.10	500.10	500.10	0.10	
	1000.00	1000.20	1000.20	1000.20	0.20	
	1500.00	1500.20	1500.20	1500.20	0.20	
	2000.00	2000.20	2000.20	2000.20	0.20	
	2400.00	2400.20	2400.20	2400.20	0.20	
	0.00	0.10	0.10	0.10	0.10	

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	0.00	0.00	0.00	0.00	
	500.00	500.00	500.00	500.00	0.00	
	1000.00	1000.10	1000.10	1000.10	0.10	
	1500.00	1500.10	1500.10	1500.10	0.10	0.346
	2000.00	2000.20	2000.20	2000.20	0.20	
	2400.00	2400.20	2400.20	2400.20	0.20	
	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±**
Filter B	0.00	0.00	0.00	0.00	0.00	
	500.00	501.30	501.30	501.30	1.30	
	1000.00	1001.00	1001.00	1001.00	1.00	
	1500.00	1500.70	1500.70	1500.70	0.70	0.346
	2000.00	2000.40	2000.40	2000.40	0.40	
	2400.00	2400.00	2400.00	2400.00	0.00	
	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	-0.10	-0.10	-0.10	0.10	
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	1000.10	1000.10	1000.10	0.10	
	1500.00	1500.10	1500.10	1500.10	0.10	0.346
	2000.00	2000.10	2000.10	2000.10	0.10	
	2400.00	2400.10	2400.10	2400.10	0.10	
	0.00	-0.10	-0.10	-0.10	0.10	

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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-206391-4525

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 #:	33086-206391-4525-B	**Customer PO#:**	1109	
Customer Name:	PFS TECO			
Customer Address:	1507 Matt Pass			
City:	Cottage Grove	**State:**	WI	**Zip:** 53527
Contact:	Ethan Frederick			
Service Address:	11785 SE Highway 212, Suite 305	Clackamas, OR 97015		

Calibration Standards

13-01811 | Thermocouple Meter/Calibrator | Tegam | SN: 2454186 | Cal: 10/04/2023 | Due: 02/28/2024 | Range: 2400 °F | Report #: 31363-217443-3646
LP-01782 | Thermo-Hygrometer | Comark | SN: 06247790052 | Cal: 01/24/2024 | Due: 01/31/2025 | Range: 122 °F 95 %RH | Report #: 32568-205513-3646

Instrument Data

Calibration Date:	February 26, 2024	**Reference:**	Navair 17-20ST-95
Recommended Due Date:	February 26, 2025	**Cal-Cert Procedure:**	CP-013
Calibration Frequency:	12 Months	**Indicating System:**	Computer
Manufacturer:	National Instruments	**Temperature:**	66 °F
Type:	Data Logger	**Humidity:**	34% 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±**
Bottom	0.00	-0.10	-0.10	-0.10	0.10	
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	1000.00	1000.00	1000.00	0.00	
	1500.00	1500.10	1500.10	1500.10	0.10	0.346
	2000.00	2000.10	2000.10	2000.10	0.10	
	2400.00	2400.00	2400.00	2400.00	0.00	
	0.00	-0.10	-0.10	-0.10	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±**
Meter B	0.00	-0.10	-0.10	-0.10	0.10	
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	1000.10	1000.10	1000.10	0.10	
	1500.00	1500.10	1500.10	1500.10	0.10	0.346
	2000.00	2000.20	2000.20	2000.20	0.20	
	2400.00	2400.20	2400.20	2400.20	0.20	
	0.00	0.00	0.00	0.00	0.00	

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	-0.20	-0.20	-0.20	0.20	0.346
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	1000.00	1000.00	1000.00	0.00	
	1500.00	1500.00	1500.00	1500.00	0.00	
	2000.00	2000.10	2000.10	2000.10	0.10	
	2400.00	2400.10	2400.10	2400.10	0.10	
	0.00	-0.10	-0.10	-0.10	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 C	0.00	-0.20	-0.20	-0.20	0.20	0.346
	500.00	499.90	499.90	499.90	-0.10	
	1000.00	1000.00	1000.00	1000.00	0.00	
	1500.00	1500.10	1500.10	1500.10	0.10	
	2000.00	2000.10	2000.10	2000.10	0.10	
	2400.00	2400.10	2400.10	2400.10	0.10	
	0.00	-0.10	-0.10	-0.10	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±**
Ambient	0.00	0.00	0.00	0.00	0.00	0.346
	20.00	18.70	18.70	18.70	-1.30	
	40.00	38.70	38.70	38.70	-1.30	
	60.00	58.90	58.90	58.90	-1.10	
	80.00	78.80	78.80	78.80	-1.20	
	100.00	98.80	98.80	98.80	-1.20	
	0.00	0.00	0.00	0.00	0.00	

Remarks:

15 Channels Tested, Ambient is Type T tested from 0-100°F per customer request.

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: Steven White **Date:** February 26, 2024

Technical Manager: Marshall Doyle **Signature:** 

Report #: 33086-206391-4525-B

Making our world more productive

DocNumber: 539508

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22023

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: 05/08/2023
Linde Order Number: 72422600
Part Number: NI CD17CO8E-AS
Customer PO Number: 80430965

Fill Date: 05/02/2023
Lot Number: 70086312207
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 1290 psig 99 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date: 05/08/2031		NIST Traceable
Cylinder Number: CC505834		Expanded Uncertainty
16.98 %	Carbon dioxide	± 0.13 %
4.30 %	Carbon monoxide	± 0.03 %
17.16 %	Oxygen	± 0.05 %
Balance	Nitrogen	

Certification Information: Certification Date: 05/08/2023 Term: 96 Months Expiration Date: 05/08/2031

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: 17 %
Certified Concentration: 16.98 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 04/25/2023

Reference Standard: Type / Cylinder #: NTRM / CC725981
Concentration / Uncertainty: 19.34 % ±0.03 %
Expiration Date: 01/12/2027
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 190701 / CC725973
SRM Concentration / Uncertainty: 19.34% / ±0.031%
SRM Expiration Date: 01/12/2027

First Analysis Data:						Date	05/08/2023
Z:	0	R:	19.34	C:	16.98	Conc:	16.97
R:	19.36	Z:	0	C:	16.99	Conc:	16.98
Z:	0	C:	17	R:	19.35	Conc:	16.99
UOM:	%			Mean Test Assay:			16.98 %

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: 4.3 %

Compressed gas, n.o.s.
(Carbon Monoxide, Carbon Dioxide, Oxygen, Nitrogen)
UN1956

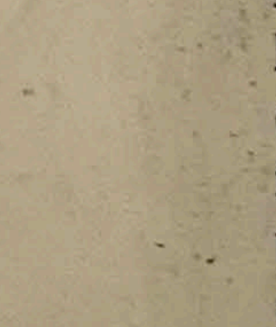
SPG 5P10162.5VM2
Part Number

Primary Standard, +/- 0.02% Absolute

2.500 % Carbon Monoxide	CAS:	630-08-0
10.00 % Carbon Dioxide	CAS:	124-38-9
10.00 % Oxygen	CAS:	7782-44-7
Balance Nitrogen	CAS:	7727-37-9

DANGER: CAUSES DAMAGE TO ORGANS THROUGH PROLONGED OR REPEATED EXPOSURE. CONTAINS GAS UNDER PRESSURE; MAY EXPLODE WHEN HEATED. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. MAY INCREASE RESPIRATION AND HEARTRATE. Use only with equipment of compatible materials of construction and rated for cylinder pressure. Protect from sunlight when ambient temperature exceeds 52C (125F). Use a back flow preventive device in the piping. Close valve after each use and when empty. Do not open valve until connected to equipment prepared for use. Obtain special instructions before use. Protect from sunlight. Store in a well-ventilated place. IF exposed or concerned: Get medical advice. Store locked up. Dispose of contents/container in accordance with container/supplier owner instructions. Do not handle until all safety precautions have been read and understood. Do not breathe gas. Wash hands throroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, protective clothing, eye protection, and/or face protection. Read and follow the Safety Data Sheet (SDS) before use.

FIRST AID: IF ON SKIN: wash with plenty of water. IF INHALED: Remove person to fresh air and keep comfortable for breathing.IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing. IF exposed or concerned: Get medical advice.



WARNING: This product can expose you to Carbon Monoxide which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Lot No : 1-053-122
Serial Number: CC341544
SPG 5P10162.5VM2
Part Number
PO # 206493
Expires: 2-2024

NorLAB

To Order Call: 800-657-6672

In Emergency Call: 1-800-424-9300

NorLAB, Inc.
698 W Gowen Road
Boise, Idaho, 83705

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. John Steinert
Vice President
PFS TECO
11785 SE Hwy 212
Suite 305
Clackamas, OR 97015

02/04/2022

Dear Mr. Steinert,

I am writing you in response to your correspondence dated February 3, 2022, in which you request the use of an alternative testing procedure to demonstrate compliance with 40 CFR part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters (Subpart AAA). The Office of Air Quality Planning and Standards, as the delegated authority, must make the determination on any major alternatives to test methods and procedures required under 40 CFR parts 59, 60, 61, 63, and 65. Your proposed alternative test method and our approval decisions are discussed below.

According to the information provided, you seek an alternative test method for use when conducting testing on the United States Stove Company, Model KP5517 pellet heater. Currently, as required by section 60.534(a)(l)(i) of Subpart AAA, a manufacturer has the option to test their appliance in accordance with 40 CFR part 60, Appendix B, Method 28R for a crib fuel appliance or ASTM E2779-10 "Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters" (ASTM E2779-10) for a pellet fuel appliance. This request seeks an alternative to section 9.4.1.2 of ASTM E2779-10 which specifies test conditions for pellet heaters including the determination of the Medium Burn Rate Category and states that the medium burn rate must be ≤50% of the maximum burn rate.

In your request, you state that the specification for determining the medium burn rate found in ASTM E2779-10 is incorrect, and the Medium Burn Rate Category should be defined as less than 50% of the midpoint point (this is defined in the attached Memo as 50% of the span between the Maximum Burn Rate and the Low Burn Rate) between the high and low burn rates. Furthermore, your request includes a memorandum dated February 2, 2022, titled "Appropriate Calculation of Medium Burn Rate Category in ASTM E-2779 Testing" (attached) which was sent to the EPA's Office of Enforcement and Compliance Assurance. This memorandum states that an error had been uncovered in determining the appropriate Medium Burn Rate Category in ASTM E2779-10 for compliance pursuant to Subpart AAA. Specifically, section 9.4.1.2 of ASTM E2779-10 states that "the pellet heater shall be operated with the control or controls set in

the position(s) as needed to achieve a burn rate that is ≤ 50% of the maximum burn rate." Table 1 of ASTM E2779-10 also notes that the Medium Burn Rate Category test must be ≤ 50% of the maximum burn rate. The memorandum states that this is incorrect as it assumes that zero is the other bound for determining half of the maximum burn rate, and that the correct approach in determining the Medium Burn Rate Category should be at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value).

We have reviewed your request and agree that the Medium Burn Rate Category should be defined as less than 50% of the span between the high and low burn rates. Meaning that the Medium Burn Rate Category should be at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value).

Based on the information provided and with the caveats set forth below, we are approving your request for an alternative methodology used when calculating the Medium Burn Rate Category to conduct certification testing as required by Subpart AAA, section 60.534(a)(1)(i) on pellet heaters. This approval is based on the understanding that the Medium Burn Rate Category is defined as less than 50% of the span between the high and low burn rates. Additionally, this approval is based on the understanding that the lowest heat output (Btu/hr) setting available to the user, and corresponds to the lowest burn rate to be evaluated during certification testing; this is consistent with Subpart AAA, section 60.534(a)(1), which states: "The burn rate for the low burn category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer."

With this Alternate Test Method, the following changes to ASTM E2779-10 must be followed for certification testing:

1. Medium Burn Rate Category burn rate is defined as:

   Nomenclature:
   Max = Maximum burn rate (kg/h)
   Min = Minimum burn rate (kg/h)

$$\frac{Max+Min}{2} \qquad \text{Eq.1}$$

All other requirements of ASTM E-2779-10 must be followed during the testing, and all requirements of 40 CFR part 60, Subpart AAA must be satisfied as described in your test report. A copy of this letter must be included in each certification test report where this alternative test method is utilized.

Because this alternative method may be of use to others, we feel that it is reasonable that this approval be broadly applicable to all pellet heaters tested in accordance with ASTM E2779-10 "Standard Test Method for Determining Particulate Matter Emissions from Pellet Heaters" and subject to the requirements of §60.534(a)(1)(i) of Subpart AAA. For this reason, we will post this

letter as ALT-146 on our website at *https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods* for use by other interested parties. This alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different pellet heater certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Angelina Brashear of my staff at 919-541-4746 or *brashear.angelina@epa.gov.*

Sincerely,

Steffan M Johnson

Steffan M. Johnson
Group Leader
Measurement Technology Group

cc: Angelina Brashear – EPA/OAQPS/AQAD
Chuck French – EPA/OAQPS/SPPD
Rafael Sanchez – EPA/OECA
Robert Scinta – EPA/OECA
Michael Toney – EPA/OAQPS/AQAD
Nathan Topham – EPA/OAQPS/SPPD
John Voorhees – United States Stove Company
Chet Wayland – EPA/OAQPS/AQAD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

02/02/2022

SUBJECT: Appropriate calculation of Medium Burn Rate Category in ASTM E-2779 Testing

FROM: Steffan Johnson
Group Leader
Measurement Technology Group
Air Quality Assessment Division

STEFFAN JOHNSON
Digitally signed by STEFFAN JOHNSON
Date: 2022.02.02 08:28:07 -05'00'

TO: Robert Scinta, P.E.
Chief, Air Branch
Monitoring, Assistance, and Media Programs Division
Office of Compliance, Office of Enforcement and Compliance Assurance

During a recent review of pellet heater compliance test reports, the Measurement Technology Group has uncovered an error in determining the appropriate Medium Burn Rate Category when using ASTM E-2779 for compliance pursuant to 40 CFR 60, subpart AAA. Specifically, the method requirements in section 9.4.1.2 and Table 1 of that test method incorrectly require that the Medium Burn Rate Category must fall below 50% of the maximum burn rate. This is not correct as this requirement assumes then that zero is the other bound for determining half of the maximum.

9.4.1.2 *Medium Burn Rate Category*—For burn rates in the medium segment, except as allowed in 9.4.1.4 or 9.4.1.5, the pellet heater shall be operated with the control or controls set in the position(s) as needed to achieve a burn rate that is ≤50 % of the maximum burn rate.

TABLE 1

Burn Rate Segment	Maximum	Medium	Minimum
Description	Maximum achievable	≤ 50% of Maximum	Minimum achievable
Time at Burn Rate	60 +5 / – 0 minutes	120 +5 / – 0 minutes	180 +5 / – 0 minutes

The correct application of this requirement would be to determine the Medium Burn Rate Category at a level below 50% of the span between the Maximum Burn Rate and the Low Burn Rate (a non-zero value). Ergo, the correct calculation for finding that midpoint of 50% is defined as $\frac{Max+M}{2}$.

For example, if the Maximum Burn rate of an appliance is 1.79 kg/hr and the minimum is 1.23 kg/hr, the method would currently place the 50% requirement at 0.895 kg/hr. This is unachievable on this appliance and presents an impossible compliance requirement. Applying the equation laid out above the value of 1.51 is derived and, therefore, presents an appropriate and likely attainable emissions test requirement for the Medium Burn Rate Category.

During your reviews of such emissions tests, as reported to OECA and intended for compliance certification purposes, MTG recommends applying the above procedure in order to ascertain if a Medium Burn Rate was appropriately established during a compliance test.

CC:
Sarah Ayres - OECA
Angelina Brashear – OAQPS
Alice Edwards – Alaska DEC
Chuck French – OAQPS
Robert Lischinsky - OECA
Theresa Lowe - OAQPS
Rafael Sanchez – OECA
Robert Scinta - OECA
Mike Toney – OAQPS
Nathan Topham - OAQPS
Chet Wayland – OAQPS